Annual Report

October 2014 – September 2015

East San Joaquin
WATER QUALITY COALITION

Irrigated Lands Regulatory Program
Central Valley Regional Water Quality Control Board

Submitted May 1, 2016

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Table A. ESJWQC 2016 Annual Report revisions summary.

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 plan for Duck Slough @ Gurr Rd remains completed; the toxicity in June 2015 did not trigger a reinstated management plan.	May 23, 2016	Tables 58, 60-61; Pages 141, 144, 146
2	Revisions were made to the verbiage in the Executive Summary, Discussion of Results, and Status of Special Projects sections to indicate the *S. capricornutum* toxicity management plan for Duck Slough @ Gurr Rd remains completed, and the Coalition received approval to complete 57 management plans instead of 56 as previously reported.	May 23, 2016	Verbiage; Pages 2, 114, 142, 145, 155
3	Appendix I was updated to indicate the *S. capricornutum* toxicity management plan for Duck Slough @ Gurr Rd remains completed.	May 23, 2016	Tables 3 and X-1; Pages 4-5, 100-101, Verbiage; Page 116
4	Appendix VIII was updated to indicate MPM for toxicity to *S. capricornutum* at Duck Slough is not required. However, due to the June 2015 toxicity, Represented site monitoring will occur for *S. capricornutum* toxicity in months of past toxicities (June, July, and September) during the 2016 WY.	May 23, 2016	Table VIII-1; Page 1 Verbiage; Page 2

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LIST OF ACRONYMS

AG	Agriculture
AI	Active Ingredient
AMR	Annual Monitoring Report
APN	Assessor Parcel Number
AWEP	Agricultural Water Enhancement Program
BMP	Best Management Practice
BU	Beneficial Use
C	Core
CalPIP	California Pesticide Information Portal
CDEC	California Data Exchange Center
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
COC	Chain of Custody
CRM	Certified Reference Materials
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
CVSC	Central Valley Salinity Coalition
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DO	Dissolved Oxygen
DPR	Department of Pesticide Regulation
DQO	Data Quality Objective
DWR	(California) Department of Water Resources
EC50	Effective Concentration of 50% of the measured endpoint
EDD	Electronic Data Deliverable
EPA	(United States) Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ESJHVA	East San Joaquin High Vulnerability Area
ESJWQC	East San Joaquin Water Quality Coalition
F	Field
FE	Farm Evaluation
FD	Field Duplicate
GAR	Groundwater Quality Assessment Report
GCC	MPEP Group Coordinating Committee
HCH	Hexachlorocyclohexane
ILRP	Irrigated Lands 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
MLJ-LLC	Michael L. Johnson, LLC
MPEP	Management Practice Evaluation Program
MPEP GCC	Management Practice Evaluation Program Group Coordinating Committee
MPM	Management Plan Monitoring
MPN	Most Probable Number
MPU	Monitoring Plan Update
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
NA	Not Applicable
ND	Not Detected
NM	Normal Monitoring
NMP	Nitrogen Management Plan
NMP TAWG	Nitrogen Management Plan Technical Advisory Work Group
NRCS	Natural Resources Conservation Service
OP	Organophosphate Pesticides
PAM	Polyacrylamide
PCA	Pest Control Advisor
pH	Power of Hydrogen
PR	Percent Recovery
PTFE	Polytetrafluoroethylene (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
SECP	Sediment and Erosion Control Plan
SDEAR	Sediment Discharge and Erosion Assessment Report
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
SWRCB	State Water Board Resources Control Board
TDS	Total Dissolved Solids
TID	Turlock Irrigation District

TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSS	Total Suspended Solids
USDA	United States Department of Agriculture
US EPA	United States Environmental Protection Agency
VOA	Volatile Organic Analyte
WDR	Waste Discharge General Order R5-2012-0116-R3
WQO	Water Quality Objective
WQTL	Water Quality Trigger Limit
WY	Water Year
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
mph	miles per hour
MPN/100mL	most probable number per 100 milliliters
ng	nanogram
NTU	Nephelometric Turbidity Units
sec	second
TUa	Toxic Unit (acute)
TUc	Toxic Unit (chronic)
µg	microgram
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 –East San Joaquin Water Quality Coalition
Coalition/ESJWQC region – The region within the Central Valley that is monitored by the East San Joaquin Water Quality Coalition
Drainage –Water that moves horizontally across the surface or vertically into the subsurface from land
General Order –Waste Discharge General Order R5-2012-0116
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 included to meet laboratory Quality Assurance requirements.
Normal Monitoring –Refers to monitoring at Core and Represented sites based on the WDR.
Regional Board – Central Valley Regional Water Quality Control Board
Site subwatershed – Starting from the sampling site, all waterbodies that drain, directly or indirectly, into the waterbody before the point where sampling occurs.
Special study – A study conducted outside of Normal Monitoring activities that involves monitoring specific constituents in an effort to determine the mechanism responsible for the exceedances; also includes Total Maximum Daily Load (TMDL) monitoring.
Subwatershed – The topographic perimeter of the catchment area of a stream tributary (Environmental Protection Agency (EPA) terms of environment: http://www.epa.gov/OCEPAterms/sterms.html).
Tributary Rule – Beneficial uses for Coalition monitoring sites are applied based on the most immediate downstream waterbody (not applied to constructed agricultural drains such as ones in Delta islands).
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 SECTIONS: ANNUAL MONITORING AND MANAGEMENT PLAN UPDATE REPORTS AS OUTLINED IN THE WASTE DISCHARGE REQUIREMENTS GENERAL ORDER (WDR OR GENERAL ORDER) FOR GROWERS WITHIN THE EASTERN SAN JOAQUIN RIVER WATERSHED (ORDER NO. R5-2012-0116-R3)	SECTION NAME/LOCATION – ANNUAL REPORT
1. Signed Transmittal Letter	Cover Letter
2. Title page	East San Joaquin Water Quality Coalition Annual Report
3. Table of contents	Table of Contents, List of Tables, List of Figures, List Appendices, List of Acronyms, List of Units, and List of Terms
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	Sampling Site Descriptions and Rainfall Records
8. Location map(s) of sampling sites, crops and land uses	Sampling Site Descriptions and Rainfall Records, and Appendix VIII (Land Use Maps)
9. Tabulated results of all analyses arranged in readily discernible tabular form	Appendix III (Monitoring Results and Sample Details), and Appendix IV (Lab and Field QC Results)
10. Discussion of data relative to water quality objectives, and water quality management plan milestones where applicable	Monitoring Results, Discussion of Results, Summary of Exceedances, and Conclusions and Recommendations
11. Sampling and analytical methods used	Sampling and Analytical Methods
12. Summary of Quality Assurance Evaluation results (as identified in the most recent approved QAPP for Precision, Accuracy and Completeness)	Precision, Accuracy and Completeness
13. Specify method used to obtain flow at each monitoring site during each monitoring event	Sampling and Analytical Methods
14. Summary of Exceedances Reports submitted during reporting period and related pesticide use information	Discussion of Results, Appendix V (Pesticide Use Reports), Appendix VI (Exceedance Reports), and PUR Access Database (attached CD)
15. Actions taken to address water quality exceedances, including but not limited to, revised or additional management practices implemented	Coalition and Member Actions Taken To Address Water Quality Exceedances, and Appendix VI (Meetings, Agendas and Handouts)
16. Evaluation of monitoring data to identify spatial trends and patterns	Six Key Programmatic Questions #3: Spatial Tends
17. Summary of Nitrogen Management Plan information	Summary of Required Grower Submittals (Nitrogen Management Plan section)
18. Summary of management practice information collected from Farm Evaluations	Summary of Required Grower Submittals (Farm Evaluations section)
19. Summary of mitigation monitoring	Summary of Required Grower Submittals (Nitrogen Management Plan section)
20. Updated table of exceedances for management plans	Status of Special Projects, Appendix I (High Priority Site Subwatershed Analysis), and Appendix II (High Priority Site Subwatershed Exceedance Tables)
21. List of new management plans triggered since the previous report	Management Plan Development Timelines and Priority Site Management, Status of Special Projects
22. Status update on preparation of new management plans and special projects	Status of Special Projects
23. Summary and assessment of MPM data collected during reporting period	Discussion of Results, Status of Special Projects, Evaluation of Management Practice Effectiveness (Six Key Programmatic Questions #4 and #6), Coalition

Required Sections: Annual Monitoring and Management Plan Update Reports as outlined in the Waste Discharge Requirements General Order (WDR or General Order) for Growers within the Eastern San Joaquin River Watershed (Order No. R5-2012-0116-R3)	Section Name/Location – Annual Report
	Wide Evaluation, and Appendix I (High Priority Site Subwatershed Analysis)
24. Summary of management plan grower education and outreach conducted	Coalition and Member Actions Taken to Address Exceedances of Water Quality Objectives: Summary of Outreach, Education and Collaboration Activities, Management Practices, and Appendix I (High Priority Site Subwatershed Analysis)
25. Summary of the degree of implementation of management practices	Management Practices, and Appendix I (High Priority Site Subwatershed Analysis)
26. Results from evaluation of management practice effectiveness	Evaluation of Management Practice Effectiveness (Six Key Programmatic Questions #4), Coalition Wide Evaluation, and Appendix I (High Priority Site Subwatershed Analysis)
27. Evaluation of progress in meeting Performance Goals and Schedules	Coalition Actions Taken to Address Exceedances of Water Quality Objectives: Performance Goals and Schedules, Management Practices, and Appendix I (High Priority Site Subwatershed Analysis)
28. Recommendations for changes to the Management Plan	Conclusions and Recommendations
29. Conclusions and recommendations	Conclusions and Recommendations

MPM-Management Plan Monitoring
PUR-Pesticide Use Report
QC- Quality Control
SWAMP- Surface Water Ambient Monitoring Program

QUALITY ASSURANCE PROJECT PLAN (QAPP) AMENDMENTS

Table A. ESJWQC QAPP amendments summary.
Original ESJWQC QAPP submitted August 25, 2008 and approved September 15, 2008.

Item Number	Amendments Descriptions	Date Submitted	MRP Plan Page Number	Date Approved
1	QAPP updated to consolidate all approved amendments since 9/15/2008 QAPP approval. Updates include typo corrections.	October 20, 2010	Verbiage, Page 2 Verbiage, Page 8 Figure 1, Page 11 Verbiage, Page 26 Table 5, Page 22 Table 8, Page 26 Table 15, Page 44 Table 16, Page 45 Verbiage, Page 49 Table 17, Page 51 Table 18, Page 53 Table 19, Page 55 Verbiage, Page 56 Figure 4, Page 59 Appendices: XI-XXXII and, XXXV-XXXVII	February 23, 2011
2	QAPP updated method validation package for analysis of pyrethroids in sediment using GC/MS-NCI SIM.	December 6, 2010	Table 2, Page 16 Table 13, Page 40 Table 15, Page 44 Table 16, Page 45	February 18, 2011
3	Request to update MRPP and associated QAPP sample preservation temperatures to be consistent with EPA method requirements, to update preservation and holding requirements for sediment chemistry and sediment Total Organic Carbon (TOC) analysis, and to update the analytical method for triazines to EPA 8141A.	November 26, 2012	Table 12, Page 36; Table 13, Pages 40-44; Verbiage, Page 62;	January 15, 2013
4	Updated MS/D and LCS recovery limits for methods: EPA 8140A (organophosphates), EPA 8270_M (sediment pesticides), and EPA 549.2 (paraquat dichloride).	November 24, 2015	Table 5, Page 25	January 8, 2016

ESJWQC MANAGEMENT PLAN UPDATES

Table B. Updates to the ESJWQC SQMP.

Item Number	Amendments Descriptions	Date Submitted[1]	Date Approved
	Revised ESJWQC Surface Water Quality Management Plan	**May 1, 2014 (resubmitted March 10, 2015)**	**November 4, 2015**
1	Request to update the DO WQTL for waterways that are given a 'warm' beneficial use; removed DO management plans based on the updated DO WQTL.	May 1, 2014	December 4, 2015
2	Request to remove constituents from site specific management plans	June 5, 2014	December 4, 2015
3	Second request to extend 6th priority Management Plan Performance Goals deadlines for Performance Measures 2.1 and 2.2	September 3, 2014	September 26, 2014
4	Request to remove constituents from site specific management plans	September 21, 2015	March 25, 2016
5	Request to remove sediment toxicity management plans based on the updated SWAMP protocol.	February 12, 2016	March 7, 2016

[1] All deliverables are submitted electronically (Quarterly Data Submittal and Annual Report/ Management Plan Progress Report).

EXECUTIVE SUMMARY

The East San Joaquin Water Quality Coalition (ESJWQC or Coalition) is submitting the May 1, 2016 Annual Report which includes an update to the Coalition's Management Plan Progress Report and management plan implementation schedules and timelines, the 2015 WY monitoring results, and a record of Coalition outreach activities, as required by the Waste Discharge Requirements General Order for Growers within the Eastern San Joaquin River Watershed (WDR, No. R5-2012-0116-R3). The 2016 Annual Report includes 1) identification of agricultural sources of discharge resulting in exceedances of WQTLs, 2) tracking of implemented management practices, and 3) documentation of progress toward meeting performance goals and measures as outlined in the Coalition's Surface Water Quality Management Plan (SQMP).

The ESJWQC area includes portions of Stanislaus and Merced Counties east of the San Joaquin River, Madera, Tuolumne, Alpine, and Mariposa Counties. In addition to the San Joaquin River, which forms the south and west boundary of the Coalition region, there are five major rivers in the watershed: the Fresno River, the Chowchilla River, the Merced River, the Tuolumne River, and the Stanislaus River. The Fresno River and the Chowchilla River typically flow only for a short time each year if at all. In addition, the Eastside Bypass is considered a major waterbody but also only contains water during a short period of time each year and the water is diverted from the San Joaquin River for irrigation. These eastern tributaries of the San Joaquin River drain the Sierra Nevada range from east to west.

The Coalition area is divided into six zones based on hydrology, crop type, land use, soil type, and precipitation. Zone names are based on primary Core site locations within each zone: 1) Dry Creek @ Wellsford Zone, 2) Prairie Flower Drain @ Crows Landing Zone, 3) Highline Canal @ Hwy 99 Zone, 4) Merced River @ Santa Fe Zone, 5) Duck Slough @ Gurr Rd Zone, and 6) Cottonwood Creek @ Rd 20 Zone.

Based on the WDR monitoring design, Core and Represented sites are designated for each of the six zones. 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. In addition, the Coalition conducts Management Plan Monitoring (MPM) to monitor constituents requiring management plans. Sampling occurred from during the 2015 WY at Core, Represented, and MPM sites, including two storm and two sediment monitoring events.

Total Maximum Daily Load (TMDL) monitoring occurred at three compliance points on the San Joaquin River (SJR) for one storm event in February, and from May through September (San Joaquin River at Hills Ferry Road, San Joaquin River at the Maze Boulevard (Highway 132) Bridge, and San Joaquin River at the Airport Way Bridge near Vernalis). The May 1, 2016 San Joaquin River Chlorpyrifos and Diazinon Annual Monitoring Report contains results from the ESJWQC and the Westside Coalition's collaborative monitoring plan for assessing compliance with the Lower San Joaquin River chlorpyrifos and diazinon TMDL monitoring at six compliance points as identified in the Basin Plan Amendment.

Monitoring Program Submittals Required by the WDR

The Coalition's WDR was adopted on December 7, 2012. 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) and according to the August 1, 2014 Monitoring Plan Update (MPU) report for the 2015 WY (approved January 5, 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; of these 29 sites, MPM took place at 25 sites. Management Plan Monitoring was conducted for copper, lead, molybdenum, chlorpyrifos, diazinon, dimethoate, diuron, and water column toxicity to C*eriodaphnia dubia*, *Pimephales promelas*, *Selenastrum capricornutum*, and sediment toxicity to *Hyalella azteca*.

Monitoring constituents are established by the Irrigated Lands Regulatory Program (ILRP) in the WDR (Appendix B, Table 2). During the 2015 WY, the Coalition sampled for numerous water quality parameters and constituents including field parameters, physical parameters, *E. coli*, organic pesticides, metals, total organic carbon (TOC), nutrients, and water column toxicity to three test species (*C. dubia, P. promelas* and *S. capricornutum*). Twice a year the Coalition samples for sediment toxicity to *H. azteca* and sediment physical parameters (grain size and TOC). When sediment toxicity is less than 80 percent survival, additional chemistry analysis for chlorpyrifos and pyrethroids is required.

Monitoring Results

During the 2015 WY, exceedances of WQTLs occurred for the following constituents, DO (69), pH (19), SC (64), *E. coli* (14), nitrate (9) and ammonia (4), dissolved copper (5), arsenic (2), and molybdenum (18). Overall, exceedances of WQTLs for physical parameters and *E. coli* were much more common than exceedances of pesticides or metals. Water column toxicity to *C. dubia* (8) and *S. capricornutum* (19) occurred and a single instance of sediment toxicity to *H. azteca* occurred during the 2015 WY. The series of actions taken to determine the potential sources causing toxicity and exceedances of the WQTLs include: 1) the use of Pesticide Use Reports (PURs) to identify relevant pesticide applications within the specified time period prior to the sampling event, as well as 2) an analysis of monitoring data and toxicity results.

As a result of the 2015 WY monitoring, several new site/constituent specific management plans are required including:

- Canal Creek @ West Bellevue Rd (DO)
- Duck Slough @ Gurr Rd (ammonia, arsenic, and malathion)
- Highline Canal @ Hwy 99 (reinstated SC and reinstated chlorpyrifos)
- Highline Canal @ Lombardy Rd (DO and reinstated SC)
- Howard Lateral @ Hwy 140 (DO)
- Lateral 2 ½ near Keyes Rd (*S. capricornutum)*

- Lateral 6 and 7 @ Central Ave (pH and *S. capricornutum*)
- Lower Stevinson @ Faith Home Rd (DO)
- Prairie Flower Drain @ Crows Landing Rd (reinstated chlorpyrifos)

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: continued monitoring as outlined in the Coalition's approved WDR, analysis of PUR data, MPM, conducting site subwatershed grower meetings, encouraging and evaluating implementation of management practices, and 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 2014 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.
1. Review the member's FE survey 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.
2. Hold meetings as necessary to inform members of water quality problems and recommend additional practices.
3. Review the member's FE survey from the year following initiation of Management Plan activities to document number/type of new management practices implemented.
4. Evaluate effectiveness of new management practices.

For seventh priority site subwatersheds, the Coalition is in the process of conducting individual meetings with nine of the 22 targeted growers to document implementation of management practices. A preliminary analysis for seventh priority initial contacts, including recommended management practices, will be submitted in an addendum to the 2016 Annual Report on September 1, 2016.

The Coalition is in the process of initiating the 2016 Focused Outreach in the Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99, and Prairie Flower Drain @ Crows Landing Rd site subwatersheds. Individual meetings with targeted members will take place during 2016 and 2017 to discuss local water quality concerns and recommend additional 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 in many areas, water quality is still not protective of all beneficial uses 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. Individual grower visits 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 ESJWQC 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 ESJWQC region are taking advantage of available funding resources to implement management practices that improve water quality.
5. Remaining exceedances may be difficult to eliminate because the cause/source of the problems may not be due to agriculture; management practices 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 may not be the cause of water quality impairments associated with elevated concentrations of copper.
7. The Coalition's focused management practice outreach and tracking strategy is effective at improving water quality. The Coalition received approval on March 25, 2016 to remove 18 specific site subwatershed/ constituent pairs from the active management plan of 12 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 and the monitoring schedule outlined in the Monitoring Plan Update (2016 WY MPU; approved November 13, 2015 and March 7, 2016),
2. Continue to document and assess management practices implemented by Coalition growers, and
3. Continue focused outreach and education efforts around constituents applied by agriculture while also educating growers about non-conserved constituents such as DO, pH, and SC.

The Coalition identified several areas in which Central Valley Regional Water Quality Control Board (CVRWQCB) 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 Eastern San Joaquin River Watershed (WDR or General Order; Order No. R5-2012-0116-R3, the East San Joaquin Water Quality Coalition (ESJWQC or Coalition) is submitting the Annual Report for monitoring results from October 2014 through September of the 2015 Water Year (WY).

The 2016 Annual Report includes sections which address reporting requirements for the Monitoring and Reporting Program (Attachment B of the WDR) and Management Plan Progress Report (Appendix MRP-1 of the WDR). The Annual Report Requirements – Section Key (Page xvii) lists the required components of the Annual Report and Management Plan Progress Report and their corresponding sections of this report. 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 of the WDR, Page 10-11).

ESJWQC GEOGRAPHICAL AREA

The ESJWQC area includes the portions of Stanislaus and Merced Counties east of the San Joaquin River, Madera County, and the portion of Fresno County that drains directly into the San Joaquin River. The eastern counties within the boundary include Tuolumne, Mariposa, and the portions of Alpine Counties that drain into the Stanislaus River. Drainage is determined using the California Watershed Boundary from the United States Geological Survey (USGS). The region that drains into the Coalition area is bordered by the crest of the Sierra Nevada on the east, the San Joaquin River on the west, the Stanislaus River, and its drainage areas on the north, and the San Joaquin River and its drainage areas on the south.

IRRIGATED LAND

Although exact acreage is difficult to estimate due to rapidly changing land use, the Coalition area contains approximately 5,595,242 acres of which 967,999 acres (17%) are considered irrigated (measured in ArcGIS; Table 1). To obtain irrigated acreages, the Coalition uses information from two California Department of Water Resources (DWR) data sources: 1) DWR Agricultural Land and Water Use data, and 2) DWR Land Use Survey.

Agricultural Land and Water Use data (DWR, http://www.water.ca.gov/landwateruse/anaglwu.cfm) were used to estimate the acreage of irrigated crops for each county. Land Use Survey data (http://www.water.ca.gov/landwateruse/lusrvymain.cfm) includes more detailed information regarding specific crop uses (both irrigated and non-irrigated); however, it is updated less often. Because Land Use Survey data are 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 used depends on: 1) whether or not the entire county is within the Coalition boundary, and 2) which data were developed most recently.

For Stanislaus, Merced, Madera, Fresno, and Alpine Counties, the Coalition utilized DWR Land Use Survey data to determine irrigated land area because 1) only portions of these counties are included in the Coalition boundary, or 2) the data were more current. For Tuolumne and Mariposa Counties, Agricultural Land and Water Use data were used since these counties are included in their entirety within the Coalition boundary (Table 1). Although the entire county of Madera is represented by the Coalition, the DWR Land Use Survey is more current and therefore was utilized. Calculations of total acreage, measurements were made using ArcGIS.

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

County	Total County Acreage (measured in ArcGIS)	County Irrigated Land Acreage	Data Source Year (Agricultural Land and Water Use)[1]	Data Source Year (Land Use Survey)[2]
Alpine	85,638	72		2013
Fresno*	607,560	0		2000*
Madera*	1,377,316	347,602		2011*
Mariposa	936,078	1,100	2010	1998
Merced	667,635	364,426		2002
Stanislaus	467,456	253,099		2004
Tuolumne	1,453,560	1,700	2010	1997
Total	**5,595,242**	**967,999**		

[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

*Land use for Fresno and Madera Counties are only described for 57% and 37% of the county, respectively.

GEOGRAPHICAL CHARACTERISTICS AND LAND USE

The Coalition area is divided into six zones to facilitate the implementation of a comprehensive monitoring program (Figure 1). These zones are based on hydrology, crop types, land use, soil types, and rainfall. Zone acreages were determined using Land Use Survey Data (Table 2). The zones are named for the primary Core site within that area: 1) Dry Creek @ Wellsford Rd Zone, 2) Prairie Flower Drain @ Crows Landing Rd Zone, 3) Highline Canal @ Hwy 99 Zone, 4) Merced River @ Santa Fe Zone, 5) Duck Slough @ Gurr Rd Zone, and 6) Cottonwood Creek @ Rd 20 Zone. Land use maps for each zone are included in Figure 2 through Figure 7.

Figure 1. ESJWQC zone boundaries and Core sites.

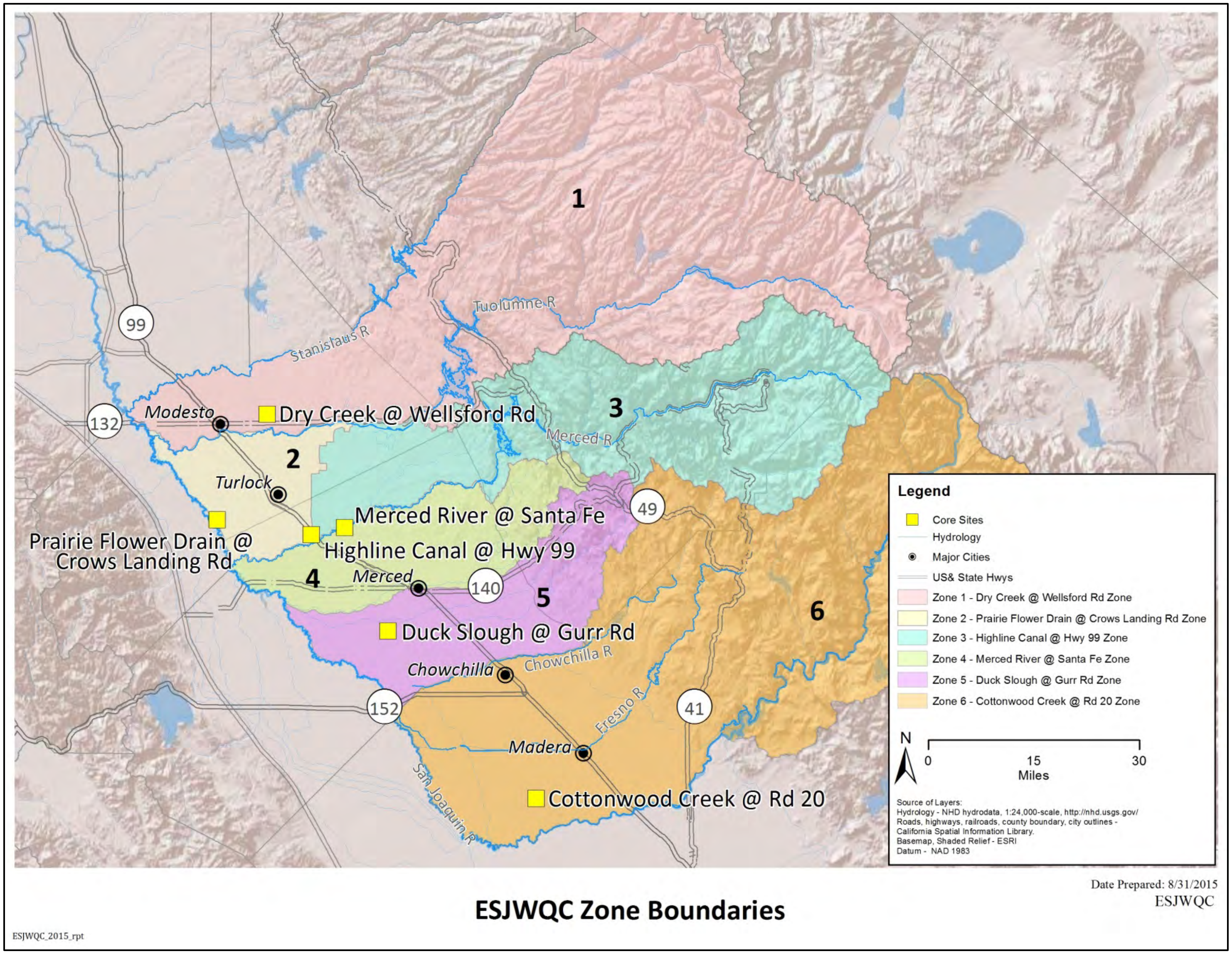


Table 2. ESJWQC total and irrigated acreages for Zones 1-6.

ZONES	TOTAL ACRES[1] (FROM ARCGIS)	IRRIGATED ACRES[2] (FROM LAND USE)
Zone 1: Dry Creek @ Wellsford Rd Zone	1,788,476	108,468
Zone 2: Prairie Flower Drain @ Crows Landing Rd Zone	195,781	145,393
Zone 3: Highline Canal @ Hwy 99 Zone	857,618	84,460
Zone 4: Merced River @ Santa Fe Zone	338,904	118,682
Zone 5: Duck Slough @ Gurr Rd Zone	396,497	160,619
Zone 6: Cottonwood Creek @ Rd 20 Zone	2,015,328	349,328
Total	**5,592,603**	**966,950**

[1]Total zone acreages calculated using ArcGIS. Total acres in Table 2 versus the amount reported elsewhere may differ.

[2]Irrigated acreage for each zone does not equal the sum of irrigated acres for all ESJWQC counties due to differences in acreage sources obtained between the county DWR Land Use layers and the Agricultural Land and Water Use estimates for 2010.

Figure 2. Dry Creek @ Wellsford Rd Zone (Zone 1) Land Use.

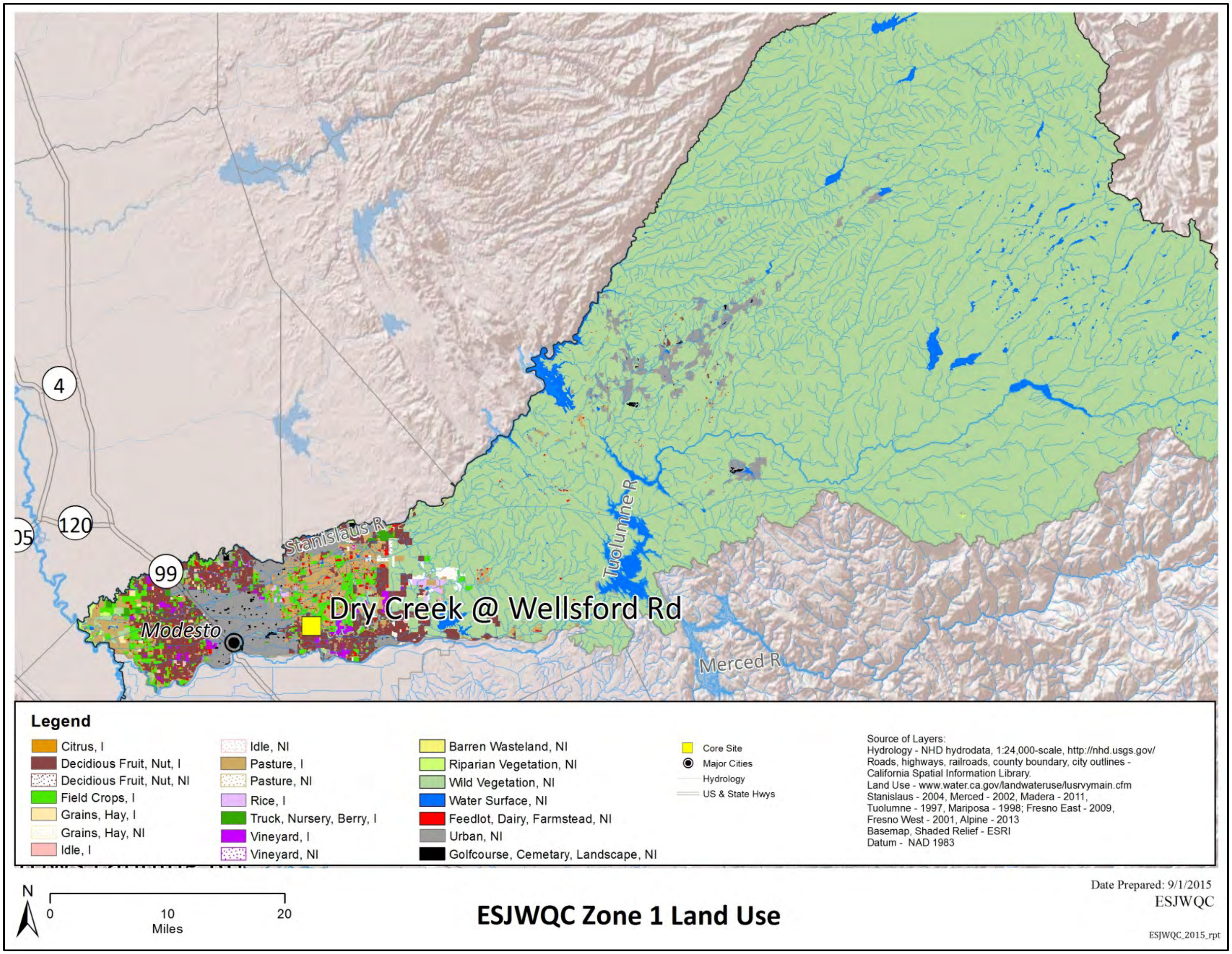


Figure 3. Prairie Flower Drain @ Crows Landing Zone (Zone 2) Land Use.

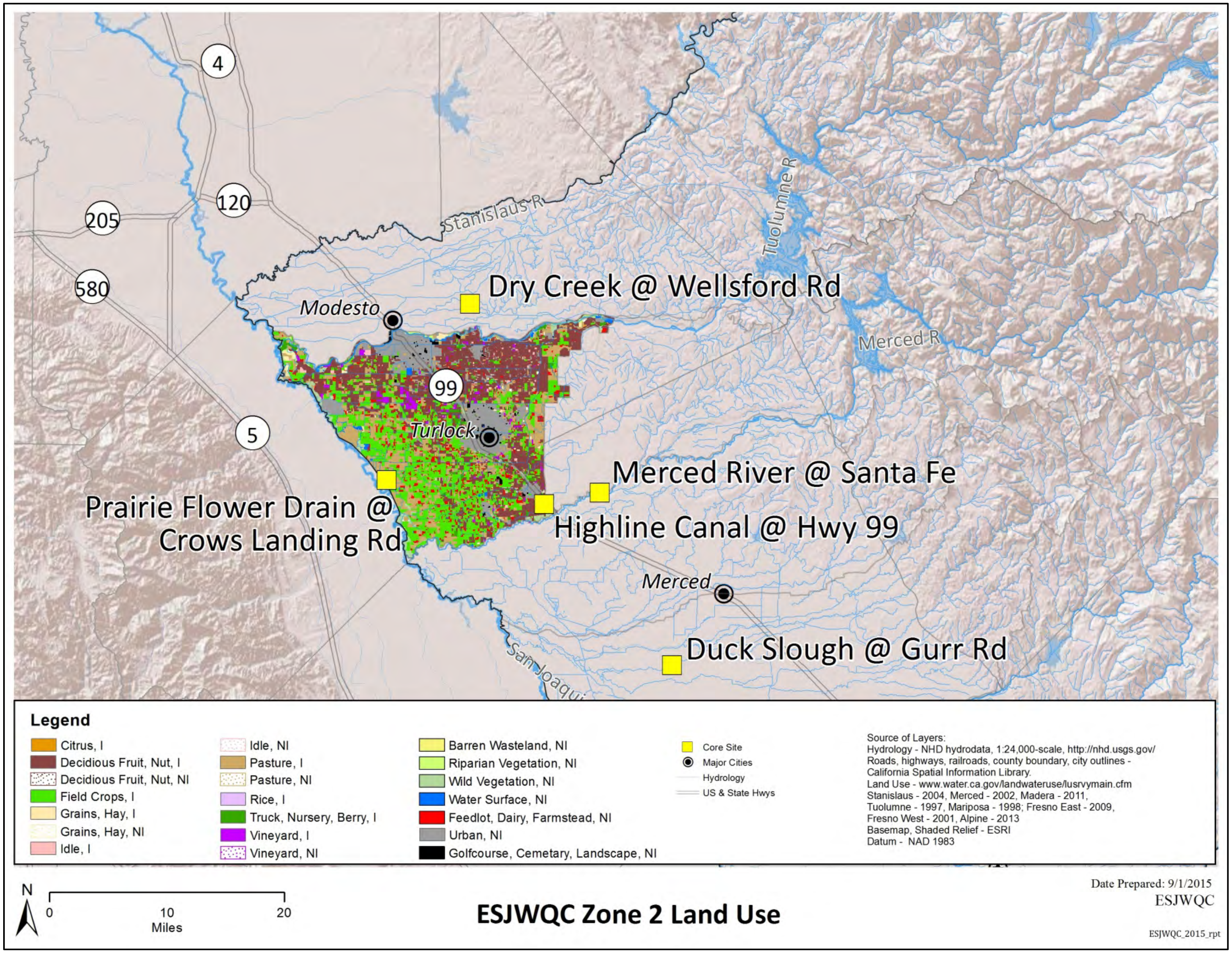


Figure 4. Highline Canal @ Hwy 99 Zone (Zone 3) Land Use.

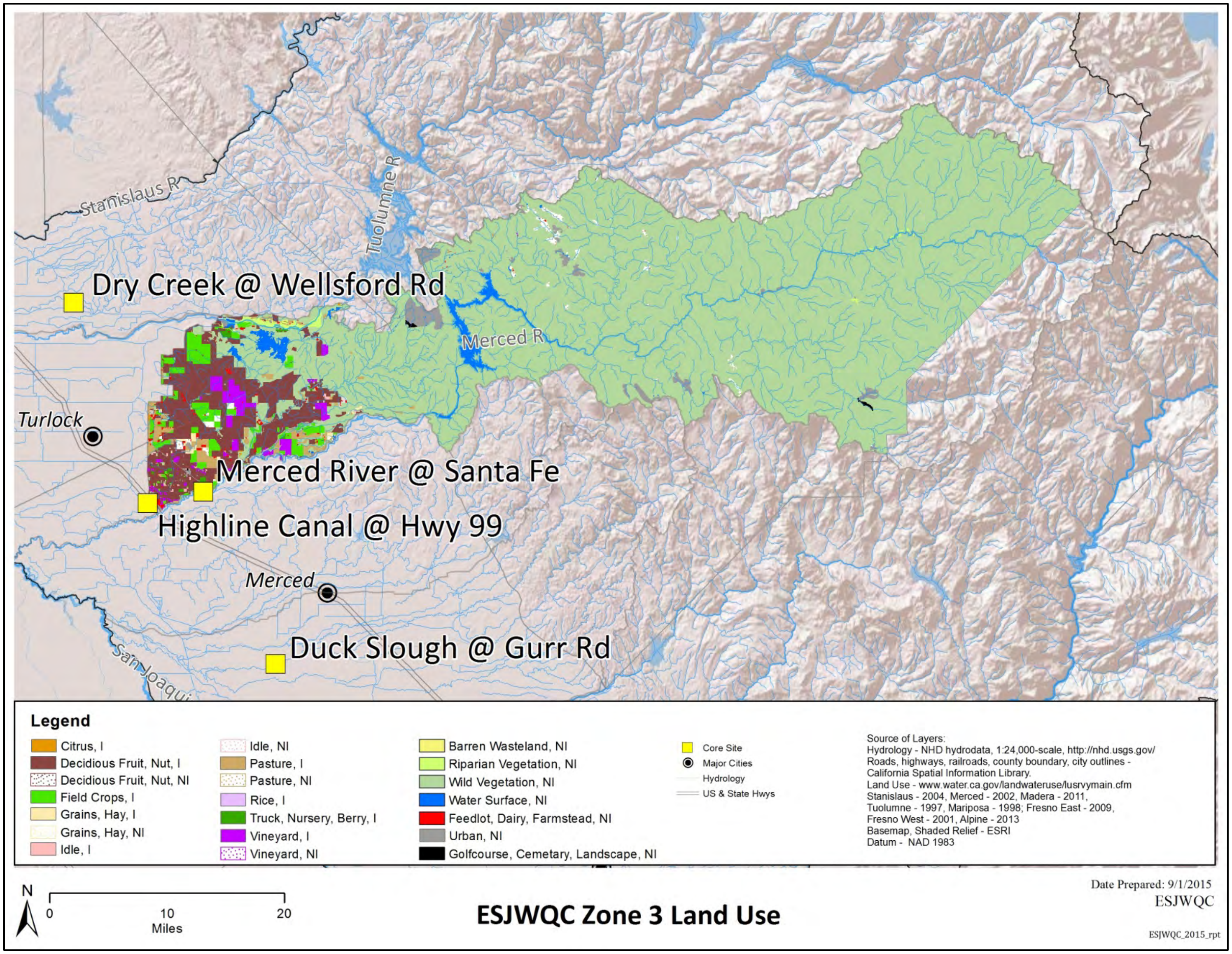


Figure 5. Merced River @ Santa Fe Zone (Zone 4) Land Use.

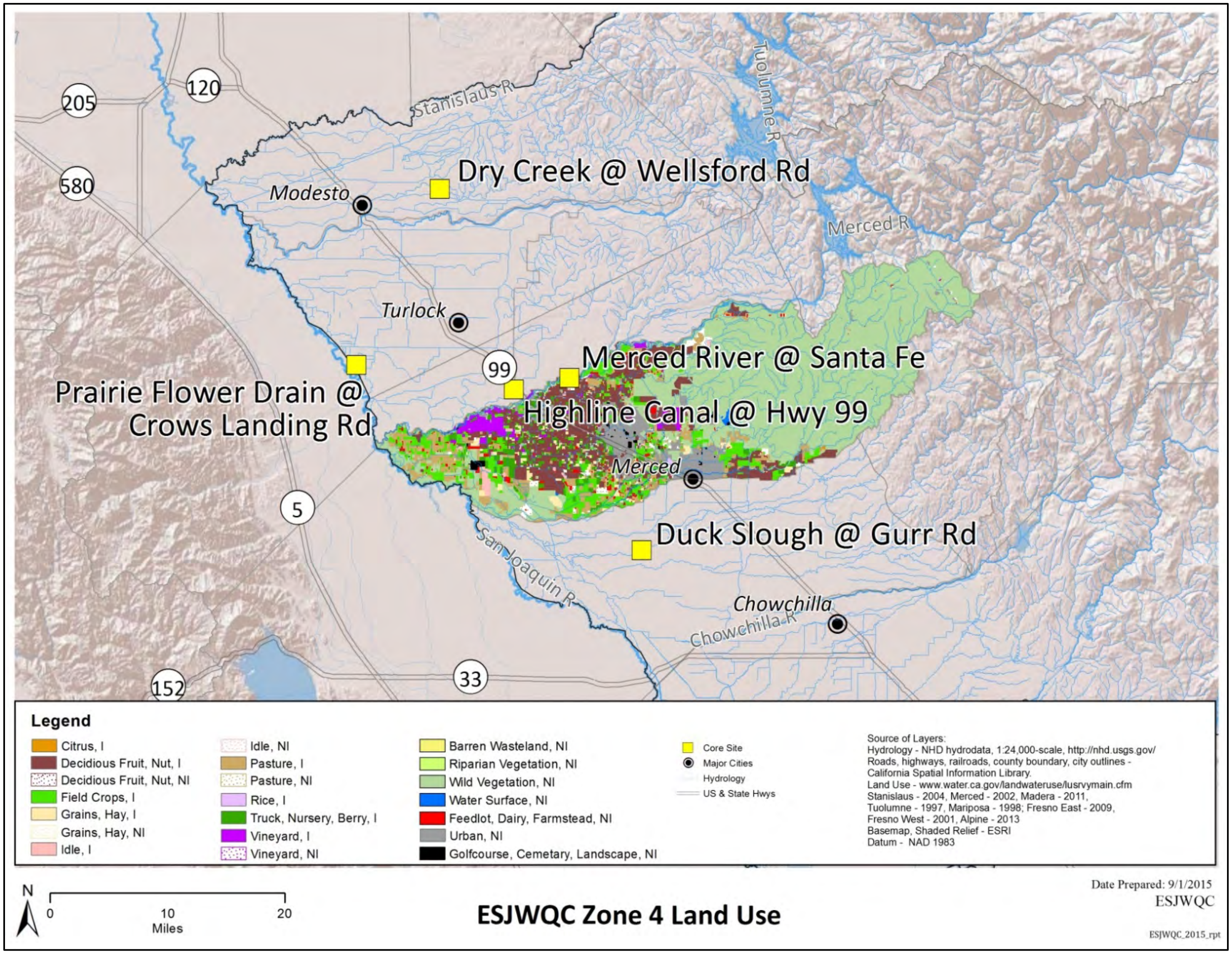


Figure 6. Duck Slough @ Gurr Rd Zone (Zone 5) Land Use.

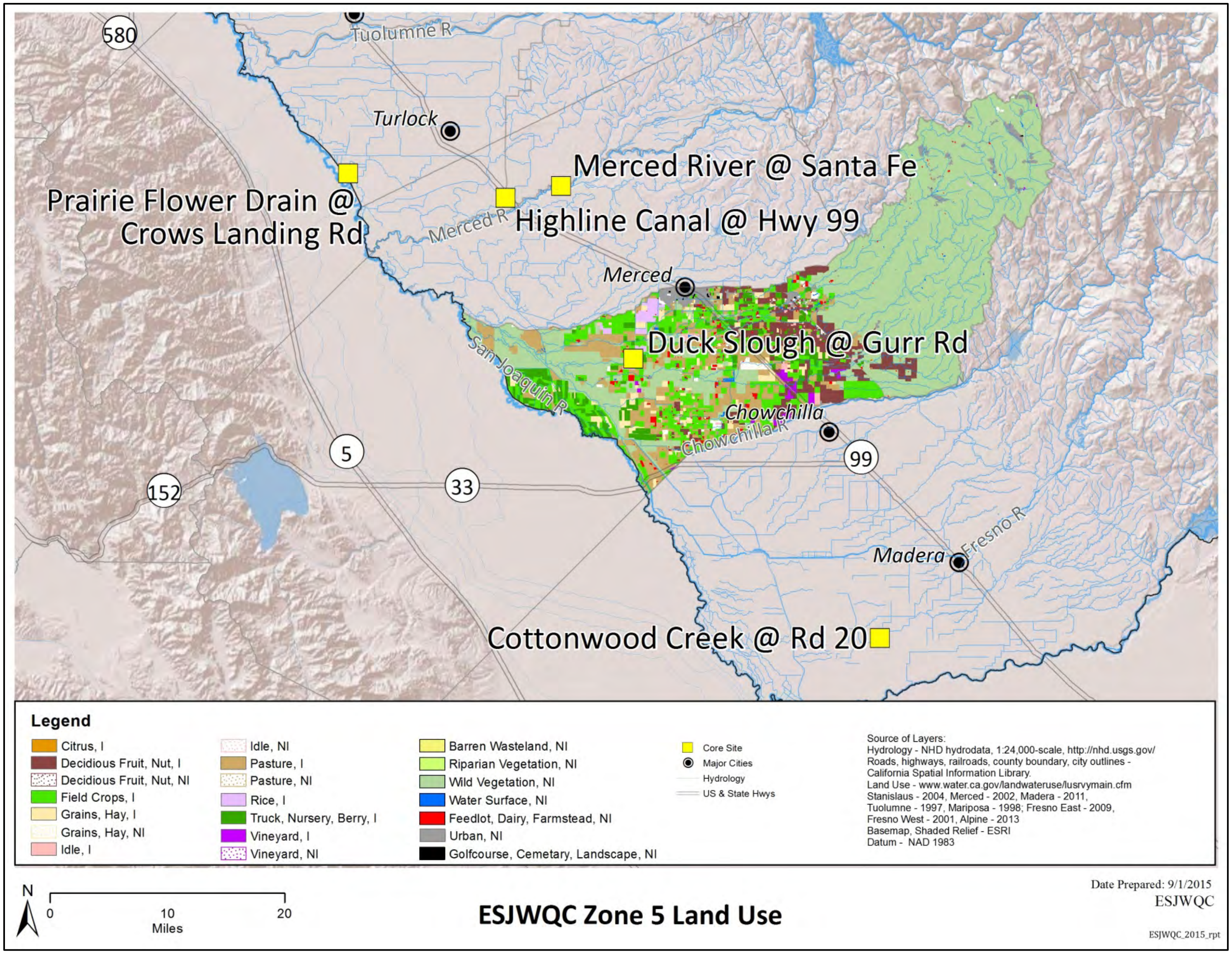
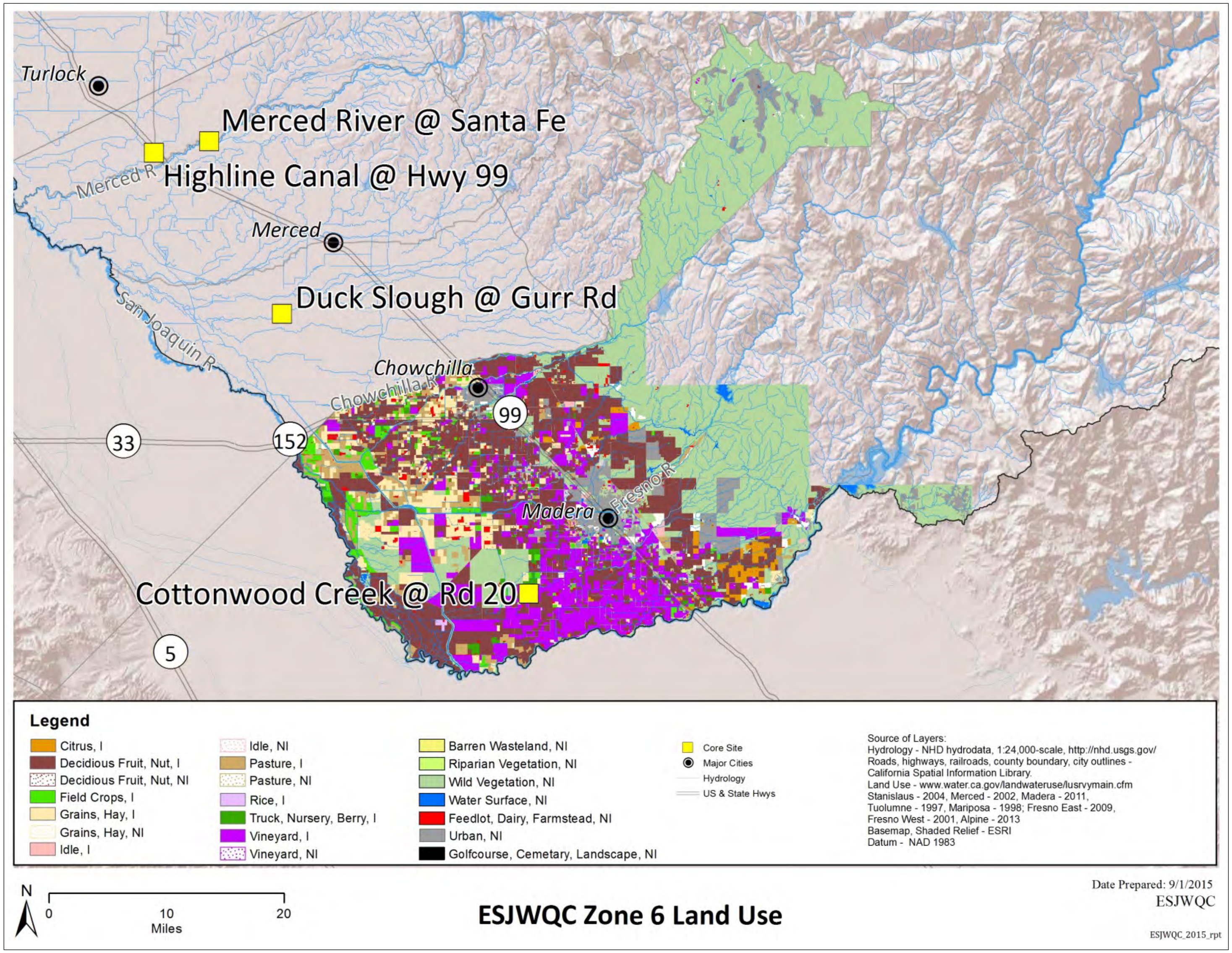


Figure 7. Cottonwood Creek @ Rd 20 Zone (Zone 6) Land Use.

Land use for Madera County is only described for 37% of the county; therefore a portion of the county is missing from the map.



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 subwatershed monitored is listed in Table 4. Land use information obtained from data provided by DWR, http://www.water.ca.gov/landwateruse/anaglwu.cfm. Data were compiled in 2001 and land use in some areas of the ESJWQC may have changed since that time.

The next two subsections include overall maps of the monitoring locations, a narrative description of each site subwatershed with respect to hydrology and agricultural production. Additional location maps of sampling sites, crops, and land uses are provided in Appendix VII.

SAMPLE SITE LOCATIONS

Figure 8 is a map of all site subwatersheds (Core, Represented, and MPM) monitored during the 2015 WY. Zone boundaries are also provided for reference. Figure 9 is a map of the Total Maximum Daily Load (TMDL) sites monitored for chlorpyrifos and diazinon by the ESJWQC for load capacity compliance.

Table 3. ESJWQC 2015 WY tributary and TMDL monitoring locations.

Zone	Site Type	Management Plan Monitoring	Site Name	Station Code	Latitude	Longitude
Zone 1	Core	X	Dry Creek @ Wellsford Rd	535XDCAWR	37.66000	-120.87526
	Represented	X	Mootz Drain downstream of Langworth Pond	535XMDDLP	37.70539	-120.89569
Zone 2	Core	X	Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	37.44187	-121.00331
	Represented	X	Hatch Drain @ Tuolumne Rd	535XHDATR	37.51498	-121.01229
	Represented	X	Hilmar Drain @ Central Ave	535XHDACA	37.39058	-120.95820
	Represented	X	Lateral 2 ½ near Keyes Rd	535LTHNKR	37.54766	-121.08509
	Represented	X	Lateral 5 ½ @ South Blaker Rd	535LFHASB	37.45827	-120.9673
	Represented		Lateral 6 and 7 @ Central Ave	535LSSACA	37.39779	-120.9596
	Represented	X	Levee Drain @ Carpenter Rd	535XLDACR	37.48062	-121.03106
	Represented	X	Lower Stevinson @ Faith Home Rd	535LSAFHR	37.37248	-120.92324
	Represented		Unnamed Drain @ Hogin Rd	535XUDAHR	37.4312	-120.99475
	Represented	X	Westport Drain @ Vivian Rd	535XWDAVR	37.53682	-121.04861
Zone 3	Core	X	Highline Canal @ Hwy 99	535XHCHNN	37.41254	-120.75941
	Represented	X	Highline Canal @ Lombardy Rd	535XHCALR	37.45547	-120.72181
	Represented	X	Mustang Creek @ East Ave	535XMCAEA	37.49180	-120.68390
Zone 4	Core	X	Merced River @ Santa Fe	535XMRSFD	37.42705	-120.67353
	Represented		Bear Creek @ Kibby Rd	535XBCAKR	37.31230	-120.41535
	Represented	X	Black Rascal Creek @ Yosemite Rd	535BRCAYR	37.33202	-120.39435
	Represented		Canal Creek @ West Bellevue Rd	535CCAWBR	37.3609	-120.5494
	Represented	X	Howard Lateral @ Hwy 140	535XHLAHO	37.30790	-120.78200
	Represented	X	Livingston Drain @ Robin Ave	535XLDARA	37.31693	-120.74229
	Represented		McCoy Lateral @ Hwy 140	535XMLAHO	37.30968	-120.78771
	Represented		Unnamed Drain @ Hwy 140	535XUDAHO	37.31331	-120.89218
Zone 5	Core	X	Duck Slough @ Gurr Rd	535XDSAGR	37.21408	-120.56126
	Represented	X	Deadman Creek @ Gurr Rd	535XDCAGR	37.19514	-120.56147
	Represented	X	Deadman Creek @ Hwy 59	535DMCAHF	37.19755	-120.48763
	Represented	X	Miles Creek @ Reilly Rd	535XMCARR	37.25830	-120.47524
Zone 6	Core	X	Cottonwood Creek @ Rd 20	545XCCART	36.86860	-120.18180
	Represented	X	Ash Slough @ Ave 21	545XASAAT	37.05448	-120.41575
	Represented	X	Berenda Slough along Ave 18 1/2	545XBSAAE	37.01820	-120.32650
	Represented	X	Dry Creek @ Rd 18	545XDCARE	36.98180	-120.22056
Zone 1	TMDL	NA	San Joaquin River at the Maze Boulevard (Hwy 132) Bridge	541STC510	37.64194	-121.22778
	TMDL	NA	San Joaquin River at the Airport Way Bridge near Vernalis	541SJC501	37.67556	-121.26417
Zone 4	TMDL	NA	San Joaquin River at Hills Ferry Rd	541STC5123	37.34250	-120.97722

NA-Not Applicable
TMDL-Total Maximum Daily Load

Table 4. ESJWQC 2015 WY land use acreage of site subwatersheds.
Land uses designated as irrigated/non-irrigated (I/NI), sites listed alphabetically; numbers are rounded to nearest whole number.

Land Use	I/NI	Ash Slough @ Ave 21	Bear Creek @ Kibby Rd	Berenda Slough along Ave 18 1/2	Black Rascal Creek @ Yosemite Rd	Canal Creek @ West Bellevue Rd	Cottonwood Creek @ Rd 20	Deadman Creek @ Gurr Rd	Deadman Creek @ Hwy 59	Dry Creek @ Rd 18	Dry Creek @ Wellsford Rd	Duck Slough @ Gurr Rd	Hatch Drain @ Tuolumne Rd	Highline Canal @ Hwy 99	Highline Canal @ Lombardy Rd	Hilmar Drain @ Central Ave	Howard Lateral @ Hwy 140	Lateral 2 ½ near Keyes Rd	Lateral 5 1/2 @ South Blaker Rd	Lateral 6 and 7 @ Central Ave	Levee Drain @ Carpenter Rd	Livingston drain @ Robin Ave	Lower Stevinson @ Faith Home Rd	McCoy Lateral @ Hwy 140	Merced River @ Santa Fe	Miles Creek @ Reilly Rd	Mootz Drain downstream of Langworth Pond	Mustang Creek @ East Ave	Prairie Flower Drain @ Crows Landing Rd	Unnamed Drain @ Hwy 140	Unnamed Drain @ Hogin Rd	Westport Drain @ Vivian Rd
Citrus	I		48	24			698	7	7	775				76	76			36	110	110			96		45	3						
Citrus	NI			5			21				7						4	7				4		4								
Deciduous nut and fruit	I	9328	3424	18401	85	1745	16329	10609	10598	13336	8118	7315		20941	17091		3585	23297	22962	25627		7647	45174	3670	20681	2372		5625				456
Field crop	I	1283	1943	542	377	654	806	11876	10400	283	4674	5249	160	7152	6899	1288	440	3854	14098	18132	1362	773	19178	1573	5527	4073	111	2109	1951	50	462	574
Field crop	NI																								140							
Grain and hay	I	4316	233	1336			430	2622	2425	374	215	766		583	583		262	100	214	236		484	777	524	701	461		32				
Grain and hay	NI	92	195	491	39	83	1864	1166	1161	644	2169	232		11	11			24	53	53			759	35	226	512		702				
Idle	I	280		365		169	984	587	587	147	238	774		181	80		130	434	154	205		112	355	251	141	145						
Idle	NI					384																			292							
Riparian Vegetation	NI	885		558						6	704							102	136	136			18									
Wild vegetation	NI	2053	16142	8487	3711	7950	47218	55864	52589	20007	57835	27400		572	499		357	2325	2996	3228	23	559	7051	378	87838	35993		275		95	43	
Water surface	NI	751	70	901		29	817	359	335	762	316	158		184	184	22	6	435	576	776	31	13	880	34	671	117		8	30		15	
Pasture	I	2660	1501	413	439	1142	1068	9958	8714	616	7599	5646	84	4949	4892	398	457	2697	8312	8462	621	298	9486	335	4543	2120	1201	79	763	366	535	323
Pasture	NI							39	18		1142	74		353	353		9	12	69	87		106	519	9	69							
Rice	I							8			1186	589					25					25		25								
Feedlot, dairy, farmstead	NI	633	93	1134		354	694	839	655	699	1479	728	25	1391	1273	147	126	1352	2758	3879	219	316	4114	375	1042	610		131	383	10	19	191
Truck, nursery, berry	I	345	636	18	96		274	3372	3348	81		2017		283	107		2212	675	937	1022		2082	1266	1525	291	1010						
Urban	NI	3350		4115		38	11670	596	544	5525	530	464	6	678	423		892	4335	1794	2933	5	1330	3951	806	3498	1649	49	5				10
Golf Course, cemetery, landscape	NI	136		169			52			315				1	1		38	186	15	235		90	204	42	203	17						
Vineyard	I	2039		2783		98	15801	1379	1321	4310	1764			1311	975		206	717	882	909		249	4601	2206	3002			2538				190
Total acres		**28150**	**24285**	**39742**	**4747**	**12646**	**98726**	**99281**	**92702**	**47880**	**87976**	**51441**	**275**	**38666**	**33447**	**1855**	**8749**	**40588**	**56066**	**66030**	**2261**	**14088**	**98429**	**11792**	**128910**	**49082**	**1361**	**11504**	**3127**	**521**	**1074**	**1744**
Irrigated acres		**20251**	**7785**	**23882**	**997**	**3808**	**36390**	**40418**	**37400**	**19922**	**23794**	**22356**	**244**	**35476**	**30703**	**1686**	**7317**	**31810**	**47669**	**54703**	**1983**	**11670**	**80933**	**10109**	**34931**	**10184**	**1312**	**10383**	**2714**	**416**	**997**	**1543**

Figure 8. ESJWQC 2015 WY monitoring sites relative to zone boundaries.

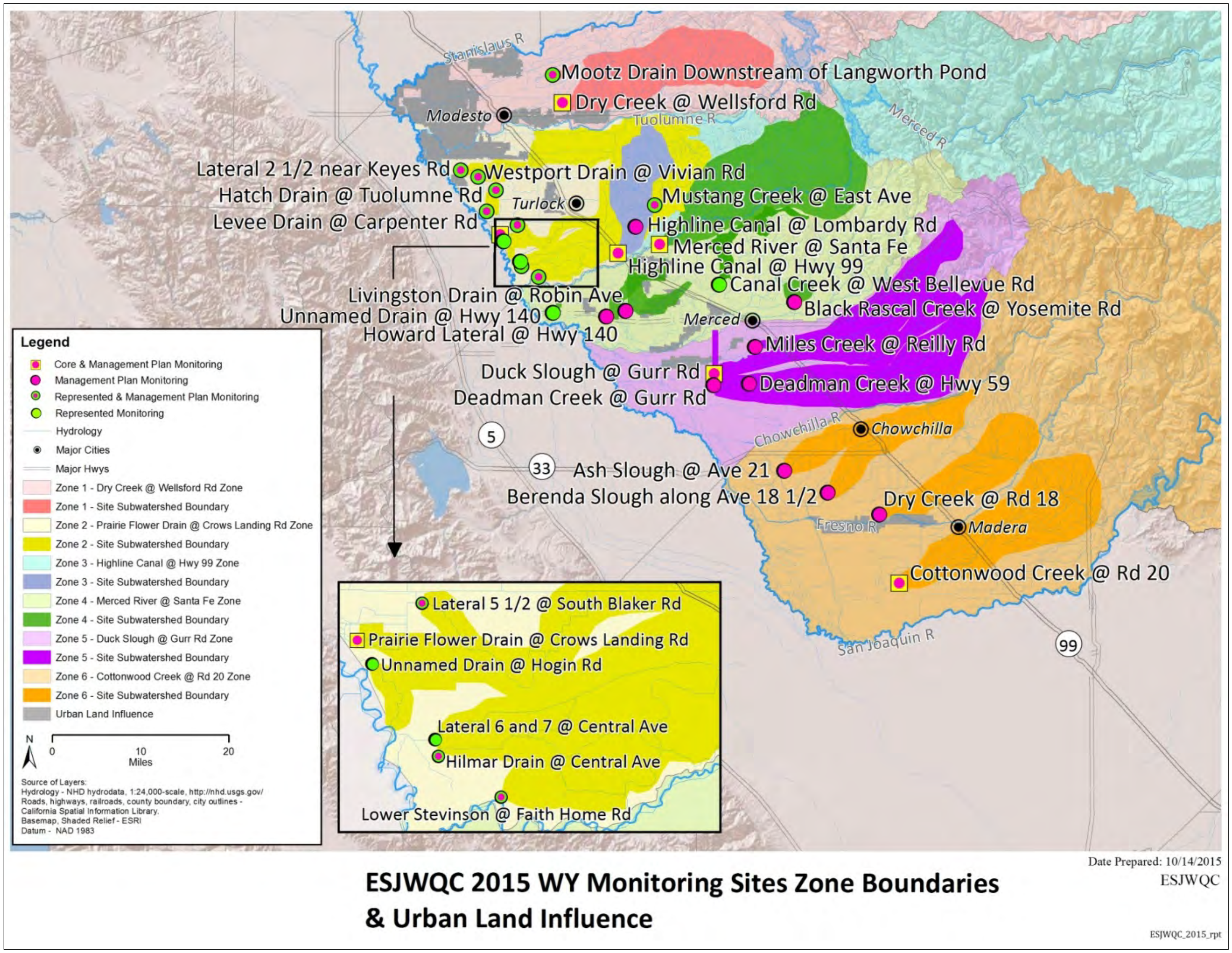
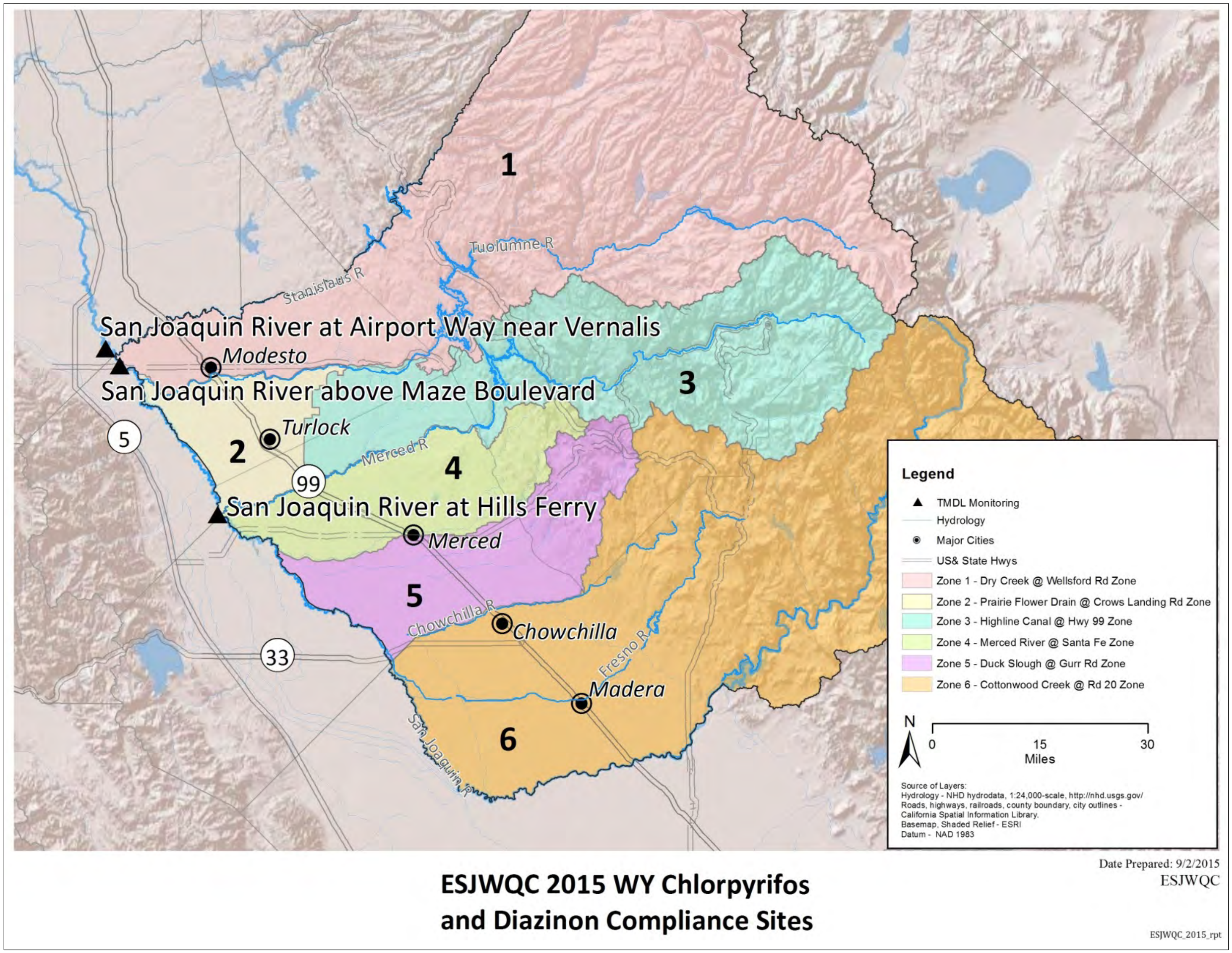


Figure 9. ESJWQC 2015 WY chlorpyrifos and diazinon TMDL compliance locations.

The three TMDL sites are part of six TMDL compliance monitoring locations. Land use information and drainage maps will be submitted in the TMDL AMR.



SITE SUBWATERSHED DESCRIPTIONS

Site descriptions, irrigated acreages, and monitoring histories of ESJWQC sites monitored during the 2015 WY are listed alphabetically below. Water was not present at all sites during every monitoring event and some sites were not scheduled to be sampled every month. Irrigated acres are included in the site subwatershed descriptions; however, the tally of these acreages is subject to change due to updated GIS layers, land entering and leaving cultivation, and subwatershed boundary modifications. Maps of land use in each site subwatershed are included in Appendix VII.

Ash Slough @ Ave 21 (20,388 irrigated acres) – Ash Slough @ Ave 21 is located in the Cottonwood Creek @ Rd 20 Zone (Zone 6). Ash Slough originates from the Chowchilla River in the foothills. Agriculture upstream is mainly deciduous nuts and grains but also includes vineyards, field crops, and pasture. Ash Slough flows just north of Chowchilla but there appears to be a buffer of agricultural land between Ash Slough and Chowchilla. Dairies are located upstream.

Bear Creek @ Kibby Rd (7,784 irrigated acres) – Bear Creek @ Kibby Rd is located in the Merced River @ Santa Fe Zone (Zone 4). This site subwatershed drains an eastern portion of the Coalition region in Merced County. Bear Creek originates in the foothills of the Sierras with Burn's Creek as one of the major tributaries. Bear Creek drains to the east just north of the town of Planada, through Merced and eventually to the San Joaquin River. The primary irrigated agriculture in the site subwatershed includes deciduous fruits and nuts, field crops, truck crops, and irrigated pasture.

Berenda Slough along Ave 18 ½ (24,049 irrigated acres) – Berenda Slough along Ave 18 ½ is located in the Cottonwood Creek @ Rd 20 Zone (Zone 6). This site subwatershed flows from Berenda Reservoir southwest through northern Madera County and is located southwest of the city of Chowchilla. When flows are sufficient, Berenda Slough empties into the Eastside Bypass. However, this waterway does not normally connect with the Bypass due to insufficient flow. The primary agriculture consists of deciduous fruit and nut orchards along with lesser amounts of vineyards, grain and hay, pasture, and field crops.

Black Rascal Creek @ Yosemite Rd (997 irrigated acres) – Black Rascal Creek @ Yosemite Rd is located in the Merced River @ Santa Fe Zone (Zone 4). Black Rascal Creek originates from Le Grand Canal and drains into Bear Creek. The eastern portion of this subwatershed is dominated by native vegetation with some irrigated corn and mixed pastureland in the southern and western portions.

Canal Creek @ West Bellevue Rd (3,808 irrigated acres) – Canal Creek @ West Bellevue Rd is located in the Merced River @ Santa Fe Zone (Zone 4). Canal Creek originates in the lower foothills of Merced County. The primary agriculture consists of pasture and deciduous trees along with some field crops.

Cottonwood Creek @ Rd 20 (36,441 irrigated acres) – Cottonwood Creek @ Rd 20 is one of the Core Sites in the Cottonwood Creek @ Rd 20 Zone (Zone 6). This site subwatershed is at the very southern edge of the Coalition region in Madera County and drains into the Eastside Bypass when flow is sufficient. The immediate upstream agriculture is vineyards with deciduous nuts farther to the east. The eastern portion of the subwatershed is dominated by wild vegetation as the subwatershed extends into the foothills.

Deadman Creek @ Gurr Rd (40,418 irrigated acres) – Deadman Creek @ Gurr Rd is located in the Duck Slough @ Gurr Rd Zone (Zone 5). This site subwatershed is a downstream site from Deadman Creek @ Hwy 59. The primary agriculture in the site subwatershed includes deciduous nuts and fruits, field crops and irrigated pasture.

Deadman Creek @ Hwy 59 (37,400 irrigated acres) – Deadman Creek @ Hwy 59 is located in the Duck Slough @ Gurr Rd Zone (Zone 5) and is upstream of Deadman Creek @ Gurr Rd. Deadman Creek flows out of the Sierra foothills and confluences with Dutchman's Creek in the vicinity of Highway 59. The primary agriculture in the site subwatershed includes orchards, irrigated pasture, and field crops. A large portion of the subwatershed is wild vegetation.

Dry Creek @ Rd 18 (20,237 irrigated acres) – Dry Creek @ Rd 18 is located within the Cottonwood Creek @ Rd 20 Zone (Zone 6). This site subwatershed originates in the Sierra foothills and flows just north of the city of Madera. Although rare, if flow is sufficient Dry Creek eventually drains into the San Joaquin River through various channels and irrigation ditches. The primary irrigated agriculture within the subwatershed is deciduous orchards and vineyards with some scattered field crops.

Dry Creek @ Wellsford Rd (23,794 irrigated acres) – Dry Creek @ Wellsford Rd is a Core Monitoring location in the Dry Creek @ Wellsford Rd Zone (Zone 1). This site subwatershed is in the northern part of the Coalition region and drains field crops, deciduous nuts, mixed pasture, and vineyards. Dry Creek originates to the east of Modesto, flows through Modesto to confluence with the Tuolumne River. Dairies are located upstream of this site and the town of Waterford may contribute an urban signal. The subwatershed extends into the foothills and is dominated in the east by wild vegetation with some rice, row crops, and irrigated pasture.

Duck Slough @ Gurr Rd (22,356 irrigated acres) – Duck Slough @ Gurr Rd is a Core Site located in the Duck Slough @ Gurr Rd Zone (Zone 5). This site subwatershed is located downstream from the Duck Slough @ Hwy 99 site subwatershed. Duck Slough originates in the Sierra foothills and flows west eventually joining with Deadman Creek in the western portion of the Coalition region. The slough eventually flows into the San Joaquin River via Deadman Creek and Deep Slough. Deane Drain, which runs north south and enters Duck Slough on its north banks just east of the sample site, has the potential to overflow into Duck Slough during high water flows and therefore land use associated with the drain have been included in the site subwatershed boundary. Duck Slough @ Gurr Rd is located to the southwest of Merced, this waterbody drains field crops, deciduous nuts, and pastureland. Treated wastewater from the city of Madera enters Duck Slough a few miles upstream of the Gurr Rd sample site.

Hatch Drain @ Tuolumne Rd (244 irrigated acres) – Hatch Drain @ Tuolumne Rd is located in the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2). This small site subwatershed is located in the western portion of the Coalition region in Stanislaus County. The subwatershed drains field crops and pasture.

Highline Canal @ Hwy 99 (35,476 irrigated acres) – Highline Canal @ Hwy 99 is a Core Site located in the Highline Canal @ Hwy 99 Zone (Zone 3). The Highline Canal is a conveyance structure of the Turlock Irrigation District (TID) and carries both clean irrigation water and irrigation return flow during the summer and urban and agricultural stormwater runoff during the winter. This site was selected as a downstream companion site to the Highline Canal @ Lombardy Rd site. The sampling site is located just south of Delhi as the canal crosses Highway 99. Irrigated agriculture above this location is primarily deciduous nuts with small amounts of field crops, pasture, and vineyards.

Highline Canal @ Lombardy Rd (30,704 irrigated acres) – Highline Canal @ Lombardy Rd is located in the Highline Canal @ Hwy 99 Zone (Zone 3) and is upstream of the Highline Canal @ Hwy 99 site. The Highline Canal is a Turlock Irrigation District (TID) conveyance structure and carries both clean irrigation water and irrigation return flow during the summer and stormwater runoff during the winter. The Highline Canal flows west and eventually drains into the Merced River. The main upstream tributary of the Highline Canal is Mustang Creek which is a major tributary during the dormant season and passes immediately to the southeast of the Turlock Airport. The predominant crop in this site subwatershed is deciduous nuts with some dairies located upstream.

Hilmar Drain @ Central Ave (1,686 irrigated acres) – Hilmar Drain @ Central Ave is located in the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2). This site subwatershed is located toward the western edge of the Coalition region near the San Joaquin River. This is a small site subwatershed containing primarily field crops and a large number of dairies with irrigated pasture. Hilmar Drain originates at Williams Ave and Washington Rd and eventually drains into the San Joaquin River. At this location, TID refers to the Hilmar Drain waterbody as "Reclamation Drain."

Howard Lateral @ Hwy 140 (7,317 irrigated acres) – Howard Lateral @ Hwy 140 is located in the Merced River @ Santa Fe Zone (Zone 4). The lateral is located just south and west of Livingston Drain, in the central portion of the Coalition region in Merced County. Agricultural land use is predominantly deciduous nut and fruit orchards, but also includes field crops, pasture, grains/hay, vineyard, and dairy.

Lateral 2 ½ near Keyes Rd (31,810 Irrigated acres) – Lateral 2 ½ near Keyes Rd is located in the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2) with its most upstream region in Highline Canal @ Hwy 99 Zone (Zone 3). The origin of Lateral 2 ½ is Turlock Lake via Turlock main Canal. The site subwatershed extends east past the city of Modesto to Turlock Lake. The primary agriculture in this site subwatershed is deciduous fruits and nuts but also includes almost all other crop types and land use found in the Coalition region.

Lateral 5 ½ @ South Blaker Rd (47,669 Irrigated acres) – Lateral 5 ½ @ South Blaker Rd is located in the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2) with half of its upstream eastern region in Highline Canal @ Hwy 99 Zone (Zone 3). The origin of Lateral 5 ½ is Turlock Lake via Turlock main Canal. The primary agriculture is deciduous fruits and nuts with field crops and pasture and a small amount of truck, nursery, and berry crops. Dairies are scattered throughout the subwatershed area.

Lateral 6 and 7 @ Central Ave (54,703 Irrigated acres) – Lateral 6 & 7 @ Central Ave is located in the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2) with half of its upstream eastern region in Highline Canal @ Hwy 99 Zone (Zone 3). The origin of Lateral 6 & 7 is Turlock Lake via Turlock main Canal. The primary agriculture is deciduous fruits and nuts with field crops and pasture and a small amount of truck, nursery, and berry crops. Dairies are scattered throughout the subwatershed area.

Levee Drain @ Carpenter Rd (1,983 irrigated acres) – Levee Drain @ Carpenter Rd is located in the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2). This site subwatershed is located north of Prairie Flower and originates at West Fulkerth Rd and South Carpenter Rd and drains into the San

Joaquin River. This is a small subwatershed containing mainly deciduous nut and fruit orchards with some irrigated pasture.

Livingston Drain @ Robin Ave (11,670 irrigated acres) – Livingston Drain @ Robin Ave is located in the Merced River @ Santa Fe Zone (Zone 4). This site subwatershed is located in the west central portion of the Coalition region in Merced County, east of Howard Lateral. It is located west of Atwater and Livingston. The water from Hammett Lateral and Arena Canal drains into Livingston Drain. Arena Canal receives stormwater from the city of Livingston as well as water from the Livingston Canal. The agriculture is almost entirely orchards with some truck crops. Several dairies are also present in the watershed.

Lower Stevinson @ Faith Home Rd (80,934 irrigated acres) –– Lower Stevinson @ Faith Home Rd is located in the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2) with half of its upstream eastern region in Highline Canal @ Hwy 99 Zone (Zone 3). The origin of Lateral 6 & 7 is Turlock Lake via Turlock main Canal. The primary agriculture is deciduous fruits and nuts with field crops, pasture and vines, with smaller amounts of truck, nursery, and berry crops. There are dairies scattered throughout the subwatershed area.

McCoy Lateral @ Hwy 140 (10,109 irrigated acres) – McCoy Lateral @ Hwy 140 is located in the Merced River @ Santa Fe Zone (Zone 4). This site subwatershed is located immediately west of Howard Lateral. The water from Hammett Lateral and Arena Canal drains into McCoy Lateral. Arena Canal receives stormwater from the city of Livingston as well as water from Livingston Canal. The agriculture of the McCoy Lateral @ Hwy 140 site subwatershed is a mixture of deciduous fruit and nut orchards, vineyards, truck/nursery/berries, and field crops.

Merced River @ Santa Fe (34,931 irrigated acres) – Merced River @ Santa Fe is a core site located within the Merced River @ Santa Fe Zone (Zone 4). This site subwatershed contains a major waterbody which is 303d listed. It was selected as an integrator site for several of the drains and tributaries in the vicinity. The Merced River originates in the high Sierra encountering several dams and impoundments as it flows west eventually draining into the San Joaquin River near Hatfield State Park. Upstream agriculture in the immediate vicinity of the river includes some field crops and deciduous nuts (primarily almonds). Irrigated pasture and vineyards are also present in the site subwatershed.

Miles Creek @ Reilly Rd (10,183 irrigated acres) – Miles Creek @ Reilly Rd is located in the Duck Slough @ Gurr Rd Zone (Zone 5). Miles Creek is located just north of Duck Slough and drains into Owen's Creek. The primary agriculture within the Miles Creek @ Reilly Rd site subwatershed is field crops in addition to deciduous nuts and fruit, pasture, and truck/nursery/berry production. Urban drainage, dairies, and hay are also present within the subwatershed.

Mootz Drain downstream of Langworth Pond (1,312 irrigated acres) – Mootz Drain downstream of Langworth Pond is located in the Dry Creek @ Wellsford Rd Zone (Zone 1). This site subwatershed is located just downstream of Mootz Drain @ Langworth Rd in the northern portion of the Coalition region. The drain originates to the east of Modesto and drains into Lateral 6 and the Stanislaus River. Land use upstream of the site is predominantly pasture and dairies. A small portion of land is field crops.

Mustang Creek @ East Ave (10,383 irrigated acres) – Mustang Creek @ East Ave is located in the Highline Canal @ Hwy 99 Zone (Zone 3). Mustang Creek originates in the foothills of the Sierra Nevada and flows into the upper portion of the Highline Canal. Mustang Creek is ephemeral with flow found primarily during winter runoff events. Summer flows are rare and intermittent as the upstream orchards utilize microspray irrigation. Citrus and deciduous nut crops are the main agriculture with smaller amounts of field crops and vineyards.

Prairie Flower Drain @ Crows Landing Rd (2,714 irrigated acres) – Prairie Flower Drain @ Crows Landing Rd is a core site located in the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2). Relative to other drains in the western portion of the Coalition region, Prairie Flower Drain is longer and drains mostly irrigated agriculture. Dairies and feedlots are common in this part of the Coalition region and this drain receives runoff immediately upstream from farmland managed by dairies. Agriculture in the upstream vicinity is primarily field crops and pasture. The water table in this site subwatershed is very shallow and the groundwater is high in salt. Prairie Flower Drain intercepts this shallow groundwater and moves it to Harding Drain where it then flows to the San Joaquin River.

San Joaquin River at Airport Way Bridge near Vernalis (82,611 irrigated acres) – San Joaquin River at Airport Way Bridge near Vernalis is monitored for chlorpyrifos and diazinon TMDL compliance. This area drains lands from Airport Way Bridge upstream to Maze Blvd into the San Joaquin River including the northern portion of Stanislaus County with a small portion west of San Joaquin River from Stanislaus and San Joaquin Counties. Agriculture in the area is primarily deciduous nuts and fruits with some field crops, pasture, truck, nursery, and berry crops.

San Joaquin River at Hills Ferry Rd (348,080 irrigated acres) – San Joaquin River at Hills Ferry Rd is monitored for chlorpyrifos and diazinon TMDL compliance. This area drains lands west of the San Joaquin River upstream from Hills Ferry Rd to Fremont Ford and includes the region west of San Joaquin River for Merced and the northern part of Fresno County. Approximately 50% of the land is native vegetation with some field crops, deciduous nuts, fruit, truck, nursery, and berry crops.

San Joaquin River at the Maze Boulevard (Highway 132) Bridge (170,673 irrigated acres) – San Joaquin River at the Maze Boulevard (Highway 132) Bridge is monitored for chlorpyrifos and diazinon TMDL compliance. This area drains lands east and west of the San Joaquin River between Maze Blvd and Las Palmas Ave. Approximately 44% of the land is native vegetation along with field crops, deciduous nuts, fruit, truck, nursery, and berry crops.

Unnamed Drain @ Hogin Rd (996 irrigated acres) – Unnamed Drain @ Hogin Rd is located in the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2). It is a small subwatershed that is just east of San Joaquin River. Its water source is both from San Joaquin River and drainage of the surrounding area. The two main crops are field crops and pasture.

Unnamed Drain @ Hwy 140 (416 irrigated acres) – Unnamed Drain @ Hwy 140 is located in the Merced River @ Santa Fe Zone (Zone 4). This waterbody originates from the East Side Irrigation Canal and flows into Old Channel which flows into San Joaquin River. The irrigated agriculture is primarily mixed pasture with a small amount of corn.

Westport Drain @ Vivian Rd (1,544 irrigated acres) – Westport Drain @ Vivian Rd is located in the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2). The origin Westport Drain is Turlock Lake via Turlock main Canal. The agriculture in this subwatershed is deciduous fruit and nut, field crops, pasture, and some vines and dairies.

RAINFALL RECORDS

In the ESJWQC region, a storm monitoring event is defined as monitoring within three days of a rainfall event that exceeds 0.25 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 its 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.

The Coalition sampled two storm events from October 2014 through September 2015 (December 3, 2014 and February 10, 2015). Listed below are quarterly descriptions of all storms that occurred in the Coalition region from October 2014 through September 2015 (further described in the Monitoring Results section of this report).

Daily rainfall records are provided for Modesto, Merced, and Madera, the three major cities in the Coalition region (Figure 10, October through December 2014, Figure 11, January through March 2015, Figure 12, April through June 2015, and Figure 13, July through September 2015).

OCTOBER THROUGH DECEMBER 2014

Samples were collected during one storm event from October through December 2014.

During the month of October, there were two measureable storm events within the Coalition region. The first storm occurred on October 25, 2014 and resulted in 0.02 inches of precipitation in Merced, 0.03 inches in Modesto, and 0.00 inches in Madera (Figure 10). The second storm occurred from October 31 through November 1, 2014 and produced 0.86 inches in Merced, 0.69 inches in Modesto, and 0.63 inches in Madera (Figure 10). Although the second storm met the rainfall trigger limit in all three cities, storm samples were not collected because the storm was not predicted to produce as much rainfall as it did and there was a lack of moisture in the soils. Observations after the storm indicated that there was no surface water runoff.

During the month of November, there were three measureable rainfall events within the Coalition region. The first storm occurred on November 13, 2014 and produced 0.23 inches of precipitation in Merced, 0.27 inches Modesto, and 0.14 inches in Madera (Figure 10). The second storm occurred from November 19 through November 22, 2014 and produced 0.06 inches of precipitation in Merced, 0.12 inches in Modesto, and 0.03 inches in Madera (Figure 10). Storm samples were not collected during the November 13 or November 19 storm events because the rainfall trigger limit was not met in all three cities in the Coalition region. The last storm occurred from November 29 through December 5, 2014 and produced total of 1.1 inches of precipitation in Merced, 1.72 inches in Modesto, and 0.54 inches in Madera (Figure 10). The rainfall trigger limit was reached during this storm event and samples were collected on December 3, 2014.

During the month of December, there were two rainfall events that brought measureable amounts of precipitation to the Coalition region. The first storm occurred from December 11 through December 12, 2014, and produced 1.86 inches in Merced, 2.94 inches in Modesto, and 1.54 inches in Madera (Figure 10). The second storm occurred from December 15 through December 24, 2014, and resulted in 0.62 in Merced, 1.63 inches in Modesto, and 0.8 inches in Madera (Figure 10). Both of these storms resulted in precipitation that met the required rainfall trigger limit in the three cities; however, storm samples were not collected because the Coalition previously captured runoff during the storm sampling event that occurred in late November and early December.

JANUARY THROUGH MARCH 2015

Samples were collected during one storm event from January through March 2015.

During the month of January, there was one day of measureable precipitation of 0.25 inches or less; however, this system was isolated and resulted in very little rainfall in the target cities. The storm occurred on January 25, 2015 and produced 0.02 inches of precipitation in Merced, 0.00 inches in Modesto, and 0.03 inches in Madera (Figure 11).

During the month of February, there were two rainfall events that resulted in measureable precipitation greater than the rainfall trigger limit (Figure 11). The first rain event occurred from February 6 through February 9, 2015, and produced 1.03 inches of precipitation in Merced, 1.39 inches in Modesto, and 0.45 inches in Madera. The rainfall trigger limit was met during this storm event, and was storm samples were collected on February 10, 2015. The second rainfall event occurred from February 22 through February 23, 2015, and produced 0.02 inches of precipitation in Merced, 0.37 inches in Modesto, and 0.09 inches in Stockton (Figure 11).

During the month of March, there were two rainfall events that resulted in a measureable amount precipitation (Figure 11). During the first storm of the month, which occurred on March 2, 2015, Merced reported a total rainfall of 0.08 inches of precipitation, Modesto reported 0.00 inches, and Madera reported 0.01 inches (Figure 11). The second storm occurred on March 11, 2015, and resulted in a total rainfall of 0.11 inches in Merced, 0.19 inches in Modesto, and 0.00 inches in Madera (Figure 11). Sampling did not occur during the March 2 or March 11 storm events because the rainfall trigger limit was not met in any of the three target cities.

APRIL THROUGH JUNE 2015

Storms during April through June 2015 did not produce enough rainfall in the three major cities of the Coalition region to meet the rainfall trigger limit of 0.25 inches within 24 hours required for storm sample collection.

During the month of April, there were two rainfall events that resulted in a measureable amount precipitation (Figure 12). The first storm occurred from April 5 through April 8, 2015 and produced 0.36 inches of precipitation in Merced, 0.42 inches in Modesto, and 0.34 inches in Madera (Figure 12). Although the rainfall trigger limit was met in all three cities during this storm, samples were not collected because the storm was not predicted to produce as much rainfall as it did and since there was a lack of moisture in the soils, surface water runoff did not occur. The last storm in April occurred from

April 24 through April 25, 2015, and resulted in 0.08 inches of precipitation in Merced, 0.21 inches in Modesto, and 0.66 inches in Madera; the rainfall trigger limit was not met and therefore storm samples were not collected (Figure 12).

During the month of May, there were two rainfall events that resulted in a measureable amount precipitation (Figure 12). The first storm occurred from May 7 through May 8, 2015, and resulted in 0.56 inches of precipitation in Merced, 0.17 inches in Modesto, and 0.31 inches in Madera. The second storm occurred on May 14, 2015, and resulted in 0.18 inches of precipitation in Merced, 0.1 inches in Modesto, and 0.14 inches in Madera (Figure 12). Storm samples were not collected following the two storms in May because the rainfall trigger limit was not met in all three target cities during the storm events.

There were no measureable rainfall events during the month of June 2015.

JULY THROUGH SEPTEMBER 2015

Storms during July through September 2015 did not produce enough rainfall in the three major cities of the Coalition region to meet the rainfall trigger limit of 0.25 inches within 24 hours required for storm sample collection.

The East San Joaquin area had typical Mediterranean climate conditions in July through September with hot and dry weather and little to no precipitation. During the month of July, one storm occurred on July 18, 2015, and produced 0.11 inches in Madera and 0.00 inches in both Merced and Modesto (Figure 13). During the month of August, there was one storm that produced a measureable amount of precipitation. The storm occurred on August 7, 2015 and resulted in 0.00 inches of precipitation in both Merced and Modesto, and 0.01 inches in Madera (Figure 13). During the month of September, there was one measureable storm that occurred from September 14 through September 15, 2014; the city of Madera received 0.17 inches of precipitation, while Merced and Modesto received 0.00 inches (Figure 13). Storm samples were not collected from July through September 2015.

Figure 10. Precipitation history for Modesto, Merced, and Madera, October through December 2014.
The shaded gray area represents the rainfall trigger limit to initiate sampling: 0.25"- 0.5" rain in 24 hours. All weather data reported on http://www.wunderground.com/.

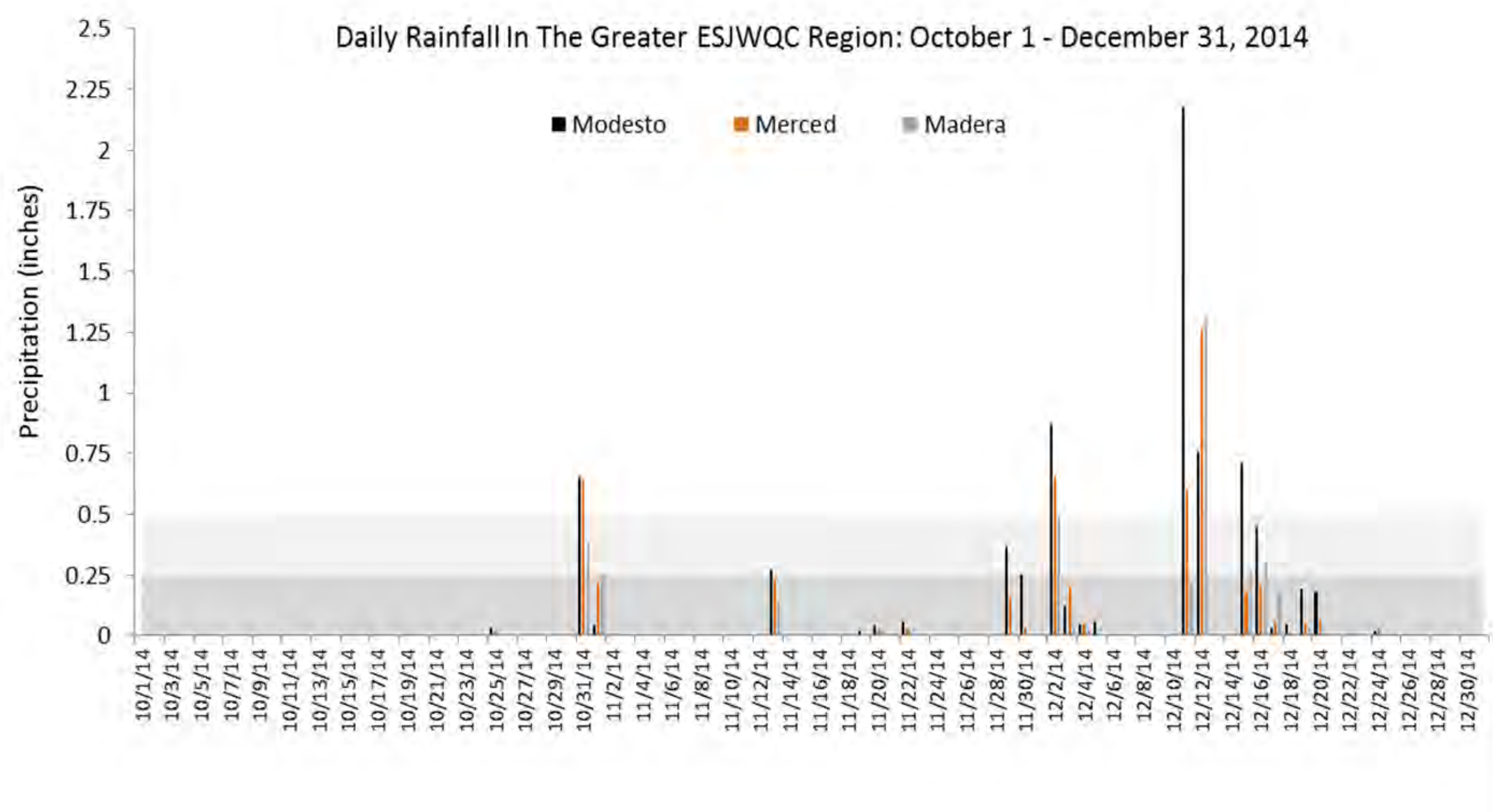


Figure 11. Precipitation history for Modesto, Merced, and Madera, January through March 2015.
The shaded gray area represents the rainfall trigger limit to initiate sampling: 0.25” - 0.5” rain in 24 hours. All data reported on http://www.wunderground.com/.

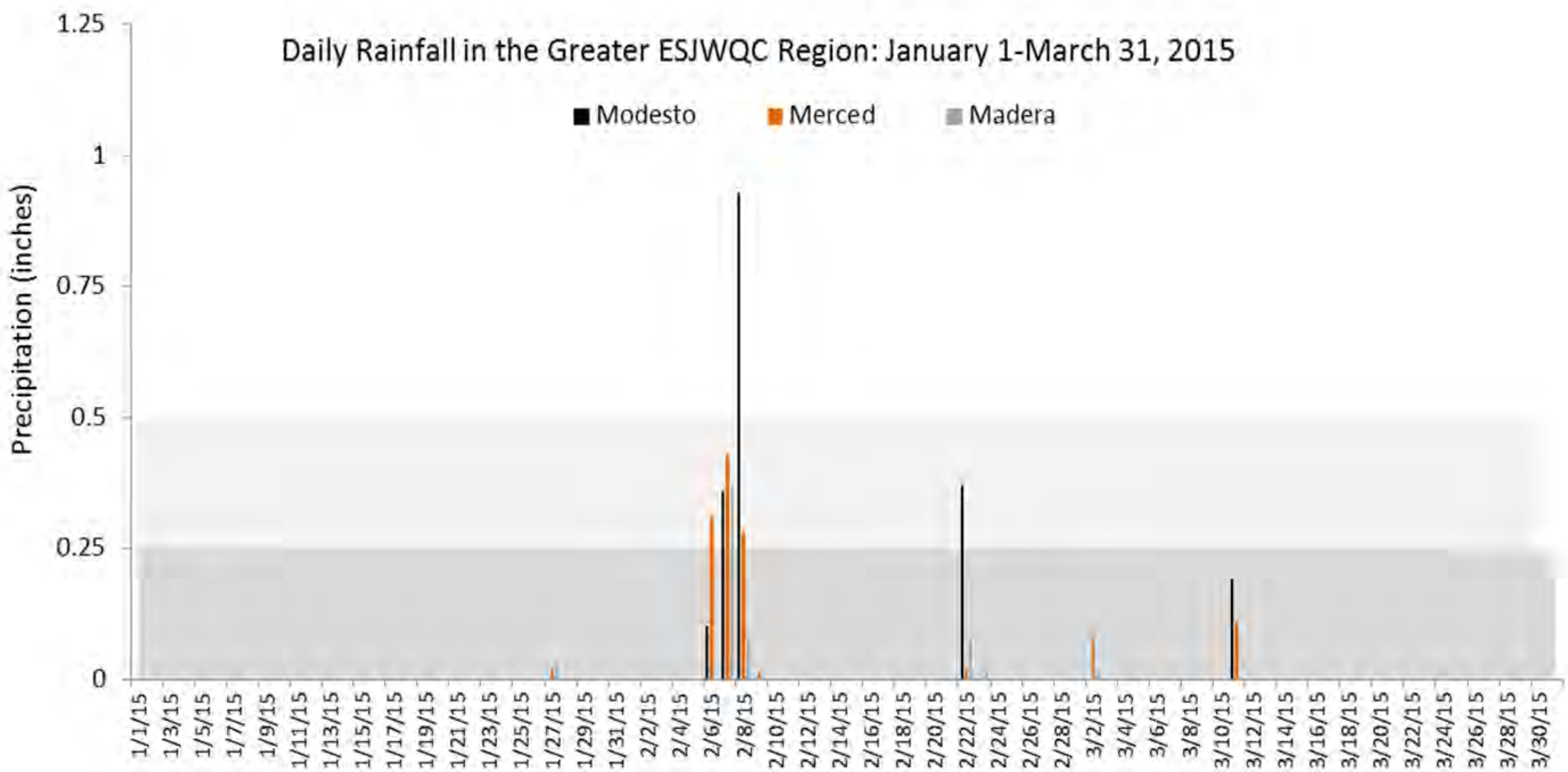


Figure 12. Precipitation history for Modesto, Merced, and Madera, April through June 2015.
The shaded gray area represents the rainfall trigger limit to initiate sampling: 0.25" - 0.5" rain in 24 hours. All data reported on http://www.wunderground.com/.

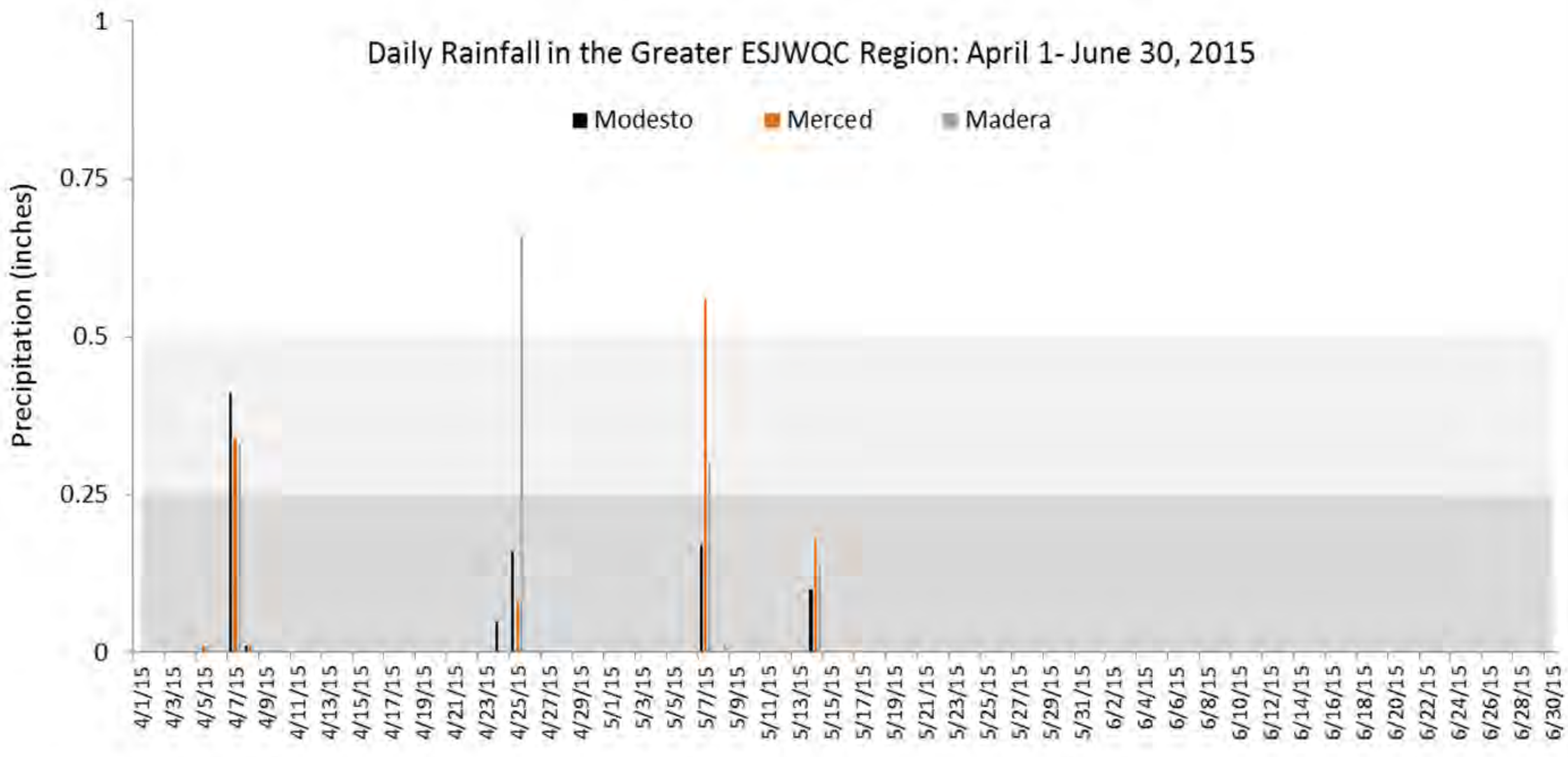
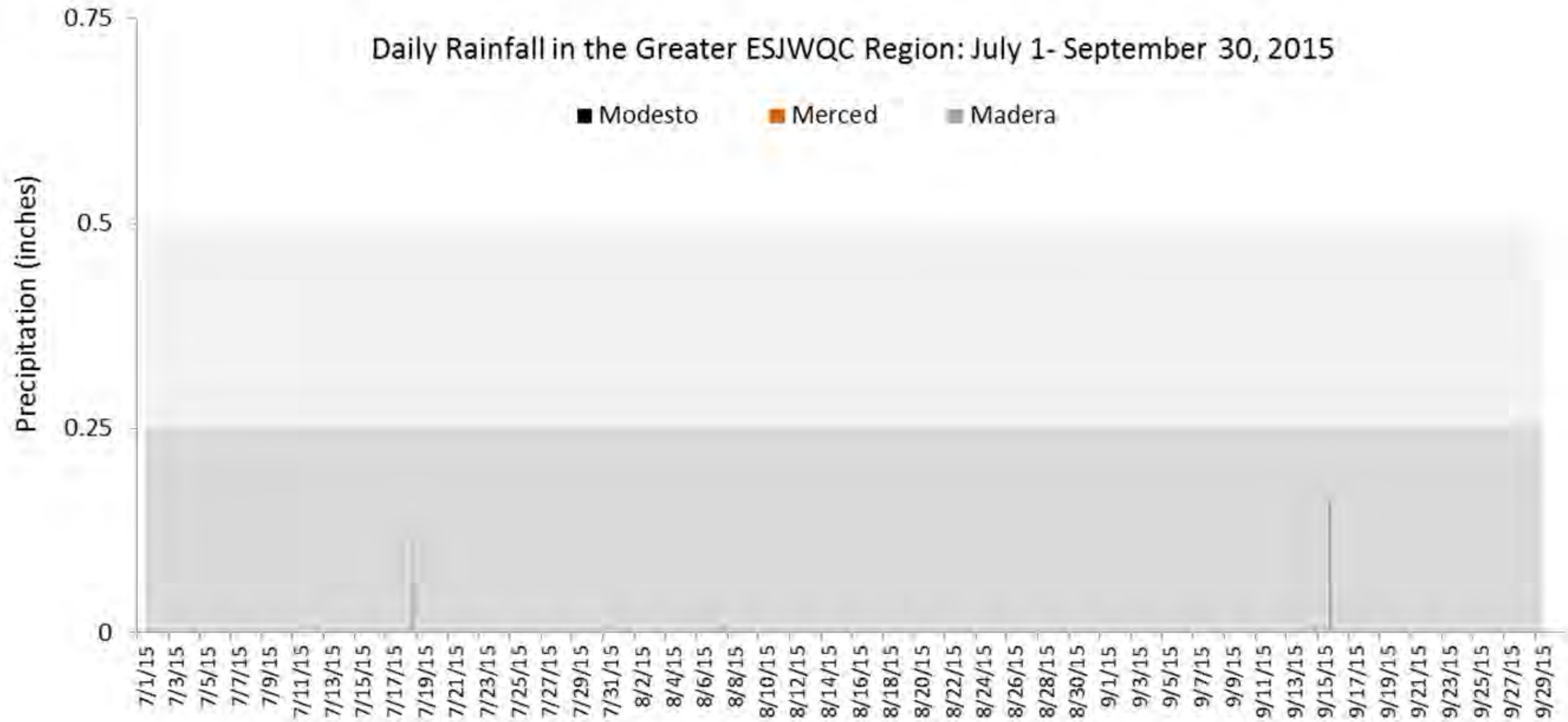


Figure 13. Precipitation history for Modesto, Merced, and Madera, July through September 2015.
The shaded gray area represents the rainfall trigger limit to initiate sampling: 0.25" - 0.5" rain in 24 hours. All data reported on http://www.wunderground.com/.



MONITORING OBJECTIVES AND DESIGN

MONITORING OBJECTIVES

The objectives of the ESJWQC 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 impact of waste discharges from irrigated agriculture to surface water.
4. Determine degree of implementation of management practices to reduce discharge of specific wastes that impact water quality in watersheds within the Coalition region.
5. Determine 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 TMDL monitoring to assess TMDL compliance. Normal Monitoring also includes two storm and two sediment monitoring events.

During the 2015 WY, the Coalition monitored according to the general guidelines outlined in the Monitoring and Reporting Program (MRP, Attachment B to the WDR) and according to the specific plan provided in the August 1, 2014 Monitoring Plan Update (MPU) report for the 2015 WY (approved January 5, 2015). 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. Storm sampling occurred on December 3, 2014 and on February 10, 2015.

Samples are collected for sediment toxicity analysis twice each year at Core sites and during MPM if the site is in a management plan for sediment toxicity. 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 (from August 15 through October 15). Sediment samples were collected on March 10, 2015 and September 8, 2015.

2016 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 2016 WY MPU on August 1, 2015 (revised on September 18, 2015; approved November 13, 2015).

On February 12, 2016, the Coalition submitted an amendment to the 2016 WY MPU to the Regional Board confirming the changes to Coalition monitoring results based on the Surface Water Ambient Monitoring Program (SWAMP) protocol for sediment toxicity results (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 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 at Core sites monthly in each zone for two consecutive years. After two years, monitoring rotates to a second set of Core sites in each zone; monitoring continues to alternate between the two Core sites every two years. Monitoring during the 2015 WY was the second of two consecutive years of monitoring for the first set of Core sites. Table 5 includes a list the 2015 WY Core sites by zone.

At each Core site, the Coalition monitors physical parameters, nutrients, bacteria, pesticides, metals, water column toxicity, and sediment toxicity, as listed in Table 2, Attachment B of the WDR. All constituents monitored at Core sites are included in Table 4 of the 2015 WY MPU. If the concentration of a constituent exceeds its respective the Water Quality Trigger Limit (WQTL) at a Core site, monitoring will continue for a third consecutive year (Attachment B of the WDR, Page 3).

Table 5. ESJWQC 2015 WY Core sites by zone.

Zone	Site Name	Station Code	Latitude	Longitude
1	Dry Creek @ Wellsford Rd	535XDCAWR	37.66000	-120.87526
2	Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	37.44187	-121.00331
3	Highline Canal @ Hwy 99	535XHCHNN	37.41254	-120.75941
4	Merced River @ Santa Fe	535XMRSFD	37.42705	-120.67353
5	Duck Slough @ Gurr Rd	535XDSAGR	37.21408	-120.56126
6	Cottonwood Creek @ Rd 20	545XCCART	36.86860	-120.18180

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).

Represented sites were identified for monitoring during the 2015 WY based on the following criteria:

1. An exceedance of an applied pesticide, applied metal, or toxicity occurred at the Core site in the same zone during the 2014 WY,
2. The Core site is in a management plan for an applied pesticide, applied metal, or toxicity and monitoring at the Represented site is necessary 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. During the 2015 WY, the Coalition monitored 23 of 25 Represented sites within the ESJWQC boundary.

Table 6. ESJWQC Represented site locations by zone.

ZONE	SITE NAME	STATION CODE	LATITUDE	LONGITUDE
1	Mootz Drain Downstream of Langworth Pond	535XMDDLP	37.70539	-120.89569
2	Hatch Drain @ Tuolumne Rd	535XHDATR	37.51498	-121.01229
2	Hilmar Drain @ Central Ave	535XHDACA	37.39058	-120.95820
2	Lateral 2 1/2 near Keyes Rd	535LTHNKR	37.54766	-121.08509
2	Lateral 5 1/2 @ South Blaker Rd	535LFHASB	37.45827	-120.96730
2	Lateral 6 and 7 @ Central Ave	535LSSACA	37.39779	-120.95960
2	Levee Drain @ Carpenter Rd	535XLDACR	37.48062	-121.03106
2	Lower Stevinson @ Faith Home Rd	535LSAFHR	37.37248	-120.92324
2	Unnamed Drain @ Hogin Rd	535XUDAHR	37.43120	-120.99475
2	Westport Drain @ Vivian Rd	535XWDAVR	37.53682	-121.04861
3	Highline Canal @ Lombardy Rd	535XHCALR	37.45547	-120.72181
3	Mustang Creek @ East Ave	535XMCAEA	37.49180	-120.68390
4	Bear Creek @ Kibby Rd	535XBCAKR	37.31230	-120.41535
4	Black Rascal Creek @ Yosemite Rd	535BRCAYR	37.33202	-120.39435
4	Canal Creek @ West Bellevue Rd	535CCAWBR	37.36090	-120.54940
4	Howard Lateral @ Hwy 140	535XHLAHO	37.30790	-120.78200
4	Livingston Drain @ Robin Ave	535XLDARA	37.31693	-120.74229
4	McCoy Lateral @ Hwy 140	535XMLAHO	37.30968	-120.78771
4	Unnamed Drain @ Hwy 140	535XUDAHO	37.31331	-120.89218
5	Deadman Creek @ Gurr Rd	535XDCAGR	37.19514	-120.56147
5	Deadman Creek @ Hwy 59	535DMCAHF	37.19755	-120.48763
5	Miles Creek @ Reilly Rd	535XMCARR	37.25830	-120.47524
6	Ash Slough @ Ave 21	545XASAAT	37.05448	-120.41575
6	Berenda Slough along Ave 18 1/2	545XBSAAE	37.01820	-120.32650
6	Dry Creek @ Rd 18	545XDCARE	36.98180	-120.22056

Monitoring at Special Project Sites

Special project sites include sites monitored as part of the Coalition's Surface Water Quality Management Plan (SQMP) and sites monitored for Total Maximum Daily Load (TMDL) compliance. Both MPM and TMDL sites are monitored for constituents specific to each site.

Special project sites with MPM are Core or Represented sites monitored according to the Coalition's SQMP in order to 1) evaluate commodity and management practice specific effects on water quality, or 2) evaluate sources of identified water quality impairments.

There are currently three special project sites with TMDL compliance monitoring in the ESJWQC region. Monitoring data are collected from TMDL sites to assess compliance according 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 Lower San Joaquin River (hereafter Basin Plan Amendment) for chlorpyrifos and diazinon in the lower reaches of the San Joaquin River.

Management Plan Monitoring Objectives

The objectives of the ESJWQC 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 with a schedule,
5. Development of waste-specific monitoring schedule, and
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 effectiveness of newly implemented management practices. For details on 2015 WY MPM results, refer to the Status of Special Projects section of this report.

Management plans are required as a result of a single exceedance of the WQTL of a TMDL constituent (SC, boron, chlorpyrifos, and diazinon), or more than one exceedance of a WQTL within a three-year time period for all other constituents. Table 58 in 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 ESJWQC management plan process was first outlined in the ESJWQC Management Plan submitted on September 30, 2008 and updated in the 2010 Management Plan Update Report (MPUR). The Coalition submitted a revised management plan strategy in the ESJWQC 2014 SQMP (submitted May 1, 2014, resubmitted March 10, 2015, and approved on November 4, 2015). The 2014 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 subwatersheds and constituents of concern, the strategy employed by the Coalition in the 2014 SQMP is to address the same constituents across the entire Coalition region in as timely a manner as practicable. The WDR specifies that management plans must be complete within 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 work plans and/or source identification studies was provided in the SQMP to the Regional Board.

Management Plan Development Timelines

The Coalition developed a schedule establishing when sites undergo focused outreach and education (Table 7). Based on the Management Plan process in the SQMP, 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 will be analyzed to develop the list of growers who will be targeted for focused outreach and education.

Table 7 is an update priority schedule for addressing each site subwatershed in a management plan. There were 25 site subwatersheds included in the schedule for focused outreach from 2008 through 2016. During the 2016 WY, the Coalition will adopt the new management plan strategy as outlined in the 2014 SQMP. This schedule will be evaluated and updated annually based on the strategy in the 2014 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	Dry Creek @ Wellsford Rd	First Priority	2008-2010
	Duck Slough @ Hwy 99[1]		2008-2010
	Prairie Flower Drain @ Crows Landing Rd		2008-2010
	Bear Creek @ Kibby Rd	Second Priority	2010-2012
	Cottonwood Creek @ Rd 20		2010-2012
	Duck Slough @ Gurr Rd		2010-2012
	Highline Canal @ Hwy 99		2010-2012
	Berenda Slough along Ave 18 1/2	Third Priority	2011-2013
	Dry Creek @ Rd 18		2011-2013
	Lateral 2 ½ near Keyes Rd		2011-2013
	Livingston Drain @ Robin Ave		2011-2013
	Black Rascal Creek @ Yosemite Rd	Fourth Priority	2012-2014
	Deadman Creek @ Hwy 59		2012-2014
	Deadman Creek @ Gurr Rd		2012-2014
	Hilmar Drain @ Central Ave		2012-2014
	Hatch Drain @ Tuolumne Rd	Fifth Priority	2013-2015
	Highline Canal @ Lombardy Rd		2013-2015
	Merced River @ Santa Fe		2013-2015
	Miles Creek @ Reilly Rd		2013-2015
	Ash Slough @ Ave 21	Sixth Priority	2014-2016
	Mustang Creek @ East Ave		2014-2016
	Westport Drain @ Vivian Rd		2014-2016
	Mootz Drain downstream of Langworth Pond[2]	Seventh Priority	2015-2017
	Howard Lateral @ Hwy 140		2015-2017
	Levee Drain @ Carpenter Rd		2015-2017
2014 SQMP	Dry Creek @ Wellsford Rd	2016 Focused Outreach	2016-2018
	Duck Slough @ Gurr Rd		2016-2018
	Highline Canal @ Hwy 99		2016-2018
	Prairie Flower Drain @ Crows Landing Rd		2016-2018

[1]Duck Slough @ Hwy 99 was approved for removal from the ESJ monitoring program in April 2012.

[2]Mootz Drain downstream of Langworth Pond monitoring included all management plan constituents detected at the upstream location (Mootz Drain @ Langworth Rd).

TMDL Monitoring

In October 2005, the Regional Board finalized the Amendments to the Basin Plan Amendment establishing TMDL objectives for the organophosphate pesticides (OP), chlorpyrifos and diazinon, in the lower reaches of the San Joaquin River outside of the Delta. The TMDL was approved by the US EPA on December 20, 2006.

The Basin Plan Amendment divides the Lower San Joaquin River into seven subareas, which include agricultural drainages monitored by the ESJWQC and the Westside San Joaquin River Watershed Coalition (Westside Coalition) under the Irrigated Lands Regulatory Program (ILRP). The ESJWQC and the Westside Coalition collaborated to develop a monitoring plan for assessing compliance with concentration based loads of chlorpyrifos and diazinon at the six compliance points in the Lower San Joaquin River identified in the Basin Plan Amendment. The ESJWQC conducts monitoring to assess compliance at three of the six compliance points, and the Westside Coalition conducts monitoring at the other three. The two Coalitions submit a joint report on monitoring results and their compliance with the TMDL regulations.

The monitoring design and an assessment of the Coalition’s compliance with TMDL Objectives are reported in detail in the 2015 WY San Joaquin River Chlorpyrifos and Diazinon TMDL AMR (submitted May 1, 2016).

MONITORING RESULTS

In order to achieve the monitoring objectives of the ESJWQC monitoring program, the Coalition monitored 29 sites during the 2015 WY. Of these 29 sites, MPM took place at 25 sites (Table 3). Nine of the 25 sites were scheduled for MPM only and MPM occurred at all six Core sites.

Based on the 2015 WY MPU (approved January 5, 2015), the Coalition monitored for the dissolved fraction of copper during MPM and NM at Unnamed Drain @ Hogin Rd and for the dissolved fraction of lead during MPM. The total fraction for arsenic was monitored at Duck Slough @ Gurr Rd, the Core site for Zone 5, during two storm and two irrigation events.

SAMPLING AND ANALYTICAL METHODS

Sample containers, volumes, and holding times are provided in Table 8. Table 9 lists the instruments used to measure field parameters and Table 10 references methods and equipment used to measure discharge. When it is safe wade in the waterbody, discharge is measured at all sites, except Merced River @ Santa Fe, using the USGS R2 Cross Streamflow Method. Analytical methods and reporting limits (RLs) are 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.

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 < 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

Groups	Analytical Parameter	Sample Volume[1]	Sample Container	Initial Preservation/Holding Requirements	Holding Time[2]
	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 should be set up as soon as possible.

Table 9. Field parameters and instruments used to collect measurements.

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

YSI- Yellow Springs Instruments

Table 10. Site specific discharge methods for the 2015 WY.

Site	Discharge Method[1]	Meter/ Gauge
Ash Slough @ Ave 21	USGS R2Cross Streamflow Method	USGS R2 Cross Streamflow Method
Berenda Slough along Ave 18 1/2	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Black Rascal Creek @ Yosemite Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Canal Creek @ West Bellevue Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Cottonwood Creek @ Rd 20	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Deadman Creek @ Gurr Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Deadman Creek @ Hwy 59	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Dry Creek @ Rd 18	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Dry Creek @ Wellsford Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Duck Slough @ Gurr Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Hatch Drain @ Tuolumne Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Highline Canal @ Hwy 99	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Highline Canal @ Lombardy Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Hilmar Drain @ Central Ave	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000

SITE	DISCHARGE METHOD[1]	METER/ GAUGE
Howard Lateral @ Hwy 140	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Lateral 2 1/2 near Keyes Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Lateral 5 1/2 @ South Blaker Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Lateral 6 and 7 @ Central Ave	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Levee Drain @ Carpenter Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Livingston Drain @ Robin Ave	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Lower Stevinson @ Faith Home Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Merced River @ Santa Fe	DWR Gauge	California Data Exchange Center (CDEC) Merced River at Cressy (CRS)
Miles Creek @ Reilly Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Mootz Drain Downstream of Langworth Pond	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Mustang Creek @ East Ave	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Prairie Flower Drain @ Crows Landing Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Unnamed Drain @ Hogin Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Unnamed Drain @ Hwy 140	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Westport Drain @ Vivian Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000

[1]USGS R2 Cross Steamflow Method is only conducted when the stream is safe to wade across. Estimated observed flow is recorded for every site on field sheets.

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
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

Group	Constituent	Matrix	Analyzing Laboratory	Reporting Limit	Minimum Detection Limit	Analytical Method
	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
	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, and irrigation seasons, and storm events (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 significant rainfalls are expected. Irrigation monitoring (April through September) characterizes the discharge from irrigated agriculture via spray drift and irrigation return flows (Table 12). 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 12. Description of monitoring seasons.

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 > 0.25 inches of rain within 24 hours; may occur during any month but generally occurs from January through March.
Irrigation	April through September	Summer months with possible irrigation.

TABULATED RESULTS

Monitoring occurred monthly at sites in the ESJWQC during the 2015 WY. Each sampling location, sampling date, sampling time, and type of monitoring is listed in the sample details (Appendix III, Table III-1). Complete monitoring results from sampling during the 2015 WY are included in Appendix III and Appendix IV. 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 accompanying flow data from the site. Monitoring data include results from samples taken for MPM, NM, sediment monitoring, and TMDL compliance monitoring.

The Coalition is required to sample every site scheduled for monitoring, as outlined in the 2015 WY MPU; however, certain field conditions can prevent samples from being collected. Table 13 lists the sampling conditions that can occur and the sampling exceptions that result in no sample collection. Table 14 indicates if a site was reported as 'Dry' or 'Non-contiguous' during the 2015 WY. All 'Dry' events are counted as sampled events and reported as 'no exceedances of the WQTLs'.

During the 2015 WY, sampling occurred for both sediment and water under both no flow and low flow conditions. If a site had no flow, discharge was recorded as zero. If a waterbody had "puddle-like conditions" the entire sample was categorized as "non-contiguous" in the database. All 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 water quality data should be evaluated with the understanding that the water was not connected to a downstream waterbody (Table 13). Table 14 lists all sites that were non-contiguous at the time of sampling.

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	None: Sediment has enough moisture to collect	No*	Yes

Sampling Conditions	Definition	Sampling Exceptions	Water Samples Collected	Sediment Samples Collected
	volume present to collect required samples.	required samples.		
		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. ESJWQC Dry and non-contiguous sites during the 2015 WY.
'X' indicates the site was successfully sampled, D' indicates the site was dry and no samples were collected, and '*N*' indicates the waterbody was non-contiguous at the time of sampling.

Zone	Site Name	Site Type	October	November	December	January	February	March	April	May	June	July	August	September
1	Dry Creek @ Wellsford Rd	Core	X	*N*	*N*	*N*	X	*N*	X	X	X	X	X	X
	Mootz Drain downstream of Langworth Pond	Represented			X		X	*N*			X			X
2	Prairie Flower Drain @ Crows Landing Rd	Core	**D**	**D**	X	X	X	X	X	X	X	X	X	X
	Hatch Drain @ Tuolumne Rd	Represented				X	X	X	X	X		X	X	**D**
	Hilmar Drain @ Central Ave	Represented				X	X	X	X		X	X	X	X
	Lateral 2 1/2 near Keyes Rd	Represented					**D**	X	X	**D**	X	X	X	X
	Lateral 5 1/2 @ South Blaker Rd	Represented	X		X	*N*	X	**D**[1]				X	X	X
	Lateral 6 and 7 @ Central Ave	Represented			X	X	X	X	X		X	X	X	X
	Levee Drain @ Carpenter Rd	Represented			*N*		X	X			X	X	X	X
	Lower Stevinson @ Faith Home Rd	Represented			X	*N*	**D**	X	X		X	X	X	X
	Unnamed Drain @ Hogin Rd	Represented					**D**	**D**				**D**	**D**	**D**
	Westport Drain @ Vivian Rd	Represented				X	X	X	**D**	X		X	X	X
3	Highline Canal @ Hwy 99	Core	X	**D**	X	*N*	**D**	**D**	X	X	X	X	X	X
	Highline Canal @ Lombardy Rd	Represented				*N*	X	*N*	X	X	X		X	X
	Mustang Creek @ East Ave	Represented	**D**		*N*	X	X	X						*N*
4	Merced River @ Santa Fe	Core	X	X	X	X	X	X	X	X	X	X	X	X
	Black Rascal Creek @ Yosemite Rd	Represented							X	X		X	*N*	*N*
	Canal Creek @ West Bellevue Rd	Represented								X			X	
	Howard Lateral @ Hwy 140	Represented	X			*N*	*N*		**D**	*N*	X	X	*N*	
	Livingston Drain @ Robin Ave	Represented			X	**D**	**D**	**D**	**D**	**D**	**D**	*N*	**D**	**D**
	Unnamed Drain @ Hwy 140	Represented					D							
5	Duck Slough @ Gurr Rd	Core	X	X	*N*	**D**	**D**	X	*N*	*N*	*N*	X	*N*	**D**
	Deadman Creek @ Gurr Rd	Represented		**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**
	Deadman Creek @ Hwy 59	Represented							D				**D**	**D**
	Miles Creek @ Reilly Rd	Represented				**D**	X	**D**	**D**	**D**	**D**	**D**	X	**D**[2]
6	Cottonwood Creek @ Rd 20	Core	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**
	Ash Slough @ Ave 21	Represented				**D**			**D**	**D**	**D**	**D**	**D**	**D**
	Berenda Slough along Ave 18 1/2	Represented	**D**	**D**	**D**	**D**	**D**		**D**	**D**	**D**	**D**	**D**	**D**
	Dry Creek @ Rd 18	Represented	X	*N*	**D**	**D**	*N*	X	X	*N*	**D**	**D**	**D**	**D**

[1]Indicates sediment samples could not be collected; however, water samples were collected.
[2]Indicates that the site was dry and surface water samples could not be collected; however, sediment samples were collected.

On December 3, 2014, Deadman Creek @ Gurr Rd was too shallow to collect samples; however, field parameters were recorded. On February 10, 2015, Deadman Creek @ Gurr Rd and Duck Slough @ Gurr Rd were too shallow to collect samples; however, field parameters were recorded at both sites. The Coalition's sampling procedure does not require field parameters to be measured if samples cannot be collected.

On March 10, 2015, not enough sediment was present at Lateral 5 ½ @ South Blaker Rd to collect sediment samples because the channel had been recently lined with concrete. On September 8, 2015, not enough sediment was present at Lateral 2 ½ near Keyes Rd and at Lateral 5 ½ @ South Blaker Rd to collect sediment samples.

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/ft^3 X Concentration (µg/L). To convert a concentration measured in mg/L to µg/L, multiply by 1,000. 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.

QUARTERLY SUBMITTALS

As required in Attachment B to the WDR R5-2012-0116-R3, the Coalition submits the Quarterly Monitoring Report for the previous quarter's surface water monitoring results in electronic format. Table 15 includes the Quarterly Monitoring Report submittal schedule. Each Quarterly Monitoring Report includes the following data for sampling that occurred during the previous monitoring quarter:

1. An Excel workbook containing exported data that was uploaded into the 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 15. ESJWQC 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 occurred between the COCs and the samples delivered to the laboratory, each item was resolved and documented either directly on the COC or on an anomaly form completed by the laboratory.

Sample collection and field delivery were performed according to the ESJWQC QAPP (amendment form submitted November 24, 2015 and approved January 8, 2016). All COC forms were faxed by the laboratories to Michael L. Johnson, LLC (MLJ-LLC) after samples were received. Table 16 includes a list and description of five instances COC discrepancies occurred during the 2015 WY. With these five exceptions, 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 (Table 16).

Table 16. ESJWQC COC discrepancies for the 2015 WY.

Sample Date	Laboratory	Anomaly Description	Date of Resolution
12/3/2014	AQUA-Science	The time the samples were received by the laboratory was incorrect on the COC. The laboratory corrected the time and the COC and sent to MLJ staff via email. The corrected COC replaced the original hard copy on file and was provided in the final laboratory report.	12/9/2014
2/10/2015	APPL	Sampling crew performed bottle checks to ensure all sample bottles were collected from the correct sites and were placed in the correct laboratory coolers for shipping at the end of each sampling event. The laboratory reported one of two sample bottles collected from Unnamed Drain @ Hogin Rd for diuron analysis was missing, despite two bottles being accounted for during the bottle checks. The laboratory confirmed that the remaining bottle contained enough sample volume for the analysis. The COC on file and in the final laboratory report was updated to indicate one bottle instead of two was collected from the site.	2/12/2015
5/12/2015	APPL	The sample ID on bottle labels did not match the COCs for the three SJR TMDL sites. The COC for those sites was correct and corrected COC was provided in the final laboratory report.	5/14/2015
9/8/2015	APPL	Laboratory staff omitted Miles Creek @ Reilly Rd off of the COC since the site was not monitored due to being dry. The updated COC is in the final copy of the lab report.	9/10/2015
9/8/2015	AQUA-Science	Laboratory staff omitted Miles Creek @ Reilly Rd off of the COC since the site was not monitored due to being dry. The updated COC is in the final copy of the lab report.	9/9/2015

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. Table 17 through Table 19 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. Table 20 through Table 32 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

Field and transport completeness is assessed by counting the number of sampled sites divided by the number of samples scheduled for the WY. Completeness must be met at a frequency of 90% or greater for each analyte. All sites scheduled for the 2015 WY were ‘sampled’ and field and transport completeness was 100% for all analytes.

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. Field measurement completeness was 99.5% for all field parameters during the 2015 WY (Table 18).

Discharge is measured at all sites when the sampling crew can safely wade across the waterbody to take flow readings. 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 discharge measurements represented as field parameter completeness in Table 18. When toxicity is the only constituent scheduled for monitoring during sample collection, discharge is not measured and does not count toward the total number of scheduled events for discharge in Table 18. Discharge may not have been measured if a waterbody was too deep to safely take flow readings, a waterbody was too shallow to submerge the flow meter, or equipment failure occurs; these instances are counted against the total number of measurements represented in Table 18. During August 11, 2015, the view screen on the discharge meter displayed conductivity and noise errors while measuring discharge at Canal Creek @ West Bellevue Rd. The sampling crew attempted to resolve the error by cleaning the probe sensor and restarting the meter, but the errors messages still occurred. Therefore discharge could not be measured at Canal Creek @ West Bellevue Rd due to the flow meter malfunctioning in the field. Discharge could not be measured because waterbodies were too shallow to submerge the flow meter during the December 3, 2014 sampling event at Highline Canal @ Hwy 99 and Prairie Flower Drain @ Crows Landing Rd and the February 10, 2015 sampling event at Lateral 5 ½ @ South Blaker Rd. Discharge could not be measured because waterbodies were too deep to safely measure flow during the February 10, 2015 sampling event at Dry Creek @ Wellsford Rd and August 11, 2015 at Lateral 5 ½ @ South Blaker Rd. Completeness for discharge was 97% for the 2015 WY (195 of 201 events, Table 18).

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, when applicable. 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. Completeness acceptability is met when 5% or more of field QC samples (field duplicates, field blanks, and equipment blanks) are analyzed in a given WY.

Field duplicates are analyzed for all constituents and field blanks are analyzed for all constituents except toxicity. Dissolved metals are analyzed in equipment blank samples. Completeness was less than 5% for hardness because it was analyzed once in an equipment blank sample for the February 10, 2015 sampling event. However, hardness is not typically analyzed in equipment blanks, but instead analyzed in field blanks. Hardness was requested on the COC for analysis in for both the field and equipment blank samples by mistake. Table 17 lists the single hardness result associated with the equipment blank and "NA" is marked as the completeness (%) since there is no completeness requirement. Completeness for all constituents was above 5% for the 2015 WY (Table 17).

Analytical Completeness

During the 2015 WY, all samples were analyzed as scheduled. Therefore, analytical completeness was 100% (Table 17).

Batch Completeness

Each chemistry and toxicity 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 217 (100%) chemistry and toxicity batches met completeness requirements.

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 30 and the ESJWQC QAPP. Results associated with hold time violations are flagged accordingly in the database. During the 2015 WY, 100% of samples were analyzed within hold time (Table 21).

PRECISION AND ACCURACY

Precision and accuracy are evaluated for each type of QC sample analyzed during the 2015 WY in Table 20 through 32 including.

Briefly, they are addressed as follows:

- Evaluation of blank samples (field blank, equipment blank, and laboratory blank): Table 20, Table 21 and Table 23,
- Evaluation of field duplicate precision for chemistry, toxicity, and grain size: Table 22 and Table 32
- Evaluation of laboratory accuracy (LCS, MS, surrogates) of recovery: Table 24, Table 26, and Table 29,
- Evaluation of laboratory precision of duplicate samples (LCSD, MSD, and laboratory duplicate): Table 25, Table 27, and Table 28,
- Summary of holding time evaluations: Table 30,
- Summary of negative control toxicity tests: Table 31.

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.

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 data when DQO acceptability criteria fell below 90% for the WY 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.

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 is loaded in the database.

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} ≤1.30. All field and laboratory duplicates had an R_{log} ≤1.30 and all results for field and laboratory blanks were non-detect. All *E. coli* results reported were accepted and are useable.

Hardness as CaCO3 (Dissolved): Hardness is analyzed in samples that are also analyzed for dissolved metals and is used to calculate the hardness based WQTLs for dissolved metals. Hardness QC samples include: field and laboratory blanks, LCS, MS, a duplicate (usually a MS or LCS duplicate), and field duplicate samples for QC. On the February 2015 COC, an equipment blank was mistakenly marked for hardness analysis; the result was non-detect. Acceptability was met for 100% of QC samples analyzed for hardness.

Metals (dissolved): Copper and lead were the only dissolved metals analyzed for the 2015 WY. 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 metals are analyzed with the following QC samples: laboratory blanks, field blanks, equipment blanks, LCS, MS, a duplicate (usually a LCS or MS duplicate), and field duplicate samples. Acceptability was met in 100% of laboratory blanks, field blanks, equipment blanks, LCS, MS, and MSD samples analyzed for dissolved lead and copper. Acceptability was met in 6 of 8 (75%) of field duplicate samples analyzed for dissolved lead and 9 of 10 (90%) of field duplicate samples analyzed for dissolved copper (Table 22).

Acceptability was not met for dissolved copper and lead in field duplicate samples during the following sampling events: August 11, 2015 (dissolved copper and dissolved lead) and September 8, 2015 (dissolved lead). For the August 11, 2015 sampling event, field duplicate RPDs were greater than 25% for both dissolved copper (RPD 119%) and dissolved lead (RPD 89%). The dissolved copper concentrations were 0.63 µg/L (environmental sample) and 2.5 µg/L (field duplicate sample). The laboratory reanalyzed and confirmed the copper results and associated RPD. During this sampling event, the waterbody of the site (Highline Canal @ Lombardy Rd) where samples were collected for copper analysis was noted as murky on the field sheet and discharge was measured at 75.47 cfs. The high RPD could be due to the turbid waters and high flow during collection. The concentrations of dissolved lead for the August sampling event were 0.05 µg/L (environmental sample) and 0.13 µg/L (field duplicate), which were reported below the 0.25 µg/L RL. The high RPD for the dissolved lead sample is due to the low concentrations that are detected but not quantifiable. Acceptability was met for all other QC samples analyzed for the August 11, 2015 sampling event.

Dissolved lead was the only metal analyzed in the batch for the September 8, 2015 sampling event and the field duplicate RPD was 33%. The lead concentrations in the environmental (0.05 µg/L) and field duplicate (0.07 µg/L) samples were reported below the 0.25 µg/L RL. As with the August samples, the high RPD for the dissolved lead sample is due to the low concentrations that are detected but not quantifiable. Acceptability was met for all other QC samples analyzed in this batch. The data were accepted because all other QC samples analyzed in the batch met acceptability.

Metals (total): Arsenic and molybdenum were the only total metals analyzed for the 2015 WY. Quality control samples for total metals include: laboratory blank, field blank, LCS, MS, a duplicate (usually a LCS or MS duplicate), and field duplicate samples. Acceptability was met in 100% of field blanks, equipment blanks, field duplicates, LCS, and MSD samples analyzed for total metals. Acceptability was met in 4 of 4 (100%) of the MS samples analyzed for arsenic, and 11 of 12 (91.7%) of MS samples analyzed for molybdenum. Due to overall acceptability being greater than 90%, data were accepted and are useable.

Nutrients: Nutrients are analyzed in water samples as ammonia as N, nitrate + nitrite as N, and orthophosphate as P. Quality control samples for these constituents are laboratory blank, field blank, field duplicate, LCS, MS, and laboratory duplicate (usually LCSD or MSD samples) samples. Overall the 90% acceptability requirement was met for laboratory blanks, field blanks, LCS, LCSD, MS, and MSD samples analyzed for ammonia as N, orthophosphate as P, and nitrate + nitrite as N. Field duplicate acceptability was met in 11 of 12 (91.7%) of samples analyzed for nitrate + nitrite as N and in 10 of 12 samples (83.3%) for both ammonia as N and orthophosphate as P (Table 22).

Field duplicate RPDs for ammonia as N did not meet acceptability (≤ 25%) for samples collected during the March 10, 2015 and July 14, 2015 sampling events. In both batches, one ammonia result was flagged as DNQ and one was only slightly above the RL (0.1 mg/L) at 0.12 mg/L (March 10) and 0.066 mg/L (July 14).

Field duplicate RPDs exceeded the acceptable limit for orthophosphate in batches analyzed for the November 12, 2014 and July 14, 2015 sampling events. Samples analyzed in the batch for the November 12, 2014 sampling event, both orthophosphate as P results were reported either at the MDL (0.006 mg/L) or slightly above it at 0.008 mg/L. Samples analyzed in the batch for the July 14, 2015 sampling event, one result was reported below the RL (0.01 mg/L) at 0.008 mg/L and slightly above it at 0.011 mg/L.

Although the field duplicate RPDs exceeded the 25% acceptable limit for ammonia and orthophosphate, acceptability was met in all other QC samples. The high RPDs for the ammonia and orthophosphate duplicate samples are due to the low concentrations that are detected but not quantifiable. All nutrient data are considered acceptable and useable.

Pesticides in water: Pesticides were analyzed in four different methods: organophosphates and triazines (EPA 8141A), carbamates and methamidophos (EPA 8321A), paraquat (EPA 549.2M), and glyphosate (EPA 547M). 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. The exceptions are paraquat in the LCS (2 of 4, 50%), paraquat in the MS (0 of 4, 0%), and methamidophos in the MSD (10 of 12, 83.3%). Each instance is discussed below.

Paraquat was collected and analyzed in samples from one storm (December 10, 2014) and one irrigation event (July 14, 2015) during the reporting period. Due to the small number of samples collected, the probability of QC samples meeting the 90% acceptability requirement is smaller. Within the batch processed for the storm event, the LCS and LCSD samples recovered paraquat below the lowest acceptable limit of 70% (Table 24). Within the same batch, the MS and MSD samples also recovered paraquat below the lowest acceptable limit of 70% (Table 26). Despite the low recoveries in the LCS and MS samples, the recoveries were between 60.7% and 68.6%. The laboratory was contacted to discuss the usability of the batch. The analyst indicated the batch was acceptable because the lowest point on the calibration curve was accurately recovered compared to the expected value and the LCS and MS recoveries were relatively close to the lowest acceptable limit. Therefore, any paraquat present in the collected samples would have been detected, even at low concentrations. Within this batch all sample results were non-detect.

Paraquat recovered below the lowest acceptable limit in the MS samples collected during the irrigation event on July 14, 2015. The recoveries were 64.2% (MS) and 56.6% (MSD); all other DQOs were met for the QC samples. During this monitoring event, water was collected from Highline Canal @ Hwy 99 for the paraquat MS. Paraquat tends to adsorb tightly to particles in the water column, making it difficult to isolate the bound paraquat during the extraction process. Samples were also collected from the site for turbidity analysis and the results were 6.8 NTU (environmental sample) and 6.5 NTU (field duplicate). Due to the physical properties of paraquat, the turbidity measured in the samples could have impacted recoverability in the MS samples. Due to non-detect results in samples analyzed in the batch and all other QC samples meeting acceptability, the data are useable.

Matrix spike duplicate RPDs for methamidophos met the acceptable limit (≤ 25%) in 10 of the 12 (83.3%) of the samples analyzed. Acceptability was not met in two batches for the February 10, 2015 and June 9, 2015 sampling events (Table 22). The RPD calculated for the February 10, 2015 sampling event was only slightly higher than the acceptable limit at 25.2%. For the samples analyzed in the batch for this sampling event, acceptability criteria were accepted in all other QC samples and all sample results were non-detect. The RPD calculated for the June 9, 2015 sampling event was 36.4%. Acceptability criteria were met for all other QC samples and sample results were non-detected in this batch. For these reasons, the data from both batches are considered acceptable.

Total Organic Carbon (TOC) in water: Quality Control samples for TOC analyses consist of a laboratory blank, field blank, field duplicate, LCS, MS, and laboratory duplicate sample. Data quality objectives were met in 100% of the field duplicate, LCS, and laboratory duplicate samples analyzed for TOC during the 2015 WY. TOC field blank samples met acceptability criteria in 10 of 12 (83.3%) samples (Table 20).

In two field blank samples, TOC was detected above the RL of 0.5 mg/L (1.4 mg/L in the samples from May 12, 2015 and 1.3 mg/L in the samples from June 9, 2015). Both concentrations are nearly three times the RL for TOC. The TOC concentrations were 2.2 mg/L (environmental sample) and 1.8 mg/L (field duplicate sample) for May 12, 2015 and 1.6 mg/L (environmental sample) and 1.6 mg/L (field duplicate sample) for June 9, 2015. The laboratory was contacted about the detections and analysts reanalyzed the field blank samples; the detections were confirmed.

Detections in the field blank may be due to contamination of the field blank water, the field blank storage container, the field blank bottle, or contamination from the sampler. Field blank water is de-ionized (DI) and collected in amber glass vials preserved with hydrochloric acid. The field blank bottles come directly from the laboratory and are certified pre-cleaned. The TOC field blank sample bottle was not opened until right before filling it with DI water in the field. Clean gloves were used when filling the bottle with DI water and neither the lid nor the opening of the bottle was touched. The cap was immediately returned to the bottle and screwed on tightly after filling with DI water. All sampling SOPs (which include the above steps to prevent contamination) were followed. Other sources of contamination may have occurred during transport from the field to the laboratory. The associated laboratory blank had no TOC detections. It is difficult to definitively know the source of contamination in the field blank. However, when detections occur in blank samples, the sampling coordinator is notified and sampling staff are reminded of protocols to reduce and eliminate field contamination.

Total Suspended Solids (TSS): Quality control samples for TSS include field and laboratory blanks and field and laboratory duplicates. One hundred percent of field and laboratory blanks and laboratory duplicates met acceptability for the 2015 WY. Nine of 12 (75%) field duplicate samples met acceptability (RPD $\leq$25%). Field duplicate RPDs exceeded the 25% acceptable limit in batches for the October 14, 2014, March 10, 2015, and September 8, 2015 sampling events. In all three associated batches, one result was reported above and one was reported below the RL. Acceptability was met in all other QC samples. Therefore, the high RPDs are likely due to the low concentrations detected relative to the sensitivity of the instrument. All TSS data are considered acceptable and useable.

Turbidity: Quality control samples analyzed for turbidity include: laboratory blank, field blank, field duplicate, LCS and laboratory duplicate samples. All DQOs were met in QC samples analyzed for turbidity, with the exception of field duplicate samples, which met acceptability in 11 of 12 samples (91.7%). All turbidity data were accepted and are useable.

Sediment Pesticides: Sediment samples were collected twice a year to test for toxicity to *H. azteca* on March 10 and September 8 for the 2015 WY. During these same sampling events, additional sediment samples were stored at the chemistry laboratory until the Coalition receives the sediment toxicity results. When percent survival is less than 80% and statistically significant compared to the control, the laboratory is notified of the samples that need sediment pesticide analyses performed. Sediment pesticides are analyzed following two different methods: EPA 8270M (chlorpyrifos and pyrethroids) and EPA 8270 (piperonyl butoxide, PBO); each method is processed as a separate batch. The QC samples analyzed for chlorpyrifos, pyrethroids and PBO batches include a laboratory blank, LCS, LCSD, MS, MSD, field duplicate, and surrogates.

During the 2015 WY, additional sediment chemistry was required for samples collected at Prairie Flower Drain @ Crows Landing Rd for the March 10, 2015 sampling event. Therefore, evaluating data for acceptability is based on the performance of the samples analyzed in the chlorpyrifos and pyrethroids batch and the PBO batch.

For the chlorpyrifos and pyrethroids batch, acceptability criteria were met for 100% of laboratory blanks, LCS, LCSD, and surrogates. Field duplicate RPDs were ≤25% for all analytes except bifenthrin, chlorpyrifos, lambda cyhalothrin, and permethrin. All MS analytes recovered within acceptable limits except chlorpyrifos (0 of 2, 0%) and lambda cyhalothrin (1 of 2, 50%). The MS RPDs met acceptability for all analytes except chlorpyrifos (0 of 1, 0%).

Field duplicate RPDs were greater than 25% for bifenthrin (43%), chlorpyrifos (87%), lambda cyhalothrin (32%), and permethrin (50%). During sediment monitoring, a clean, metal scoop is used to collect sediment for sediment toxicity, grain size, TOC, and sediment pesticide analyses. Sediment collected in each scoop is distributed evenly between sample jars and repeated until the jars are filled with enough sediment volume for analysis. The laboratory also homogenizes all sediment samples prior to analysis to increase precision. Despite these efforts to minimize variability, high RPDs can be due to unknown reasons that cannot be resolved by collection or laboratory methods.

Chlorpyrifos and lambda cyhalothrin were recovered outside the acceptable limit in the MS samples. Chlorpyrifos and lambda cyhalothrin were the two pesticides with the highest concentration detected in the environmental sample; chlorpyrifos was 1,400 ng/g dw and lambda cyhalothrin was29 ng/g dw. The spike concentration in the MS (2.5 ng/L) is considerably lower compared to the concentration detected in the sample. Therefore, the spike concentration is essentially lost among the high concentrations of the environmental sample. The low spike concentrations most likely resulted in the high RPD. All sediment pesticide data are considered acceptable and useable.

In the PBO batch, none of the MS samples recovered PBO within acceptable limits. The recoveries were 203% (MS) and 253% (MSD). Recoveries were also above the acceptable limit in 4 of 7 (57.1%) surrogates (esfenvalerate-d6) analyzed in the batch (Table 29). Piperonyl butoxide was not detected in the environmental or field duplicate samples. The PBO batch was accepted because the high recoveries in the MS samples and surrogates indicate that PBO would have been detected in the samples, if it was present.

Sediment Grain Size and TOC: Samples were collected for sediment grain size and TOC analyses on March 10th and September 8th during the 2015 WY. The associated QC for inorganics in sediments consist of: laboratory blank (TOC only), CRM (TOC only), field duplicate, and laboratory duplicate samples.

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 replicability and precision 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 1 of 2 (50%) samples. A field duplicate RPD was greater than 25% during the March 10, 2015 sampling event and the RPD was 30%. The high RPD could be due to heterogeneous composition of TOC in sediments which would result in variability, even when samples are homogenized. The data were accepted because laboratory duplicate precision met acceptability. Therefore, the data were accepted and are useable.

Toxicity

The Coalition collects samples to monitor water column toxicity to 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. One hundred percent of field duplicates were within the acceptability criterion for *C. dubia* and *P. promelas*. The field duplicate RPD for *S. capricornutum* was within the acceptable limit for 11 of 12 samples (91.7%; Table 22). During the 2015 WY, all CNEG tests met the acceptability criteria (Table 31).

Sediment Toxicity: Sediment samples were collected to test for toxicity on March 10 and September 8 of the 2015 WY. Field duplicate samples were collected for these two events and all RPDs were within 25%. Test acceptability was met in all CNEG tests for sediment.

CORRECTIVE ACTIONS

Corrective actions are decisions made by the laboratory to demonstrate laboratory capabilities to perform analyses and data quality. The laboratories routinely address analytical discrepancies, such as reanalysis or confirmation analyses, prior to submitting final laboratory reports and Electronic Data Deliverables (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 year's recoveries were not achieved due to high concentrations in environmental samples. On July 23, 2015, the Coalition discussed options with the laboratory to address MS recoverability and improvements in sediment pesticide analyses. Concentrations of sediment pesticides detected in samples indicated the spike concentrations the laboratory was using were not effectively demonstrating accuracy in percent recoveries. The laboratory agreed to change the spike concentration in MS samples based on past results to improve recoveries. The change should reduce or eliminate instances where recoveries cannot be calculated due to high concentrations in the environmental samples. 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.

Table 17. ESJWQC field and transport and analytical completeness: environmental sample counts and percentages.
Samples collected during the 2015 WY. The table counts environmental grabs only; field duplicates are not included. Each analyte is sorted by method and in alphabetical order. Bolded rows represent analytes that did not meet the acceptability requirement.

Method	Matrix	Analyte	Environmental Samples scheduled	Dry/too shallow	Samples Collected	Field and transport completeness (%)	Total environmental samples Analyzed	Analytical Completeness (%)
ASTM D422	Sediment	Grain size	40	11	29	100.0	29	100.0
EPA 180.1	Water	Turbidity	72	21	51	100.0	51	100.0
EPA 200.8	Water	Arsenic	4	1	3	100.0	3	100.0
EPA 200.8	Water	Dissolved Copper	84	54	30	100.0	30	100.0
EPA 200.8	Water	Dissolved Lead	34	13	21	100.0	21	100.0
EPA 200.8	Water	Molybdenum	12	2	10	100.0	10	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	72	21	51	100.0	51	100.0
EPA 547M	Water	Glyphosate	15	5	10	100.0	10	100.0
EPA 549.2M	Water	Paraquat	15	5	10	100.0	10	100.0
EPA 600/R-99-064	Sediment	*Hyalella azteca*	40	11	29	100.0	29	100.0
EPA 8141A	Water	Atrazine	72	21	51	100.0	51	100.0
EPA 8141A	Water	Azinphos Methyl	72	21	51	100.0	51	100.0
EPA 8141A	Water	Chlorpyrifos	119	43	76	100.0	76	100.0
EPA 8141A	Water	Cyanazine	72	21	51	100.0	51	100.0
EPA 8141A	Water	Demeton-s	72	21	51	100.0	51	100.0
EPA 8141A	Water	Diazinon	73	21	52	100.0	52	100.0
EPA 8141A	Water	Dichlorvos	72	21	51	100.0	51	100.0
EPA 8141A	Water	Dimethoate	95	24	71	100.0	71	100.0
EPA 8141A	Water	Disulfoton	72	21	51	100.0	51	100.0
EPA 8141A	Water	Malathion	72	21	51	100.0	51	100.0
EPA 8141A	Water	Methidathion	72	21	51	100.0	51	100.0
EPA 8141A	Water	Parathion, Methyl	72	21	51	100.0	51	100.0
EPA 8141A	Water	Phorate	72	21	51	100.0	51	100.0
EPA 8141A	Water	Phosmet	72	21	51	100.0	51	100.0
EPA 8141A	Water	Simazine	72	21	51	100.0	51	100.0
EPA 8141A	Water	Trifluralin	72	21	51	100.0	51	100.0
EPA 821/R-02-012	Water	*Ceriodaphnia dubia*	99	27	72	100.0	72	100.0
EPA 821/R-02-012	Water	*Pimephales promelas*	92	28	64	100.0	64	100.0
EPA 821/R-02-013	Water	*Selenastrum capricornutum*	127	34	93	100.0	93	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

Method	Matrix	Analyte	Environmental Samples scheduled	Dry/too shallow	Samples Collected	Field and transport completeness (%)	Total environmental samples Analyzed	Analytical Completeness (%)
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
EPA 8321A	Water	Aldicarb	72	21	51	100.0	51	100.0
EPA 8321A	Water	Carbaryl	72	21	51	100.0	51	100.0
EPA 8321A	Water	Carbofuran	72	21	51	100.0	51	100.0
EPA 8321A	Water	Diuron	94	25	69	100.0	69	100.0
EPA 8321A	Water	Linuron	72	21	51	100.0	51	100.0
EPA 8321A	Water	Methamidophos	72	21	51	100.0	51	100.0
EPA 8321A	Water	Methiocarb	72	21	51	100.0	51	100.0
EPA 8321A	Water	Methomyl	72	21	51	100.0	51	100.0
EPA 8321A	Water	Oxamyl	72	21	51	100.0	51	100.0
SM 2340 C	Water	Dissolved Hardness as CaCO3	52	12	40	100.0	40	100.0
SM 2540 D	Water	Total Suspended Solids	72	21	51	100.0	51	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	72	21	51	100.0	51	100.0
SM 4500-P E	Water	OrthoPhosphate as P	72	21	51	100.0	51	100.0
SM 5310 B	Water	Total Organic Carbon	72	21	51	100.0	51	100.0
SM 9223 B	Water	*E. coli*	72	21	51	100.0	51	100.0
Walkley-Black	Sediment	Total Organic Carbon	40	11	29	100.0	29	100.0
		Total	**3061**	**915**	**2146**	**100.0**	**2146**	**100.0**

Table 18. ESJWQC field and transport completeness: field parameter counts and percentages.
Samples collected during the 2015 WY; sorted by method. Each analyte is sorted by method and in alphabetical order. Bolded rows represent analytes that did not meet the completeness requirement.

Method	Analyte	Samples Scheduled	Dry or too shallow Sites	Total Measurements	Completeness (%)
USGS R2Cross streamflow	Discharge[1], cfs	201	69	126	97.0
SM 4500-O	Dissolved Oxygen, mg/L	241	82	159	100.0
EPA 150.1	pH	241	82	159	100.0
EPA 120.1	Specific Conductivity, µS/cm	241	82	159	100.0
SM 2550	Temperature, ° C	241	82	159	100.0
	Total	**1165**	**397**	**762**	**99.5**

[1]Discharge is excluded from counts for 'samples scheduled' when toxicity is the only constituent scheduled or when the waterbody does not have enough water to collect samples.

Table 19. ESJWQC Field QC batch completeness: Total counts per analyte and completeness percentages.
Samples collected during the 2015 WY. The environmental sample count does not include the field duplicate. Toxicity field duplicate samples are excluded from table. Completeness for each analyte that resulted in less than 5% is bolded.

Method	Matrix	Analyte	Total Environmental Samples	Total Field Duplicate Samples	Total Equipment Blank Samples	Total Field Blank Samples	Total Environmental & Field QC Samples	Field Duplicate Completeness (%)	Equipment Blank Completeness (%)	Field Blank Completeness (%)
ASTM D4464M	Sediment	Grain Size	29	2	NA	NA	31	6.5	NA	NA
EPA 180.1	Water	Turbidity	51	12	NA	12	75	16.0	NA	16.0
EPA 200.8	Water	Arsenic	3	3	NA	3	9	33.3	NA	33.3
EPA 200.8	Water	Dissolved Copper	30	10	10	10	60	16.7	16.7	16.7
EPA 200.8	Water	Dissolved Lead	21	8	8	8	45	17.8	17.8	17.8
EPA 200.8	Water	Molybdenum	10	10	NA	10	30	33.3	NA	33.3
EPA 353.2	Water	Nitrate + Nitrite as N	51	12	NA	12	75	16.0	NA	16.0
EPA 547M	Water	Glyphosate	10	2	NA	2	14	14.3	NA	14.3
EPA 549.2M	Water	Paraquat	10	2	NA	2	14	14.3	NA	14.3
EPA 600/R-99-064	Sediment	*Hyalella azteca*	29	2	NA	NA	12	16.7	NA	NA
EPA 8141A	Water	Atrazine	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Azinphos Methyl	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Chlorpyrifos	76	12	NA	12	100	12.0	NA	12.0
EPA 8141A	Water	Cyanazine	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Demeton-s	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Diazinon	52	12	NA	12	76	15.8	NA	15.8
EPA 8141A	Water	Dichlorvos	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Dimethoate	71	12	NA	12	95	12.6	NA	12.6
EPA 8141A	Water	Disulfoton	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Malathion	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Methidathion	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Parathion, Methyl	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Phorate	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Phosmet	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Simazine	51	12	NA	12	75	16.0	NA	16.0
EPA 8141A	Water	Trifluralin	51	12	NA	12	75	16.0	NA	16.0
EPA 821/R-02-012	Water	*Ceriodaphnia dubia*	72	12	NA	NA	84	14.3	NA	NA
EPA 821/R-02-012	Water	*Pimephales promelas*	64	12	NA	NA	84	14.3	NA	NA
EPA 821/R-02-013	Water	*Selenastrum capricornutum*	93	12	NA	NA	76	15.8	NA	NA
EPA 8270	Sediment	Piperonyl Butoxide	1	1	NA	NA	2	50.0	NA	NA
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

Method	Matrix	Analyte	Total Environmental Samples	Total Field Duplicate Samples	Total Equipment Blank Samples	Total Field Blank Samples	Total Environmental & Field QC Samples	Field Duplicate Completeness (%)	Equipment Blank Completeness (%)	Field Blank Completeness (%)
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	51	12	NA	12	75	16.0	NA	16.0
EPA 8321A	Water	Carbaryl	51	12	NA	12	75	16.0	NA	16.0
EPA 8321A	Water	Carbofuran	51	12	NA	12	75	16.0	NA	16.0
EPA 8321A	Water	Diuron	69	12	NA	12	93	12.9	NA	12.9
EPA 8321A	Water	Linuron	51	12	NA	12	75	16.0	NA	16.0
EPA 8321A	Water	Methamidophos	51	12	NA	12	75	16.0	NA	16.0
EPA 8321A	Water	Methiocarb	51	12	NA	12	75	16.0	NA	16.0
EPA 8321A	Water	Methomyl	51	12	NA	12	75	16.0	NA	16.0
EPA 8321A	Water	Oxamyl	51	12	NA	12	75	16.0	NA	16.0
SM 2340 C	Water	Dissolved Hardness as CaCO3[1]	40	12	1	12	65	18.5	NA	18.5
SM 2540 D	Water	Total Suspended Solids	51	12	NA	12	75	16.0	NA	16.0
SM 4500-NH3 C v20	Water	Ammonia as N	51	12	NA	12	75	16.0	NA	16.0
SM 4500-P E	Water	OrthoPhosphate as P	51	12	NA	12	75	16.0	NA	16.0
SM 5310 B	Water	Total Organic Carbon	51	12	NA	12	75	16.0	NA	16.0
SM 9223 B	Water	*E. coli*	51	12	NA	12	75	16.0	NA	16.0
Walkley-Black	Sediment	Total Organic Carbon	29	2	NA	NA	31	6.5	NA	NA
		Total	**2146**	**483**	**19**	**431**	**3039**	**15.9**	**18.1**	**15.96**

NA; Not applicable, analysis was not conducted or the QC is not required for the constituent listed.

[1]Hardness was requested by mistake for analysis in the equipment blank for the February 10, 2015 sampling event. The Coalition kept the equipment blank hardness result as extra QC for the batch. The % completeness is Not Applicable (NA).

Table 20. ESJWQC summary of field blank QC sample evaluations.
Samples collected during the 2015 WY, sorted by method and analyte. Each analyte is sorted by method and in alphabetical order. Bolded rows represent analytes that did not meet the 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 (environ. concentration/5)	12	12	100.0
EPA 200.8	Water	Arsenic	<RL or (environ. concentration/5)	3	3	100.0
EPA 200.8	Water	Dissolved Copper	<RL or (environ. concentration/5)	10	10	100.0
EPA 200.8	Water	Dissolved Lead	<RL or (environ. concentration/5)	8	8	100.0
EPA 200.8	Water	Molybdenum	<RL or (environ. concentration/5)	10	10	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	<RL or (environ. concentration/5)	12	12	100.0
EPA 547M	Water	Glyphosate	<RL or (environ. concentration/5)	2	2	100.0
EPA 549.2M	Water	Paraquat	<RL or (environ. concentration/5)	2	2	100.0
EPA 8141A	Water	Atrazine	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Azinphos methyl	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Chlorpyrifos	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Cyanazine	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Demeton-s	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Diazinon	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Dichlorvos	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Dimethoate	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Disulfoton	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Malathion	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Methidathion	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Parathion, Methyl	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Phorate	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Phosmet	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Simazine	<RL or (environ. concentration/5)	12	12	100.0
EPA 8141A	Water	Trifluralin	<RL or (environ. concentration/5)	12	12	100.0
EPA 8321A	Water	Aldicarb	<RL or (environ. concentration/5)	12	12	100.0
EPA 8321A	Water	Carbaryl	<RL or (environ. concentration/5)	12	12	100.0
EPA 8321A	Water	Carbofuran	<RL or (environ. concentration/5)	12	12	100.0
EPA 8321A	Water	Diuron	<RL or (environ. concentration/5)	12	12	100.0
EPA 8321A	Water	Linuron	<RL or (environ. concentration/5)	12	12	100.0
EPA 8321A	Water	Methamidophos	<RL or (environ. concentration/5)	12	12	100.0
EPA 8321A	Water	Methiocarb	<RL or (environ. concentration/5)	12	12	100.0
EPA 8321A	Water	Methomyl	<RL or (environ. concentration/5)	12	12	100.0
EPA 8321A	Water	Oxamyl	<RL or (environ. concentration/5)	12	12	100.0
SM 2340 C	Water	Dissolved Hardness as CaCO3	<RL or (environ. concentration/5)	12	12	100.0
SM 2540 D	Water	Total Suspended Solids	<RL or (environ. concentration/5)	12	12	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	<RL or (environ. concentration/5)	12	12	100.0
SM 4500-P E	Water	OrthoPhosphate as P	<RL or (environ. concentration/5)	12	12	100.0
SM 5310 B	**Water**	**Total Organic Carbon**	**<RL or (environ. concentration/5)**	**12**	**10**	**83.3**
SM 9223 B	Water	*E. coli*	<RL or (environ. concentration/5)	12	12	100.0
			Total	**431**	**429**	**99.5**

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

Table 21. ESJWQC summary of equipment blank QC sample evaluations.
Samples collected during the 2015 WY, sorted by method and analyte. Bolded rows represent analytes that did not meet the equipment blank (EB) acceptability requirement.

Method	Analyte	Equipment Blank Data Acceptability Criteria	Total EB Samples	EB within Acceptability	Acceptability Met (%)
EPA 200.8	Dissolved Copper	<RL or (environ. concentration/5)	10	10	100.0
EPA 200.8	Dissolved Lead	<RL or (environ. concentration/5)	8	8	100.0
SM 2340 C	Dissolved Hardness as CaCO3	<RL or (environ. concentration/5)	1	1	100.0
		Total	**19**	**19**	**100.0**

Table 22. ESJWQC summary of field duplicate QC sample evaluations.
Samples collected during the 2015 WY, sorted by method and analyte. Bolded rows represent analytes that did not meet the acceptability requirement.

Method	Matrix	Analyte	Duplicate Data Acceptability Criteria	Total Field Duplicate Samples	Field Duplicate Samples within Limit	Acceptability Met (%)
ASTM D4464M	Sediment	Grain Size	RSD ≤20	2	2	100.0
EPA 180.1	Water	Turbidity	RPD ≤25	12	11	91.7
EPA 200.8	Water	Arsenic	RPD ≤25	3	3	100.0
EPA 200.8	Water	Dissolved Copper	RPD ≤25	10	9	90.0
EPA 200.8	**Water**	**Dissolved Lead**	**RPD ≤25**	**8**	**6**	**75.0**
EPA 200.8	Water	Molybdenum	RPD ≤25	10	10	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	RPD ≤25	12	11	91.7
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	Sediment	*Hyalella azteca*	RPD ≤25	2	2	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	11	91.7
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	Water	*Ceriodaphnia dubia*	RPD ≤25	12	12	100.0
EPA 821/R-02-012	Water	*Pimephales promelas*	RPD ≤25	12	12	100.0
EPA 821/R-02-013	Water	*Selenastrum capricornutum*	RPD ≤25	12	11	91.7
EPA 8270	Sediment	Piperonyl butoxide	RPD ≤25	1	1	100.0
EPA 8270M_NCI	**Sediment**	**Bifenthrin**	**RPD ≤25**	**1**	**0**	**0.0**
EPA 8270M_NCI	**Sediment**	**Chlorpyrifos**	**RPD ≤25**	**1**	**0**	**0.0**
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

Method	Matrix	Analyte	Duplicate Data Acceptability Criteria	Total Field Duplicate Samples	Field Duplicate Samples within Limit	Acceptability Met (%)
EPA 8270M_NCI	**Sediment**	**Permethrin, Total**	**RPD ≤25**	**1**	**0**	**0.0**
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	12	12	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	12	100.0
SM 2340 C	Water	Dissolved Hardness as CaCO3	RPD ≤25	12	12	100.0
SM 2540 D	**Water**	**Total Suspended Solids**	**RPD ≤25**	**12**	**9**	**75.0**
SM 4500-NH3 C v20	**Water**	**Ammonia as N**	**RPD ≤25**	**12**	**10**	**83.3**
SM 4500-P E	**Water**	**OrthoPhosphate as P**	**RPD ≤25**	**12**	**10**	**83.3**
SM 5310 B	Water	Total Organic Carbon	RPD ≤25	12	12	100.0
SM 9223 B	Water	*E. coli*	R_{log} ≤3.27 x mean R_{log}	12	12	100.0
Walkley-Black	**Sediment**	**Total Organic Carbon**	**RPD ≤25**	**2**	**1**	**50.0**
			Total	483	464	96.1

Table 23. ESJWQC summary of laboratory blank QC sample evaluations.
Samples analyzed in batches with samples collected during the 2015 WY, sorted by method and analyte. Bolded rows represent analytes that did not meet the 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	13	13	100.0
EPA 200.8	Water	Arsenic	< RL	3	3	100.0
EPA 200.8	Water	Dissolved Copper	< RL	10	10	100.0
EPA 200.8	Water	Dissolved Lead	< RL	10	10	100.0
EPA 200.8	Water	Molybdenum	< RL	10	10	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	< RL	14	14	100.0
EPA 547M	Water	Glyphosate	< RL	2	2	100.0
EPA 549.2M	Water	Paraquat	< RL	2	2	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, lambda, total	< 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/ Fenvalerate, total	< MDL	1	1	100.0

Method	Matrix	Analyte[1]	LB Data Acceptability Criteria	Total LB Samples	LB Samples within Limits	Acceptability Met (%)
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	11	11	100.0
EPA 8321A	Water	Carbaryl	< RL	11	11	100.0
EPA 8321A	Water	Carbofuran	< RL	11	11	100.0
EPA 8321A	Water	Diuron	< RL	11	11	100.0
EPA 8321A	Water	Linuron	< RL	11	11	100.0
EPA 8321A	Water	Methamidophos	< RL	12	12	100.0
EPA 8321A	Water	Methiocarb	< RL	11	11	100.0
EPA 8321A	Water	Methomyl	< RL	11	11	100.0
EPA 8321A	Water	Oxamyl	< RL	11	11	100.0
SM 2340 C	Water	Dissolved Hardness as CaCO3	< RL	12	12	100.0
SM 2540 D	Water	Total Suspended Solids	< RL	15	15	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	< RL	13	13	100.0
SM 4500-P E	Water	OrthoPhosphate as P	< RL	12	12	100.0
SM 5310 B	Water	Total Organic Carbon	< RL	17	17	100.0
SM 9223 B	Water	*E. coli*	< RL	12	12	100.0
Walkley-Black	Sediment	Total Organic Carbon	<MDL or <30% of lowest sample	3	3	100.0
			Total	**450**	**450**	**100.0**

[1]Laboratory blank (LB) are not analyzed for grain size and water column and sediment toxicity analyses and are not included in table.

Table 24. ESJWQC summary of LCS QC sample evaluations.
Laboratory control spikes (LCS) and laboratory control spike duplicates analyzed in batches with samples collected from during the 2015 WY, sorted by method and analyte. Bolded rows represent analytes that did not meet the 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 80-120	13	13	100.0
EPA 200.8	Water	Arsenic	PR 80-120	3	3	100.0
EPA 200.8	Water	Dissolved Copper	PR 80-120	10	10	100.0
EPA 200.8	Water	Dissolved Lead	PR 80-120	10	10	100.0
EPA 200.8	Water	Molybdenum	PR 80-120	10	10	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	PR 90-110	17	17	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 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 53-131	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 44-131	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

Method[1]	Matrix	Analyte[2]	LCS Data Acceptability Criteria	Total LCS Samples	LCS Samples within Limits	Acceptability Met (%)
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	Water	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	12	12	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	12	12	100.0
SM 2540 D	Water	Total Suspended Solids	PR 80-120	16	16	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	24	24	100.0
Walkley-Black	Sediment	Total Organic Carbon	PR 75-125	3	3	100.0
			Total	**482**	**480**	**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 analyzed for *E. coli*, grain size and water column and sediment toxicity analyses and are not included in table.

Table 25. ESJWQC summary of Laboratory Control Spike QC sample evaluations.
Laboratory control spike duplicates analyzed in batches with samples collected for the 2015 WY, sorted by method and analyte. Bolded rows represent analytes that did not meet the 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 200.8	Water	Dissolved Lead	RPD ≤20	NA	NA	NA
EPA 200.8	Water	Molybdenum	RPD ≤20	NA	NA	NA
EPA 353.2	Water	Nitrate + Nitrite as N	RPD ≤20	3	3	100.0
EPA 547M	Water	Glyphosate	RPD ≤25	2	2	100.0
EPA 549.2M	Water	Paraquat	RPD ≤25	2	2	100.0
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	1	1	100.0
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, lambda, total	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

Method[1]	Matrix	Analyte[2]	Duplicate Data Acceptability Criteria	Total LCSD Samples	LCSD Samples within Limits	Acceptability Met (%)
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
EPA 8321A	Water	Oxamyl	RPD ≤25	NA	NA	NA
SM 2540 D	Water	Total Suspended Solids	RPD ≤20	1	1	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	RPD ≤20	11	11	100.0
SM 4500-P E	Water	OrthoPhosphate as P	RPD ≤20	NA	NA	NA
SM 5310 B	Water	Total Organic Carbon	RPD ≤20	7	7	100.0
SM 2340 C	Water	Dissolved Hardness as CaCO3	RPD ≤20	NA	NA	NA
Walkley-Black	Sediment	Total Organic Carbon	RPD ≤20	NA	NA	NA
			Total	**37**	**37**	**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 analyzed 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 26. ESJWQC summary of matrix spike QC sample evaluations.

Matrix spikes and matrix spike duplicates collected for the 2015 WY, sorted by method and analyte. Non project matrix spikes are included for batch Quality Assurance completeness purposes. Bolded rows represent analytes that did not meet the 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	6	6	100.0
EPA 200.8	Water	Dissolved Copper	PR 80-120	24	24	100.0
EPA 200.8	Water	Dissolved Lead	PR 80-120	24	24	100.0
EPA 200.8	Water	Molybdenum	PR 80-120	20	19	95.0
EPA 353.2	Water	Nitrate + Nitrite as N	PR 90-110	30	29	96.7
EPA 547M	Water	Glyphosate	PR 85.7-121	4	4	100.0
EPA 549.2M	**Water**	**Paraquat**	**PR 70-130**	**4**	**0**	**0.0**
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	22	91.7
EPA 8141A	Water	Cyanazine	PR 22-172	24	24	100.0
EPA 8141A	Water	Demeton-s	PR 35-130	24	24	100.0
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	24	100.0
EPA 8141A	Water	Malathion	PR 30-137	24	24	100.0
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	23	95.8
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	2	100.0
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**	**1**	**50.0**

Method	Matrix	Analyte[1]	MS Data Acceptability Criteria	Total MS Samples	MS Samples within Limits	Acceptability Met (%)
EPA 8270M_NCI	Sediment	Cypermethrin, total	PR 70-172	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	24	24	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	24	24	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	PR 90-110	26	26	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	17	17	100.0
			Total	**823**	**809**	**98.3**

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

Table 27. ESJWQC summary of matrix spike duplicate QC sample evaluations.

Matrix spike duplicates collected for the 2015 WY. Non project matrix spike duplicates are included for batch Quality Assurance completeness purposes. Evaluations are sorted by method and analyte. Bolded rows represent analytes that did not meet the acceptability requirement.

Method	Matrix	Analyte[1]	Duplicate Data Acceptability Criteria	Total MSD Samples	MSD Samples within Limits	Acceptability Met (%)
EPA 200.8	Water	Arsenic	RPD ≤20	3	3	100.0
EPA 200.8	Water	Dissolved Copper	RPD ≤20	12	12	100.0
EPA 200.8	Water	Dissolved Lead	RPD ≤20	12	12	100.0
EPA 200.8	Water	Molybdenum	RPD ≤20	10	10	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	RPD ≤20	15	15	100.0
EPA 547M	Water	Glyphosate	RPD ≤25	2	2	100.0
EPA 549.2M	Water	Paraquat	RPD ≤25	2	2	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 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**	**0**	**0.0**
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,	RPD ≤25	1	1	100.0

Method	Matrix	Analyte[1]	Duplicate Data Acceptability Criteria	Total MSD Samples	MSD Samples within Limits	Acceptability Met (%)
		total				
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	12	12	100.0
EPA 8321A	Water	Linuron	RPD ≤25	12	12	100.0
EPA 8321A	**Water**	**Methamidophos**	**RPD ≤25**	**12**	**10**	**83.3**
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 ≤20	12	12	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	PR 90-110	NA	NA	NA
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	17	17	100.0
			Total	407	404	99.2

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

Table 28. ESJWQC summary of laboratory duplicate QC sample evaluations.
Laboratory 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 the acceptability requirement.

Method	Matrix	Analyte[1]	Duplicate Data Acceptability Criteria	Total Laboratory Duplicate Samples	Laboratory Duplicate Samples within Limit	Acceptability Met (%)
ASTM D4464M	Sediment	Grain Size	RSD ≤20	2	2	100.0
EPA 180.1	Water	Turbidity	RPD ≤20	13	13	100.0
EPA 200.8	Water	Arsenic	RPD ≤20	NA	NA	NA
EPA 200.8	Water	Dissolved Copper	RPD ≤20	NA	NA	NA
EPA 200.8	Water	Dissolved Lead	RPD ≤20	NA	NA	NA
EPA 200.8	Water	Molybdenum	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 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	Water	Bifenthrin	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Water	Chlorpyrifos	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Water	Cyfluthrin, total	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Water	Cyhalothrin, lambda, total	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Water	Cypermethrin, total	RPD ≤25	NA	NA	NA

METHOD	MATRIX	ANALYTE[1]	DUPLICATE DATA ACCEPTABILITY CRITERIA	TOTAL LABORATORY DUPLICATE SAMPLES	LABORATORY DUPLICATE SAMPLES WITHIN LIMIT	ACCEPTABILITY MET (%)
EPA 8270M_NCI	Water	Deltamethrin/ Tralomethrin	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Water	Esfenvalerate/ Fenvalerate, total	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Water	Fenpropathrin	RPD ≤25	NA	NA	NA
EPA 8270M_NCI	Water	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 2540 D	Water	Total Suspended Solids	RPD ≤20	17	17	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	RPD ≤20	NA	NA	NA
SM 4500-P E	Water	OrthoPhosphate as P	RPD ≤20	NA	NA	NA
SM 5310 B	Water	Total Organic Carbon	RPD ≤20	NA	NA	NA
SM 2340 C	Water	Dissolved Hardness as CaCO3	RPD ≤20	NA	NA	NA
SM 9223 B	Water	*E. coli*	R_{log} ≤ 1.30	12	12	100
Walkley-Black	Sediment	Total Organic Carbon	RPD ≤20	3	3	100.0
			Total	**47**	**47**	**100.0**

[1]Laboratory duplicates are not analyzed for water column and sediment toxicity analyses and are not included in table.
NA; Not applicable, analysis was not conducted for constituent.

Table 29. ESJWQC summary of surrogate recovery QC sample evaluations.

Evaluation sorted by method and analyte. Bolded rows represent analytes that did not meet the acceptability requirement. Surrogates are analyzed in all sample types except toxicity, paraquat, and glyphosate for the 2015 WY.

Method	Analyte	Surrogate Data Acceptability Criteria	Total Surrogate Samples	Surrogates within Limits	Acceptability Met
EPA 8141A	Tributylphosphate	PR 60-150	168	167	99.4
EPA 8141A	Triphenyl phosphate	PR 56-129	168	168	100.0
EPA 8270	**Esfenvalerate-d6, Total**	**PR 30-150**	**7**	**3**	**42.9**
EPA 8270M_NCI	Esfenvalerate-d6-1	PR 70-130	7	7	100.0
EPA 8270M_NCI	Esfenvalerate-d6-2	PR 70-130	7	7	100.0
EPA 8321A	Diphenamid	PR 52-122	123	121	98.4
EPA 8321A	Tributylphosphate	PR 36-140	140	138	98.6
		Total	620	611	98.5

Table 30. ESJWQC summary of holding time evaluations for environmental, field blank, equipment blank, field duplicate and matrix spike samples.

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

Method	Matrix	Analyte	Hold time	Total Samples Analyzed	Samples Analyzed within Hold time	Acceptability Met (%)
ASTM D4464M	Sediment	Grain Size	28 days	31	31	100.0
EPA 180.1	Water	Turbidity	48 hours	103	103	100.0
EPA 200.8	Water	Arsenic	180 days	18	18	100.0
EPA 200.8	Water	Dissolved Copper	180 days	95	95	100.0
EPA 200.8	Water	Dissolved Lead	180 days	80	80	100.0
EPA 200.8	Water	Molybdenum	180 days	60	60	100.0
EPA 353.2	Water	Nitrate + Nitrite as N	28 days	121	121	100.0
EPA 547M	Water	Glyphosate	6 months	20	20	100.0
EPA 549.2M	Water	Paraquat	Extract within 7 days, analyze within 21 days.	20	20	100.0
EPA 600/R-99-064	Water	*Hyalella azteca*	14 days	31	31	100.0
EPA 8141A	Water	Atrazine	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8141A	Water	Azinphos methyl	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8141A	Water	Chlorpyrifos	Extract with 7 days, analyze within 40 days	136	136	100.0
EPA 8141A	Water	Cyanazine	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8141A	Water	Demeton-s	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8141A	Water	Diazinon	Extract with 7 days, analyze within 40 days	112	112	100.0
EPA 8141A	Water	Dichlorvos	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8141A	Water	Dimethoate	Extract with 7 days, analyze within 40 days	131	131	100.0
EPA 8141A	Water	Disulfoton	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8141A	Water	Malathion	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8141A	Water	Methidathion	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8141A	Water	Parathion, Methyl	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8141A	Water	Phorate	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8141A	Water	Phosmet	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8141A	Water	Simazine	Extract with 7 days, analyze within 40 days	111	111	100.0

Method	Matrix	Analyte	Hold time	Total Samples Analyzed	Samples Analyzed within Hold time	Acceptability Met (%)
EPA 8141A	Water	Trifluralin	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 821-R-02-012	Water	*Ceriodaphnia dubia*	36	84	84	100.0
EPA 821-R-02-012	Water	*Pimephales promelas*	36 hours	76	76	100.0
EPA 821-R-02-013	Water	*Selenastrum capricornutum*	36	105	105	100.0
EPA 8270	Sediment	Piperonyl butoxide	12 Months	5	5	100.0
EPA 8270M_NCI	Sediment	Bifenthrin	12 Months	5	5	100.0
EPA 8270M_NCI	Sediment	Chlorpyrifos	12 Months	5	5	100.0
EPA 8270M_NCI	Sediment	Cyfluthrin, total	12 Months	5	5	100.0
EPA 8270M_NCI	Sediment	Cyhalothrin, Total lambda-	12 Months	5	5	100.0
EPA 8270M_NCI	Sediment	Cypermethrin, total	12 Months	5	5	100.0
EPA 8270M_NCI	Sediment	Deltamethrin/ Tralomethrin	12 Months	5	5	100.0
EPA 8270M_NCI	Sediment	Esfenvalerate/ Fenvalerate, total	12 Months	5	5	100.0
EPA 8270M_NCI	Sediment	Fenpropathrin	12 Months	5	5	100.0
EPA 8321A	Water	Aldicarb	Extract with 7 days, analyze within 40 days	110	110	100.0
EPA 8321A	Water	Carbaryl	Extract with 7 days, analyze within 40 days	110	110	100.0
EPA 8321A	Water	Carbofuran	Extract with 7 days, analyze within 40 days	110	110	100.0
EPA 8321A	Water	Diuron	Extract with 7 days, analyze within 40 days	128	128	100.0
EPA 8321A	Water	Linuron	Extract with 7 days, analyze within 40 days	110	110	100.0
EPA 8321A	Water	Methamidophos	Extract with 7 days, analyze within 40 days	111	111	100.0
EPA 8321A	Water	Methiocarb	Extract with 7 days, analyze within 40 days	110	110	100.0
EPA 8321A	Water	Methomyl	Extract with 7 days, analyze within 40 days	110	110	100.0
EPA 8321A	Water	Oxamyl	Extract with 7 days, analyze within 40 days	110	110	100.0
SM 2540 D	Water	Total Suspended Solids	7 days	113	113	100.0
SM 2340 C	Water	Hardness as CaCO3	180 days	102	102	100.0
SM 4500-NH3 C v20	Water	Ammonia as N	28 days	115	115	100.0
SM 4500-P E	Water	OrthoPhosphate as P	48 hours	112	112	100.0
SM 5310 B	Water	Total Organic Carbon	28 days, unfrozen	131	131	100.0
SM 9223 B	Water	*E. coli*	24 hours	87	87	100.0
Walkley-Black	Sediment	Total Organic Carbon	28 days, unfrozen	37	37	100.0
			Total	**4546**	**4546**	**100.0**

Table 31. ESJWQC summary of toxicity laboratory control sample evaluations.
Samples collected for the 2015 WY; sorted by method and species. Bolded rows represent analytes that did not meet the acceptability requirement.

Method	Test Species	Control 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%	12	12	100.0
EPA 821/R-02-012	*Pimephales promelas*	Survival ≥ 80%	12	12	100.0
EPA 821/R-02-013	*Selenastrum capricornutum*	> 200,000 cells/mL, variability of controls <20%,	12	12	100.0
		Total	**39**	**39**	**100.0**

Table 32. ESJWQC summary of calculated sediment grain size RSD results.

Batch calculations based on the relative percent difference (RPDSD) between the standard deviation of the environmental samples and the standard deviation of their duplicate samples. Bolded rows represent analytes that did not meet the acceptability requirement.

Sample Type	Analysis Month	Φ5	Φ16	Φ84	Φ95	SD	RSD
Environmental Sample	3/10/2015	0.42	1.15	5.66	7.83	2.25	NA
Field Duplicate	3/10/2015	0.11	0.94	5.54	7.66	2.29	1.92
Lab Duplicate	3/10/2015	0.34	1.09	5.76	7.80	2.30	0.168
Environmental Sample	9/8/2015	0.16	1.31	5.99	7.99	2.36	NA
Field Duplicate	9/8/2015	0.14	1.29	5.98	7.99	2.36	0.170
Lab Duplicate	9/8/2015	0.21	1.35	5.94	7.99	2.33	1.52

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

DISCUSSION OF RESULTS

INTRODUCTION

A list of all WQTLs used to evaluate results is included in Table 33. Tallies of exceedances that occurred during the 2015 WY are listed by site and zone in Appendix III, Tables III-2-4. 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 result was counted.

Coalition monitoring during the 2015 WY resulted in exceedances of WQTLs for DO, pH, SC, *E. coli,* ammonia, nitrate, arsenic, copper, molybdenum, chlorpyrifos, dimethoate, and malathion. Water column toxicity to *C. dubia* and *S. capricornutum,* and sediment toxicity to *H. azteca* also occurred.

The Coalition monitored Core sites on December 3, February 10, July 14, and August 11 during the 2015 WY to capture storm / high TSS events (including additional samples for glyphosate, paraquat, and arsenic analysis), as outlined in the 2015 WY MPU submitted August 1, 2014 and September 23, 2014 (approved on January 5, 2015). 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 33. Water Quality Trigger Limits.

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 & Westcot)	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 Maximum Contaminant Level (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 - Maximum Contaminant Levels (MCLs). California Department 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 -	1

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
				Sources of Drinking Water (water & fish consumption)	
	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-	3

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
				cancer health effects. USEPA IRIS Reference Dose as a drinking water level.	
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 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	
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	0.00021 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)	
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
	0.0002 µg/L		Cold Freshwater Habitat, Spawning	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-day average (total)	
Pesticides – Herbicides					

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

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
	10 µg/L	Narrative	Agricultural Supply	Water Quality for Agriculture (Ayers & Westcot)	3
	35 µg/L		Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA IRIS Reference Dose as a drinking water level.	
Nickel	For aquatic life variable	Numeric	Freshwater Habitat	CTR Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - varies with water hardness	1
	100 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
Selenium	50 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL (MUN, human health)	1
	5 µg/L (4-day average)	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: NTR Freshwater Aquatic Life Protection - Continuous Concentration - 4-Day Average	
Zinc	For aquatic life variable	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - varies with water hardness	1
Nutrients					
Nitrate as 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	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 Water Quality Objective (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 Available. Until completion of evaluation studies and MRP Plan submittals with site specific information on beneficial uses.
ND-Not Detected
USEPA- United States Environmental Protection Agency
(*) -Water Quality Control Plan for the Sacramento and San Joaquin River Basins, revised on 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 submitted on December 10, 2014 was amended on December 11, 2014 to correct a discharge measurement typographical error.
2. The Field Exceedance Report submitted on February 17, 2015 was amended on February 18, 2015 to update the picture file with correct sample time entries.
3. The Water Column Toxicity Exceedance Report submitted on July 30, 2015 was amended on August 24, 2015 to correct an error in a percent control result.
4. The Inorganics, metals, and nutrients Exceedance Report submitted on September 11, 2015 was amended on December 21, 2015 to include a previously overlooked exceedance of the WQTL for arsenic in the field duplicate sample.

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 the organic carbon partitioning coefficient (K_{oc}), chemical type, mode of action, and solubility. If water column toxicity occurs, pesticides with a relatively low K_{oc} (below 1900) are evaluated and the PUR database is queried for pesticides applied within 30 days prior to water sampling. If sediment toxicity occurs, pesticides with a relatively high K_{oc} (1600 or greater) are considered potential causes and the PUR data base 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 toxicity) due to the long half-life of pyrethroids. The database is queried for applications of metals 90 days prior to exceedances (Table 34). If no applications can be associated with the exceedance or toxicity in the specified time period, the PUR database is queried an additional 30 days prior to determine which pesticides were applied within 60 days of the sample date.

If exceedances of WQTLs for arsenic, lead, or molybdenum occur, the PUR database cannot be queried for associated applications since there are no registered products containing these chemicals. During the 2015 WY, exceedances of chemicals no longer applied/registered apply to arsenic and molybdenum.

Table 34. 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 data may include zeroes 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 it 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 the result is a blank cell for AI per acre. Values recorded as 'zero' in the pounds AI per acre column are due to values less than 0.0001 being rounded to zero during the calculation process; this occurs when the amount of chemical applied to an acre is extremely small. 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. Information regarding available and outstanding PURs is included in Table 35.

Table 35. Obtained PUR data for 2015 WY exceedances.

County	2015 PUR Data Obtained	2015 PUR Data Outstanding for 2016 Report
Madera	October 2014 through December 2015	None
Merced	October 2014 through December 2015	None
Stanislaus	October 2014 through December 2015	None

Toxicity Identification Evaluations

A phase I TIE is performed on water samples when survival or growth of the respective target organism is 50% or less compared to the control in order to identify the chemical class of toxicant(s) in the test sample. All TIE results are submitted quarterly with laboratory results. Water column and sediment toxicity results are listed in Table 36. A phase III TIE is performed to identify the chemicals responsible for the toxicity in water samples when survival or growth of the respective target organism is 50% or less compared to the control. Table 37 includes phase III analyses on toxic samples that have chemical results for the same sample date to calculate the toxic units (TU). Additional sediment chemistry results associated with sediment toxicity can be found in Table 38.

Table 36. Water column and sediment toxicity exceedance summary.

The table is organized alphabetically by site. The table only includes field duplicate exceedances if no exceedances occurred in the environmental sample. If an exceedance in the field duplicate sample and not environmental sample occurred, the field duplicate result was included and noted (FD) by the site name. Red bolded values represent MPM exceedances.

Site Name	Sample Date	Species	Toxicity End Point	Mean	Percent Control	Toxicity Significance	Summary Comments
Duck Slough @ Gurr Rd	3/10/15	*Ceriodaphnia dubia*	Survival %	0	**0**	SL	A TIE was conducted on 3/12/15. It was concluded that non-polar organics (organophosphate insecticides) were the cause of toxicity. Toxicity coincides with a malathion exceedance of 2.0 µg/L (Table 37).
Duck Slough @ Gurr Rd	6/9/15	*Ceriodaphnia dubia*	Survival %	75	75	SL	No TIE was conducted.
Duck Slough @ Gurr Rd	6/9/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	608731	37	SL	A TIE was conducted on 6/16/15. The toxicity in the baseline test was lost; indicating the source of toxicity in initial tests was unknown.
Duck Slough @ Gurr Rd	7/14/15	*Ceriodaphnia dubia*	Survival %	0	0	SL	A TIE was conducted on 7/17/15. It was concluded that non-polar organic chemicals, specifically organophosphate insecticides were the cause of toxicity. Toxicity coincides with a chlorpyrifos exceedance of 0.19 µg/L (Table 37).
Highline Canal @ Hwy 99	7/14/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	556627	**63**	SL	No TIE was conducted.
Highline Canal @ Lombardy Rd	9/8/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	927868	**75**	SL	No TIE was conducted.
Hilmar Drain @ Central Ave	9/8/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	400315	**32**	SL	A TIE was initiated on 9/15/15. The toxicity in the baseline test was lost; indicating the source of toxicity in the initial test was unknown.
Lateral 2 ½ near Keyes Rd	6/9/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	1113488	68	SL	No TIE was conducted.
Lateral 2 ½ near Keyes Rd	7/14/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	66	66	SL	No TIE was conducted.
Lateral 5 ½ @ South Blaker Rd	10/14/14	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	925914	**71**	SL	No TIE was conducted.
Lateral 5 ½ @ South Blaker Rd	3/10/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	103973	**8**	SL	A phase I TIE was conducted on 3/18/15. Toxicity was present in the baseline toxicity test. The sample was ran through a SPE column and treated with EDTA and neither of the procedures had any effect on the toxicity. Therefore, the toxicity was unknown.
Lateral 6 and 7 @ Central Ave	12/3/14	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	634783	56	SL	No TIE was conducted.
Lateral 6 and 7 @ Central Ave	1/13/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	25817	2	SL	A phase I TIE was conducted on 1/21/15. Toxicity was present in the baseline toxicity test. The sample was ran through a SPE column and treated with EDTA and neither of the procedures had any effect on the toxicity. Therefore, the toxicity was unknown.
Lower Stevinson @ Faith Home Rd	6/9/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	693400	**42**	SL	A phase I TIE was conducted on 6/16/15. The sample lost all toxicity prior to or during the TIE.
Lower Stevinson @ Faith Home Rd	8/11/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	403571	**73**	SL	No TIE was conducted.
Merced River @ Santa Fe	7/14/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	654322	74	SL	No TIE was conducted.
Prairie Flower Drain @ Crows Landing Rd	2/10/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	517549	**75**	SL	No TIE was conducted.
Prairie Flower Drain @ Crows Landing Rd	3/10/15	*Ceriodaphnia dubia*	Survival %	0	**0**	SL	A TIE was conducted on 3/12/15. It was concluded that non-polar organics were the cause of toxicity. Toxicity coincides with a chlorpyrifos exceedance of 4.2 µg/L (Table 37).
Prairie Flower Drain @ Crows Landing Rd	3/10/15	*Hyalella azteca*	Survival %	0	**0**	SL	Bifenthrin (5.1 ng/g), chlorpyrifos (1,400 ng/g), lambda-cyhalothrin (29 ng/g), and

Site Name	Sample Date	Species	Toxicity End Point	Mean	Percent Control	Toxicity Significance	Summary Comments
							permethrin (1.1 ng/g) were detected in sediment samples (Table 38).
Prairie Flower Drain @ Crows Landing Rd	4/14/15	*Ceriodaphnia dubia*	Survival %	0	0	SL	A TIE was conducted on 4/16/15. It was concluded that non-polar organics, specifically organophosphate insecticides were the source of toxicity. Toxicity coincides with a chlorpyrifos exceedance of 0.2 µg/L (Table 37).
Prairie Flower Drain @ Crows Landing Rd	5/12/15	*Ceriodaphnia dubia*	Survival %	0	0	SL	A TIE was conducted on 5/14/15. It was concluded that non-polar organics, specifically organophosphate insecticides were the source of toxicity. Toxicity coincides with a chlorpyrifos exceedance of 0.2 µg/L (Table 37).
Prairie Flower Drain @ Crows Landing Rd	5/12/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	2614735	**85**	SG	No TIE was conducted.
Prairie Flower Drain @ Crows Landing Rd	6/9/15	*Ceriodaphnia dubia*	Survival %	70	70	SL	No TIE was conducted.
Prairie Flower Drain @ Crows Landing Rd	6/9/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	1178618	72	SL	No TIE was conducted.
Prairie Flower Drain @ Crows Landing Rd	7/14/15	*Ceriodaphnia dubia*	Survival %	60	60	SL	No TIE was conducted.
Prairie Flower Drain @ Crows Landing Rd	7/14/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	667348	76	SL	Toxicity coincides with a chlorpyrifos and molybdenum exceedance of 0.044 µg/L and 15 µg/L.
Prairie Flower Drain @ Crows Landing Rd	8/11/15	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	380776	69	SL	No TIE was conducted. Toxicity coincides with a chlorpyrifos exceedance of 0.017 µg/L.

SL-Statistically significantly different from control; less than 80% threshold.
SG-Statistically significantly different from control; Greater than 80% threshold.

Table 37. 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 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}.

Site Name	Sample Date	Species	Baseline Toxicity Result		Phase III TIE Result			Phase III conclusions
			EC_{50}	TU	Chemical, concentration	EC_{50} (µg/L)	TU	
Duck Slough @ Gurr Rd	3/10/2015	*Ceriodaphnia dubia*	47.6	2.1	Malathion, 2 µg/L	1.0-3.4	0.6-2.0	Malathion can account for some or most of the toxicity that occurred in the sample.
Duck Slough @ Gurr Rd	7/14/2015	*Ceriodaphnia dubia*	43.5	2.3	Chlorpyrifos, 0.19 µg/L	0.08	2.4	Chlorpyrifos can account for most of the toxicity that occurred in the sample. Toxicity due to the concentration of copper in sample is negligible.
					Dissolved copper, 2.4 µg/L	159	<0.01	
Prairie Flower Drain @ Crows Landing Rd	3/10/2015	*Ceriodaphnia dubia*	58.8	1.7	Chlorpyrifos, 4.2 µg/L	0.08	52.5	Chlorpyrifos can account for all the toxicity that occurred in the sample.
Prairie Flower Drain @ Crows Landing Rd	4/14/2015	*Ceriodaphnia dubia*	17.7	5.6	Chlorpyrifos, 4.2 µg/L	0.08	52.5	Chlorpyrifos can account for most of the toxicity that occurred in the sample.
Prairie Flower Drain @ Crows Landing Rd	5/12/2015	*Ceriodaphnia dubia*	35.4	2.8	Chlorpyrifos, 0.2 µg/L	0.08	2.5	Chlorpyrifos can account for most of the toxicity that occurred in the sample.

EC_{50} = The effective concentration that inhibits 50% of the test population (taken from the USEPA ECOTOCX database).

Sediment Chemistry Analysis

The Coalition analyzes sediment for the presence of pyrethroids and chlorpyrifos when toxicity to *H. azteca* occurs and survival is less than 80% compared to the control (Table 38). Pyrethroids readily bind to sediment and a small portion partitions 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 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 is the lethal concentration at which 50% mortality of the test species occurs. The Coalition utilized the pyrethroid and chlorpyrifos LC50 concentration values in Table 39 as determined by Amweg and Weston (Amweg et al., 2005 and Weston et al., 2013). Sediment chemistry analysis is discussed in the Summary of Exceedances section below and TUa calculations are reported in Table 42.

Table 38. Sediment toxicity chemistry results for samples with less than 80% survival when compared to the control.

Site Name	Sample date	Monitoring Type	*H. azteca* (%Control)	Bifenthrin, ng/kg	Chlorpyrifos, ng/kg	Cyfluthrin, µg/kg	Cyhalothrin, lambda ng/kg	Cypermethrin, µg/kg	Deltamethrin:Tralomethrin, g/kg	Esfenvalerate/Fenvalerate, µg/kg	Fenpropathrin, µg/kg	Permethrin, ng/kg	Piperonyl Butoxide	TOC (mg/Kg DW)	Percent TOC	Mean GS Description	Median GS (mm)
Prairie Flower Drain @ Crows Landing Rd	3/10/2015	MPM	0%	5.1	1,400	ND	29	ND	ND	ND	ND	1.1	ND	22,300	2.23	Fine sand (0.075 to <0.425mm)	0.091

GS- Grain Size, recorded in millimeters (MM)
MPM-Management Plan Monitoring
ND- Not Detected
TOC- Total Organic Carbon

Table 39. Pyrethroid and chlorpyrifos LC50 concentrations for sediment analysis.

Sediment Pesticide	LC50 (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

LC50- the lethal concentration at which 50% mortality of the test species occurs.
OC- Organic Carbon

SUMMARY OF EXCEEDANCES

All exceedances and toxicity that occurred during the 2015 WY are included in Table 40 through Table 46 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 are potential sources of the exceedances. Measures taken to address these exceedances are described in the Member Actions Taken to Address Water Quality Exceedances section of this report (Page 130).

Zone 1 (Dry Creek @ Wellsford Rd and Mootz Drain downstream of Langworth Pond)

During the 2015 WY, Dry Creek @ Wellsford Rd was monitored monthly as the Core site in Zone 1 and Mootz Drain downstream of Langworth Pond was monitored as the Represented site.

Dry Creek @ Wellsford Rd was monitored monthly for the entire suite of constituents as well as MPM for chlorpyrifos and sediment toxicity to *H. azteca* (as indicated in the 2015 WY MPU, Table 1). Monitoring for sediment toxicity to *H. azteca* at Mootz Drain downstream occurred in March and September 2015, in addition to MPM for diuron during December and February. Table 40 includes all exceedances that occurred during the 2015 WY in Zone 1.

Non-contiguous samples were collected from Dry Creek @ Wellsford Rd in November 2014 through January 2015 and again in March2015. Non-contiguous samples were collected from Mootz Drain downstream of Langworth Pond in March 2015 (Table 14).

Field Parameters and E. coli

In Zone 1, field parameters (DO, pH, and SC) were measured 17 times and 12 samples were collected for *E. coli* analysis (Appendix III, Table III-2). Exceedances of the WQTLs for DO (17) and *E. coli* (7) occurred during 2015 WY monitoring (Table 40).

Dissolved Oxygen

Exceedances of Water Quality Objectives (WQOs) for field parameters, such as DO, are difficult to track and source. For example, DO is non-conserved meaning it can increase or decrease as water moves downstream. The concentration of DO is the result of processes occurring in the water column and in the sediment which can vary diurnally and seasonally.

The Coalition conducted a preliminary analysis to evaluate water quality parameters most likely to influence DO (submitted February 2, 2016). Processes affecting DO in waterways include 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.

Monitoring during the 2015 WY resulted in exceedances of the WQTL for DO at both sites in Zone 1. Seventeen exceedances of the WQTL for DO (< 7 mg/L) occurred in Zone 1, ranging from 1.03 to 6.86 mg/L; 12 at Dry Creek @ Wellsford Rd and five at Mootz Drain downstream of Langworth Pond (Table 40). There was no measureable flow during five sampling events at Dry Creek @ Wellsford Rd and observed flow was recorded as < 5 cfs for these events. Exceedances of the WQTL for DO occurred in four non-contiguous samples collected from Dry Creek @ Wellsford. Observed flow was measured at Mootz Drain downstream of Langworth Pond as <1 cfs during three out of five sampling events; one exceedance of the WQTL for DO occurred in non-contiguous samples. Due to the low flow conditions at both sites and the processes stated above that can affect DO, exceedances of the WQTL for DO occurred frequently in Zone 1.

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, seven exceedances of the WQTL (235 MPN/100 mL) occurred in Zone 1 and ranged from 410.6 to >2419.6 MPN/100 mL; all occurred in samples collected from Dry Creek @ Wellsford Rd (Table 40). There are numerous dairies located in the site subwatershed. It is possible that the exceedances of the WQTL for *E. coli* during the fall and irrigation seasons were associated with fall/spring applications of manure on those operations. In addition, naturally occurring *E. coli* are always present in the water column. It is possible that these naturally occurring populations of *E. coli* in the waterbody increase activity with increasing air and water temperatures during the spring.

Table 40. Zone 1 (Dry Creek @ Wellsford Rd and Mootz Drain downstream of Langworth Pond) exceedances. The WQTLs are listed with each constituent. Red bolded values represent MPM exceedances.

Zone 1 Site Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	*E. coli*, 235 MPN/100 mL
Dry Creek @ Wellsford Rd	Core	MPM, NM	10/14/2014	5.30	727
Dry Creek @ Wellsford Rd	Core	NM, Non-contiguous	11/12/2014	1.03	
Dry Creek @ Wellsford Rd	Core	NM, Non-contiguous, High TSS	12/3/2014	3.84	
Dry Creek @ Wellsford Rd	Core	NM, Non-contiguous	1/13/2015	4.79	410.6
Dry Creek @ Wellsford Rd	Core	NM	2/10/2015	6.86	>2419.6
Dry Creek @ Wellsford Rd	Core	MPM, NM, SED, Non-contiguous	3/10/2015	5.24	
Dry Creek @ Wellsford Rd	Core	NM	4/14/2015	2.79	435.2
Dry Creek @ Wellsford Rd	Core	NM	5/12/2015	5.56	648.8
Dry Creek @ Wellsford Rd	Core	NM	6/9/2015	5.14	
Dry Creek @ Wellsford Rd	Core	MPM, NM	7/14/2015	4.44	
Dry Creek @ Wellsford Rd	Core	MPM, NM	8/11/2015	5.00	344.8
Dry Creek @ Wellsford Rd	Core	MPM, NM, SED	9/8/2015	6.00	365.4
Mootz Drain downstream of Langworth Pond	Represented	MPM	12/3/2014	5.75	
Mootz Drain downstream of Langworth Pond	Represented	MPM	2/10/2015	6.31	
Mootz Drain downstream of Langworth Pond	Represented	NM, SED, Non-contiguous	3/10/2015	1.93	
Mootz Drain downstream of Langworth Pond	Represented	MPM	6/9/2015	1.89	
Mootz Drain downstream of Langworth Pond	Represented	NM, SED	9/8/2015	2.16	
			Normal Monitoring Exceedances	**17**	**7**
			Non-contiguous Waterbody Exceedances	**5**	**1**
			Management Plan Monitoring Exceedances[1]	**NA**	**NA**
			Total Exceedances	**17**	**7**

[1]MPM not conducted for field parameters, nutrients, or *E. coli* even if they are under a management plan; however, field parameters are measured during every sampling event.
MPM-Management Plan Monitoring.
NA-Not Applicable.
NM-Normal Monitoring.
SED-Sediment monitoring.

Zone 2 (Hatch Drain @ Tuolumne Rd, Hilmar Drain @ Central Ave, Lateral 2 1/2 near Keyes Rd, Lateral 5 1/2 @ South Blaker Rd, Lateral 6 and 7 @ Central Ave, Levee Drain @ Carpenter Rd, Lower Stevinson @ Faith Home Rd, Prairie Flower Drain @ Crows Landing Rd, Unnamed Drain @ Hogin Rd, and Westport Drain @ Vivian Rd)

During the 2015 WY, Prairie Flower Drain @ Crows Landing Rd was monitored monthly as the Core site in Zone 2. Hatch Drain @ Tuolumne, Hilmar Drain @ Central Ave, Lateral 2 ½ near Keyes Rd, Lateral 5 ½ @ South Blaker Rd, Lateral 6 and 7 @ Central Ave, Levee Drain @ Carpenter Rd, Lower Stevinson @ Faith Home Rd, Unnamed Drain @ Hogin Rd, and Westport Drain @ Vivian Rd were monitored as Represented sites.

Prairie Flower Drain @ Crows Landing Rd was monitored monthly for the entire suite of constituents (as indicated in the 2015 WY MPU, Table 1) as well as MPM for dimethoate, molybdenum, *C. dubia, P. promelas, S. capricornutum* water column toxicity, and *H. azteca* sediment toxicity. Management Plan Monitoring occurred at Hatch Drain @ Tuolumne, Hilmar Drain @ Central Ave, Lateral 2 ½ near Keyes Rd, Lateral 5 ½ @ South Blaker Rd, Levee Drain @ Carpenter Rd, Lower Stevinson @ Faith Home Rd, and Westport Drain @ Vivian Rd. Table 41 includes all exceedances that occurred during the 2015 WY in Zone 2.

Hatch Drain @ Tuolumne Rd was dry in August 2015, Lateral 2 ½ near Keyes Rd was dry in February, March, and May 2015, Lower Stevinson @ Faith Home Rd was dry in February 2015, Prairie Flower Drain @ Crows Landing Rd was dry in October and November 2014, and Westport Drain @ Vivian Rd was dry in April 2015. During the March 2015 sampling event, not enough sediment was present at Lateral 5 ½ @ South Blaker Rd to collect sediment samples; however, water samples were collected.

Non-contiguous samples were collected from Levee Drain @ Carpenter Rd in December and from Lower Stevinson @ Faith Home Rd and Lateral 5 ½ @ South Blaker Rd in January.

Field Parameters and E. coli

In Zone 2, the field parameters DO, pH, and SC were scheduled to be monitored 83 times during the 2015 WY; 73 measurements were taken and sites were dry during 10 sampling events. Ten samples were collected for *E. coli* analysis. Exceedances of the WQTLs for DO (34), pH (10), SC (55), and *E. coli* (5) occurred (Appendix III, Table III-2).

Dissolved Oxygen

Exceedances of the WQTL for DO (< 7 mg/L)in Zone 2 ranged from 0.05 to 5.85 mg/L and occurred at: Hatch Drain @ Tuolumne Rd (5), Hilmar Drain @ Central Ave (6), Lateral 5 ½ @ South Blaker Rd (1), Lateral 6 and 7 @ Central Ave (1), Levee Drain @ Carpenter Rd (3), Lower Stevinson @ Faith Home Rd (1), Prairie Flower Drain @ Crows Landing Rd (8), Unnamed Drain @ Hogin Rd (5), and Westport Drain @ Vivian Rd (4). The majority of exceedances of the WQTL for DO in Zone 2 occurred during the irrigation season when temperatures were elevated (April through September; between 14 to 31°C/55 to 88°F) which could have contributed to the low DO in the waterbody. During the 2015 WY, sites in Zone 2 had an average discharge measurement of 3.5 cfs; discharge measurements ranged from 0 cfs to 44.16 cfs (measurements taken monthly during scheduled sampling events). Due to the low flow conditions throughout Zone 2 and the processes that can affect DO, including fluctuations in temperature, loss of vegetation around streams, excessive nutrients (phosphate), associated field parameters (SC, TOC, TSS), and algae growth, exceedances of the lower WQTL for DO occurred frequently in Zone 2.

pH

Causes of fluctuating pH can have both natural and anthropogenic origins. 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 Coalition conducted a preliminary analysis to evaluate water quality parameters most likely to influence pH (submitted February 2, 2016). The study concluded that exceedances of the upper pH WQO were mostly correlated with elevated DO concentrations, suggesting that elevated pH is a result of very high levels of photosynthesis. 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. However, since the exceedances of the upper pH objective were only weakly correlated with the concentration of nutrients, it is unclear what factors are driving photosynthesis.

In Zone 2, a total of 10 exceedances of the WQTL for pH (<6.5 and >8.5) occurred during the 2015 WY. Nine exceedances of the WQTL for pH were above the upper limit of 8.5 and occurred at Lateral 2 ½ near Keyes Rd (1), Lateral 5 ½ @ South Blaker Rd (3), Lateral 6 and 7 @ Central Ave (2), Lower Stevinson @ Faith Home Rd (3), and Westport Drain @ Vivian Rd (1). One exceedance of the WQTL for pH was below the lower limit of 6.5 and occurred at Lower Stevinson @ Faith Home Rd.

Specific Conductivity

Elevated levels of SC are common in Zone 2 because the monitoring sites are located in the western portion of the Coalition region with shallow, salty groundwater. This section of the valley has inadequate subsurface drainage conditions that result in a negative impact on crop productivity. Management of subsurface drainage is necessary to cope with shallow groundwater conditions which result in the accumulation of salts in the root zone (http://www.water.ca.gov/drainage/index.cfm). Tile drains have been installed to intercept rising groundwater and move the water to the larger drains that are sampled by the Coalition.

Detections of SC above the 700 µS/cm WQTL occurred at all sites in Zone 2 with the exception of Lateral 2 ½ near Keyes Rd (Table 41). Exceedances ranged from 721 to 8190 µS/cm and occurred at: Hatch Drain @ Tuolumne Rd (7), Hilmar Drain @ Central Ave (8), Lateral 5 ½ @ South Blaker Rd (6), Lateral 6 and 7 @ Central Ave (6), Levee Drain @ Carpenter Rd (7), Lower Stevinson @ Faith Home Rd (4), Prairie Flower Drain @ Crows Landing Rd (10), Unnamed Drain @ Hogin Rd (5), and Westport Drain @ Vivian Rd (2).

E. coli

Five samples collected from Prairie Flower Drain @ Crows Landing Rd resulted in exceedances of the WQTL for *E. coli*, from December 2014 through March and June 2015 (Table 41). There are many dairies located in the Prairie Flower Drain @ Crows Landing Rd site subwatershed (383 acres of feedlots, diary, or farmstead, and 763 acres of dairy pastureland; Table 4). These dairies generate solid and liquid manure that is applied to the dairy irrigated cropland, and sometimes adjacent cropland. The presence of *E. coli* and nutrients (ammonia and nitrate) above the WQTLs may be associated with dairy manure applications and/or possible discharges from dairy lagoons. Four of the five exceedances of the WQTL for *E. coli* at Prairie Flower Drain @ Crows Landing Rd coincided with exceedances of the WQTL for nitrate (ranging from 14 through 29 mg/L). Two of the five exceedances of the WQTL for *E. coli* coincided with exceedances of the WQTL for ammonia (5.4 and 5.6 mg/L, respectively).

Ammonia

Ammonium can enter a waterbody from three sources: 1) direct discharge of agricultural fertilizers (anhydrous ammonia), 2) direct discharge of animal waste, and 3) discharge from wastewater treatment plants. In soils, ammonium from fertilizers is typically converted to nitrite and then to nitrate over a very short period of time. Ammonium is also a positively charged ion and binds to soil particles preventing leaching of the ammonium ion. Therefore, ammonium from fertilizers would require a direct discharge to surface waters to detect it in the receiving waters. The method of anhydrous ammonium application to fields is injection into soil which argues against direct discharge to a receiving waterbody. Animal waste from confined animal facilities has a high load of dissolved ammonia and organic material that can easily be transported to surface waters. Dairies are not allowed to discharge lagoon waste into surface waters, although such discharges have been known to occur.

Three samples collected from Prairie Flower Drain @ Crows Landing Rd resulted in exceedances of the WQTL for ammonia during two storm events in December (5.40 mg/L), February (5.60 mg/L), and one irrigation event in August (4.7 mg/L; Table 41). Dairy discharge is most likely responsible for high ammonia detections in samples collected from Prairie Flower Drain @ Crows Landing Rd; Prairie Flower Drain has the highest density of confined animal facilities (12% acreage). In addition, dairy discharge and/or applications of manure as fertilizer have contributed to other exceedances within the site subwatershed, including nitrate and *E. coli*. Samples collected in December and August also contained concentrations of nitrate over the WQTL (25 and 20 mg/L, respectively). Two out of the three samples with concentrations above the ammonia WQTL, also exceeded the WQTL for *E. coli*. The high density of dairies in the area, and the association of the exceedances with *E. coli* and nitrates, suggest that dairies are the source of exceedances of the WQTL for ammonia in this watershed.

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. Because of their high solubility, nitrate-based fertilizers applied to the soil can easily move to surface waters with storm or irrigation discharge, or leach to groundwater. 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 ESJWQC 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.

In Zone 2, a total of nine exceedances of the WQTL for nitrate + nitrite occurred in samples collected from Prairie Flower Drain @ Crows Landing Rd from December through September, with the exception of February; exceedances of the WQTL (10 mg/L) ranged from 14 mg/L to 29 mg/L (Table 41). Samples collected in December and August also resulted in exceedances of the WQTL for ammonia. Samples collected in December and March through June also resulted in exceedances of the WQTL for *E. coli*. In Zone 2, groundwater is shallow and contains high concentration of nitrate. The drains monitored by the Coalition were constructed to lower the water table, and are fed by seepage from the shallow groundwater. The lack of seasonality in the nitrate exceedances supports the conclusion that the source of nitrate in Prairie Flower Drain is the seepage of shallow groundwater to the surface water drains.

Total Molybdenum

Although it is possible for molybdenum to be applied by agricultural, there are no registered products containing this constituent currently in use in the Coalition area. A small amount of molybdenum may be found in fertilizer blends. The Coalition conducted a preliminary analysis to evaluate water quality parameters most likely to influence molybdenum (submitted March 23, 2016). The study concluded molybdenum found in Coalition surface water is naturally occurring (Westcot and Belden (1989) and Westcot et al. (1988)). It is found in water entering the Coalition's agricultural regions from the Sierra, and from shallow groundwater that is drained off by the major drains on the west side of the Coalition region. For those monitoring locations in the basin trough geologic setting, concentrations are elevated and are sufficiently elevated in the Prairie Flower Drain watershed to result in exceedances of the WQO.

In Zone 2, a total of 18 samples collected during MPM at Prairie Flower Drain @ Crows Landing Rd resulted in exceedances of the WQTL for molybdenum from December 2014 through August 2015; nine of the 18 exceedances were from field duplicate samples (Table 41). The first year that molybdenum was monitored at Prairie Flower Drain @ Crows Landing Rd was 2011 as part of scheduled Assessment Monitoring. Due to exceedances of the WQTL, molybdenum was as placed in a management plan in 2012. The 2015 WY was the second year the Coalition conducted MPM for molybdenum; molybdenum was monitored monthly at the site. Based on the preliminary analysis, the Coalition proposed to remove the single molybdenum management plan and proposes to discontinue monitoring for molybdenum during the 2016 WY.

Chlorpyrifos

Chlorpyrifos is an organophosphate pesticide applied for 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 (Koc of 6070). 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.

In Zone 2, a total of 21 samples were scheduled to be collected and analyzed for chlorpyrifos during the 2015 WY; 18 samples were collected and sites were dry during three sampling events (Appendix III,

Table III-3). Six samples collected from Prairie Flower Drain @ Crows Landing Rd during Normal Monitoring resulted in exceedances of the WQTL for chlorpyrifos from March through August 2015 (Table 41).

Samples collected on March 10, 2015 resulted in an exceedance of the WQTL for chlorpyrifos with a concentration of 4.2 µg/L. At the time of sampling, discharge was recorded as 0.68 cfs which indicates that flow is essentially non-existent. A slight wind over the drain can result in a discharge of that amount even if the water is stagnant. The March sample was the first to result in an exceedance of the WQTL for chlorpyrifos in the site subwatershed since 2008; chlorpyrifos was approved for management plan completion on May 30, 2012. Due to the exceedance in March, the management plan for chlorpyrifos has been reinstated for the 2016 WY. Toxicity to *C. dubia* also occurred in March; the phase III TIE results indicated chlorpyrifos concentrations were high enough to account for all toxicity (0% survival compared to the control, Table 38). The PUR data associated with the exceedance indicate that nine applications totaling 185 lbs AI occurred on 454 acres of alfalfa from February 18, 2015 through March 5, 2015. Seven of the nine applications, totaling 166 lbs AI, were from non-member dairy farmers; two of the seven dairy farmers who applied chlorpyrifos were past members, previously targeted for focused outreach in 2008.

Over the next five months, samples were collected from the site and resulted in exceedances of the WQTL for chlorpyrifos (April = 0.2 µg/L, May = 0.2 µg/L, June = 0.061 µg/L, July = 0.044 µg/L, and August = 0.0017 µg/) and toxicity to *C. dubia* (Survival - April = 0%, May = 0%, June = 70%, and July = 60%; Table 41). A TIE was required for the April and May toxicities and results indicated caused the toxicity (Table 38).

The amount of flow measured at the site was extremely low or recorded as zero during the six sampling events (March through August 2015). Since water at the site was not flowing during most of the six sampling events, it is likely that products containing chlorpyrifos washed into the waterbody during a storm event in February or early March and remained in the drain until finally degrading. Substances remaining in the water column can potentially become concentrated due to no flow and evaporation.

As part of the Coalition's focused outreach, the Coalition informed all members and non-members of the chlorpyrifos detected in the waterbody in a meeting on October 29, 2015 with Dairy Cares, Prairie Flower Drain dairy members, and Coalition members. Members were given surveys to complete about currently implemented management practices. The Coalition will be tracking any changes in management practices and completing contacts with the targeted members during 2016 Focused Outreach efforts.

During the 2016 WY, Prairie Flower Drain @ Crows Landing Rd is scheduled as a Represented site; MPM for chlorpyrifos will occur from February through September (2016 WY MPU).

Dimethoate

Dimethoate is an organophosphate insecticide that is used in California predominantly on alfalfa, tomatoes, oranges, and corn. Dimethoate is an acetylcholinesterase inhibitor, and in water, is not expected to adsorb to sediments or suspended particles. Like chlorpyrifos, dimethoate is known to be toxic to birds, fish such as *P. promelas,* and aquatic invertebrates such as *C. dubia* (http://extoxnet.orst.edu/pips/dimethoa.htm). The WQTL to protect aquatic life is 1.0 µg/L.

In Zone 2, a total of 34 samples were scheduled to be collected and analyzed for dimethoate; 30 samples were able to be collected because sites were dry during four sampling events. A single exceedance of the WQTL for dimethoate occurred in samples collected from Unnamed Drain @ Hogin Rd (8.4 µg/L) on March 10, 2015 (Table 41).

Unnamed Drain @ Hogin Rd is a Represented site in Zone 2; the 2015 WY was the second year of monitoring at the site. Samples were collected from stagnant water where discharge was recorded as 0 cfs. The PUR data associated with the exceedance indicate three applications of dimethoate totaling 87 lbs AI occurred on 175 acres of alfalfa on February 20, 2015 and February 24, 2015. This is the first exceedance of the WQTL for dimethoate to occur at the site; therefore, no management plan is required. During the 2016 WY, Unnamed Drain @ Hogin is scheduled to be monitored for dimethoate in March (2016 WY MPU).

Water Column Toxicity

In Zone 2, a total of 28 samples were scheduled to be collected and analyzed for *C. dubia* toxicity; 26 samples were collected because sites were dry during two sampling events. Of the 26 samples, five collected from Prairie Flower Drain @ Crows Landing Rd were toxic to *C. dubia*.

Of the 49 samples scheduled to be collected and analyzed for *S. capricornutum* toxicity, sites were dry during six sampling events and a total of 43 samples were collected and analyzed. All toxicity results are included in Table 41 below and Appendix III, Table III-4.

***C. dubia* toxicity**

During the 2015 WY, 26 samples were collected and analyzed for *C. dubia* toxicity in Zone 2; five collected from Prairie Flower Drain @ Crows Landing Rd resulted in toxicity to *C. dubia*.

Prairie Flower Drain @ Crows Landing Rd

Five samples collected from Prairie Flower Drain @ Crows Landing Rd analyzed for *C. dubia* toxicity resulted in toxicity in March through July 2015. Three samples resulted in 0% survival compared to the control; TIEs were required since survival compared to the control was less than 50%. The TIEs for each toxicity indicated non-polar organics were the cause. The phase III TIEs confirmed that the chlorpyrifos detected above the WQTL in each sample (Table 41) was the cause of the toxicity. Two samples results were above 50% compared to the control; TIEs were not required. The amount of flow measured at the site was extremely low or recorded as zero during the five sampling events. Therefore, it is likely that products containing chlorpyrifos entered the waterbody during a storm event in February or early March and remained in the drain until finally degrading.

Samples collected during MPM on March 10, 2015 were analyzed for *C. dubia* toxicity and resulted in 0% survival compared to the control. The TIE indicated non-polar organics were the cause of toxicity. The phase III TIE confirmed that the concentration of chlorpyrifos detected above the WQTL in the sample (4.2 µg/L) was the cause of the toxicity (TUa = 52.5; Table 37). The PUR data associated with the toxicity indicate 17 applications totaling 1,405 lbs AI on 1,234 acres of alfalfa and almonds from February 14, 2015 through March 5, 2015. Nine of the 17 applications associated with the March toxicity contained chlorpyrifos, totaling 185 lbs on 454 acres of alfalfa. Seven of the nine chlorpyrifos applications, totaling 166 lbs AI, were made by non-member dairy farmers; two of the seven dairy farmers who applied chlorpyrifos were past members, previously targeted for focused outreach in 2008.

Samples collected during Normal Monitoring on April 14, 2015 were analyzed for *C. dubia* toxicity and resulted in 0% survival compared to the control (Table 41). The TIE indicated non-polar organics were the cause of toxicity. The phase III TIE analysis confirmed that the concentration of chlorpyrifos detected in the sample above the WQTL (0.2 µg/L) was the cause of most of the toxicity (TUa = 2.5; Table 37). However, chlorpyrifos applications were not associated with the toxicity. The PUR data associated with the toxicity indicate seven applications of dimethoate and cypermethrin totaling 35 lbs AI on 209 acres of alfalfa from February 18, 2015 through March 18, 2015.

Samples collected during Normal Monitoring on May 12, 2015 were analyzed for *C. dubia* toxicity and resulted in 0% survival compared to the control (Table 41). The TIE indicated non-polar organics were the cause of toxicity. The phase III TIE analysis confirmed that the concentration of chlorpyrifos detected in the sample above the WQTL (0.2 µg/L) could be the cause of the toxicity (TUa = 2.5; Table 37). However, chlorpyrifos applications were not associated with the toxicity. The PUR data associated with the toxicity indicate nine applications totaling 37 lbs AI on 437 acres of alfalfa and almonds from February 18, 2015 through May 1, 2015.

Samples collected during Normal Monitoring on June 9, 2015 were analyzed for *C. dubia* toxicity and resulted in 70% survival compared to the control (Table 41). A TIE was not required because the percent survival compared to the control was greater than 50%. Samples were also collected for chemistry analyses in June and resulted in an exceedance of the WQTL for chlorpyrifos (0.044 µg/L). The PUR data associated with the toxicity indicate six applications of bifenthrin and cypermethrin totaling 258 lbs AI occurred across 234 acres of alfalfa, almonds, and corn from February 18, 2015 through May 18, 2015.

Samples collected during Normal Monitoring on July 14, 2015 were analyzed for *C. dubia* toxicity and resulted in 60% survival compared to the control (Table 41). A TIE was not required because the percent survival compared to the control as greater than 50%. Samples were also collected for chemistry analyses in July and resulted in an exceedance of the WQTL for chlorpyrifos (0.061 µg/L). However, chlorpyrifos applications were not associated with the toxicity. The PUR data associated with the toxicity indicate 20 applications totaling 462 lbs AI occurred on 1,342 acres of alfalfa, almonds, corn, and watermelon from February 18, 2015 through July 14, 2015.

Prairie Flower Drain @ Crows Landing Rd is scheduled for *C. dubia* toxicity MPM from March through September during the 2016 WY (2016 WY MPU). The Coalition previously conducted focused outreach in the Prairie Flower Drain @ Crows Landing Rd site subwatershed from 2008 through 2010. Due to membership changes and new water quality impairments, the Coalition informed all members and non-members of the chlorpyrifos detected in the waterbody in a meeting with Dairy Cares, Prairie Flower Drain dairy members, and Coalition members on October 29, 2015. The Coalition will conduct focused outreach in the site subwatershed in 2016 and will address all management plan constituents with targeted growers.

***S. capricornutum* toxicity**

During the 2015 WY, 43 samples were collected and analyzed for *S. capricornutum* toxicity. Toxicity occurred in 14 samples collected from Hilmar Drain @ Central Ave, Lateral 2 ½ near Keyes Rd, Lateral 5 1/2 @ South Blaker Rd, Lateral 6 and 7 @ Central Ave, Lower Stevinson @ Faith Home Rd, and Prairie Flower Drain @ Crows Landing Rd.

Hilmar Drain @ Central Ave

Samples collected during MPM from Hilmar Drain @ Central Ave on September 8, 2015 were analyzed for *S. capricornutum* toxicity and resulted in 32% growth compared to the control (Table 41). The TIE indicated that the sample lost all toxicity prior to or during the analysis. The PUR data associated with the September toxicity indicate three applications of paraquat, glyphosate, and oxyflurofen totaling 68 lbs AI on 69 acres of almonds on August 28, 2015 and September 1, 2015. Hilmar Drain @ Central Ave is scheduled for *S. capricornutum* toxicity MPM in April, July, and September during the 2016 WY (2016 WY MPU).

Lateral 2 ½ near Keyes Rd

Samples collected during Normal Monitoring on June 9, 2015 were analyzed for *S. capricornutum* toxicity and resulted in 68% growth compared to the control (Table 41). A TIE was not required because growth was greater than 50% compared to the control. This was the second toxicity to *S. capricornutum* at Lateral 2 ½ near Keyes Rd; therefore, *S. capricornutum* toxicity has been added to the site's management plan for the 2016 WY. The PUR data associated with the June toxicity indicate 1,483 applications of pesticides containing copper, herbicides, and pyrethroids totaling 62,951 lbs AI on 149,599 acres of orchards from March 17, 2015 through June 9, 2015.

Samples collected on July 14, 2015 during Normal Monitoring resulted in toxicity to *S. capricornutum* and resulted in 66% growth compared to the control. A TIE was not required. The PUR data associated with the July toxicity indicate 1,396 applications of pesticides containing copper and herbicides totaling 114,755 lbs AI on 41,044 acres of row crops and orchards from April 21, 2015 through July 14, 2015.

Lateral 2 ½ near Keyes Rd is scheduled for *S. capricornutum* toxicity MPM from May through August during the 2016 WY (2016 WY MPU). The Coalition previously conducted focused outreach in the Prairie Flower Drain @ Crows Landing Rd site subwatershed from 2011 through 2013. Due to membership changes and new water quality impairments, the Coalition will conduct 2017 focused outreach in the site subwatershed and will address all management plan constituents with targeted growers.

Lateral 5 ½ @ South Blaker Rd

Samples collected during MPM on October 12, 2014 were analyzed for *S. capricornutum* toxicity and resulted in 71% growth compared to the control; a TIE was not required (Table 41). The PUR data associated with the October toxicity indicate 120 applications totaling 30,582 lbs AI across 5,408 acres of orchards from August 26, 2015 through October 14, 2015.

Samples collected on March 10, 2015 during MPM resulted in toxicity to *S. capricornutum* (8% growth compared to the control (Table 41). The TIE conducted on the toxic sample indicated neither non-polar organics nor cationic metals caused the toxicity. Samples collected in March were analyzed for diuron and concentrations did not exceed the WQTL. The PUR data associated with the toxicity in March indicate 890 applications of herbicides totaling 89,289 lbs AI on 34,341 acres of fruit and nut trees from December 22, 2014 through March 10, 2015.

During the 2016 WY, Lateral 5 ½ @ South Blaker Rd is the Core site in Zone 2; samples will be collected and analyzed for *S. capricornutum* toxicity monthly (2016 WY MPU, Table 1). Management Plan Monitoring for *S. capricornutum* toxicity will continue at Lateral 5 ½ @ South Blaker Rd when the Coalition conducts focused outreach in the site subwatershed.

Lateral 6 and 7 @ Central Ave

Samples collected during Normal Monitoring on December 3, 2014 were analyzed for *S. capricornutum* toxicity and resulted in 56% growth compared to the control; a TIE was not required (Table 41). Samples collected in December were analyzed for diuron and concentrations did not exceed the WQTL. This was the second toxicity to *S. capricornutum* at Lateral 6 and 7 @ Central Ave; therefore, *S. capricornutum* toxicity has been added to the site's management plan. The PUR data associated with the toxicity in December indicate 486 applications totaling 20,618 lbs AI on 21,553 acres of orchards and row crops from October 10, 2014 through December 2, 2014.

Samples collected on January 13, 2015 during Normal Monitoring resulted in toxicity to *S. capricornutum* (2% growth compared to the control; Table 41). The TIE indicated neither non-polar organics nor cationic metals caused the toxicity; therefore, the TIE was inconclusive. Samples collected in January were analyzed for diuron and concentrations did not exceed the WQTL. The PUR data associated with the toxicity in January indicate 932 applications totaling 95,783 lbs AI on 46,152 acres of multiple orchards and row crops from November 10, 2014 through January 13, 2015.

Management Plan Monitoring for *S. capricornutum* toxicity will occur at Lateral 6 and 7 @ Central Ave when the Coalition conducts focused outreach in the site subwatershed.

Lower Stevinson @ Faith Home Rd

Samples collected during MPM on June 9, 2015 were analyzed for *S. capricornutum* toxicity and resulted in 42% growth compared to the control (Table 41). The TIE conducted on the toxic sample was inconclusive; samples lost all detectable toxicity prior to or during the TIE. The PUR data associated with the toxicity in June indicate 1,458 applications totaling 116,467 lbs AI on 54,267 acres of fruit and nut trees from March 17, 2015 through June 9, 2015.

Samples collected on August 11, 2015 during MPM resulted in toxicity to *S. capricornutum* and resulted in 73% growth compared to the control; a TIE was not required (Table 41;. The PUR data associated with the toxicity in August indicate 824 applications totaling 166,401 lbs AI across 47,492 acres of alfalfa, corn, and fruit and trees from May 19, 2015 through August 11, 2015.

Management Plan Monitoring for *S. capricornutum* toxicity will continue at Lower Stevinson @ Faith Home Rd when the Coalition conducts focused outreach in the site subwatershed.

Prairie Flower Drain @ Crows Landing Rd

Five samples collected from Prairie Flower Drain @ Crows Landing Rd analyzed for *S. capricornutum* toxicity resulted in toxicity in February, and May through August 2015. All toxicity results were above 50% compared to the control; TIEs were not required. The amount of flow measured at the site was extremely low or recorded as zero during the five sampling events. Therefore, it is likely that products associated with *S. capricornutum* toxicity washed into the waterbody during a storm event in February or early March and remained in the drain, potentially become concentrated due to no flow and evaporation.

Samples collected during MPM on February 10, 2015 were analyzed for *S. capricornutum* toxicity and resulted in 75% growth compared to the control (Table 41). Samples collected in February for chemistry analysis resulted in an exceedance of the WQTL for ammonia (5.6 mg/L). The PUR data associated with the February toxicity indicate 50 applications of herbicides totaling 1,553 lbs AI on 2861 acres of alfalfa, oat and wheat for fodder, and almonds from January 13, 2015 through February 5, 2015.

Samples collected during MPM on May 12, 2015 were analyzed for *S. capricornutum* toxicity and resulted in 85% growth compared to the control (Table 41). The PUR data associated with the May toxicity indicate seven applications of herbicides totaling 641 lbs AI on 554 acres of almond, corn, and Sudan grass from April 25, 2015 through May 7, 2015.

Samples collected during Normal Monitoring on June 9, 2015 were analyzed for *S. capricornutum* toxicity and resulted in 72% growth compared to the control (Table 41). The PUR data associated with the June toxicity indicate 24 applications of herbicides totaling 1,183 lbs AI on 947 acres of almonds, alfalfa, corn, and rights of way from May 16, 2015 through June 9, 2015.

Samples collected during Normal Monitoring on July 14, 2015 were analyzed for *S. capricornutum* toxicity and resulted in 76% growth compared to the control (Table 41). The PUR data associated with the July toxicity indicate 44 applications of herbicides totaling 2,521 lbs AI on 2,224 acres of orchards and row crops from June 16, 2015 through July 14, 2015.

Samples collected during Normal Monitoring on August 11, 2015 were analyzed for *S. capricornutum* toxicity and resulted in 69% growth compared to the control (Table 41). Samples collected in August for chemistry analysis resulted in an exceedance of the WQTL for ammonia (4.7 mg/L). The PUR data associated with the August toxicity indicate 15 applications of glyphosate, oxyflurofen, and triflumizole totaling 939 lbs AI across 680 acres of alfalfa, rights of way, corn, and watermelon from July 14, 2015 through July 29, 2015.

During the 2016 WY, Prairie Flower Drain @ Crows Landing Rd is scheduled for *S. capricornutum* toxicity MPM in October and December through June (2016 WY MPU). The Coalition will begin 2016 Focused Outreach in the site subwatershed and address all management plan constituents with targeted growers.

Sediment toxicity

During the 2015 WY, 15 samples were collected and analyzed for sediment toxicity to *H. azteca* in Zone 2; one of the 15 samples was toxic to *H. azteca*.

Prairie Flower Drain @ Crows Landing Rd

Samples were collected to analyze for sediment toxicity during March and September 2015. Of the samples collected at Prairie Flower Drain @ Crows Landing Rd, sediment toxicity to *H. azteca* occurred in samples collected on March 10, 2015 during MPM and resulted in complete mortality. Since survival in the toxic samples was less than 80% compared to the control, additional sediment chemistry analysis for pyrethroids and chlorpyrifos was required. The analysis resulted in detections of bifenthrin (5.1 µg/kg dw), chlorpyrifos (1,400 µg/kg dw), cyhalothrin lambda (29 µg/kg dw), and permethrin (1.1 µg/kg dw; Table 42). The total organic carbon (TOC) concentration was 22,300 mg/kg for this sample with a grain size of 0.091 mm (fine sand; Table 38).

The amount of chlorpyrifos and pyrethroids contributing to sediment toxicity can be evaluated using the TUa calculation based on the LC50s for chlorpyrifos and pyrethroids determined to cause acute toxicity to *H. azteca*. Based on the chemistry results, there was 15.9 TUa of chlorpyrifos which is sufficient to account for sediment toxicity in the March sediment sample (Table 42). The TUs of pyrethroids were sufficient to cause toxicity (3.334 TUa); however, they were small compared to the TUa calculated from the amount of chlorpyrifos detected (Table 42). The PUR data associated with the sediment toxicity indicate nine applications of chlorpyrifos totaling 185 lbs AI on 454 acres of alfalfa from February 18, 2015 through March 5, 2015. The PUR data also indicate 10 applications of pyrethroids (lambda-cyhalothrin and cypermethrin) totaling 13 lbs AI on 499 acres of alfalfa from February 18, 2015 through March 5, 2015.

During the 2016 WY, MPM for sediment toxicity will continue during March and September at Prairie Flower Drain @ Crows Landing Rd (2016 WY MPU). The Coalition will begin 2016 Focused Outreach in the site subwatershed and address all management plan constituents with targeted growers.

Table 41. Zone 2 (Hatch Drain @ Tuolumne Rd, Hilmar Drain @ Central Ave, Lateral 2 1/2 near Keyes Rd, Lateral 5 1/2 @ South Blaker Rd, Lateral 6 and 7 @ Central Ave, Levee Drain @ Carpenter Rd, Lower Stevinson @ Faith Home Rd, Prairie Flower Drain @ Crows Landing Rd, Unnamed Drain @ Hogin Rd, and Westport Drain @ Vivian Rd) exceedances.

The WQTLs are listed with each constituent. Red bolded values represent MPM exceedances.

Zone 2 Site Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	pH, <6.5 and > 8.5 units	SC, 700 µS/cm	*E. coli*, 235 MPN/100 mL	Ammonia, Variable[1] or 1.5 mg/L	Nitrate + Nitrite, 10 mg/L	Molybdenum, total, 10 G/L	Chlorpyrifos, 0.015 µg/L	Dimethoate, 1.0 µg/L	*C. dubia*, % Control	*S. capricornutum*, % Control	*H. azteca*, % Control
Hatch Drain @ Tuolumne Rd	Represented	MPM	1/13/2015			1306									
Hatch Drain @ Tuolumne Rd	Represented	MPM, NM	2/10/2015			1137									
Hatch Drain @ Tuolumne Rd	Represented	MPM, SED	3/10/2015	1.70		1035									
Hatch Drain @ Tuolumne Rd	Represented	MPM	4/14/2015	3.53		1135									
Hatch Drain @ Tuolumne Rd	Represented	MPM	5/12/2015	5.57		825									
Hatch Drain @ Tuolumne Rd	Represented	MPM, NM	7/14/2015	4.99		939									
Hatch Drain @ Tuolumne Rd	Represented	MPM	8/11/2015	1.24		1105									
Hilmar Drain @ Central Ave	Represented	MPM	1/13/2015	6.77		1256									
Hilmar Drain @ Central Ave	Represented	MPM	2/10/2015	2.64		1349									
Hilmar Drain @ Central Ave	Represented	MPM, SED	3/10/2015			1553									
Hilmar Drain @ Central Ave	Represented	MPM	4/14/2015			1225									
Hilmar Drain @ Central Ave	Represented	MPM	6/9/2015	4.08		845									
Hilmar Drain @ Central Ave	Represented	MPM, NM	7/14/2015	4.59		908									
Hilmar Drain @ Central Ave	Represented	NM	8/11/2015	4.91		1035									
Hilmar Drain @ Central Ave	Represented	MPM, SED	9/8/2015	5.50		1161								**32**	
Lateral 2 1/2 near Keyes Rd	Represented	MPM	4/14/2015		8.61										
Lateral 2 1/2 near Keyes Rd	Represented	MPM, NM	6/9/2015											68	
Lateral 2 1/2 near Keyes Rd	Represented	MPM, NM	7/14/2015											66	
Lateral 5 1/2 @ South Blaker Rd	Represented	MPM	10/14/2014		8.56	1122								**71**	
Lateral 5 1/2 @ South Blaker Rd	Represented	NM, Non-contiguous	1/13/2015		10.37	724									
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	2/10/2015		8.74	1041									
Lateral 5 1/2 @ South Blaker Rd	Represented	MPM, NM, SED	3/10/2015	4.84		721								**8**	
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	5/12/2015			818									
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	8/11/2015			2981									
Lateral 6 and 7 @ Central Ave	Represented	NM	12/3/2014			1251								56	
Lateral 6 and 7 @ Central Ave	Represented	NM	1/13/2015			1583								2	
Lateral 6 and 7 @ Central Ave	Represented	NM	2/10/2015		8.56										
Lateral 6 and 7 @ Central Ave	Represented	NM, SED	3/10/2015		8.84	999									
Lateral 6 and 7 @ Central Ave	Represented	NM	7/14/2015			1105									

Zone 2 Site Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	pH, <6.5 and > 8.5 units	SC, 700 µS/cm	*E. coli*, 235 MPN/100 mL	Ammonia, Variable[1] or 1.5 mg/L	Nitrate + Nitrite, 10 mg/L	Molybdenum, total, 10 g/L	Chlorpyrifos, 0.015 µg/L	Dimethoate, 1.0 µg/L	*C. dubia*, % Control	*S. capricornutum*, % Control	*H. azteca*, % Control
Lateral 6 and 7 @ Central Ave	Represented	NM	8/11/2015			807									
Lateral 6 and 7 @ Central Ave	Represented	NM, SED	9/8/2015	6.09		882									
Levee Drain @ Carpenter Rd	Represented	MPM, Non-contiguous	12/3/2014	5.52		1375									
Levee Drain @ Carpenter Rd	Represented	MPM, NM	2/10/2015			1900									
Levee Drain @ Carpenter Rd	Represented	MPM, SED	3/10/2015			1881									
Levee Drain @ Carpenter Rd	Represented	MPM	6/9/2015	6.61		2190									
Levee Drain @ Carpenter Rd	Represented	MPM, NM	7/14/2015			1855									
Levee Drain @ Carpenter Rd	Represented	NM	8/11/2015	2.87		734									
Levee Drain @ Carpenter Rd	Represented	MPM, SED	9/8/2015			1849									
Lower Stevinson @ Faith Home Rd	Represented	MPM, NM	12/3/2014		4.30										
Lower Stevinson @ Faith Home Rd	Represented	MPM, NM, Non-contiguous	1/13/2015	1.22											
Lower Stevinson @ Faith Home Rd	Represented	NM, SED	3/10/2015		8.77	1093									
Lower Stevinson @ Faith Home Rd	Represented	MPM,NM	6/9/2015			888								**42**	
Lower Stevinson @ Faith Home Rd	Represented	MPM,NM	7/14/2015		9.30										
Lower Stevinson @ Faith Home Rd	Represented	MPM,NM	8/11/2015			973								**73**	
Lower Stevinson @ Faith Home Rd	Represented	NM, SED	9/8/2015			1081									
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM, High TSS	12/3/2014			2155	>2419.6	5.40	25	**19**					
Prairie Flower Drain @ Crows Landing Rd-FD	Core	MPM, NM, High TSS	12/3/2014							**19**					
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	1/13/2015	5.34		2747	488.4		29	**27**					
Prairie Flower Drain @ Crows Landing Rd-FD	Core	MPM, NM	1/13/2015							**26**					
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	2/10/2015	1.10		834	>2419.6	5.60						**75**	
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM, SED	3/10/2015	5.65		2657	235.9		25	**16**	4.200		**0**		**0**
Prairie Flower Drain @ Crows Landing Rd-FD	Core	MPM, NM	3/10/2015							**16**					
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	4/14/2015	6.87		2944			27	**25**	0.200		0		
Prairie Flower Drain @ Crows Landing Rd-FD	Core	MPM, NM	4/14/2015							**25**					
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	5/12/2015			2806			15	**23**	0.200		0	**85**	
Prairie Flower Drain @ Crows Landing Rd-FD	Core	MPM, NM	5/12/2015							**23**					
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	6/9/2015	3.43		2782	866.4		14	**22**	0.061		70	72	
Prairie Flower Drain @ Crows Landing Rd-FD	Core	MPM, NM	6/9/2015							**22**					
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	7/14/2015	1.65		2439			24	**15**	0.044		60	76	
Prairie Flower Drain @ Crows Landing Rd-FD	Core	MPM, NM	7/14/2015							**15**					
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	8/11/2015	2.55		2202		4.70	20	**13**	0.017			69	
Prairie Flower Drain @ Crows Landing Rd-FD	Core	MPM, NM	8/11/2015							**13**					
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM, SED	9/8/2015	2.55		2662			29	**18**					
Prairie Flower Drain @ Crows Landing Rd-FD	Core	MPM, NM	9/8/2015							**19**					

Zone 2 Site Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	pH, <6.5 and > 8.5 units	SC, 700 µS/cm	*E. coli*, 235 MPN/100 mL	Ammonia, Variable[1] or 1.5 mg/L	Nitrate + Nitrite, 10 mg/L	Molybdenum, total, 10 g/L	Chlorpyrifos, 0.015 µg/L	Dimethoate, 1.0 µg/L	*C. dubia*, % Control	*S. capricornutum*,% Control	*H. azteca*,% Control
Unnamed Drain @ Hogin Rd	Represented	NM	2/10/2015	3.47		1274									
Unnamed Drain @ Hogin Rd	Represented	NM, SED	3/10/2015	4.38		2681						8.4			
Unnamed Drain @ Hogin Rd	Represented	NM	7/14/2015	4.80		1827									
Unnamed Drain @ Hogin Rd	Represented	NM	8/11/2015	5.81		1813									
Unnamed Drain @ Hogin Rd	Represented	NM, SED	9/8/2015	2.16		1854									
Westport Drain @ Vivian Rd	Represented	MPM	2/10/2015	4.17											
Westport Drain @ Vivian Rd	Represented	MPM, NM, SED	3/10/2015		8.71	860									
Westport Drain @ Vivian Rd	Represented	MPM	5/12/2015			8190									
Westport Drain @ Vivian Rd	Represented	MPM	7/14/2015	5.06											
Westport Drain @ Vivian Rd	Represented	MPM	8/11/2015	3.55											
Westport Drain @ Vivian Rd	Represented	NM, SED	9/8/2015	2.93											
Normal Monitoring Exceedances				**34**	**10**	**55**	**5**	**3**	**9**	**0**	**6**	**1**	**4**	**7**	**0**
Non-contiguous Waterbody Exceedances				**2**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Management Plan Monitoring Exceedances[2]				**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**18**	**0**	**0**	**1**	**7**	**1**
Total Exceedances				**34**	**10**	**55**	**5**	**3**	**8**	**18**	**6**	**1**	**5**	**14**	**1**

[1]Ammonia WQTL variable based on pH and temperature.

[2]MPM not conducted for field parameters, nutrients, or *E. coli* even if they are under a management plan; however, field parameters are measured during every sampling event.

MPM-Management Plan Monitoring
NM-Normal Monitoring
SED- Sediment monitoring

Table 42. Sediment pesticide results for Prairie Flower Drain @ Crows Landing Rd and associated TUa.
The table includes results associated with the environmental sample. Calculated 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.

Site 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
Prairie Flower Drain @ Crows Landing Rd	3/10/2015	0%	Bifenthrin	5.1	520	22,300	2.23%	0.43
			Chlorpyrifos	1,400	4,160			1,500
			Lambda-cyhalothrin	29	450			2.9
			Permethrin	1.1	10,830			0.0046
Total TUa of Chlorpyrifos								**15.09**
Total TUa of Pyrethroids								**3.334**

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

Zone 3 (Highline Canal @ Hwy 99, Highline Canal @ Lombardy Rd, Mustang Creek @ East Ave)

During the 2015 WY, Highline Canal @ Hwy 99 was monitored monthly as the Core site in Zone 3 and Highline Canal @ Lombardy Rd and Mustang Creek @ East Ave were monitored as Represented sites.

Highline Canal @ Hwy 99 was monitored monthly for the entire suite of constituents (2015 WY MPU, Table 1) as well as MPM for copper, lead, *C. dubia* and *S. capricornutum* toxicity, and sediment toxicity to *H. azteca*. Management Plan Monitoring occurred at Highline Canal @ Lombardy Rd for copper, lead, *S. capricornutum* toxicity, and sediment toxicity to *H. azteca*. Monitoring occurred at Mustang Creek @ East Ave for sediment toxicity in March and September 2015. In addition, MPM for copper occurred from October through March 2015. Table 43 includes all exceedances that occurred during the 2015 WY in Zone 3.

Highline Canal @ Hwy 99 was dry during November, February, and March sampling events. Mustang Creek @ East Ave was dry in October. Non-contiguous samples were collected from Highline Canal @ Hwy 99 in January, at Highline Canal @ Lombardy Rd in January and March, and at Mustang Creek @ East Ave in September.

Field Parameters

In Zone 3, field parameters were scheduled to be measured 26 times during the 2015 WY; 22 measurements were taken and sites were dry during four sampling events (Appendix III, Table III-2). Exceedances of the WQTLs for DO (5), pH (7), and SC (3) occurred (Table 43).

Dissolved Oxygen

During the 2015 WY, exceedances of the WQTL for DO ranged from 2.87 through 6.25 mg/L and occurred at Highline Canal @ Hwy 99 (1), Highline Canal @ Lombardy Rd (2), Mustang Creek @ East Ave (2). Measurements of DO were taken from a non-contiguous waterbody during two of the five sampling events that resulted in exceedances of the WQTL. In addition, flow was minimal (<1 cfs) during the times when exceedances of the WQTL for DO occurred.

pH

During the 2015 WY, seven exceedances of the WQTL for pH occurred, ranging from 5.76 through 9.73 at Highline Canal @ Hwy 99 (5), and Highline Canal @ Lombardy Rd (2). Of the seven exceedances, six were above the upper 8.5 WQTL for pH; four occurred at Highline Canal @ Hwy 99 and two occurred at Highline Canal @ Lombardy Rd. One exceedance of the lower 6.5 WQTL for pH occurred at Highline Canal @ Hwy 99.

Specific Conductivity

During the 2015 WY, three exceedances of the WQTL for SC occurred at Highline Canal @ Hwy 99 (1) and at Highline Canal @ Lombardy Rd (2).

Chlorpyrifos

In Zone 3, 12 samples were scheduled to be collected and analyzed for chlorpyrifos during the 2015 WY; nine samples were collected and sites were dry during three sampling events. The nine samples were collected from Highline Canal @ Hwy 99 and a single exceedance of the WQTL for chlorpyrifos occurred (Appendix III, Table III-3).

Non-contiguous samples collected from Highline Canal @ Hwy 99 on January 13, 2015 resulted in an exceedance of the WQTL for chlorpyrifos (0.070 µg/L; Table 43). All other samples from chlorpyrifos monitoring were non-detect. This is the first exceedance of the WQTL to occur in the site subwatershed since 2009; the chlorpyrifos management plan was approved for completion on May 30, 2012. Due to the exceedance in January 2015, the chlorpyrifos management plan has been reinstated for Highline Canal @ Hwy 99 for the 2016 WY. The exceedance of the WQTL for chlorpyrifos did not coincide with water column toxicity. The PUR data associated with the exceedance indicate one application of 2 lbs of chlorpyrifos occurred on four acres of cherries on January 7, 2015. A single application was made by a member of the Coalition on parcels that do not directly drain to Highline Canal. For this reason, the member was not targeted during 2010 focused outreach. The member will be targeted for 2016 Focused Outreach based on the application associated with this exceedance. However, since the parcel with the application is so far from the waterway and does not have a means to directly drain to the canal, it is unlikely that the application was significant to the direct cause of the exceedance. It is more likely that the source of this exceedance came from non-reported applications. Any chlorpyrifos that was transported to the waterway could have remained due to low flow conditions, becoming concentrated in the non-contiguous channel until finally degrading. Field observations at Highline Canal @ Hwy 99 indicated the canal was drying up from November through March; the site was dry November, February and March.

During the 2016 WY, MPM is scheduled for chlorpyrifos and Highline Canal @ Hwy 99 will be monitored monthly for all constituents as part of Core site monitoring (2016 WY MPU).

Copper

There are a number of possible sources of copper in waterbodies within the Coalition region. Copper is applied as a fungicide to a variety of vegetable crops, grains, and fruit and nut orchards in forms such as copper hydroxide, copper sulfide, and copper oxide. Copper can also enter drainage systems from sources other than agriculture. Copper is commonly used by dairies and can also enter waterbodies through the weathering of rocks and soils. Automobile components may also contain copper and the wearing of brakes can add substantial amounts of copper to surface waters that pass through urban areas. The Coalition conducted a preliminary analysis to evaluate water quality parameters most likely to influence copper (submitted March 23, 2016). According to the preliminary analysis, hardness is a main determinant of exceedances, copper concentration is secondary; copper concentration and hardness are related, meaning when water originates in high mineral/high hardness regions and if copper concentration is sufficiently elevated, exceedances occur. Discharges from agriculture seem to not be a factor, even if the discharge is simply a result of tailwater discharge to waterbodies. To determine the WQTL for dissolved copper, the WQTL is calculated based on the hardness of each individual sample. The resulting value is the limit for the bioavailable fraction of copper that could be toxic to aquatic life. Therefore, the WQTL for dissolved copper is unique to the hardness of each sample.

In Zone 3, 14 samples were scheduled to be collected and analyzed for dissolved copper; 11 samples were collected and sites were dry during three sampling events (Appendix III, Table III-3). Two samples, one collected from Highline Canal @ Lombardy Rd and one collected from Mustang Creek @ East Ave during MPM, resulted in exceedances of the hardness based WQTL for copper (Table 43).

Field duplicate samples collected for MPM during a high TSS event on August 11, 2015 from Highline Canal @ Lombardy Rd resulted in an exceedance of the hardness based WQTL for dissolved copper with a concentration of 2.5 µg/L (hardness based WQTL = 1.87 µg/L; Table 43); concentrations of the associated environmental samples did not exceed the hardness based WQTL. The PUR data associated with the exceedance in August indicate there were two applications of copper of 41.2 and 94.5 lbs AI (137 total lbs AI) on 81 acres of walnut orchards on May 19, 2015. Highline Canal is a TID supply canal and therefore does not generally accept drainage from nearby parcels; however, some growers may return irrigation tailwater or stormwater to the canal. Since the last applications of copper products occurred in May, the exceedance was most likely the result of stormwater runoff transporting copper to the canal during the storms that occurred from May through August. During the 2016 WY, Highline Canal @ Lombardy Rd will not be monitored, as determined by the Delta Regional Monitoring Program (Delta RMP) reduced monitoring proposal (approved September 29, 2015); MPM for copper will continue downstream at Highline Canal @ Hwy 99 from December through May, and in August.

A sample from non-contiguous water collected for MPM during the first storm monitoring event from Mustang Creek @ East Ave on December 3, 2014 resulted in an exceedance of the hardness based WQTL for dissolved copper with a concentration of 8 µg/L (hardness based WQTL 6.44 µg/L; Table 43). The PUR data associated with the exceedance in December indicate seven applications of copper products (copper sulfate and copper oxide) totaling 4,838 lbs of AI on 1,696 acres of almonds and olives upstream of the sample site from November 8, 2015 through November 21, 2015. There was one measureable storm within the Coalition region which occurred before and during the December sampling event. The storm occurred from November 29 through December 5, 2014, and produced 1.1 inches of precipitation in Merced. During the 2016 WY, MPM for copper will continue Mustang Creek @ East Ave from December through March (2016 WY MPU).

Water Column Toxicity

In Zone 3, 18 samples were scheduled to be collected and analyzed for *S. capricornutum* toxicity during the 2015 WY; 15 samples were collected and sites were dry during three sampling events (Appendix III, Table III-4). Toxicity occurred in two samples collected from Highline Canal @ Hwy 99 (2; field duplicate and environmental sample) and Highline Canal @ Lombardy Rd (1; Table 43).

S. capricornutum **toxicity**

Highline Canal @ Hwy 99

Samples collected during MPM on July 14, 2015 from Highline Canal @ Hwy 99 were analyzed for *S. capricornutum* toxicity and resulted in 63% growth compared to the control (Table 43). The field duplicate sample also resulted in *S. capricornutum* toxicity (69% compared to the control). A TIE was not required for either the sample. The PUR data associated with the July toxicity indicate 445 applications of herbicides and fungicides totaling 108,552 lbs of AI on 25,381 acres of orchards and row crops from April 21, 2015 through July 14, 2015.

During the 2016 WY, MPM for *S. capricornutum* toxicity will continue in February through September in addition to monthly monitoring at Highline Canal @ Hwy 99 (2016 WY MPU).

Highline Canal @ Lombardy Rd

Samples collected during MPM on September 8, 2015 from Highline Canal @ Lombardy Rd were analyzed for *S. capricornutum* toxicity and resulted in 75% growth compared to the control; a TIE was not required (Table 43). The PUR data associated with the September toxicity indicate that 136 applications of herbicides and fungicides totaling 30,041 lbs AI on 5,861 acres of row crops and orchards occurred between August 11, 2015 and September 8, 2015.

During the 2016 WY, Highline Canal @ Lombardy will not be monitored, as determined by the Delta RMP reduced monitoring proposal (approved September 29, 2015); MPM for *S. capricornutum* toxicity will continue downstream at Highline Canal @ Hwy 99.

Table 43. Zone 3 (Highline Canal @ Hwy 99, Highline Canal @ Lombardy Rd, and Mustang Creek @ East Ave) exceedances.

The WQTLs are listed with each constituent. Red bolded values represent MPM exceedances.

Zone 3 Site Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	pH, <6.5 and > 8.5 Units	SC, 700 µS/cm	Copper Dissolved, µg/L (hardness based trigger limit)	Chlorpyrifos, 0.015 µg/L	*S. capricornutum*, % Control
Highline Canal @ Hwy 99	Core	NM	10/14/2014	4.76					
Highline Canal @ Hwy 99	Core	MPM, NM, Non-contiguous	1/13/2015		8.60	750		0.070	
Highline Canal @ Hwy 99	Core	MPM, NM	5/12/2015		8.88				
Highline Canal @ Hwy 99	Core	MPM, NM	7/14/2015		5.76				**63**
Highline Canal @ Hwy 99-FD	Core	MPM, NM	7/14/2015						**69**
Highline Canal @ Hwy 99	Core	MPM, NM	8/11/2015		8.66				
Highline Canal @ Hwy 99	Core	MPM, NM, SED	9/8/2015		9.73				
Highline Canal @ Lombardy Rd	Represented	MPM, Non-contiguous	1/13/2015			1280			
Highline Canal @ Lombardy Rd	Represented	MPM	2/10/2015	2.87					
Highline Canal @ Lombardy Rd	Represented	MPM, Non-contiguous, SED	3/10/2015	6.25		778			
Highline Canal @ Lombardy Rd	Represented	MPM	5/12/2015		8.87				
Highline Canal @ Lombardy Rd-FD	Represented	MPM	8/11/2015				**2.5 (1.87)**		
Highline Canal @ Lombardy Rd	Represented	MPM, SED	9/8/2015		8.67				**75**
Mustang Creek @ East Ave	Represented	MPM, Non-contiguous	12/3/2014				**18 (6.44)**		
Mustang Creek @ East Ave	Represented	MPM	2/10/2015	5.66					
Mustang Creek @ East Ave	Represented	NM, Non-contiguous, SED	9/8/2015	3.47					
			Normal Monitoring Exceedances	**5**	**7**	**3**	**0**	**1**	**0**
			Non-contiguous Waterbody Exceedances	**2**	**1**	**3**	**1**	**1**	**0**
			Management Plan Monitoring Exceedances[1]	**NA**	**NA**	**NA**	**2**	**0**	**3**
			Total Exceedances	**5**	**7**	**3**	**2**	**1**	**3**

[1] MPM not conducted for field parameters or *E. coli*.
FD- Field Duplicate
MPM-Management Plan Monitoring
NM-Normal Monitoring
SED-Sediment monitoring

Zone 4 (Black Rascal Creek @ Yosemite Rd, Canal Creek @ West Bellevue Rd, Howard Lateral @ Hwy 140, Livingston Drain @ Robin Ave, Merced River @ Santa Fe, and Unnamed Drain @ Hwy 140)

During the 2015 WY, Merced River @ Santa Fe was monitored monthly as the Core site in Zone 4. Black Rascal Creek @ Yosemite Rd, Canal Creek @ West Bellevue Rd, Howard Lateral @ Hwy 140, Livingston Drain @ Robin Ave, and Unnamed Drain @ Hwy 140 are Represented sites in Zone 4.

Merced River @ Santa Fe was monitored monthly for the entire suite of constituents (as indicated in the 2015 WY MPU, Table 1) as well as MPM for chlorpyrifos, lead, and *C. dubia* water column toxicity. Normal Monitoring occurred at two Represented sites: Canal Creek @ West Bellevue Rd for chlorpyrifos and toxicity to *C. dubia*, and at Unnamed Drain @ Hwy 140 for copper. In addition, MPM occurred at Black Rascal Creek @ Yosemite Rd, Howard Lateral @ Hwy 140, and Livingston Drain @ Robin Ave. Table 44 includes all exceedances that occurred during the 2015 WY in Zone 4.

Two sites in Zone 4 were dry during monitoring: Livingston Drain @ Robin Ave from January through June and August through September, and Howard Lateral @ Hwy 140 in April. Non-contiguous samples were collected from Black Rascal Creek @ Yosemite Rd in August and September, from Howard Lateral @ Hwy 140 in January, February, May, and August, and from Livingston Drain @ Robin Ave in July.

Field Parameters

In Zone 4, field parameters were scheduled to be monitored 38 times during the 2015 WY; measurements were not taken during 10 sampling events because the sites were dry (Appendix III, Table III-2). Exceedances of the WQTLs for DO (11) and SC (1) occurred in Zone 4 (Table 44).

Dissolved Oxygen

Monitoring during the 2015 WY resulted in exceedances of the WQTL for DO ranging from 0.26 to 6.81 mg/L. Exceedances occurred at Black Rascal Creek @ Yosemite Rd (4), Canal Creek @ West Bellevue Rd (1), Howard Lateral @ Hwy 140 (4), Livingston Drain @ Robin Ave (1), and Merced River @ Santa Fe (1). Five out of the 11 exceedances were measured from non-contiguous waterbodies when the water was stagnant.

Specific Conductance

Measurements taken from Howard Lateral @ Hwy 140 resulted in exceedance of the WQTL for SC (838 µS/cm; Table 44).

Copper

In Zone 4, a total of 14 samples were scheduled to be collected and analyzed for dissolved copper; six samples were collected and sites were dry during eight sampling events (Appendix III, Table III-3). Samples collected for copper MPM from Howard Lateral @ Hwy 140 in February and from Livingston Drain @ Robin Ave in December resulted in exceedances of the hardness based WQTL for copper.

Samples collected from non-contiguous water for copper MPM during the second storm event on February 10, 2015 at Howard Lateral @ Hwy 140 resulted in an exceedance of the hardness based WQTL for dissolved copper with a concentration of 5.70 µg/L (hardness based WQTL 1.57 µg/L; Table 44). The PUR data associated with the February exceedance indicate 81 applications of copper products (copper oxide, copper sulfate, copper hydroxide) totaling 10,807 lbs of AI on 2,053 acres of almonds, grapes, and peaches from November 21, 2014 through February 5, 2015. There was one measureable storm within the Coalition region that occurred just prior to the February sampling event. The storm occurred from February 6 through February 9, 2015, and produced 1.03 inches of precipitation in Merced. Rainfall could have increased flow in subwatershed enough to transport pesticides containing copper to the waterway before samples were collected on February 10, 2015. Management Plan Monitoring for dissolved copper is scheduled at Howard Lateral @ Hwy 140 during the 2016 WY in December, October, January through April, and in July (2015 MPU).

Environmental and field duplicate samples collected for copper MPM during the first storm event on December 3, 2014 at Livingston Drain @ Robin Ave resulted in an exceedances of the hardness based WQTL for dissolved copper with a concentration of 4.80 µg/L (hardness based WQTL 2.07 µg/L) in the environmental sample and a concentration of 5.80 µg/L (hardness based WQTL 2.26 µg/L) in the field duplicate sample (Table 44). The PUR data associated with the exceedances in December indicate one application of 123 lbs of AI of copper sulfate on 65 acres of row crops on November 24, 2014. The December storm event from November 29 through December 5, 2014 produced 1.1 inches of precipitation in Merced.

During the 2016 WY, copper MPM is scheduled at Livingston Drain @ Robin Ave in December and January through March (2016 WY MPU).

Water Column Toxicity

In Zone 4, a total of 17 samples were collected and analyzed for *C. dubia* toxicity, 12 samples were collected and analyzed for *S. capricornutum* and *P. promelas* toxicity, and two samples were collected and analyzed for sediment toxicity to *H. azteca*. Toxicity to *S. capricornutum* occurred in samples collected from Merced River @ Santa Fe in July 2015.

***S. capricornutum* toxicity**

Samples collected from Merced River @ Santa Fe on July 14, 2015 during Normal Monitoring were analyzed for *S. capricornutum* toxicity and resulted in 74% growth compared to the control; a TIE was not required. This is the first sample to be toxic to *S. capricornutum* in the site subwatershed since 2005 and therefore no management plan is required. The PUR data associated with the exceedance in July indicate 343 applications of 104,772 lbs of AI of herbicides and fungicides on 29,187 acres of orchards and row crops from April 21, 2015 through July 14, 2015.

In the 2016 WY, Merced River @ Santa Fe will be a Represented site; monitoring for toxicity to *S. capricornutum* will occur in July (2016 WY MPU).

Table 44. Zone 4 (Black Rascal Creek @ Yosemite Rd, Canal Creek @ West Bellevue Rd, Howard Lateral @ Hwy 140, Livingston Drain @ Robin Ave, Merced River @ Santa Fe) exceedances.
The WQTLs are listed with each constituent. Red bolded values represent MPM exceedances.

Zone 4 Site Name	Site Type	Monitoring Type	Sample Date	DO, <7 MG/L	SC, 700 µS/CM	Copper, Dissolved, µG/L (Hardness Based)	S. capricornutum, % Control
Black Rascal Creek @ Yosemite Rd	Represented	MPM	5/12/2015	1.53			
Black Rascal Creek @ Yosemite Rd	Represented	MPM	7/14/2015	2.23			
Black Rascal Creek @ Yosemite Rd	Represented	MPM, Non-contiguous	8/11/2015	6.64			
Black Rascal Creek @ Yosemite Rd	Represented	MPM, Non-contiguous	9/8/2015	0.26			
Canal Creek @ West Bellevue Rd	Represented	NM	8/11/2015	6.81			
Howard Lateral @ Hwy 140	Represented	MPM, Non-contiguous	1/13/2015	0.86			
Howard Lateral @ Hwy 140	Represented	MPM, Non-contiguous	2/10/2015			**5.70 (1.57)**	
Howard Lateral @ Hwy 140	Represented	MPM, Non-contiguous	5/12/2015		838		
Howard Lateral @ Hwy 140	Represented	MPM	6/9/2015	4.47			
Howard Lateral @ Hwy 140	Represented	MPM	7/14/2015	6.77			
Howard Lateral @ Hwy 140	Represented	MPM, Non-contiguous	8/11/2015	3.00			
Livingston Drain @ Robin Ave	Represented	MPM	12/3/2014			**4.80 (2.07)**	
Livingston Drain @ Robin Ave-FD	Represented	MPM	12/3/2014			**5.80 (2.26)**	
Livingston Drain @ Robin Ave	Represented	MPM, Non-contiguous	7/14/2015	5.47			
Merced River @ Santa Fe	Core	MPM, NM	7/14/2015	6.37			74
Normal Monitoring Exceedances				**11**	**1**	**0**	**1**
Non-contiguous Waterbody Exceedances				**5**	**1**	**1**	**0**
Management Plan Monitoring Exceedances[1]				**NA**	**NA**	**3**	**0**
Total Exceedances[2]				**11**	**1**	**3**	**1**

[1]MPM not conducted for field parameters or *E. coli,* even if they are under a management plan; however, field parameters are measured during every sampling event.
[2]Field duplicates not included in total count, unless the associated environmental sample did not exceed the WQTL.
FD-Field Duplicate
MPM-Management Plan Monitoring
NM-Normal Monitoring

Zone 5 (Deadman Creek @ Gurr Rd, Deadman Creek @ Hwy 59, Duck Slough @ Gurr Rd, and Miles Creek @ Reilly Rd)

During the 2015 WY, Duck Slough @ Gurr Rd was monitored monthly as the Core site in Zone 5 and Deadman Creek @ Hwy 59, Deadman Creek @ Gurr Rd, and Miles Creek @ Reilly Rd were monitored as Represented sites.

Duck Slough @ Gurr Rd was monitored monthly for the entire suite of constituents (as indicated in the 2015 WY MPU, Table 1) as well as MPM for chlorpyrifos, copper, lead, toxicity to *C. dubia, P. promelas,* and sediment toxicity to *H. azteca*. Management Plan Monitoring occurred at Deadman Creek @ Gurr Rd for chlorpyrifos, toxicity to *C. dubia* and *P. promelas*, and *S. capricornutum*, at Deadman Creek @ Hwy 59 for chlorpyrifos, and at Miles Creek @ Reilly Rd for copper, lead, chlorpyrifos, diazinon, toxicity to *C. dubia* and *S. capricornutum*, and sediment toxicity to *H. azteca*. Table 45 includes all exceedances that occurred during the 2015 WY in Zone 5.

In Zone 5, Duck Slough @ Gurr Rd was dry in January, February, and May, Deadman Creek @ Gurr Rd was dry from November through August, Deadman Creek @ Hwy 59 was dry in April and August, and Miles Creek @ Reilly Rd was dry in January, and March through July. Non-contiguous samples were collected from Duck Slough @ Gurr Rd in December, April, June, and August.

Due to the most recent exceedances, the Coalition assessed the surrounding waterbodies in an effort to identify potential sources of additional agricultural input in the Duck Slough @ Gurr Rd site subwatershed. The waterway, Deane Drain, is perpendicular to Duck Slough and runs north to south entering the Duck Slough @ Gurr Rd site subwatershed just east of the sample site. Deane Drain has the potential to overflow into Duck Slough during high flow events. Since the Duck Slough @ Gurr Rd sample site is located just downstream of the culvert where Deane Drain enters the waterbody, water samples collected during monitoring most likely include input from Deane Drain. Therefore, the Duck Slough @ Gurr Rd site subwatershed has been expanded to include land associated with the Deane Drain. The PUR data for Duck Slough @ Gurr Rd now includes Deane Drain to more accurately represent all agricultural drainage with the potential to impact water quality in the site subwatershed. Deane Drain was included in all Duck Slough @ Gurr Rd site subwatershed PUR data associations to exceedances from the 2015 WY. One sample was collected upstream of the culvert during the 2015 WY because Duck Slough was non-contiguous at that time.

Field Parameters and E. coli

In Zone 5, field parameters were scheduled to be monitored 35 times during the 2015 WY; field parameters were measured 13 times and sites were dry during 22 sampling events (Appendix III, Table III-2). Exceedances of the WQTLs for DO (2), pH (1), and SC (5) occurred in Zone 5 (Table 45).

Dissolved Oxygen

During the 2015 WY, two exceedances of the WQTL of < 7 mg/L for DO occurred at Duck Slough @ Gurr Rd in June and July, both at a concentration of 6.49 mg/L (Table 45). During the June sampling event, DO was measured from a non-contiguous waterbody when the water was stagnant and during the July sampling event there was no measurable flow. Discharge is inversely related to exceedances of the WQTL for DO; there is a higher probability of exceeding the WQTL when discharge is not measurable.

pH

A single exceedance of the WQTL for pH was above the upper limit of 8.5 at Duck Slough @ Gurr Rd in March (Table 45). Discharge was measured at 3.09 cfs, indicating low flow conditions at the time of sampling. The single exceedance coincided with an exceedance of the WQTL for ammonium. The low flow conditions and high ammonium in the water column could have contributed to an increase in pH.

Specific Conductance

Field parameters were measured when Deadman Creek @ Gurr Rd was non-contiguous and an exceedance of the 700 µS/cm WQTL for SC occurred on February 20, 2015 (913 µS/cm; Table 45). Four exceedances of the WQTL for SC occurred during monitoring at Duck Slough @ Gurr Rd in December, March, June, and August, ranging from 703 µS/cm to 984 µS/cm (Table 45).

E. coli

During the 2015 WY, 12 samples were scheduled to be collected for the analysis of *E. coli* from Duck Slough @ Gurr Rd; the site was dry during four sampling events. Eight samples were analyzed for *E. coli* from Duck Slough @ Gurr Rd and two exceedances of the WQTL of 235 MPN/100 mL occurred, both at a concentration of >2419.6 mL (Table 45).

Arsenic

Products containing arsenic for agricultural purposes have not been registered for use by agriculture since the 1980s. However, there are four products currently registered for non-agricultural purposes (arsenic acid, arsenic acid anhydride, arsenic trioxide and chromate copper arsenate) including wood protection, as a household ant killer, ditch weed control, use as weed control on non-agricultural plants, around buildings, driveways, sidewalks, rights-of-way, and fencerows. The Coalition conducted a preliminary analysis to evaluate water quality parameters most likely to influence arsenic (submitted March 23, 2016). As discussed in the preliminary analysis, arsenic is found throughout the Coalition region as evidenced by monitoring data from the 1980s, 1990s, (Westcot (1988, 1990) and with current monitoring by the ESJWQC. The USGS found that elevated concentrations of arsenic near the valley trough are the result of the release of arsenic resulting from reductive dissolution of iron or manganese oxyhydrides under iron or manganese-reducing conditions and from pH dependent desorption or arsenic from aquifer sediments under oxic conditions. As indicated by the USGS, neither of these mechanisms is a result of irrigated agriculture and would occur regardless of the land use. Furthermore, since there are no registered products containing arsenic, the PUR database cannot be queried for associated applications.

In Zone 5, arsenic was monitored during two storm and two irrigation events at Duck Slough @ Gurr Rd. Samples collected from a non-contiguous waterbody during August 11, 2015 resulted in exceedances of the 10 µg/L WQTL for arsenic with a concentration of 35 µg/L in the environmental sample and 33 µg/L in the associated field duplicate (Table 45). Elevated levels of arsenic are common in Zone 5. Exceedances of the WQTL for arsenic occurred 20 times from 2007 through the 2015 WY, and may be due to naturally occurring arsenic. Since there are no registered products containing arsenic used for agriculture, no PUR data were associated with this exceedance. The August sample was the second to result in an exceedance of the WQTL for arsenic in the site subwatershed; therefore, a management plan for arsenic in the Duck Slough @ Gurr Rd site subwatershed is required.

Chlorpyrifos

In Zone 5, 24 samples were scheduled to be collected and analyzed for chlorpyrifos; nine samples were collected and sites were dry during 15 sampling events (Appendix III, Table III-2).

During the 2015 WY, Duck Slough @ Gurr Rd was monitored as the Core site in Zone 5 and samples were scheduled to be analyzed monthly for chlorpyrifos. Eight samples were collected during MPM for chlorpyrifos from Duck Slough @ Gurr Rd; the site was dry during four sampling events. Samples collected on July 14, 2015 resulted in an exceedance of the WQTL for chlorpyrifos with a concentration of 0.190 µg/L (Table 45). Chlorpyrifos was not detected in any other sample collected from Duck Slough @ Gurr Rd. Toxicity to *C. dubia* coincided with the July monitoring event with complete mortality of the test species; the phase III TIE results indicated chlorpyrifos concentrations were high enough to account for the majority of the toxicity (Table 37). The PUR data associated with the July exceedance indicate five applications, ranging from 32 to 742 lbs AI (1,241 lbs AI total) on 900 acres of alfalfa and almonds on July 7 and July 10, 2015. All five applications of products containing chlorpyrifos were applied using aerial methods, indicating a potential for spray drift from parcels being treated with chlorpyrifos near the waterway. One member was responsible for three of the five applications associated with this exceedance on 309 acres of alfalfa, totaling 143 lbs AI on July 7, 2015. This member was not contacted during focused outreach in 2010. However, due to recent exceedances and water quality impairments, the Coalition has targeted this member for contact during 2016 Focused Outreach. The other two applications associated with the July exceedance were from one other member (1,097 lbs AI applied on 591 acres of almonds). However, these parcels are located near the outer boundary of the subwatershed are most likely too far (more than 2 miles) away to have contributed to the exceedance (Appendix V). Parcels next to the waterbody have a higher likelihood of having direct drainage and a higher potential for spray drift.

During the 2016 WY, Duck Slough @ Gurr Rd is a Represented site in Zone 5; MPM for chlorpyrifos will continue in March and July (2016 WY MPU). The Coalition will begin 2016 Focused Outreach in the site subwatershed and address all management plan constituents with the associated targeted growers.

Malathion

Malathion is an organophosphate insecticide applied to over 100 crops in the United States including alfalfa, rice, cotton, sorghum, wheat, and walnuts. It is also used for structural pest control (mosquito and fruit fly eradication in home settings), and has been used by vector control districts to control mosquitoes over wide areas. Malathion is easily mixed with water and can be found in both urban and agricultural runoff. Malathion is a prohibited discharge pesticide except under the Rice Coalition Management Plan and any detection is considered to be an exceedance.

Duck Slough @ Gurr Rd is the Core site in Zone 5 and samples were scheduled to be collected and analyzed for malathion monthly; eight samples were collected and the site was dry during four sampling events (Appendix III, Table III-2).

Samples collected from Duck Slough @ Gurr Rd site subwatershed on March 10, 2015 resulted in an exceedance of the WQTL for malathion with a concentration of 2.0 µg/L. Malathion is known to be toxic to *C. dubia* (LC50 = 3.35 µg/L); March samples collected and analyzed for *C. dubia* toxicity resulted in complete mortality. A phase III TIE analysis confirmed that malathion was responsible for the toxicity (Table 37). Malathion was not detected in any other samples collected from the Duck Slough @ Gurr Rd site subwatershed during the 2015 WY. The March sample was the second exceedance of the WQTL for malathion in the site subwatershed; therefore, a management plan has been instated for malathion at Duck Slough @ Gurr Rd. The PUR data associated with the March exceedance indicate 28 applications of malathion, ranging from six to 187 lbs AI (1,839 lbs AI) on 1,778 acres of alfalfa, barley, triticale, and wheat from February 12, 2015 through March 6, 2015. Twenty of those applications were by aerial methods on 1,422 acres of barley, alfalfa, wheat, and triticale, indicating a potential for spray drift from parcels being treated with malathion near the waterway. The applications were associated with both members (targeted and not targeted during prior focused outreach) and non-members. It is possible that growers in the site subwatershed have decreased their use of chlorpyrifos due to awareness of past water quality concerns, and increased their use of malathion. The Coalition will continue to inform growers about the water quality concerns due to chlorpyrifos and malathion applications, and the importance of implementing management practices to reduce irrigation runoff during the 2016 Focused Outreach.

During the 2016 WY, Duck Slough @ Gurr Rd is a Represented site in Zone 5; MPM for malathion will occur in February through April (2016 WY MPU). During 2016 Focused Outreach, the Coalition will discuss all water quality impairments (including malathion) with targeted growers in the site subwatershed.

Water Column Toxicity

In Zone 5, 17 samples were scheduled to be collected and analyzed for *C. dubia* toxicity; eight samples were collected and sites in the zone were dry during nine sampling events (Appendix III, Table III-4). Of the eight samples collected, three collected from Duck Slough @ Gurr Rd were toxic to *C. dubia* in March, June, and July 2015 (Table 45).

Of the 17 samples scheduled to be collected and analyzed for *S. capricornutum* toxicity; nine samples were collected and sites were dry during eight sampling events (Appendix III, Table III-4). Of the nine samples collected, toxicity to *S. capricornutum* occurred once in samples collected from Duck Slough @ Gurr Rd in June 2015 (Table 45).

***C. dubia* toxicity**

Duck Slough @ Gurr Rd

Samples collected during MPM from Duck Slough @ Gurr Rd on March 10, 2015 were analyzed for *C. dubia* toxicity and resulted in complete mortality. An exceedance of the WQTL for malathion (2.0 µg/L) coincided with the March toxicity (Table 45). The TIE results indicated non-polar organics were the cause of toxicity. The phase III TIE confirmed the concentration of malathion detected in the sample (2.0 µg/L) caused the toxicity (TUa = 0.6-2.0; Table 37). The PUR data associated with the March toxicity indicate 328 applications of 12,124 lbs AI of insecticides and fungicides on 19,126 acres of orchards and row crops from October 4, 2014 through March 10, 2015. Twenty-eight of the 328 applications associated with the March toxicity contained malathion, totaling 1,839 lbs AI occurred across 1,778 acres of barely, alfalfa, and wheat from February 12, 2015 through March 10, 2015.

Non-contiguous samples collected during Normal Monitoring from Duck Slough @ Gurr Rd on June 9, 2015 were toxic to *C. dubia* and resulted in 75% survival compared to the control; a TIE was not required. The PUR data associated with the June toxicity indicate 250 applications of 26,836 lbs of AI of insecticides and fungicides across 12,158 acres of orchards and row crops from March 19, 2015 through June 9, 2015.

Non-contiguous samples collected during Normal Monitoring from Duck Slough @ Gurr Rd on July 14, 2015 were analyzed for *C. dubia* toxicity and resulted in 0% survival compared to the control. The TIE conducted on the toxic sample indicated that organophosphate insecticides were the cause of toxicity. The phase III TIE confirmed that the concentration of chlorpyrifos detected in the sample (0.190 µg/L) was the cause of toxicity (TUa = 2.4; Table 37). The PUR data from the Duck Slough @ Gurr Rd and Deane Drain subwatersheds indicate 436 applications of 45,123 lbs of AI of insecticides and fungicides occurred on 25,141 acres of orchards and row crops from April 6, 2015 through July 14, 2015.

During the 2016 WY, MPM for toxicity to *C. dubia* is scheduled at Duck Slough @ Gurr Rd in February, March, June, and July (2015 MPU, Appendix VIII). The Coalition will begin focused outreach in 2016 in the site subwatershed and address all management plan constituents with targeted growers.

S. capricornutum **toxicity**

Duck Slough @ Gurr Rd

Samples from non-contiguous water collected during Normal Monitoring from Duck Slough @ Gurr Rd on June 9, 2015 resulted in 37% growth of *S. capricornutum* compared to the control. The TIE results indicated the sample lost all toxicity prior to, or during the TIE and the cause of toxicity is unknown. Samples collected on June 9 also resulted in concentrations of dissolved copper under the WQTL at 5.9 µg/L. The PUR data associated with the June toxicity indicate 236 applications of 21,163 lbs of AI of herbicides and fungicides on 10,108 acres of orchards and row crops from March 19, 2015 through June 9, 2015. Of those 236 applications, 38 were applications of pesticides containing copper, totaling 4,286 lbs AI on 1,303 acres of walnuts, peppers, tomatoes almonds, and onion seed.

This was the first *S. capricornutum* toxicity to occur in the Duck Slough @ Gurr Rd site subwatershed since 2007; the *S. capricornutum* toxicity management plan was approved for completion on May 30, 2012. The Coalition will conduct 2016 Focused Outreach in the site subwatershed to address all management plan constituents with targeted growers.

Table 45. Zone 5 (Deadman Creek @ Gurr Rd, Duck Slough @ Gurr Rd) exceedances.
Red bolded values represent MPM exceedances. The WQTLs are listed with each constituent.

Zone 5 Site Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	pH, <6.5 and > 8.5 Units	SC, 700 µS/cm	*E. coli*, 235 MPN/100 mL	Ammonia, Variable[1] or 1.5 mg/L	Arsenic, Total 10 µg/L	Chlorpyrifos, 0.015 µg/L	Malathion, 0 µg/L	*C. dubia*,% Control	*S. capricornutum*,% Control
Deadman Creek @ Gurr Rd	Represented	MPM, Non-contiguous	2/10/2015			913							
Duck Slough @ Gurr Rd	Core	NM, Non-contiguous, High TSS	12/3/2014				>2419.6						
Duck Slough @ Gurr Rd	Core	MPM, NM, SED	3/10/2015		8.75	703		2.10			2.0	**0**	
Duck Slough @ Gurr Rd	Core	MPM, NM, Non-contiguous	4/14/2015			847							
Duck Slough @ Gurr Rd	Core	MPM, NM, Non-contiguous	6/9/2015	6.49		875	>2419.6					75	37
Duck Slough @ Gurr Rd	Core	MPM, NM	7/14/2015	6.49						**0.190**		0	
Duck Slough @ Gurr Rd	Core	MPM, NM, Non-contiguous	8/11/2015			984			35				
Duck Slough @ Gurr Rd-FD	Core	MPM, NM, Non-contiguous	8/11/2015						33				
Normal Monitoring Exceedances				**2**	**1**	**5**	**2**	**1**	**2**	**0**	**1**	**2**	**1**
Non-contiguous Waterbody Exceedances				**1**	**0**	**4**	**2**	**0**	**1**	**0**	**0**	**1**	**1**
Management Plan Monitoring Exceedances[2]				**NA**	**NA**	**NA**	**NA**	**NA**	**0**	**1**	**0**	**1**	**0**
Total Exceedances				**2**	**1**	**5**	**2**	**1**	**2**	**1**	**1**	**3**	**1**

[1] Ammonia WQTL variable based on pH and temperature.

[2] MPM not conducted for field parameters or *E. coli*; however, field parameters are measured during every sampling event.

MPM- Management Plan Monitoring

NM-Normal Monitoring

SED-Sediment monitoring

Zone 6 (Ash Slough @ Ave 21, Berenda Slough along Ave 18 ½, Cottonwood Creek @ Rd 20, Dry Creek @ Rd 18)

During the 2015 WY, Cottonwood Creek @ Rd 20 was monitored monthly as the Core site in Zone and Ash Slough @ Ave 21, Berenda Slough along Ave 18 1/2, Dry Creek @ Rd were monitored as Represented sites.

Cottonwood Creek @ Rd 20 was monitored monthly for the entire suite of constituents (as indicated in the 2015 WY MPU, Table 1) as well as MPM for copper and lead. Management Plan Monitoring occurred at Ash Slough @ Ave 21 for copper, at Berenda Slough along Ave 18 ½ for copper and chlorpyrifos, and at Dry Creek @ Rd 18 for copper, lead, chlorpyrifos, diuron, toxicity to *S. capricornutum*, and sediment toxicity to *H. azteca*. Table 46 includes all exceedances that occurred during the 2015 WY in Zone 6.

In Zone 6, Cottonwood Creek @ Rd 20 was dry every month except December, Ash Slough @ Ave 21 was dry during January, and April through September, and Dry Creek @ Rd 18 was dry during December, January, May, and August. Samples from non-contiguous water were collected from Dry Creek @ Rd 18 in November, February, and May.

Field Parameters

In Zone 6, the field parameters were scheduled to be monitored 42 times during the 2015 WY; six measurements were taken and sites were dry during 36 sampling events. A single exceedance of the WQTL for pH occurred in Zone 6 (Appendix III, Table III-2).

Based on the 2014 SQMP (approved November 4, 2015) all sites in Zone 6 were assigned a WQTL of <5 mg/L for DO. Therefore, the reported exceedances of the 7 mg/L WQTL in October and May for Dry Creek @ Rd 18 are no longer considered exceedances of the WQTL and are not included in Table 46 below (Appendix IX).

pH

During the May sampling event, pH was measured from a non-contiguous waterbody when the water was stagnant. Monitoring at Dry Creek @ Rd 18 in March resulted in a single exceedance of the upper 8.5 WQTL for pH (Table 46).

Table 46. Zone 6 (Dry Creek @ Rd 18) exceedances.
The WQTLs are listed with each constituent. Red bolded values represent MPM exceedances.

Zone 6 Site Name	Site Type	Monitoring Type	Sample Date	pH, <6.5 and > 8.5 units
Dry Creek @ Rd 18	Represented	MPM, SED	3/10/2015	8.71
			Normal Monitoring Exceedances	**1**
			Non-contiguous Waterbody Exceedances	**0**
			Management Plan Monitoring Exceedances[1]	**NA**
			Total Exceedances	**1**

[1]Mangement Plan Monitoring (MPM) not conducted for field parameters, even if they are under a management plan; however, field parameters are measured during every sampling event.
SED-Sediment monitoring

COALITION ACTIONS TAKEN TO ADDRESS EXCEEDANCES OF WATER QUALITY OBJECTIVES

The Coalition conducts monitoring of ambient surface waters to characterize discharges from irrigated agriculture. Monitoring results are analyzed to identify constituents, agricultural lands, crops, and/or specific pesticides that need to be managed to reduce or eliminate discharges from agriculture to surface water. Actions taken to identify the potential sources of chemicals causing exceedances may include the following: 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, at grower outreach meetings, and through personal communication with growers. Appendix VI includes copies of mailings, meeting agendas and handouts; all documents associated with outreach are available from the Coalition upon request. The Coalition encourages growers to be cognizant of water quality concerns and, when applicable, to implement management practices designed to improve water quality.

Coalition actions taken to address exceedances of WQTLs include: 1) outreach, education, and collaboration, and 2) meeting performance goals and tracking schedules (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 component of the Coalition's monitoring program. The Coalition continues to provide information to growers through mailings, large group grower meetings, workshops, meetings conducted by the County Agricultural Commissioners, and individual grower meetings. During the 2015 WY, Coalition representatives informed members of progress in achieving water quality goals, site subwatershed-specific monitoring results, and Best Management Practices (BMPs) proven to be effective at reducing the discharge of pesticides, nutrients, and metals to both surface and groundwater. All outreach and education activities are documented in Table 47.

The Coalition also hosts a website (http://www.esjcoalition.org/home.asp), which houses Coalition activities and outreach on management practices. Information provided through the website can be utilized as a supplement to regular grower contacts and meetings and growers can view recordings of the annual meetings. The website provides growers the option to download the Nitrogen Management Plan Worksheet, and a tool to calculate the pounds of nitrogen in irrigation water. The website also provides access to water quality monitoring results and updates on Coalition news and activities.

Member Mailings

During the 2015 WY, the Coalition sent mailings to address irrigation/stormwater quality and sediment runoff. Mailings to growers included newsletters, the Annual Grower's Summary Report, and focused outreach and education notifications (Table 47).

Newsletters:

The Coalition mails newsletters to members with information on monitoring results, upcoming events, and updates to the monitoring program (see Appendix VI). The November 2014 newsletter was mailed to 2,122 members and emailed to 997 members on October 30, 2014. The February 2015 newsletter was mailed to 3,878 members on January 22, 2015. The May 2015 newsletter was mailed to 1,565 members and emailed to 325 members on April 22, 2015.

Farm Evaluations:

Members are mailed Farm Evaluation (FE) surveys to record their current management practices and return to the Coalition by March 1. On December 10, 2014, FE surveys were mailed and/or emailed to all members in high vulnerability. On June 10, 2015, 750 members were mailed FE survey late notices and were informed of the requirements to return their completed surveys.

Annual Grower's Summary Report:

The Annual Grower's Summary Report informs growers of monitoring results, Coalition actions, and related news. The report was handed out during the annual grower meetings on May 18 (Madera), May 19 (Merced), and May 20, 2015 (Modesto), and were mailed to 2,746 members and emailed to 737 members.

Nitrogen Management Plans:

Members are mailed a Nitrogen Management Plan (NMP) worksheet to fill out for certification and to be kept on their farm. The Coalition mailed the NMP worksheet on January 31, 2015 to 3,877 members.

Focused Outreach Notifications:

The Coalition sent letters to growers in Ash Slough requesting an individual meeting to discuss BMPs on October 7, 2014. On February 3, 2015, postcards were mailed to targeted growers in the seventh priority watersheds requesting individual meetings as part of focused outreach and education.

Member Meetings

Coalition representatives conducted or participated in meetings with members during the 2015 WY to discuss topics including WDR requirements, irrigation and stormwater quality, sediment runoff, management practices, NMPs, FE surveys, SECPs, and groundwater.

Annual Grower's Meetings:

In November 2014, the Coalition hosted member meetings on November 3 in Madera, November 4 in Merced, and November 5 in Modesto; 77 members, 133 members, and 216 members attended each meeting, respectively. The Coalition hosted member meetings in February 2015 in Madera on the February 2, in Merced on February 5, and in Modesto on February 27, 2015; 313 members, 563 members, and 1,145 members attended each meeting respectively. The Coalition hosted meetings on May 18, 19, and 20, 2015 in Madera, Merced, and Modesto, respectively. The meetings were held to discuss water quality in the 2015 WY, overall ILRP regulations, NMPs, and groundwater vulnerability areas. On May 18, 80 members attended, on May 19, 121 members attended, and on May 20, 202 members attended; the 2015 Annual Grower Summary Report was handed out at each meeting.

Collaboration Activities

Pest Control Advisors, Agricultural Commissioners, and Registrants

Agricultural Commissioners from the various counties in the Coalition region are active participants as non-voting members of the ESJWQC Board of Directors. The Coalition collaborates with County Agricultural Commissioners, Pest Control Advisors (PCAs), and pesticide registrants to provide growers within the ESJWQC region with information on effective management practices. Throughout 2015, the Coalition collaborated with each of these entities as needed to follow-up on exceedances, provide management practice information and prepare strategies for compliance under the WDR.

Table 47. ESJWQC education and outreach activities during the 2015 WY.
Outreach categories include Management Practice Tracking, Best Management Practice (BMP) Outreach and Education, Grower Notification, and Collaboration.

AREA	DATE	CATEGORY	DETAILS	WHO
Madera Area	10/7/2014	BMP Outreach and Education	Letters to growers in Ash Slough requesting an individual meeting to discuss BMPs.	Parry Klassen, Wayne Zipser
Coalition Region	10/30/2014	Grower Notification	November Member Meeting Announcement: mailed to 2,122 and emailed to 997 members.	Parry Klassen, Wayne Zipser
Madera Area	11/3/2014	BMP Outreach and Education	November Madera Member Meeting: 77 members attended.	Parry Klassen, Wayne Zipser
Merced Area	11/4/2014	BMP Outreach and Education	November Merced Member Meeting: 133 members attended.	Parry Klassen, Wayne Zipser
Modesto Area	11/5/2014	BMP Outreach and Education	November Modesto Member Meeting: 216 members attended.	Parry Klassen, Wayne Zipser
Coalition Region	12/10/2014	BMP Outreach and Education	Farm Evaluation Survey: mailed and emailed to all members.	Parry Klassen, Wayne Zipser
Coalition Region	12/15/2014	Grower Notification	Online Member Meeting Announcement: mailed to 1,523 and emailed to 829 members.	Parry Klassen, Wayne Zipser
Coalition Region	1/22/2015	Grower Notification	February Member Meeting Announcement: mailed to 3,878 members.	Parry Klassen, Wayne Zipser
Coalition Region	1/31/2015	BMP Outreach and Education	Nitrogen Management Plan Worksheet: mailed to 3,877 members.	Parry Klassen, Wayne Zipser
Subwatershed Areas	2/3/2015	BMP Outreach and Education	Letters to growers in priority watersheds requesting an individual meeting to discuss BMPs.	Parry Klassen, Wayne Zipser
Madera Area	2/2/2015	BMP Outreach and Education	February Madera Member Meeting: 313 members attended.	Parry Klassen, Wayne Zipser
Merced Area	2/5/2015	BMP Outreach and Education	February Merced Member Meeting: 563 members attended.	Parry Klassen, Wayne Zipser
Modesto Area	2/27/2015	BMP Outreach and Education	February Modesto Member Meeting: 1,145 members attended.	Parry Klassen, Wayne Zipser
San Joaquin River	4/10/2015	Grower Notification	TMDL letter mailed to 1,899 members and emailed to 473 members.	Parry Klassen, Wayne Zipser
Coalition Region	4/22/2015	Grower Notification	May Member Meeting Announcement: mailed to 1,565 members and emailed to 325 members.	Parry Klassen, Wayne Zipser
Coalition Region	5/7/2015	Grower Notification	May Member Meeting Reminder emailed to 852 members.	Parry Klassen, Wayne Zipser
Madera Area	5/18/2015	BMP Outreach and Education	May Madera Member Meeting: 80 members attended. Annual Reports handed out at meeting.	Parry Klassen, Wayne Zipser
Merced Area	5/19/2015	BMP Outreach and Education	May Merced Member Meeting: 121 members attended. Annual Reports handed out at meeting.	Parry Klassen, Wayne Zipser
Modesto Area	5/20/2015	BMP Outreach and Education	May Modesto Member Meeting: 202 members attended.	Parry Klassen, Wayne Zipser
Coalition Region	5/29/2015	Grower Notification	Annual Report mailed to 2,746 members and emailed to 737 members.	Parry Klassen, Wayne Zipser
Coalition Region	6/10/2015	Grower Notification	Farm Evaluation Survey Reminder and Survey: mailed to 750 members.	Parry Klassen, Wayne Zipser

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 ESJWQC Management Plan (approved on November 25, 2008) to meet the following management goal:

"To continue to monitor and analyze the water and sediment quality of ESJWQC 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 sixth and seventh priority subwatersheds which were prioritized under the original Management Plan. The Coalition submitted the SQMP (approved November 4, 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 (the sixth and seventh priority site subwatersheds) and sites where focused outreach is planned in 2016.

2015 Focused Outreach Activities

Sixth Priority Subwatersheds (2014 – 2016)

The sixth priority subwatersheds include Ash Slough @ Ave 21, Mustang Creek @ East Ave, and Westport Drain @ Vivian Rd. Performance Goals for the sixth priority subwatersheds are similar to those formulated for the fifth priority subwatershed Performance Goals and were approved on November 1, 2012 (Table 48).

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 growers in the sixth priority subwatersheds. Contact letters were sent to inform growers of member responsibilities, management plan strategies, and growers were encouraged to initiate the scheduling of individual contact meetings with the Coalition. All initial contacts were complete before March 30, 2014 (Table 48).

A total of 26 growers farming 9,838 acres or 60% of the acreage with the potential for direct drainage in the sixth priority subwatersheds were contacted (Table 48). Of the three site subwatersheds, Mustang Creek @ East Ave had the highest percentage of acreage with direct drainage represented by contacted growers (82%), followed by Ash Slough @ Ave 21 (55%), and Westport Drain @ Vivian Rd (33%).

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

Coalition representatives met and documented current management practices for 100% of targeted growers within the sixth priority subwatersheds (Table 48). One hundred percent of the management practices documented on the member surveys during the meetings were recorded in an Access database. A summary of currently implemented and recommended management practices is included in the Sixth Priority Subwatersheds Summary of Management Practices section of the 2015 Annual Report.

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

The Coalition mailed follow-up surveys to growers in the sixth priority subwatersheds on April 1, 2015. The Coalition followed-up with four growers who had recommendations to implement additional practices in 2015; all four growers returned their follow-up surveys (Table 48). A summary of recommended and newly implemented management practices is included in the Sixth Priority Subwatersheds Summary of Management Practices (2014-2016) section of this report.

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

The Coalition conducted MPM at sixth priority sites during the 2014 and 2015 WYs. Management Plan Monitoring will continue through the 2016 WY to assess changes in water quality and evaluate the effectiveness of newly implemented management practices. Evaluation of Management Practice Effectiveness section includes the water quality results from the 2015 WY in the sixth priority site subwatersheds.

Performance Goal 5: Consult with the 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.

During the 2015 WY, the Coalition met with the Regional Board staff on April 22, 2015 and August 11, 2015 to discuss Coalition Management Plan activities.

Table 48. High Priority Performance Goals status for 2014–2016 priority site subwatersheds (Ash Slough @ Ave 21, Mustang Creek @ East Ave, and Westport Drain @ Vivian Rd), approved on February 13, 2014.

Performance Goal/Performance Measure	Outputs	Who	Completion Deadlines		
			Ash Slough @ Ave 21	Mustang Creek @ East Ave	Westport Drain @ Vivian 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.	Parry Klassen	**17 of 17** (100%) March 30, 2014	**6 of 6** (100%) March 30, 2014	**3 of 3** (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	**5,915 of 10,730** (55%) Quarterly	**3,472 of 4,218** (82%) Quarterly	**451 of 1,359** (33%) Quarterly
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 in an Access database current management practices used that may reduce agricultural impact on water quality.	Parry Klassen	**17 of 17** (100%)	**6 of 6** (100%)	**3 of 3** (100%)
Performance Measure 2.2 – Document management practices that the identified grower were encouraged to implement.	Summary of management practice evaluations on a site subwatershed level in the Management Plan Update Report.	MLJ-LLC	**Complete**	**Complete**	**Complete**
Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.					
Performance Measure 3.1 – Document (e.g. assess number/type) new management practices implemented by identified growers.	Record implemented management practices from returned surveys in an Access database.	Parry Klassen/ MLJ-LLC	**Complete**	**Complete**	**Complete**
	Summary of management practices implemented as a result of individual contacts.	MLJ-LLC	**Complete**	**Complete**	**Complete**
Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.					
Performance Measure 4.1 – 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, 2016	**Complete:** May 1, 2016	**Complete:** May 1, 2016
Performance Goal 5: Consult with CVRWQCB at least once to discuss Management Plan activities and consider if changes need to be made in management plan strategy for High Priority waterbodies.					

Seventh Priority Site Subwatersheds

The Coalition requested to modify the 2008 Management Plan Performance Goals schedule for the seventh priority site subwatersheds (approved January 5, 2015) according to the Coalition's 2014 SQMP strategy (approved November 24, 2015). The updated Performance Goals are built on the following actions essential to the Coalition's SQMP strategy:

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 survey 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 impairments and recommend additional practices.
4. Review the member's FE survey 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 seventh priority subwatersheds include Howard Lateral @ Hwy 140, Levee Drain @ Carpenter Rd, and Mootz Drain downstream of Langworth Pond. Performance Goals for the seventh priority subwatersheds were approved on January 5, 2015 (Table 49).

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

On February 3, 2015, targeted growers in Howard Lateral @ Hwy 140 (12 growers), Levee Drain @ Carpenter Rd (4 growers), and Mootz Drain downstream of Langworth Pond (6 growers) were mailed initial contact letters (Table 49). The contact letters informed growers of their responsibilities, management plan strategies, and encouraged growers to call Coalition representatives to schedule individual meetings.

A total of 22 growers farming 2,043 irrigated acres with the potential for direct drainage in the seventh priority subwatersheds were contacted (Table 49).

Performance Goal 2: Review the member's FE survey 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 evaluated member FE surveys prior to contacting individuals. The FE surveys were used to determine current management practices. Based on the FE survey results for current management practices, members were targeted for outreach and individual grower meetings with Coalition representatives. The Coalition is in the process of meeting with seventh priority growers to complete surveys that record implemented and recommended management practices (Table 49). A preliminary analysis of the currently implemented and recommended management practices will be provided in the September 1, 2016 addendum to the Annual Report.

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

During all individual meetings with growers, Coalition representatives discuss local water quality concerns, and may recommend additional management practices effective at reducing water quality impairments (Table 49).

The Coalition has conducted individual meetings with 9 of the 22 targeted growers in the site subwatersheds: Howard Lateral @ Hwy 140 (17% of targeted growers, 530 out of 933 acres), Levee Drain @ Carpenter Rd (50% of targeted growers, 290 out of 627 acres), and Mootz Drain downstream of Langworth Pond (83% of targeted growers, 336 out of 482 acres). To address the water quality impairments in the seventh priority subwatersheds, the Coalition is concerned with management practices that apply to irrigation water management, stormwater runoff, erosion and sediment management, pest management, and dormant sprays (when applicable).

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

Management practices implemented by members and reported on the FE surveys are stored an Access database. During individual visits some members may be encouraged to implement additional management practices. The Coalition will utilize the FE survey responses from 2015 and 2016 to determine if those practices were implemented.

Performance Goal 5: Evaluate effectiveness of new management practices.

The Coalition conducted MPM in the seventh priority sites during the 2015 WY. The Coalition will continue to conduct MPM during the 2016 and 2017 WYs to assess changes in water quality and evaluate the effectiveness of newly implemented management practices.

Table 49. High Priority Performance Goals status for 2015–2017 priority site subwatersheds (Howard Lateral @ Hwy 140, Levee Drain @ Carpenter Rd, Mootz Drain downstream of Langworth Pond), approved on January 5, 2015.

Performance Goal	Performance Measure	Outputs	Who	Annual Report Year		
				2015	2016	2017
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	Complete		
	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	Complete		
2	Performance Measure 2.1 – Review FE surveys (or NMP or SECP as appropriate) from 100% of targeted members.	Received management practices recorded in Access database.	MLJ-LLC	Complete		
	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.	ESJWQC and MLJ-LLC	Complete		
	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.	ESJWQC and MLJ-LLC		In Progress	
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.	Parry Klassen and MLJ-LLC		Complete	X
	Performance Measure 3.2 – When available and appropriate, provide information on the results of the management practices studies.	Provide reports from studies.	Parry Klassen	NA	NA	NA
	Performance Measure 3.3 - Track attendance at meetings attended by the targeted members.	Report of members attending meetings provided in Management Plan Progress Report.	Parry Klassen and MLJ-LLC		In Progress	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			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		Complete	X

NA–Not applicable, no studies proposed for these site subwatersheds.

2016 Focused Outreach Activities

The five Performance Goals outlined in the SQMP incorporate information generated from the FE surveys and NMP Summary Reports, as applicable. The 2016 Focused Outreach includes site subwatersheds where outreach has been successful in the past (2008 through 2012) and chlorpyrifos management plans have been completed. Due to recent exceedances, management plans for chlorpyrifos were reinstated (Highline Canal @ Hwy 99 and Prairie Flower Drain @ Crows Landin Rd). It is a priority for the ESJWQC to reinitiate focused outreach and conduct outreach with members who were not previously contacted for various reasons (e.g. not previously a member or did not previously apply chlorpyrifos).

The 2016 Focused Outreach subwatersheds include Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99, and Prairie Flower Drain @ Crows Landing Rd. Performance Goals for the 2016 Focused Outreach subwatersheds were approved on November 24, 2015 (Table 50).

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

On February 3, 2015, the Coalition sent letters to all members in the Prairie Flower Drain @ Crows Landing Rd site subwatershed (14 growers). The contact letters informed growers of their responsibilities, management plan strategies, recent WQTL exceedances for chlorpyrifos, and encouraged growers to attend the meeting scheduled in coordination with Dairy Cares on October 29, 2015.

Targeted growers in Dry Creek @ Wellsford Rd (6 growers), Duck Slough @ Gurr Rd (9 growers), and Highline Canal @ Hwy 99 (7 growers) were mailed initial contact letters on April 21, 2016. The contact letters informed growers of member responsibilities, management plan strategies, and encouraged growers to call Coalition representatives to initiate the scheduling of individual meetings.

Performance Goal 2: Review the member's FE survey 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 contacted all members in the Prairie Flower Drain @ Crows Landing Rd site subwatershed for focused outreach in response to recent exceedances of the WQTL for chlorpyrifos. The Coalition evaluated member FE surveys prior to contacting members in three other site subwatersheds as part of 2016 Focused Outreach (Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, and Highline Canal @ Hwy 99). The FE surveys were used to determine current management practices. Based on the FE survey results, members were targeted for individual grower meetings with Coalition representatives. The Coalition is in the process of meeting with growers to complete surveys that record their implemented and management practices recommended by the Coalition (Table 50). To address water quality impairments in the 2016 Focused Outreach subwatersheds, the Coalition is concerned with management practices that apply to irrigation water management, erosion and sediment management, pest management, and dormant sprays (when applicable).

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

On October 29, 2015, the Coalition held a meeting in conjunction with Dairy Cares for all ESJWQC members and Dairy Coalition members in the Prairie Flower Drain @ Crows Landing Rd site subwatershed. During this meeting, Coalition representatives discussed local water quality concerns, specifically, the recent exceedances of the WQTL for chlorpyrifos and management practices effective in improving water quality. Coalition representatives are in the process of meeting individually with all 2016 Focused Outreach site subwatershed members (Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99, and Prairie Flower Drain @ Crows Landing Rd) to discuss local water quality concerns and recommend additional management practices effective at reducing water quality impairments (Table 50).

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

Management practices implemented by members and reported on the FE surveys are stored an Access database. During individual visits some members may be encouraged to adopt additional management practices. The Coalition will utilize the FE survey responses from 2016 and 2017 to determine if those 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 through the 2018 WY to assess changes in water quality and evaluate the effectiveness of newly implemented management practices.

Table 50. Performance Goals status for 2016–2018 focused outreach site subwatersheds (Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99, and Prairie Flower Drain @ Crows Landing 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	Complete		
	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	Complete		
2	Performance Measure 2.1 – Review FE surveys (or NMP or SECP as appropriate) from 100% of targeted members.	Received management practices recorded in Access database.	MLJ-LLC	Complete		
	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.	ESJWQC and MLJ-LLC	Complete		
	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.	ESJWQC and MLJ-LLC		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.	Parry Klassen and MLJ-LLC		X	X
	Performance Measure 3.2 – When available and appropriate, provide information on the results of the management practices studies.	Provide reports from studies.	Parry Klassen	NA	NA	NA
	Performance Measure 3.3 - Track attendance at meetings attended by the targeted members.	Report of members attending meetings provided in Management Plan Progress Report.	Parry Klassen and MLJ-LLC		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			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		X	X

MEMBER ACTIONS TAKEN TO ADDRESS EXCEEDANCES OF THE WATER QUALITY OBJECTIVES

MANAGEMENT PRACTICES

The Coalition conducts meetings and mails information to inform members about various management practices that are designed to: 1) reduce stormwater runoff, 2) manage discharge of irrigation tailwater, 3) manage spray applications, and 4) avoid mobilization of sediment that could move to receiving waters. In 2015, the growers were also provided with information regarding nutrient management practices and sediment and erosion control practices.

The Coalition has conducted focused outreach in priority site subwatersheds since 2008. The purpose of focused outreach is to:

1. Review local water quality concerns and document practices implemented prior to focused outreach (current practices),
2. Recommend additional practices if applicable, and
3. Document practices implemented following focused outreach (newly implemented practices; Table 51).

The Coalition followed the strategy outlined in the 2008 Management Plan for first through sixth priority focused outreach. The Coalition followed the strategy outlined in the 2014 SQMP for seventh priority focused outreach and will continue to follow this strategy for 2016 Focused Outreach and all other outreach activities moving forward.

Table 51. Management practice categories and associated recommended management practices.

CATEGORY	RECOMMENDED MANAGEMENT PRACTICE
Irrigation Water Management/ Storm Drainage	Install and/or Improve Berms Between Field & Waterway
	Install Device to Control Timing of Pump/Drain into Waterway
	Install drainage basins (sediment ponds)
	Recirculation - Tailwater return system
	Reduce amount of water used in surface irrigation
	Use of Polyacrylamide (PAM)
Erosion and Sediment Management	Grass Row Centers (Orchards, Vineyards)
	Maintain vegetated filter strips around field perimeter at least 10' wide
	Vegetation is planted along or allowed to grow along ditches
Pest Management/ Dormant Spray Management	Calibrate spray equipment prior to every application
	Nozzles Provide Largest Effective Droplet Size
	Outside nozzles shut off when spraying outer rows next to sensitive sites
	Spray Areas Close to Waterbodies when Wind is Blowing Away
	Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site

The Coalition completed focused outreach in the first through sixth set of priority subwatersheds; initial and follow-up meetings are complete for 100% of targeted growers in all 22 subwatersheds:

- 2008-2010: Dry Creek @ Wellsford Rd, Duck Slough @ Hwy 99, and Prairie Flower Drain @ Crows Landing Rd;
- 2010-2012: Bear Creek @ Kibby Rd, Cottonwood Creek @ Rd 20, Duck Slough @ Gurr Rd, and Highline Canal @ Hwy 99;
- 2011-2013: Berenda Slough along Ave 18 ½, Dry Creek @ Rd 18, Lateral 2 ½ near Keyes Rd, and Livingston Drain @ Robin Ave;
- 2012-2014: Black Rascal Creek @ Yosemite Rd, Deadman Creek @ Hwy 59, Deadman Creek @ Gurr Rd, and Hilmar Drain @ Central Ave;
- 2013-2015: Hatch Drain @ Tuolumne Rd, Highline Canal @ Lombardy Rd, Merced River @ Santa Fe, and Miles Creek @ Reilly Rd;
- 2014-2016: Ash Slough @ Ave 21, Mustang Creek @ East Ave, and Westport Drain @ Vivian Rd.

The summary of the implemented management practices in the first through sixth priority site subwatersheds and a final analysis of newly implemented management practices in the sixth priority site subwatersheds are discussed below.

Summary of Newly Implemented Management Practices

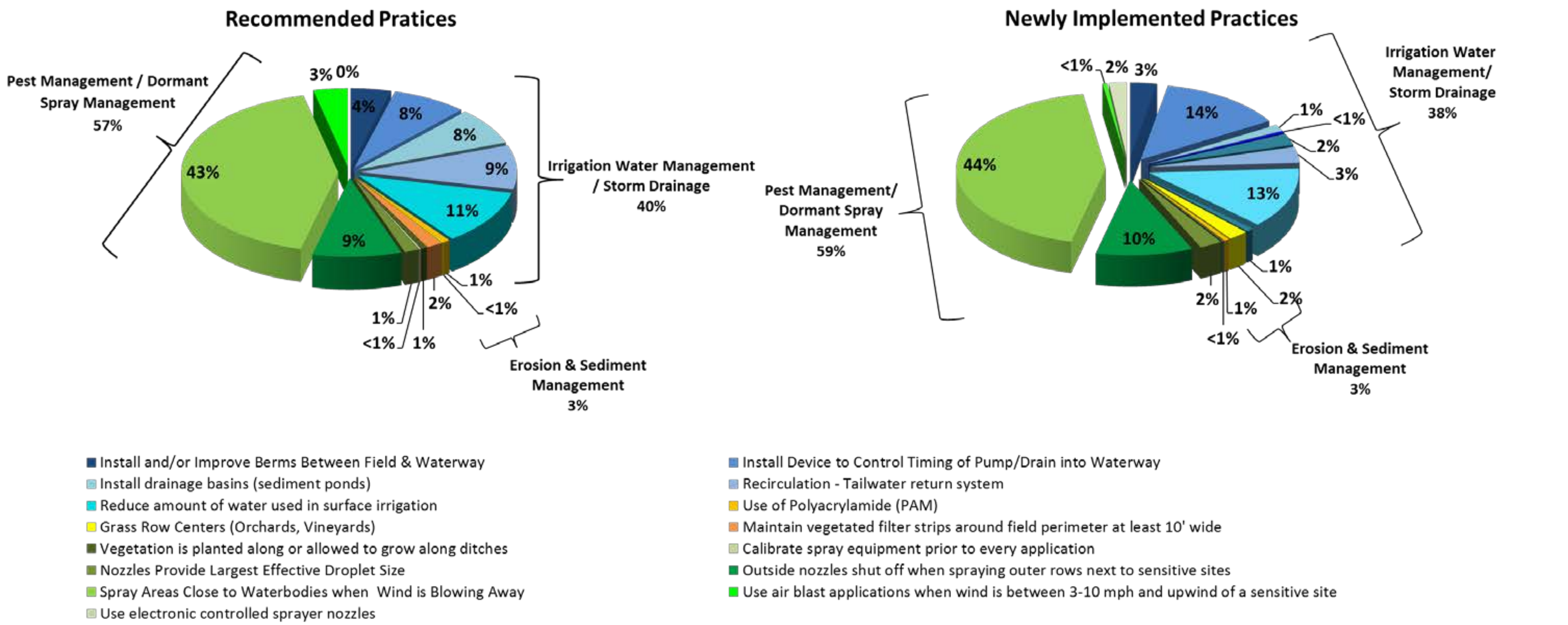
The Coalition completed focused outreach and management practice tracking in the first through sixth priority site subwatersheds. Recommended management practices were recorded and those implemented were documented. Figure 14 illustrates the management practices recommended by Coalition representatives to growers and the newly implemented management practices within first through sixth priority site subwatersheds. Management practices are color coded in the figure by category: Irrigation Water Management/Storm Drainage (blue shades), Erosion and Sediment Management (yellow/orange shades) and Pest Management/Dormant Spray Management (green shades).

Recommended and Newly Implemented Practices

Overall, most of the management practices recommended by Coalition representatives were implemented by growers. In addition, growers implemented additional practices that were not recommended but seen by the member as decreasing their risk of discharge. Of the acres with newly implemented practices, growers implemented Pest Management/Dormant Spray Management practices the most frequently (59% of acres, Figure 14). Irrigation Water Management/Storm Drainage practices accounted for 38% of the acres with newly implemented practices (Figure 14). These practices also indirectly affect Erosion and Sediment Management. For example, the use of microirrigation systems improves management of irrigation runoff and also reduces or eliminates erosion caused by the movement of irrigation tailwater.

During follow-up contacts, Coalition representatives noted that the most common reason growers were unable to implement recirculation/tailwater return systems and drainage basins/sediment ponds (two of the more expensive recommended management practices) was due to lack of resources. In an effort to assist growers in securing financial resources, the Coalition continues to provide members with funding information for management practice implementation including the following programs: Agricultural Water Enhancement Program (AWEP) and Environmental Quality Incentives Program (EQIP). More information regarding financial resources for management practice implementation can be found in the Funding Resources section of this report.

Figure 14. Percentage of acreage associated with each recommended and newly implemented management practice in the first through sixth priority site subwatersheds. Irrigation Water Management/Storm Drainage practices (blue shades), Erosion & Sediment Management practices (yellow/orange shades), and Pest Management/Dormant Spray Management practices (green shades) are included; the legend below applies to both pie charts.



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

Focused outreach in sixth priority site subwatersheds began in January 2014. The Coalition mailed initial contact letters on November 27, 2013 to inform growers of the Management Plan process and requested members contact Coalition representatives to schedule an individual meeting. The Coalition completed individual meetings and documented current management practices with all 26 targeted growers by January 27, 2015 (Table 52). The preliminary summary of sixth priority outreach results was included in the 2015 Annual Report (Pages 163-178).

The Coalition conducted follow-up contacts with growers who received recommendations for additional management practices between April 10, 2015 and November 12, 2015 to record newly implemented practices. Follow-up mailings included a survey with instructions for growers to record any newly implemented management practices. Four growers received recommendations to implement management practices in Ash Slough @ Ave 21; however, two of the four growers are no longer members of the Coalition. One grower each in Mustang Creek @ East Ave and Westport Drain @ Vivian Rd received recommendations to implement management practices. One hundred percent of the required follow-up contacts in all three site subwatersheds are complete. A summary of the results for recommended and newly implemented management practices is provided below.

Table 52. Tally of growers who participated in focused outreach in the sixth set of priority site subwatersheds (2014-2016).

Focused Outreach Actions	Ash Slough @ Ave 21	Mustang Creek @ East Ave	Westport Drain @ Vivian Rd
Targeted Growers	17	6	3
Completed Individual Meeting	17	6	3
Growers with Recommended Practices	2	1	1
Completed Follow-up Contact	2	1	1
Percent Complete (Initial Contact)	**100%**	**100%**	**100%**
Percent Complete (Follow-up Contact)	**100%**	**100%**	**100%**

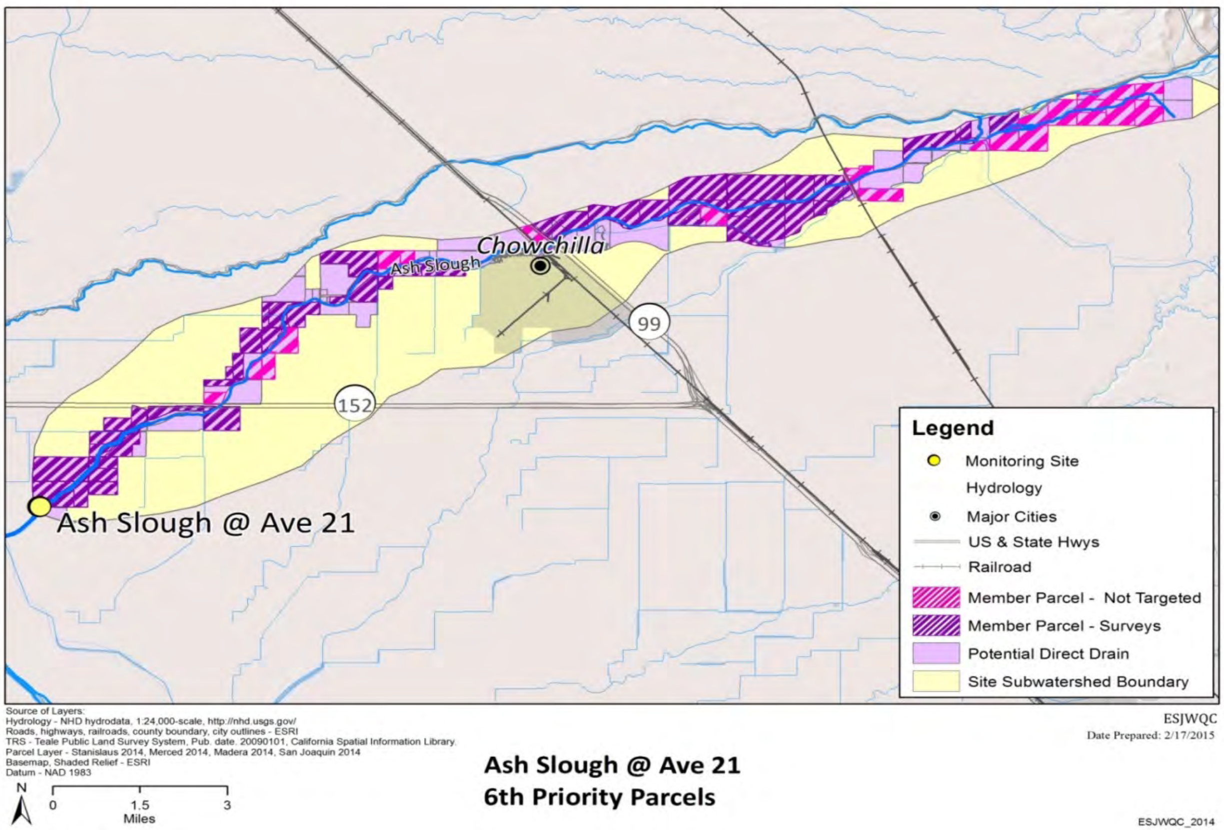
Ash Slough @ Ave 21

Management practices were documented for 55% of the total irrigated acres with direct drainage in the Ash Slough @ Ave 21 site subwatershed (5,915 of 10, 730 irrigated acres; Figure 15 and Table 48). The Coalition sent follow-up surveys to two targeted growers who farm 1,764 acres within the site subwatershed. Both growers reported no irrigation runoff from their property; however, Coalition representatives discussed local water quality concerns and the importance of preventing offsite movement of agricultural constituents. One additional management practice was recommended to each grower. Both growers indicated on their follow-up surveys they implemented the recommended management practice to spray areas close to waterbodies when the wind is blowing away from them (Table 53).

Table 53. Comparison of recommended and implemented practices in the Ash Slough @ Ave 21 site subwatershed.

Management Practice	Recommended Practices		Implemented Practices		% Recommended Acreage with Implemented Practices
	# Growers	Acres	# Growers	Acres	
No irrigation drainage from property					
Spray areas close to waterbodies when the wind is blowing away from them.	2	1,764.36	2	1,764.36	100%

Figure 15. Ash Slough @ Ave 21 member parcels with direct drainage potential.

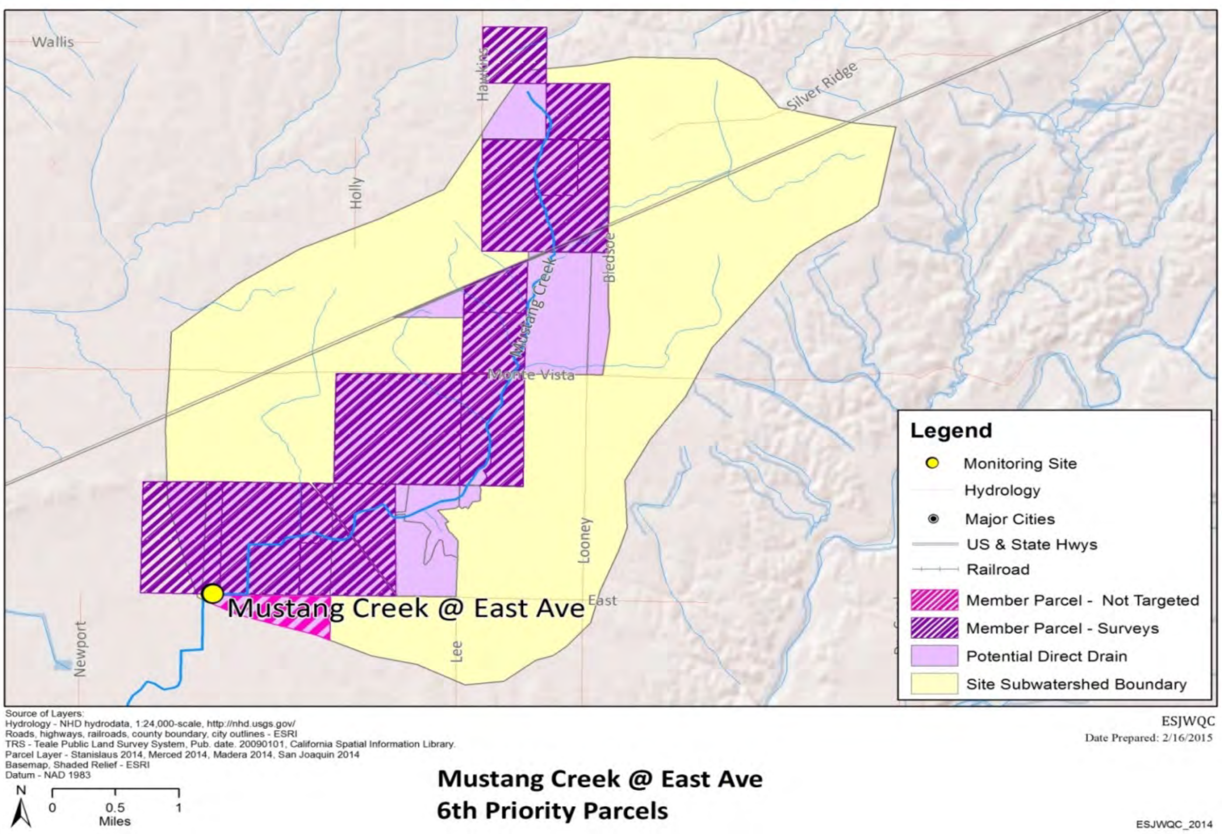


Management practices were documented for 82% of the irrigated acres with direct drainage in the Mustang Creek @ East Ave site subwatershed (3,472 of 4,218 irrigated acres; Figure 16 and Table 48). The Coalition sent a follow-up survey to one targeted growers, who farms 1,611 acres within the site subwatershed. The grower reported no irrigation runoff from the property; however, Coalition representatives discussed local water quality concerns, the importance of preventing the offsite movement of all agricultural constituents, and recommended one additional management practice. The member indicated on their follow-up survey the recommended practice was implemented (Table 54).

Table 54. Comparison of recommended and implemented management practices in the Mustang Creek @ East Ave site subwatershed.

Management Practice	Recommended Practices		Implemented Practices		% Recommended Acreage with Implemented Practices
	# Growers	Acres	# Growers	Acres	
No irrigation drainage from property					
Spray areas close to waterbodies when the wind is blowing away from them.	1	1,611	1	1,611	100%

Figure 16. Mustang Creek @ East Ave member parcels with direct drainage potential.

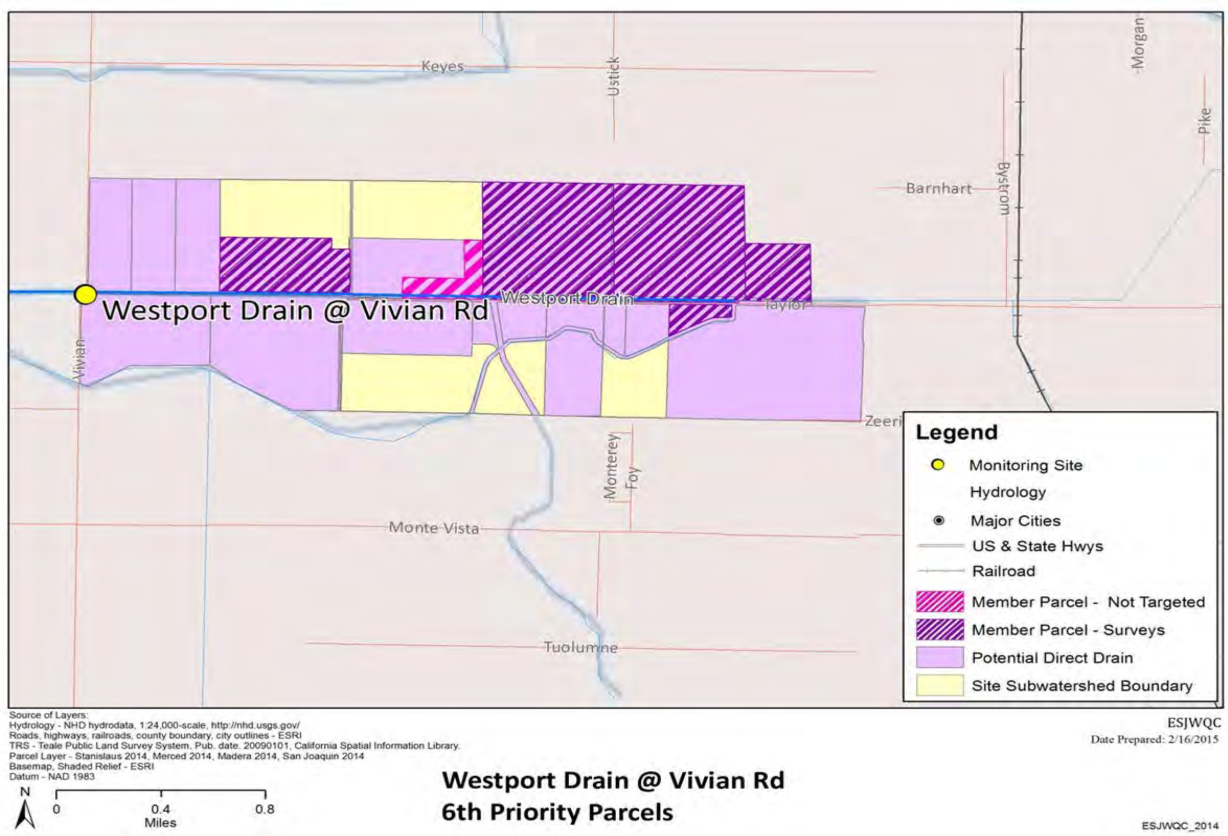


Management practices were documented for 33% of the total irrigated acres identified with direct drainage in the Westport Drain @ Vivian Rd site subwatershed (451 of 1,360 irrigated acres; Figure 17 and Table 48). The Coalition sent a follow-up survey to one member who farms 70 acres within the site subwatershed. The grower reported no irrigation runoff from the property; however, Coalition representatives discussed local water quality concerns, the importance of preventing the offsite movement of all agricultural constituents, and recommended one additional management practice. The member indicated on their follow-up survey the recommended practice was implemented (Table 55).

Table 55. Comparison of recommended and implemented management practices in the Westport Drain @ Vivian Rd site subwatershed.

Management Practice	Recommended Practices		Implemented Practices		% Recommended Acreage with Implemented Practices
	# Growers	Acres	# Growers	Acres	
No irrigation drainage from property					
Spray areas close to waterbodies when the wind is blowing away from them.	1	70	1	70	100%

Figure 17. Westport Drain @ Vivian Rd member parcels with direct drainage potential.



Seventh Priority Subwatersheds Summary of Management Practices (2015-2017)

Management plan tracking continues in the seventh set of high priority subwatersheds (2015-2017): Howard Lateral @ Hwy 140, Levee Drain @ Carpenter Rd, and Mootz Drain downstream of Langworth Pond. The Coalition targeted 22 growers based on the SQMP Performance Goals and Measures for the Howard Lateral @ Hwy 140 (12), Levee Drain @ Carpenter Rd (4), and Mootz Drain downstream of Langworth Pond (6) site subwatersheds. On February 3, 2015, the Coalition mailed targeted growers a letter requesting that the growers contact Coalition representatives to schedule the focused outreach meeting. The Coalition began contacting individual growers in April 2015.

To date, growers comprising 17% in the Howard Lateral @ Hwy 140 site subwatershed, 50% of the Levee Drain @ Carpenter Rd site subwatershed, and 83% of the Mootz Drain downstream of Langworth Pond site subwatershed have been contacted (Table 56). The Coalition could not complete 100% of the initial contacts due to limited resources, which were redirected to assist growers in completing FE surveys, NMPs, SECPs, and NMP summary reports. Coalition representatives will complete initial surveys and follow-up contacts in 2016. A preliminary analysis for seventh priority initial contacts, including recommended management practices, will be included in an addendum to the 2016 Annual Report on September 1, 2016.

Table 56. Tally of grower who participated in focused outreach in the seventh set of priority site subwatersheds (2015-2017).

Focused Outreach Actions	Howard Lateral @ Hwy 140	Levee Drain @ Carpenter Rd	Mootz Drain downstream of Langworth Pond
Targeted Growers	12	4	6
Completed Individual Meeting	2	2	5
Growers with Recommended Practices (as of April 30, 2016)	1	1	3
Percent Complete (Initial Contact)	**17%**	**50%**	**83%**

2016 Focused Outreach Site Subwatersheds (2016-2018)

The 2016 Focused Outreach site subwatersheds include Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99, and Prairie Flower Drain @ Crows Landing Rd. On February 3, 2015, the Coalition sent letters to all members in the Prairie Flower Drain @ Crows Landing Rd site subwatershed (14 growers), which informed growers of member responsibilities, management plan strategies, recent exceedances of the WQTL for chlorpyrifos, and encouraged growers to attend the meeting scheduled in coordination with Dairy Cares on October 29, 2015.

Prior to contacting members in Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, and Highline Canal @ Hwy 99, the Coalition identified members based direct drainage data, pesticide application data, existing FE survey data, and past targeted outreach lists to create a targeted grower list. The Coalition sent initial contact letters to targeted growers in Dry Creek @ Wellsford Rd (6 growers), Duck Slough @ Gurr Rd (9 growers), and Highline Canal @ Hwy 99 (7 growers) on April 22, 2016. The contact letters informed growers of member responsibilities, management plan strategies, and directed growers to call Coalition representatives to initiate the scheduling of individual meetings.

Coalition representatives will meet individually with all targeted members in these site subwatersheds during 2016 and early 2017 to discuss local water quality concerns and recommend additional management practices effective at reducing water quality impairments (Table 50). The Coalition will utilize the FE survey responses from 2016 and 2017, or follow-up surveys if FE surveys are not returned, to determine if recommended practices were implemented. 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 in the ESJWQC region include MPM and TMDL compliance monitoring. During the 2015 WY, the Coalition monitored in accordance with the Basin Plan requirements for chlorpyrifos and diazinon TMDL monitoring, the 2015 WY MPU (approved on January 5, 2015), the WDR, and the ESJWQC SQMP. The WDR requires 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 (TMDL constituents with a source of agriculture in the ESJWQC region include chlorpyrifos, diazinon, and salinity/boron), a management plan will be required for that constituent in the site subwatershed. In addition, if there is no TMDL for a constituent, a management plan is required when more than one exceedance of the WQTL of that constituent occurs 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. 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.

A narrative about each monitoring constituent was provided in the Coalition's SQMP (approved November 4, 2015) as well as the Coalition strategy for prioritizing exceedances to meet the 10-year compliance requirements. After three years of monitoring with no exceedances of the WQTL for a specific management plan constituent at a site, the Coalition may petition the Regional Board for completion of the management plan. Three years of monitoring with no exceedances indicates improved water quality which is due to grower reduction/elimination of the offsite movement of agricultural constituents. Table 57 includes the number of management plans petitioned for removal/approved for completion as submittal and approval dates. Table 58 lists current management plans per site, constituents approved for management plan completion, and reinstated management plans.

Table 57. Number of complete management plans and submittal/approval dates.
Management plans approved for removal from Duck Slough @ Hwy 99 reflected in counts below but not included Table 60.

Petition Date	# of Management Plans Petitioned for Completion	# of Management Plans Approved for Completion	Approval Date
1/6/2012	35	33	5/30/2012
11/7/2012	14	8	10/15/2013
6/5/2014	18	12	12/04/2015
9/21/2015	29	18	3/25/2016

Table 58. Status of ESJWQC management plan constituents per site subwatershed.
Active – X, removed – dark grey cell, and reinstated – light grey cell.

Site Subwatershed	Most Recent Monitoring for Full Suite of Constituents	Dissolved Oxygen	pH	Specific Conductance*	Ammonia	Nitrate/Nitrite	*E. coli*	Arsenic	Copper (Total & Dissolved)	Lead (Total & Dissolved)	Molybdenum	Chlorpyrifos	DDE	Diazinon	Dimethoate	Diuron	Malathion	Simazine	*C. dubia* Toxicity	*P. promelas* Toxicity	*S. capricornutum* Toxicity	*H. azteca* Toxicity	Total Removed Per Site
Ash Slough @ Ave 21	2010								X														3
Bear Creek @ Kibby Rd	2008		X				X																4
Berenda Slough along Ave 18 1/2	2012	X					X		X			X											1
Black Rascal Creek @ Yosemite Rd	2008	X	X				X																3
Canal Creek @ West Bellevue Rd	NA	X																					0
Cottonwood Creek @ Rd 20	2015 WY						X		X														5
Deadman Creek @ Gurr Rd	2010	X	X	X	X		X	X				X							X	X			2
Deadman Creek @ Hwy 59	2012	X	X				X	X				X											1
Dry Creek @ Rd 18	2013		X				X		X							X					X		4
Dry Creek @ Wellsford Rd	2015 WY	X	X				X					X											5
Duck Slough @ Gurr Rd**	2015 WY	X	X	X	X		X	X				X					X		X	X		X	3
Hatch Drain @ Tuolumne Rd	2008	X		X		X	X	X													X	X	0
Highline Canal @ Hwy 99	2015 WY	X	X	X			X		X			X									X		5
Highline Canal @ Lombardy Rd	2011	X	X	X			X		X												X		4
Hilmar Drain @ Central Ave	2008	X		X	X	X	X														X	X	4
Howard Lateral @ Hwy 140	2010	X	X	X			X		X														1
Lateral 2 ½ near Keyes Rd	2010		X	X								X									X		1
Lateral 5 ½ @ South Blaker Rd	NA		X	X																	X		0
Lateral 6 and 7 @ Central Ave	NA	X	X	X																	X		0
Levee Drain @ Carpenter Rd	2013	X		X	X	X	X												X		X	X	0
Livingston Drain @ Robin Ave	2008		X				X		X			X									X		1
Lower Stevinson @ Faith Home Rd	NA	X	X	X																	X		0
McCoy Lateral @ Hwy 140	2012		X						X														0
Merced River @ Santa Fe	2015 WY	X					X																3
Miles Creek @ Reilly Rd	2013	X	X				X		X					X							X		3
Mootz Drain downstream of Langworth Pond	2010	X			X		X									X							1
Mustang Creek @ East Ave	2013	X		X		X	X		X				X										2
Prairie Flower Drain @ Crows Landing Rd	2015 WY	X	X	X	X	X	X				X	X			X				X		X	X	1
Unnamed Drain @ Hogin Rd	NA	X		X																			0
Unnamed Drain @ Hwy 140	2013	X	X	X			X																0
Westport Drain @ Vivian Rd	2008	X		X		X	X					X									X		0
Total Approved Management Plan Completion (Grey Cells)		**3**	**1**	**1**	**1**	**0**	**2**	**0**	**5**	**10**	**0**	**12**	**0**	**2**	**0**	**4**	**0**	**1**	**7**	**1**	**5**	**2**	**57**
Total Reinstated Management Plans (Light Grey Cells)		**1**	**1**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**
Total Management Plan Constituents Remaining (X)		**23**	**19**	**17**	**6**	**6**	**23**	**4**	**11**	**0**	**1**	**10**	**1**	**1**	**1**	**2**	**0**	**0**	**4**	**2**	**14**	**5**	**150**

*TDS management plans are now addressed under SC management plans (SQMP, approved 11/4/15); TDS is no longer required to be monitored under the Order.
**Duck Slough @ Hwy 99 site subwatershed was removed from the Coalitions monitoring schedule; all remaining management plan constituents are monitored at the Duck Slough @ Gurr Rd location.
NA-Represented site, monitoring for full suite of constituents not scheduled.

Based on the evaluation provided in the 2015 WY MPU, MPM was conducted for copper, lead, molybdenum, chlorpyrifos, diazinon, dimethoate, diuron, water column toxicity (*C. dubia*, *P. promelas*, and *S. capricornutum*), and sediment toxicity (*H. azteca*). Table 5 and Table 6 list the sampling locations and type of monitoring conducted during the 2015 WY.

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

Status of Management Plans

The Coalition has received approval to remove 57 constituents from 21 site subwatershed management plans. Eight management plans have been reinstated due to exceedances of WQTLs during recent monitoring (Table 58).

Based on the WDR, monitoring for TDS is no longer required. Sites within the Coalition region have management plans for both TDS and SC. Although both measure salt, there is not a perfect correlation between the two, i.e. there are site subwatersheds that are in a management plan for TDS but not for SC. In the 2014 SQMP, the Coalition requested to place all site subwatersheds that were previously in a management plan for TDS into a management plan for SC since monitoring for TDS is no longer required (approved November 4, 2015).

The ESJWQC northern boundary was revised in the WDR (Order No. R5-2012-0116-R3; approved April 17, 2015). As a result, Rodden Creek @ Rodden Rd is no longer located inside the ESWQC boundary and has been removed from the management plan 10 year compliance schedule for *E. coli*.

A reevaluation of the DO WQTLs was submitted in the Coalition's SQMP based on criteria outlined in the Fourth Edition of the Basin Plan for the Sacramento River and San Joaquin River Basins (revised June 2015, Page III-5). The Basin Plan indicates the lower DO trigger limit of 5 mg/L should be utilized for waterways that are given a 'warm' beneficial use, and/or not considered a resource for fisheries. Information on the past reported exceedances and justification based on the Basin Plan criteria can be referenced in the SQMP (Pages 10-14).

Based on the approval of the SQMP, the Coalition applied the lower DO trigger limit of 5 mg/L for measurements taken at all four sites in Zone 6: Ash Slough @ Ave 21, Cottonwood Creek @ Rd 20, Berenda Slough along Ave 18 ½, and Dry Creek @ Rd 18. The previously reported results affected by the new trigger limit are included in Appendix IX, Table 2. In some cases, the management plan status of the site subwatershed was also affected. Cottonwood Creek @ Rd 20 and Dry Creek @ Rd 18 no longer require DO management plans; both management plans were approved for completion (approved December 4, 2015). Table 58 and Table 60 have been revised to reflect changes based on the DO WQTL updates.

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 (approved March 7, 2016). 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 lower should be considered toxic if they are also considered statistically significant.

The ESJWQC reviewed all past reported sediment toxicity results and evaluated sediment toxicity management plans on a case-by-case scenario. In some instances, removing a sediment toxicity result affected the management plan status of the site subwatershed. Table 59 below includes the site subwatersheds where management plans are no longer required based on these changes. Appendix IX, Table 1 includes a table of all past reported sediment toxicity results that are no longer considered toxic.

Table 59. ESJWQC changes to sediment toxicity management plans based on SWAMP protocol.

Site	Site Type	Management Plan Updates
Dry Creek @ Rd 18	Core	No management plan required.
Dry Creek @ Wellsford Rd	Core	No management plan required. The two remaining sediment toxicities are not within 3 years.
Miles Creek @ Reilly Rd	Core	No management plan required.

Table 60 is a tally of exceedance counts from 2004 through the 2015 WY. Table 61 is a tally of exceedance counts from the 2015 WY. In both Table 60 and Table 61, cells with blue highlights indicate constituents that are currently in management plans. In Table 60, dark grey cells indicate sites/constituents approved for management plan completion and light grey cells indicate sites/ constituents where management plans were previously completed but were reinstated due to recent exceedances. In Table 61, 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 60. ESJWQC exceedance tally based on results from 2004-2015 WY.

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, grey are removed from management plans, and light grey are reinstated management plans. The tally only includes field duplicate exceedances if no exceedance occurred in the environmental sample.

	F			I				B	M						P																T			
SITE NAME	Oxygen, Dissolved	pH	Specific Conductivity	Ammonia	Nitrate as N	Nitrite as N	Nitrate + Nitrite as N	*E. coli*	Arsenic	Copper Dissolved[1]	Copper Total[1]	Lead	Molybdenum	Zinc	Aldicarb	Carbaryl	Carbofuran	Chlorpyrifos	Cyanazine	DDD (p,p')	DDE (p,p')	DDT (p,p')	Diazinon	Dieldrin	Dimethoate	Diuron	HCH	Malathion	Methidathion	Methoxychlor	Simazine	*C. dubia*	*P. promelas*	*S. capricornutum*	*H. azteca*
Ash Slough @ Ave 21								3		2	5	2						4																1	
Bear Creek @ Kibby Rd	2	5						7	1		4							2				1										3		2*	
Berenda Slough along Ave 18 ½	5	1						7		13								4								1						1		3	
Black Rascal Creek @ Yosemite Rd	26	3						11			1	2						4														5		1	1
Canal Creek @ West Bellevue Rd	2																																		
Cottonwood Creek @ Rd 20	1[3]	1						22		10	12	3						3	1				1			2					1		1	2*	
Deadman Creek @ Gurr Rd	36	7	10	5				41	11		4							4				1		1				1				5	9	3	
Deadman Creek @ Hwy 59	20	6						18	6									6		1		1				1					1			3	
Dry Creek @ Rd 18	0[3]	10						6		13	21	5		1				3					2			3						1		5	
Dry Creek @ Wellsford Rd	65	7	1					60			3	1						10								2	1					2		4	2*
Duck Slough @ Gurr Rd	12	14	9	2			1	30	2	1	8	4					1	3										2				8	2	3	6
Hatch Drain @ Tuolumne Rd	44		45	1	13	1		12	12													1			1					1				11	9
Highline Canal @ Hwy 99	4	27	2	2				14		4	7	7						6				1				2						4		8	1
Highline Canal @ Lombardy Rd	4	13	3	1				6		7	5	8		1				6								1		1			1	6	2*	7	5
Hilmar Drain @ Central Ave	16	3	60	2	12			20			2							1		1	1					3						1		7	3
Howard Lateral @ Hwy 140	5	6	2				1	3		6								1																1	
Lateral 2 ½ near Keyes Rd		10	1	1			1	2										4									1							3	
Lateral 5 ½ @ South Blaker Rd	1	5	16																															6	
Lateral 6 and 7 @ Central Ave	4	3	16																															3	
Levee Drain @ Carpenter Rd	18	1	33	4			18	13																								2	1	3	2
Livingston Drain @ Robin Ave	2*	18			1			2		4	9	2						4																4	
Lower Stevinson @ Faith Home Rd	2	7	11																															5	
McCoy Lateral @ Hwy 140		7						1		7																									
Merced River @ Santa Fe	9	1						6			1	2						3				1					1					5		2*	
Miles Creek @ Reilly Rd	14	2						12			7	5			1			4					1					1	1			3		4	
Mootz Drain downstream of Langworth Pond	22	1		1[2]				16										2[2]								1[2]									
Mustang Creek @ East Ave	16		9	1			2	10		8								2			3										2	2*		1	1
Prairie Flower Drain @ Crows Landing Rd	35	8	122	18	18	1	62	65	1				22			1		10				1			3	1		1				9	3	21	4
Unnamed Drain @ Hogin Rd	12		13																						1										
Unnamed Drain @ Hwy 140	3	2	1					3		1																									
Westport Drain @ Vivian Rd	16	1	24		13			7										2																4	
Grand Total	**398**	**172**	**378**	**38**	**57**	**2**	**85**	**409**	**33**	**76**	**100**	**52**	**22**	**2**	**1**	**1**	**1**	**90**	**1**	**2**	**4**	**7**	**4**	**1**	**5**	**17**	**3**	**6**	**1**	**1**	**5**	**58**	**18**	**120**	**35**

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

[1]Exceedances of the hardness based WQTL for dissolved and total copper are evaluated under the same management plan.

[2]Exceedances from Mootz Drain @ Langworth Rd count toward management plan for Mootz Drain Downstream of Langworth Pond if within a three year period (site moved in December 2010).

[3]Due to the approved lower WQTL for DO (SQMP, approved 11/4/2015) a management plan is no longer required.

Management Plans Implemented in 2016

New sites requiring a focused management plan approach are prioritized and addressed based on 10-year compliance deadlines for each constituent in a management plan, as outlined in the 2014 SQMP.

As a result of monitoring during the 2015 WY, several new site/constituent specific management plans are required or have been reinstated (see dark and light green highlights in Table 61). Below is a list of sites/constituents with exceedances of WQTLs from the 2015 WY resulting in 1) new management plans or 2) reinstated management plans.

- **Canal Creek @ West Bellevue Rd**
  - -DO
- **Duck Slough @ Gurr Rd**
  - -Ammonia
  - -Arsenic
  - -Malathion
- **Highline Canal @ Hwy 99**
  - -SC (reinstated)
  - -Chlorpyrifos (reinstated)
- **Highline Canal @ Lombardy Rd**
  - -DO
  - -SC (reinstated)
- **Howard Lateral @ Hwy 140**
  - -DO
- **Lateral 2 ½ near Keyes Rd**
  - -*S. capricornutum*
- **Lateral 6 and 7 @ Central Ave**
  - -pH
  - -*S. capricornutum*
- **Lower Stevinson @ Faith Home Rd**
  - -DO
- **Prairie Flower Drain @ Crows Landing Rd**
  - -Chlorpyrifos (reinstated)

Table 61. ESJWQC exceedance tally based on monitoring during the 2015 WY.

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 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	**Oxygen, Dissolved**	**pH**	**Specific Conductivity**	**Ammonia**	**Nitrate + Nitrite as N**	***E. coli***	**Arsenic, Total**	**Copper, Dissolved**	**Molybdenum, Total**	**Chlorpyrifos**	**Dimethoate**	**Malathion**	***C. dubia***	***S. capricornutum***	***H. azteca***
Black Rascal Creek @ Yosemite Rd	3														
Canal Creek @ West Bellevue Rd	1														
Deadman Creek @ Gurr Rd			1												
Dry Creek @ Rd 18		1													
Dry Creek @ Wellsford Rd	12					7									
Duck Slough @ Gurr Rd	2	1	4	1		2	1			1		1	3	1	
Hatch Drain @ Tuolumne Rd	5		7												
Highline Canal @ Hwy 99	1	5	1							1				1	
Highline Canal @ Lombardy Rd	2	2	2					1						1	
Hilmar Drain @ Central Ave	6		8											1	
Howard Lateral @ Hwy 140	4		1					1							
Lateral 2 ½ near Keyes Rd		1												2	
Lateral 5 ½ @ South Blaker Rd	1	3	6											2	
Lateral 6 and 7 @ Central Ave	1	2	6											2	
Levee Drain @ Carpenter Rd	3		7												
Livingston Drain @ Robin Ave	1							1							
Lower Stevinson @ Faith Home Rd	1	3	4											2	
Merced River @ Santa Fe	1													1	
Mootz Drain downstream of Langworth Pond	5														
Mustang Creek @ East Ave	2							1							
Prairie Flower Drain @ Crows Landing Rd	8		10	3	9	5			9	6			5	5	1
Unnamed Drain @ Hogin Rd	5		5								1				
Westport Drain @ Vivian Rd	4	1	2												
Grand Total	**68**	**19**	**64**	**4**	**9**	**14**	**1**	**4**	**9**	**8**	**1**	**1**	**8**	**18**	**1**

Evaluation of Management Practice Effectiveness

The Coalition implemented its management plan process in the first through sixth priority site subwatersheds from 2008 through March 2016 (Table 62). Since focused outreach was initiated growers have implement new management practices in 22 site subwatersheds. In addition, water quality results have been collected during MPM at each site. 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 62. 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[1]
First (2008-2010)	Dry Creek @ Wellsford	2008-2009	2009	2009-2014
	Duck Slough @ Hwy 99[2]	2008	2009	2009-2014
	Prairie Flower Drain @ Crows Landing Rd	2008	2009	2009-2014
Second (2010-2012)	Bear Creek @ Kibby Rd	2009	2010	2009-2014
	Cottonwood Creek @ Rd 20	2009	2010	2010-2014
	Duck Slough @ Gurr Rd	2009	2010	2010-2014
	Highline Canal @ Hwy 99	2009	2010	2010-2014
Third (2011-2013)	Berenda Slough along Ave 18 ½	2010	2011	2011-2014
	Dry Creek @ Rd 18	2010	2011	2011-2014
	Lateral 2 ½ near Keyes Rd	2010	2011	2011-2014
	Livingston Drain @ Robin Ave	2010	2011	2011-2014
Fourth (2012-2014)	Black Rascal Creek @ Yosemite Rd	2011	2012	2012-2014
	Deadman Creek @ Gurr Rd	2011	2012	2012-2014
	Deadman Creek @ Hwy 59	2011	2012	2012-2014
	Hilmar Drain @ Central Ave	2011	2012	2012-2014
Fifth (2013-2015)	Hatch Drain @ Tuolumne Rd	2012	2013-2014	2013-2014
	Highline Canal @ Lombardy Rd	2011-2012	2013-2014	2013-2014
	Merced River @ Santa Fe	2012	2013-2014	2013-2014
	Miles Creek @ Reilly Rd	2012	2013-2014	2013-2014
Sixth (2014-2016)	Ash Slough @ Ave 21	2014	2015-2016	2014-2015
	Mustang Creek @ East Ave	2014	2015-2016	2014-2015
	Westport Drain @ Vivian Rd	2014	2015-2016	2014-2015

[1] In 2012, MPM was suspended April through December in all site subwatersheds except at Bear Creek @ Kibby Rd.

[2] On April 26, 2012, the Coalition received approval to remove Duck Slough @ Hwy 99 from the Coalition's monitoring program. All remaining active management plan constituents will be addressed at the Duck Slough @ Gurr Rd site.

MPM-Management Plan Monitoring.

Summary of Management Practices

During initial individual contacts, the Coalition documented numerous management practices currently implemented by members targeted for focused outreach. The survey completed during the initial contact is organized into Checklist Sections, which categorize management practices into five categories:

Irrigation Water Management, Storm Drainage, Erosion and Sediment Management, Pest Management, and Dormant Spray Management.

Figure 18 compares the acreages associated with current management practices (prior to outreach) to the acreages associated with newly implemented management practices (after outreach) for the first through sixth priority site subwatersheds. In some cases, management practices are not applicable. For example, if a grower does not need to apply dormant sprays, dormant spray management activities are not applicable. Pest management practices have been implemented by members across the largest amount of acreage, including before and after outreach (Figure 18).

As a result of focused outreach, 48% of targeted growers in 22 site subwatersheds implemented new management practices. Seventy-five growers implemented 99 additional management practices from 2009 through March 2016 due to the Coalition's focused outreach (Table 63). The number and type of practices implemented by members varies among site subwatersheds because each is unique in both water quality impairments and sources of the impairments. Table 64 lists the number of acres associated with each newly implemented management practice. Figure 19 compares the percentage of acreages with newly implemented practices in each category. Overall, growers implemented several new practices in the Pest Management and Dormant Spray Management categories to manage spray drift and took additional steps to better manage irrigation tailwater and storm drainage. The most common practices include reducing the volume of water used for irrigation, installing a device to control the timing of discharge (tailwater and/or stormwater runoff), and management of the timing of spraying areas close to waterbodies (Table 64 and Figure 19).

Due to the implementation of management practices by growers, 54 management plan constituents have been approved for completion in 19 of the first through sixth priority site subwatersheds (Table 58).

Figure 18. Targeted acreage of categories of current and newly implemented management practices in the first through sixth priority site subwatersheds. Targeted acreage associated with grower displayed if one or more practice(s) are implemented per category. Several practices serve multiple purposes and fall into more than one category, but practices are counted only once with their primary category.

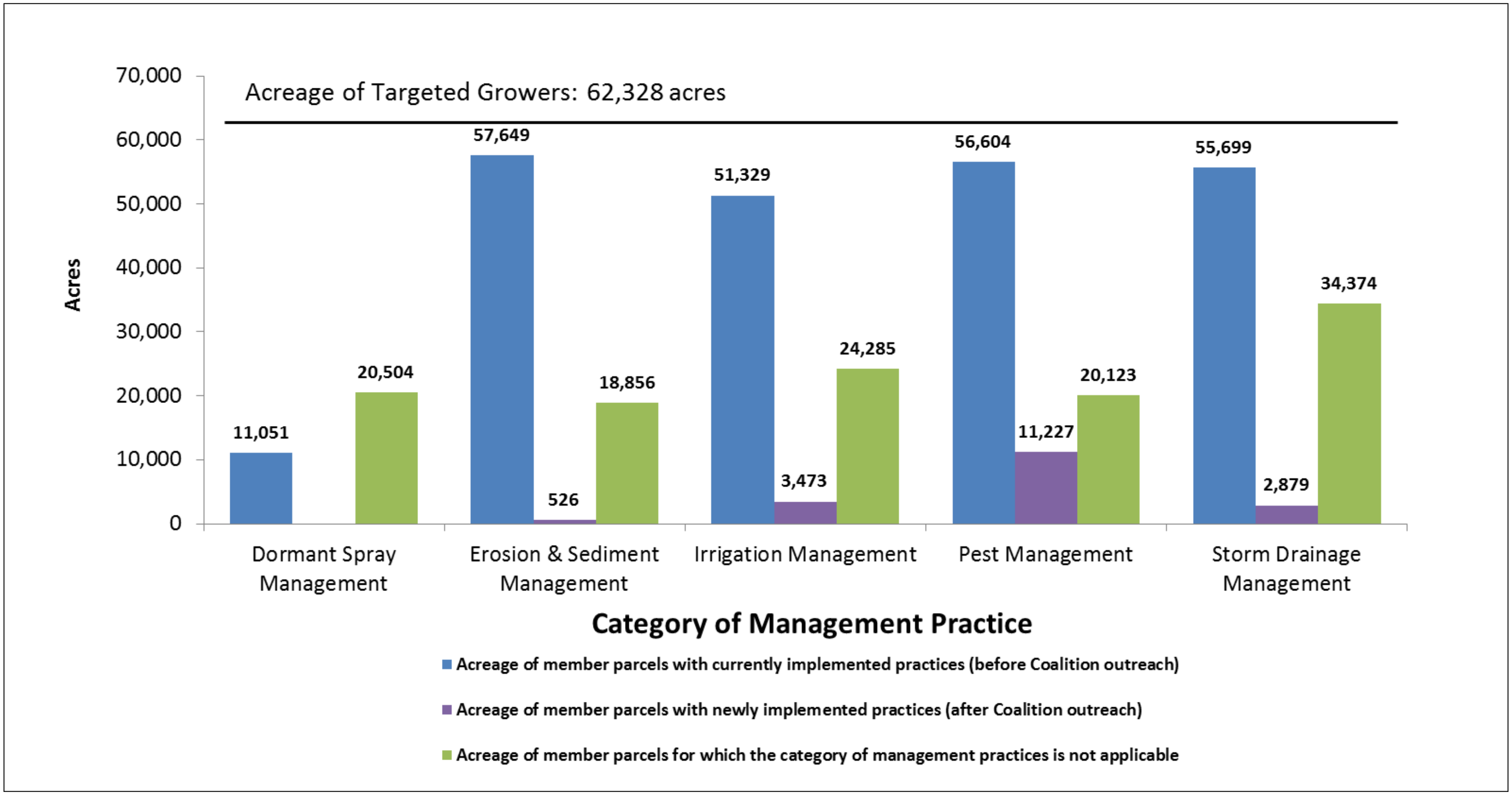


Table 63. Count of targeted growers implementing new management practices in first through sixth priority site subwatersheds.

Priority Group	Site Name	Number of Growers Implementing: 1 New MP	2 New MPs	3 New MPs	Number of Growers: Implementing new MPs	Targeted (Follow-up)	% Targeted Growers Implementing New MPs	Count of New MPs Implemented
First (2008-2010)	Dry Creek @ Wellsford Rd	7	1	0	8	22	36%	9
	Duck Slough @ Hwy 99	3	3	1	7	20	35%	12
	Prairie Flower Drain @ Crows Landing	2	1	1	4	10	40%	7
	1st Priority total	**12**	**5**	**2**	**19**	**52**	**38%**	**28**
Second (2010-2012)	Bear Creek @ Kibby Rd	2	1	0	3	14	21%	4
	Cottonwood Creek @ Rd 20	5	1	0	6	24	25%	7
	Duck Slough @ Gurr Rd	2	0	0	2	6	33%	2
	Highline Canal @ Hwy 99	2	2	0	4	8	50%	6
	2nd Priority Total	**11**	**4**	**0**	**15**	**52**	**29%**	**19**
Third (2011-2013)	Berenda Slough along Ave 18 ½	1	1	0	2	3	67%	3
	Dry Creek @ Rd 18	1	2	0	3	3	100%	5
	Lateral 2 ½ near Keyes Rd	2	0	1	3	3	100%	5
	Livingston Drain @ Robin Ave	1	0	1	2	3	67%	4
	3rd Priority Total	**5**	**3**	**2**	**10**	**12**	**83%**	**17**
Fourth (2012-2014)	Black Rascal Creek @ Yosemite Rd	0	0	0	0	1	0%	0
	Deadman Creek @ Gurr Rd	0	0	0	0	2	0%	0
	Deadman Creek @ Hwy 59	4	1	0	5	8	62%	5
	Hilmar Drain @ Central Ave	2	2	0	4	3	133%	4
	4th Priority Total	**6**	**3**	**0**	**6**	**14**	**43%**	**9**
Fifth (2013-2015)	Hatch Drain @ Tuolumne Rd	1	0	0	1	1	100%	1
	Highline Canal @ Lombardy Rd	8	2	0	8	8	100%	10
	Merced River @ Santa Fe	6	0	0	6	7	86%	6
	Miles Creek @ Reilly Rd	4	0	0	5	5	90%	4
	5th Priority Total	**19**	**2**	**0**	**20**	**21**	**90%**	**21**
Sixth (2014-2016)	Ash Slough @ Ave 21	2	0	0	2	2	100%	2
	Mustang Creek @ East Ave	1	0	0	1	1	100%	1
	Westport Drain @ Vivian Rd	1	0	0	1	1	100%	1
	6th Priority Total	**4**	**0**	**0**	**4**	**4**	**100%**	**4**
	1st-6th Priority Total	**58**	**17**	**4**	**75**	**155**	**48%**	**99**

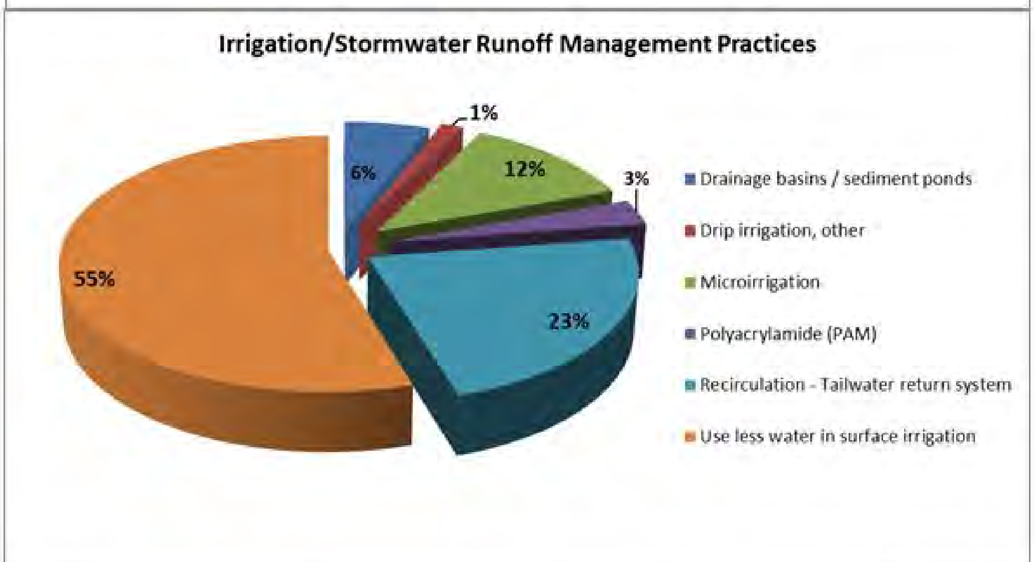
MP – Management Practice.

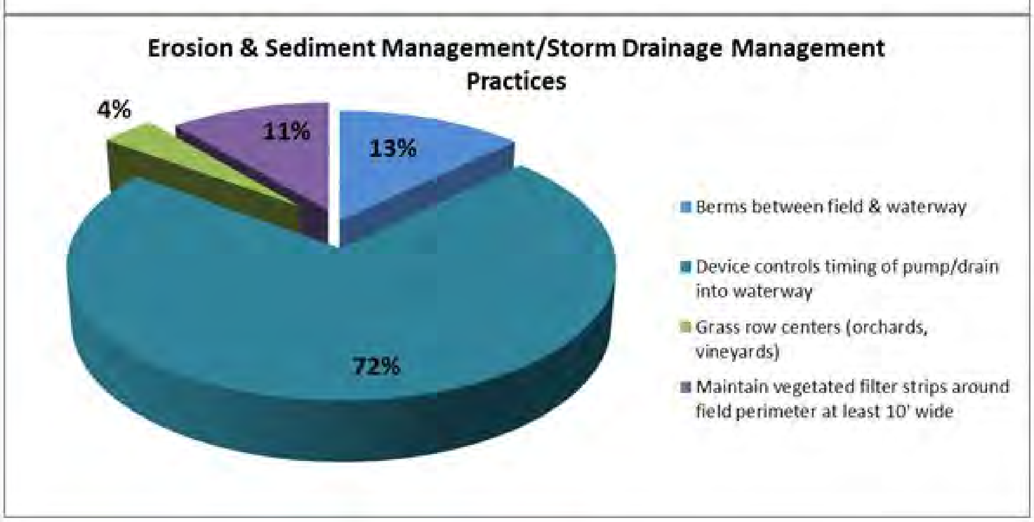
Table 64. Summary of first through sixth priority subwatershed targeted acreage with newly implemented management practices.
First through fifth subwatersheds have been reported on in previous MPURs and the 2015 Annual Report, and summarized in this table.

Practice Category		1st Priority Subwatersheds	2nd Priority Subwatersheds	3rd Priority Subwatersheds	4th Priority Subwatersheds	5th Priority Subwatersheds	6th Priority Subwatersheds			Sum of Acreage	% of Targeted Acres with New Practices Implemented
							Ash Slough @ Ave 21	Mustang Creek @ East Ave	Westport Drain @ Vivian Rd		
	Targeted Acreage:	11,273	10,084	10,974	4,410	9,947	5,915	3,472	451	56,523	NA
	Management Practices										
Irrigation, Storm Runoff	Berms between field & waterway			402	80					482	1%
Irrigation, Storm Runoff	Drainage Basins (Sediment Ponds)	271								271	<1%
Irrigation, Storm Runoff	Install device to control amount/timing of discharge to waterway	1,660		402	80	574				2,716	5%
Irrigation, Storm Runoff	Microirrigation system	279	207	71						557	1%
Irrigation, Storm Runoff	Recirculation - Tailwater return system	443			609					1,052	2%
Irrigation, Storm Runoff	Reduce amount of water used in surface irrigation	1,197	1,028	308						2,533	4%
Irrigation, Storm Runoff	Use Polyacrylamide (PAM)	150								150	<1%
Sed. and Erosion	Filter strips at least 10' wide around field perimeter	28	8							419	1%
Sed. and Erosion	Grass row centers	107								107	<1%
Pest, Dormant Spray	Calibrate spray equipment prior to every application			44						44	<1%
Pest, Dormant Spray	Shut off outside nozzles when spraying outer rows next to sensitive sites	1,170	622	251						2,043	4%
Pest, Dormant Spray	Spray areas close to waterbodies when the wind is blowing away from them		1,223	528		3,489	1,764	1,611	70	8,685	15%
Pest, Dormant Spray	Use air blast applications when wind is 3-10 mph and upwind of sensitive sites		25			72				97	<1%
Pest, Dormant Spray	Use electronic controlled sprayer nozzles		375							375	1%
Pest, Dormant Spray	Use nozzles that provide largest effective droplet size to minimize drift		121	215	139					475	1%
Other[1]	Other (Not specified)	4,102			303					4,405	8%
	Total Acres of Implemented Management Practices	**9,407**	**3,609**	**2,221**	**1,594**	**4,135**	**1,764**	**1,611**	**70**	**24,411**	**42%**

[1]Management practices implemented other than those specifically recommended by Coalition representatives for growers.

Figure 19. Percentage of acreage represented by newly implemented management practices in the first through sixth priority site subwatersheds.





The Coalition began conducting MPM in 2009 to evaluate the effectiveness of newly implemented management practices. Management plan constituents monitored during the 2015 WY include chlorpyrifos, diazinon, diuron, copper, water column toxicity to *C. dubia, S. capricornutum,* and *P. promelas,* and sediment toxicity to *H. azteca*. Since 2009, the number of exceedances of these constituents has decreased significantly (Table 65 and Table 66). The improved water quality in the first through sixth priority site subwatersheds, where focused outreach is complete, demonstrates the effectiveness of management practices.

Table 65 and Table 66 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 Figure 20 for pesticides and metals, and Figure 21 for toxicity. 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 management plan constituent is provided below for the first through sixth priority site subwatersheds.

Chlorpyrifos

Chlorpyrifos management plans are complete in the 10 first through sixth priority site subwatersheds: Ash Slough @ Ave 21, Bear Creek @ Kibby Rd, Black Rascal Creek @ Yosemite Rd, Cottonwood Creek @ Rd 20, Dry Creek @ Rd 18, Highline Canal @ Lombardy Rd, Hilmar Drain @ Central Ave, Merced River @ Santa Fe, Miles Creek @ Reilly Rd, and Mustang Creek @ East Ave (Table 58).

Overall, the Coalition has demonstrated that focused outreach is effective in improving water quality. Forty-eight percent of the first through sixth priority targeted growers implemented new management practices due to focused outreach. As a result, exceedances of the WQTL for chlorpyrifos decreased from 22 exceedances (11%) in 2008 to eight exceedances (5%) during the 2015 WY (Table 65). Chlorpyrifos is a restricted chemical and use in the first through sixth priority site subwatersheds has decreased substantially since 2009; 139,101 pounds AI of chlorpyrifos were applied in 2009 compared to only 48,181 pounds AI in the 2015 WY.

Copper

Copper management plans are complete for five site subwatersheds: Bear Creek @ Kibby Rd, Deadman Creek @ Gurr Rd, Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, and Hilmar Drain @ Central Ave (Table 58).

Exceedances of the WQTL for copper have decreased significantly in the site subwatersheds; 36 exceedances of both the dissolved and total fraction of copper occurred in 2008 (18%) compared to only three exceedances (6%) of the hardness based WQTL for dissolved copper during the 2015 WY (Figure 20).

Diazinon

Diazinon management plans are completed for Cottonwood Creek @ Rd 20 and Dry Creek @ Rd 18 site subwatersheds (Table 58). Miles Creek @ Reilly Rd is the only site subwatershed that remains in a management plan for diazinon.

The last exceedances of the WQTL for diazinon occurred in 2013, no exceedances have occurred since (Figure 20). Due to no exceedances within three years, the Coalition will petition for the completion of the management plan in 2016. The Coalition conducted focused outreach from 2013 through 2015 in the Miles Creek @ Reilly Rd site subwatershed and management practices implemented by growers in 2014 and 2015 have been effective in improving water quality and preventing diazinon from entering the waterways. Additionally, the applications of diazinon have decreased since 2007, from 5,536 lbs AI applied to crops within the first through sixth priority site subwatersheds compared to only 315 lbs AI in the 2015 WY (Table 65).

Diuron

Diuron management plans have been completed for four site subwatersheds: Cottonwood Creek @ Rd 20, Dry Creek @ Wellsford Rd, Highline Canal @ Hwy 99, and Hilmar Drain @ Central Ave (Table 58). Dry Creek @ Rd 18 is the only site subwatershed that remains in management plans for diuron.

During the 2015 WY, 100 samples were collected for diuron analysis; no exceedances occurred within the first through sixth priority site subwatersheds (Table 65). Diuron use in the first through sixth priority site subwatersheds has fluctuated from 2006 through 2015; however, implemented management practices designed to address stormwater runoff and dormant spray applications have proven effective in reducing the offsite movement of diuron, improving water quality in the first through sixth priority site subwatersheds.

C. dubia Toxicity

Water column toxicity to *C. dubia* management plans are completed for seven site subwatersheds: Bear Creek @ Kibby Rd, Dry Creek @ Wellsford Rd, Black Rascal Creek @ Yosemite Rd, Highline Canal @ Hwy 99, Highline Canal @ Lombardy Rd, Merced River @ Santa Fe, and Miles Creek @ Reilly Rd.

Toxicity to *C. dubia* decreased from 2008 through the 2014 WY; eight samples resulted in toxicity in 2008 compared to two samples in the 2014 WY ((Table 66), demonstrating the effectiveness of grower implemented management practices. The increase in *C. dubia* toxicity see in the 2015 WY is attributed to the six chlorpyrifos WQTL exceedances from Prairie Flower Drain @ Crows Landing Rd that resulted from applications made by non-members in February and March 2015.

P. promelas Toxicity

The water column toxicity to *P. promelas* management plans is complete for Prairie Flower Drain @ Crows Landing Rd.

There has been very little toxicity to *P. promelas* in the first through sixth priority site subwatersheds; only three samples in 2008 resulted in toxicity and no toxicity occurred during the 2015 WY (Table 66), demonstrating the effectiveness of grower implemented management practices. Only two site subwatersheds remain in a management plan for *P. promelas* toxicity, Deadman Creek @ Gurr Rd and Duck Slough @ Gurr Rd.

S. capricornutum toxicity

The *S. capricornutum* toxicity management plans are completed for five site subwatersheds: Berenda Slough along Ave 18 ½, Deadman Creek @ Hwy 59, Deadman Creek @ Gurr Rd, Dry Creek @ Wellsford Rd, and Duck Slough @ Gurr Rd (Table 58).

An increase in the number of samples collected that resulted in toxicity to *S. capricornutum* occurred during the 2015 WY; 136 samples were analyzed and 12 were toxic (9%), compared to only three samples out of 104 in the 2014 WY (3%). This is still significantly lower than the number of samples collected in 2008 that resulted in toxicity; prior to outreach, 49 samples (24%) resulted in toxicity to *S. capricornutum*. The overall decrease in toxic samples can be attributed to the Coalition's focused outreach efforts and growers implementing management practices designed to prevent pesticides from mobilizing to waterways.

H. azteca Toxicity

Management plans for *H. azteca* sediment toxicity are completed for the Highline Canal @ Lombardy Rd and Highline Canal @ Hwy 99 site subwatersheds (Table 58).

Due to the effectiveness of management practices, toxicity to *H. azteca* has decreased significantly in the site subwatersheds; in 2008, 11 toxic samples (19%) were collected at first through sixth priority sites, compared to one toxic sample (3%) collected during the 2015 WY (Table 66).

Table 65. Count of exceedances and samples collected for pesticides in first through sixth priority subwatersheds.
The 2013 data are from January through September. Field duplicates are not included unless the exceedance occurred in the duplicate only.

Year	Chlorpyrifos				Copper[1]				Diazinon				Diuron			
	Count of Exceedances	Count of Samples[2]	% Exceedance	Lbs Applied[3]	Count of Exceedances	Count of Samples[2]	% Exceedance	Lbs Applied[3]	Count of Exceedances	Count of Samples[2]	% Exceedance	Lbs Applied[3]	Count of Exceedances	Count of Samples[2]	% Exceedance	Lbs Applied[3]
2006	16	105	15%	158,825	18	64	28%	602,779	0	105	0%	4,653	0	83	0%	25,661
2007	17	160	11%	123,590	46	139	37%	333,640	1	156	1%	5,536	7	152	5%	22,169
2008	22	193	11%	71,490	36	195	18%	268,427	2	182	1%	2,748	7	180	4%	12,983
2009	4	81	5%	139,101	5	79	6%	234,397	0	65	0%	2,179	0	55	0%	12,337
2010	8	73	11%	91,035	6	93	6%	411,232	0	55	0%	1,149	0	58	0%	16,771
2011	3	122	2%	61,194	26	131	20%	517,378	0	107	0%	1,109	0	110	0%	24,705
2012	0	40	0%	57,302	7	53	13%	394,444	0	30	0%	414	0	35	0%	18,950
2013	1	64	2%	94,278	9	85	11%	379,748	1	32	3%	376	1	34	3%	8,256
2014 WY	3	114	3%	55,606	5	96	5%	347,518	0	71	0%	611	1	75	1%	17,769
2015 WY	8	151	5%	48,181	3	54	6%	485,488	0	93	0%	315	0	100	0%	14,351

[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 a site is scheduled for copper total and copper dissolved analysis, only one sample is counted for copper). Concentrations from a single sample collected from one site during one event have never exceeded both the total and dissolved copper WQTLs.

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

[3] All PUR data are considered preliminary until received from California Pesticide Information Portal (CalPIP); CalPIP data are available through December 2013.

Table 66. Count of toxicity and samples collected for toxic analysis in first through sixth priority subwatersheds.
The 2013 data are from January through September.

Year	*C. dubia* Toxicity			*P. promelas* Toxicity			*S. capricornutum* Toxicity			*H. azteca* Sediment Toxicity		
	Count of Toxicities	Count of Samples[1]	% Toxic	Count of Toxicities	Count of Samples[1]	% Toxic	Count of Toxicities	Count of Samples[1]	% Toxic	Count of Toxicities	Count of Samples[1]	% Toxic
2006	14	119	12%	3	107	3%	4	108	4%	1	30	3%
2007	10	164	6%	1	155	1%	14	166	8%	5	35	14%
2008	8	193	4%	3	182	2%	49	207	24%	11	58	19%
2009	2	57	4%	3	61	5%	3	71	4%	0	11	0%
2010	2	61	3%	2	61	3%	1	77	1%	1	14	7%
2011	1	108	1%	2	106	2%	4	115	3%	1	20	0%
2012	0	36	0%	0	31	0%	1	39	3%	0	13	0%
2013	2	54	4%	0	39	0%	4	64	6%	2	19	11%
2014 WY	2	78	3%	3	75	4%	6	104	6%	2	27	7%
2015 WY	8	105	8%	0	104	0%	12	136	9%	1	38	3%

[1]Samples refers to all samples scheduled for constituent analysis (dry sites are included). Resampling events are not scheduled monitoring events and are not included.
NA – Not applicable, no samples were collected for the constituent during the year.

Figure 20. Percentage of exceedances of WQTLs in first through sixth priority site subwatersheds.

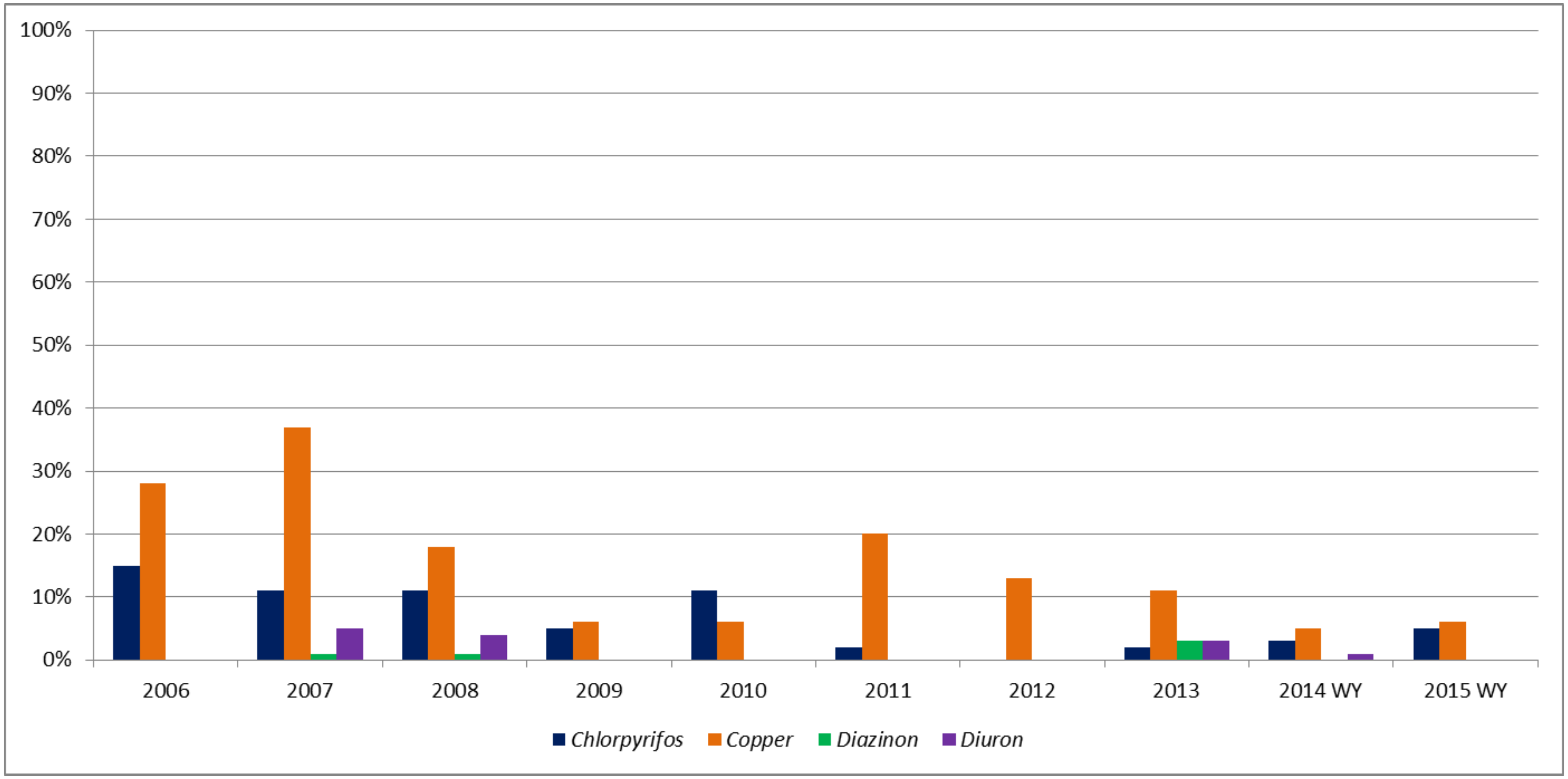
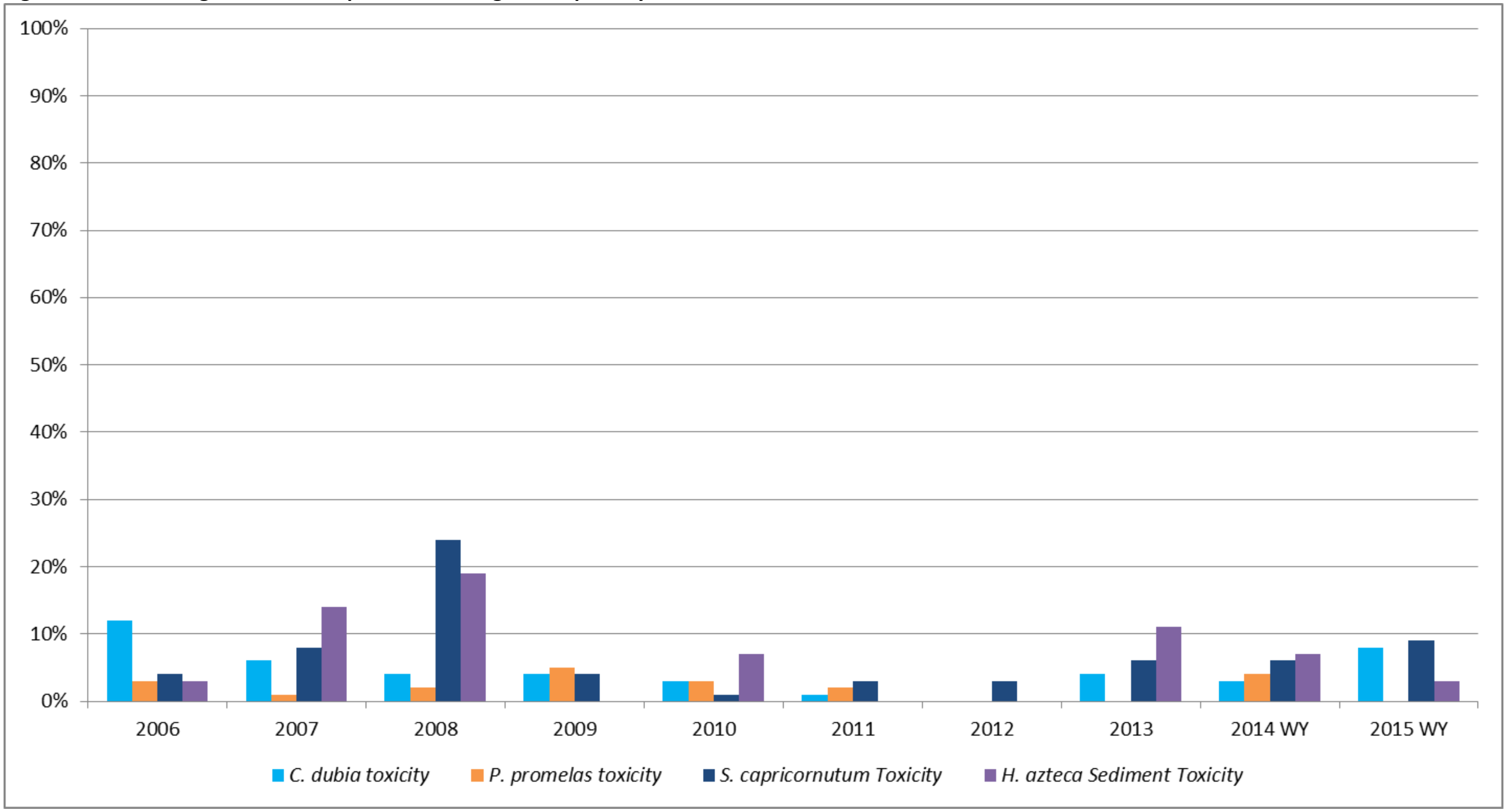


Figure 21. Percentage of toxic samples first through sixth priority site subwatersheds.



TMDL CONSTITUENTS

Monitoring to evaluate compliance with approved TMDLs occurred in the Coalition region during the 2015 WY. If an exceedance of the WQTL occurs for a TMDL constituent, a management plan is required. A management plan for a TMDL constituent results in additional focused monitoring, source identification, and outreach within the site subwatershed. Coalition efforts include: 1) MPM, 2) outreach meetings with growers, 3) encouraging the implementation of and evaluating the efficacy of management practices, and 4) addressing the seven surveillance and monitoring objectives for chlorpyrifos and diazinon as described in the Basin Plan Amendment. Intensive outreach and documentation of implemented management practices occur throughout the Coalition region every year. Furthermore, the Coalition conducts annual meetings to provide growers with information on management practices designed to improve water quality.

Chlorpyrifos and Diazinon TMDL

During the 2015 WY, the ESJWQC assessed compliance with seven monitoring objectives established in the Basin Plan Amendment:

1. Determine load capacity compliance,
4. Determine load allocation compliance,
5. Determine degree of implemented management practices,
6. Determine effectiveness of implemented management practices,
7. Determine if alternative pesticides are impairing water quality,
8. Determine if additive or synergistic effects of multiple pollutants are causing toxicity, and
9. Demonstrate management practices achieve the lowest pesticide levels technically and economically achievable.

To assess compliance with Objective 1 (loading capacity) the ESJWQC monitored three of the six compliance points, once during the February storm event, and from May through September (San Joaquin River at Hills Ferry Road, San Joaquin River at the Maze Boulevard (Highway 132) Bridge, and San Joaquin River at the Airport Way Bridge near Vernalis). The Westside Coalition monitored the other three compliance points monthly (San Joaquin River at Sack Dam, San Joaquin River at Highway 165 near Stevinson, and San Joaquin River at Las Palmas Avenue near Patterson). To assess compliance with Objectives 2 through 7, the Coalitions assessed results and outcomes of actions taken (e.g. monitoring and outreach) to meet the specifications of either Coalition's respective ILRP monitoring program.

Chlorpyrifos and diazinon were not detected in any samples collected from the San Joaquin River during the 2015 WY. There were eight exceedances of WQTLs for chlorpyrifos in ESJWQC tributary sites: Duck Slough @ Gurr Rd (0.19 µg/L), Highline Canal @ Hwy 99 (0.070 µg/L), and Prairie Flower Drain @ Crows Landing Rd (4.200 µg/L, 0.200 µg/L, 0.200 µg/L, 0.061 µg/L, 0.044 µg/L, 0.017 µg/L). Complete monitoring results from the 2015 WY as well as a detailed assessment of each Coalition's compliance with Monitoring Objectives 1 through 7 can be referenced in the 2015 WY San Joaquin River Chlorpyrifos and Diazinon TMDL AMR (submitted May 1, 2016).

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 67 includes a list of all ESJWQC 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, documents were submitted to the Regional Board for items 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.

Farm Evaluations:

The Coalition included an analysis of the returned 2014 FE surveys in the May 1, 2015 Annual Report. In response to a request from the Regional Board for additional information, an amendment to the May 1, 2015 Annual Report was submitted on September 1, 2015 to include updates to the Farm Evaluation Summary and correct statistical calculation errors. An analysis of returned 2015 FE surveys is included in the Farm Evaluations section below.

Groundwater:

On December 24, 2014 the Coalition received official approval for the Groundwater Assessment Report (GAR) that was resubmitted on November 7, 2014 (conditional approval was received on June 4, 2014). As required, the Coalition submitted the Groundwater Quality Management Plan (GQMP) on February 23, 2015 within 60 days of the conditional approval of the GAR, (approval pending). Based on the GAR approval, the Groundwater Quality Trend Monitoring Work Plan (GQTM) was submitted on June 4, 2015. The Coalition sent a letter to the Regional Board on November 18, 2015 requesting feedback on the GQTM Work Plan Phase I. The Regional Board sent a memo to the Coalition on December 4, 2015 with comments for the GQTM Work Plan with additional requests to address Phase I in the submittal for the GQTM Work Plan Phase II. The Coalition submitted the GQTM Phase II Work Plan on January 29, 2016 with a proposed schedule for a Phase III Work Plan.

Another component for evaluating groundwater quality and protection is through the implementation of a 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 (to be submitted on June 4, 2016). Further details on the groundwater program are included in the Groundwater Quality Assessment and Programs section below.

Nitrogen Management:

The Coalitions resubmitted the NMP template on December 18, 2014 (approved on 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 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. The NMP Summary Report template was submitted on November 18, 2015 (approved December 23, 2015). Growers on large farms in high vulnerability areas were mailed their 2015 NMP Summary Reports on February 24, 2016. The Coalition is in the process of analyzing all returned 2015 NMP summary reports and the Nitrogen Management Plan section below includes a preliminary summary of the 2015 NMP Summary Report information. A complete analysis of the NMP Summary Reports will be included in an addendum to the 2016 Annual Report, to be submitted on May 30, 2016.

Sediment and Erosion Control:

The ESJWQC resubmitted the Sediment Discharge and Erosion Assessment Report (SDEAR) on December 12, 2014 and May 15, 2015 (conditionally approved July 24, 2015). The Sediment Erosion Control Plan (SECP) Template was submitted on April 11, 2013 and revised on October 9, 2015 (approved December 1, 2015). The Coalition addressed proximity to surface waters in the risk analysis submitted on December 1, 2015 (conditionally approved December 24, 2015). A document identifying farming operations on large tributaries with the potential to discharge sediment was submitted on March 24, 2016. Further details are included in the Sediment and Erosion Control Plan section below.

Table 67. ESJWQC WDR related submittals and approvals.
The ESJWQC WDR (R5-2012-0116-R3) was approved December 7, 2012 and revised on October 3, 2013, March 27, 2014, and April 17, 2015.

Document Description	Submittal/ Due Date[1]	Approval Date
Farm Evaluations		
FE Template	April 11, 2013 and December 6, 2013	December 9, 2013
2015 FE High (small & large farms) and Low (large farm) Vulnerability Areas	March 1, 2015	NA
2014 FE Summary- 2015 Annual Report	May 1, 2015 and September 1, 2015 (amendment)	February 12, 2016
2015 FE High (small & large farms) and Low (large farm) Vulnerability Areas	March 1, 2016	NA
2015 FE Summary- 2016 Annual Report	May 1, 2016	Approval Pending
FE Low Vulnerability Areas (small farm)	March 1, 2017	NS
FE Low Vulnerability Areas (large farm)	March 1, 2020	NS
Groundwater Monitoring		
GAR Outline	April 11, 2013	May 6, 2013
GAR	January 13, 2014 and November 7, 2014	June 4, 2014 (conditional) December 24, 2014 (official)
GQMP	February 23, 2015	Approval Pending
GQTM Work Plan Phase I	June 4, 2015 and January 29, 2016 (resubmittal)	Approval Pending
Request for GQTM Work Plan Phase I Feedback	November 18, 2015	December 4, 2015 (memo)
GQTM Work Plan Phase II	January 29, 2016	Approval Pending
GQTM QAPP	30 days from GQTM Work Plan (Phase I and II) approval	NS

Document Description	Submittal/ Due Date[1]	Approval Date
GQTM Work Plan Phase III Progress Update	May 1, 2016	NA
GQTM Work Plan Phase III Submittal	Summer 2016	NS
GAR Update	June 4, 2019	NS
MPEP Group Agreement	January 14, 2014 and September 23, 2014 (refine plan)	March 13, 2014 (conditional) June 17, 2015 (official)
MPEP Identify Technical Experts	September 23, 2014	NA
MPEP Identify Program Administrator	November 1, 2014	NA
Extension Request and Addition to MPEP GCC	June 30, 2015	NA
MPEP Conceptual Study Design	July 31, 2015	NA
MPEP Draft Work Plan	March 1, 2016	NA
MPEP Final Work Plan	June 4, 2016	NS
Nitrogen Management		
NMP Template (All Coalitions)	April 11, 2013 and December 18, 2014	December 23, 2014
NMP Technical Advisory Work Group description	March 13, 2015 and May 27, 2015	NA
NMP Summary Report Template (All Coalitions)	November 18, 2015	December 23, 2015
NMP Guidance Documents Timeline	December 18, 2015	January 19, 2016 (conditional)
NMP Crop Nitrogen Knowledge Gap Study Plan	December 18, 2015	January 19, 2016 (conditional)
Response to comments on Study Plan and Guidance Docs.	February 19, 2016	March 29, 2016 (Regional Board memo)
NMP Work Plan for expanding/revising Y/R conversions	July 2016	NS
NMP (High Vuln >60 ac)	March 1, 2015[2]	NA
NMP Summary Report (High Vuln >60 ac)	March 1, 2016	NA
NMP (Small Farm High Vuln <60 ac)	March 1, 2017	NS
NMP Summary Report (Small Farm High Vuln <60 ac)	March 1, 2018	NS
NMP (Low Vuln)	March 1, 2017	NS
NMP Summary Report (Low Vuln)	March 1, 2018	NS
Sediment and Erosion Control		
SECP Template (All Coalitions)	April 11, 2013, September 3, 2015, and October 9, 2015 (resubmittal)	December 1, 2015
SDEAR	January 13, 2014, December 12, 2014, and May 15, 2015 (resubmittal)	July 24, 2015 (conditional)
SDEAR Proximity to Surface Waters Proposal with Timeline	December 1, 2015	December 24, 2015 (conditional)
SECP (All other Members)	January 22, 2016	NA
SECP (Small Farm < 60 acres)	July 23, 2016	NA
Identify Large Tributaries with potential for sed. discharge	March 24, 2016	Approval Pending
Identify Secondary Tributaries with potential for sed. discharge	June 24, 2016	NS
Identify Remaining Waterbodies with potential for sed.discharge	June 24, 2017	NS

*Approval of the Annual Report for the reporting year will be the approval of the addendum/resubmittal.

NA-Not applicable

NS-Not submitted yet

[1]-Items submitted on March 1 are reported on in the May 1 Annual Report unless otherwise stated.

[2]-On January 20, 2015 the Coalition submitted a request to extend the due date for members in high vulnerability areas to have NMPs certified from March 1, 2015 to March 1, 2016 (approved April 16, 2015).

FARM EVALUATIONS

FARM EVALUATION SUREYS

The ESJWQC WDR requires that Coalition members complete Farm Evaluation surveys, which gather information on general site conditions and current management practices put in place to protect surface and groundwater quality. Data from the surveys can be used to evaluate changes in surface water quality relative to changes in management practices. The Farm Evaluation is designed to collect information in four parts:

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

The survey parts gather information from growers regarding 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),
5. Location of active irrigation wells and abandoned wells, and
6. Applied wellhead protection and backflow prevention practices and devices.

Members are required to complete their Farm Evaluation based on farm size and whether they have parcels in a high or low vulnerability area (HVA or LVA). The HVAs are the geographic regions within the Coalition area where a management plan is required as a result of surface or groundwater quality impairments or the area has been determined to be highly vulnerable for groundwater contamination. An overall vulnerability was assigned to all parcels associated with a survey if at least one of those parcels was located in a surface water or groundwater HVA. Table 67 includes the Farm Evaluation official submittal deadlines for HVAs and LVAs.

Farm Evaluation surveys for 2015 were required for members with: 1) parcels in surface and/or groundwater HVAs or 2) parcels in LVAs without prior survey data available (excluding small farms which do not have to return a survey until March 1, 2017). Farm Evaluation surveys are returned to the Coalition from growers by March 1, annually. A list of active members created in January 2016 was used to evaluate the status of returned surveys. All members on the list were sent notifications regarding survey completion deadlines and provided with a hard copy of the survey.

Members without prior survey data were sent surveys with pre-populated parcel information and whether or not the parcel is within a HVA for either surface or groundwater. If the member submitted a previous Farm Evaluation survey, the 2015 survey was pre-populated with the same information plus the Farm Evaluation survey responses from the previous year. Members with pre-populated Farm

Evaluation responses were asked to correct crop information, update acreage, and change responses as needed to accurately reflect the farming practices implemented in 2015. Survey responses were recorded in an Access database and linked to an APN and acreage. The results are being submitted in an Access database along with this report and are identified on a Township level.

The following actions were taken to assist growers with completing their Farm Evaluation survey:

- For members with pre-populated surveys, questions without responses in the prior year were highlighted, marked with an arrow, and noted as necessary.
- Workshops were held at local Farm Bureaus that allowed Coalition representatives to help members. Providing assistance with answering questions was important to ensure that the members were able to understand the intent of the questions and mark responses that accurately reflect field specific practices.
- Members were contacted by phone or email for follow-up when there were unanswered questions or their responses were unclear; this only occurred for priority questions that were essential to the survey (management practice questions) and not all members could be contacted prior the submission of this report.
- Data were reviewed in the database to reduce errors including comparing acreages provided by the members versus acreages enrolled with the Coalition and ensuring that there is a response for every question (if the question was not answered a default answer of 'No Selection' was entered).

During the data entry process, reviewing responses indicated several areas of concern:

- Some parcels were not included on returned surveys and therefore could not be associated with the answers on the survey. In some cases, it was unclear which parcels were associated with which group of responses. For example, a member may have returned two sets of surveys and recorded a crop of corn on one survey and a crop of tomatoes on the second survey. If the parcels were not clearly marked on each of the surveys, data entry personnel could not enter the data into the database and would have to follow up with the member for clarification.
- In situations where members have multiple parcels with different fields and management practices, many members did not divide their APN acreage into each Site ID/Field ID. It is unclear whether this was because of a lack of understanding of how to subdivide their APNs and associated acreage or if they simply failed to complete the subdivision as requested. Failure to complete this task potentially 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.
- Surveys were returned without all questions completed. When surveys were reviewed and missing responses were noted, the Coalition representatives called as many members as possible to complete the missing responses.

Summary

The Coalition received surveys from 83% of the required members, representing 85% of the required acreage by April 1, 2016 (Figure 22 and Table 68). More members returned completed surveys for 2015 than 2013 (80%) and 2014 (72%). Members failing to return a 2015 Farm Evaluation survey were sent a reminder notice in an effort to reach 100% compliance.

For less than two percent of members who were sent a survey in 2015, completion was not necessary for one of three possible reasons: 1) the member had no irrigated acreage enrolled in the Coalition during 2015 (a member may do this if the ground will be temporarily fallowed), 2) they did not farm in 2015 (new members who recently acquired the land), or 3) they are no longer a member (e.g. sold their land Figure 23 illustrates the parcels included on returned surveys, surface water HVAs based on the management plans in place when the mailing list was created, and groundwater HVAs. Some memberships included parcels falling into multiple vulnerability categories. Of the parcel numbers provided on the returned surveys, 281 parcels could not be mapped and are therefore associated with an unknown vulnerability (Table 68). Reasons for the inability to map include 1) the member assigned the parcel to the incorrect county, 2) the parcel number has been recently updated, and/or 3) either the member reported an old parcel number or the GIS parcel layer has not yet been updated to include that parcel.

Figure 22. An illustration of 2015 surveys showing 1) the percent of sent surveys that did not need to be returned based on changes in membership or crop status and 2) the percent of required surveys that were returned. Percentages were calculated using member counts.

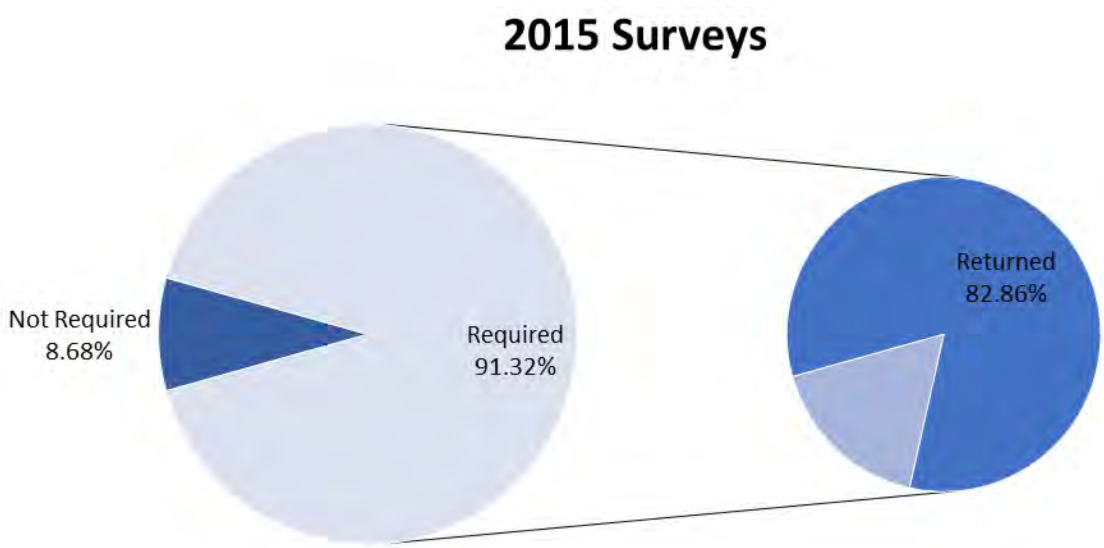


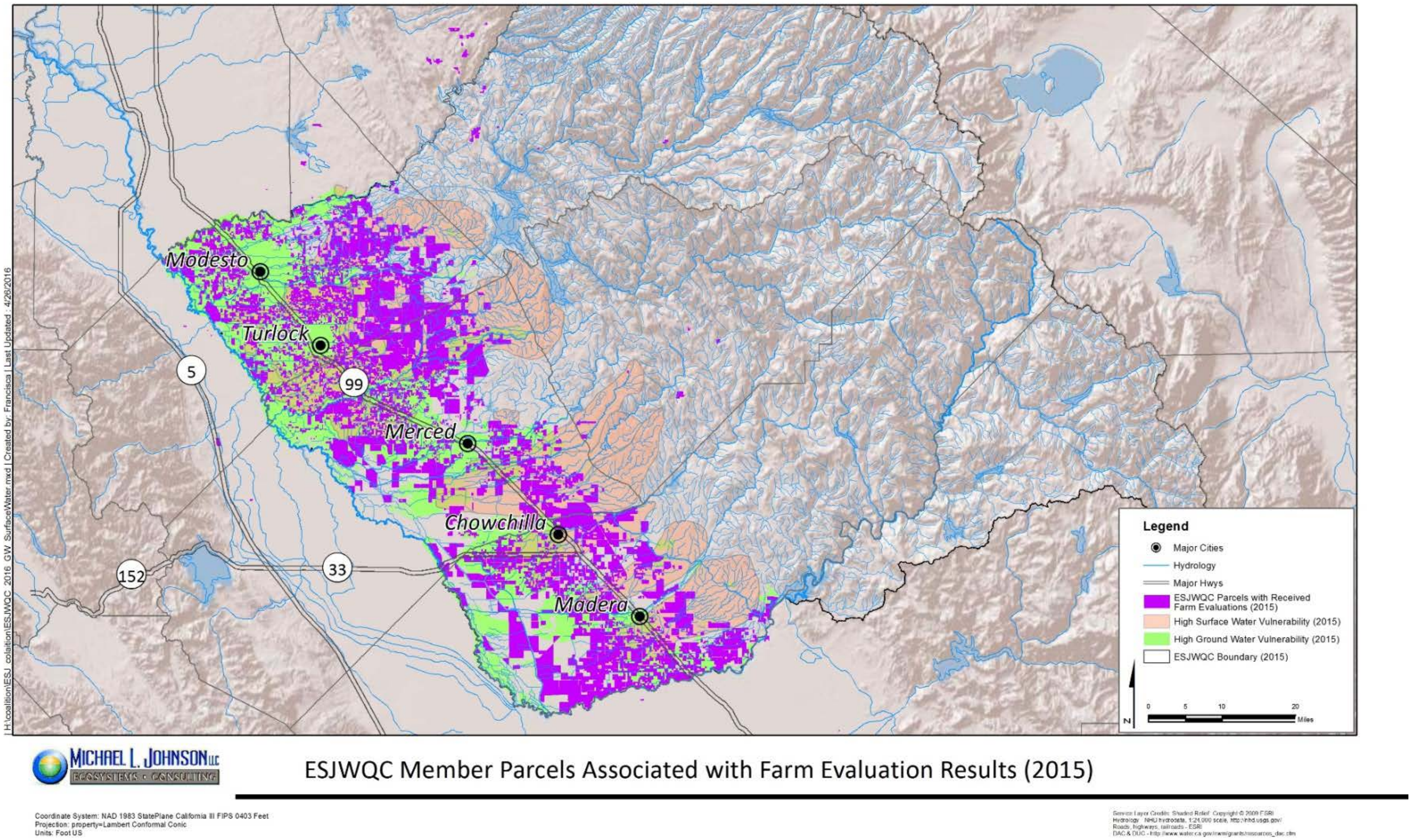
Table 68. Summary of acreage and count of members represented by 2015 Farm Evaluation surveys, returned, and not returned.

Unknown refers to parcels that could not be mapped and therefore a vulnerability designation is unknown.

SURVEY STATUS	VULNERABILITY	OVERALL VULNERABILITY	SUM OF ACREAGE	COUNT OF MEMBERS
Received	Both SW and GW - High	High	344,297	1,282
	GW - High	High	169,795	1,243
	SW - High	High	53,784	215
	Both SW and GW - Low	Low	10,580	102
	Unknown	Unknown	1,404	35
		Received Total	***579,861***	***2877***
Not Received	Both SW and GW - High	High	65,487	244
	GW - High	High	23,903	264
	SW - High	High	8,669	43
	Both SW and GW - Low	Low	5,045	34
	Unknown	Unknown	363	10
		Not Received Total	***103,467***	***595***
		Grand Total	**683,328**	**3,472**
		% High Vulnerability of Total	*97.45%*	*94.79%*
		% Low Vulnerability of Total	*2.29%*	*3.92%*
		% Received of Required	**84.96%**	**82.86%**

GW – Groundwater
SW – Surface Water

Figure 23. ESJWQC member parcels associated with one or more Farm Evaluation for the 2015 crop year.



Many members reported multiple crops per parcel and/or management unit resulting in up to five crops being associated with a survey (Crop 1, Crop 2, Crop 3, Crop 4, and Crop 5). Similar to the previous analyses, in the case of multiple crops per parcel, the first crop listed was recorded as the primary crop, Crop 1, and the remaining crops as Crop 2, Crop 3, and so on. For example, both walnuts and almonds were farmed on the same parcel however all the management practices recorded were the same. In this situation, the grower may have filled out the crop information as almonds/walnuts and the data was recorded in the database as Crop 1 – almonds and Crop 2 – walnuts.

Primary crops (Crop 1) were grouped into subcategories and general categories. General categories include Pasture/Hay/Grain, Orchard, Row Crop, Vineyard, Not Farmed, and Not Recorded (Figure 24 and Table 69). For example, Orchard is a general category with a subcategory of Nut Trees and almonds is a primary crop associated with both. In some cases, surveys were returned without a crop designation (less than two percent of the acreage) and the crop information was recorded as Not Recorded. Two percent of the acreage was grouped under the general category of Not Farmed, which includes non-agriculture land and fallowed fields (Figure 24). Table 69 lists the designations for each primary crop and illustrates the percentage of reported acreage for returned 2015 surveys.

Orchards represent the largest percent of acreage (63%) followed by vineyards (14%) and row crops (11%; Figure 24). For the surveys returned, nut trees have more acreage than any other type of orchard (94% of orchard acreage; Figure 25). Almonds comprised 76% of the reported nut tree acreage (Figure 25 and Table 69). Grapes and walnuts are the most common secondary crops (Crop 2) where almond fields are the primary crop (Figure 26). Corn was reported for half of the row crop acreage (Figure 27).

Figure 24. General categories of reported crops in 2015 Farm Evaluations, displayed as percent of total reported acreage.

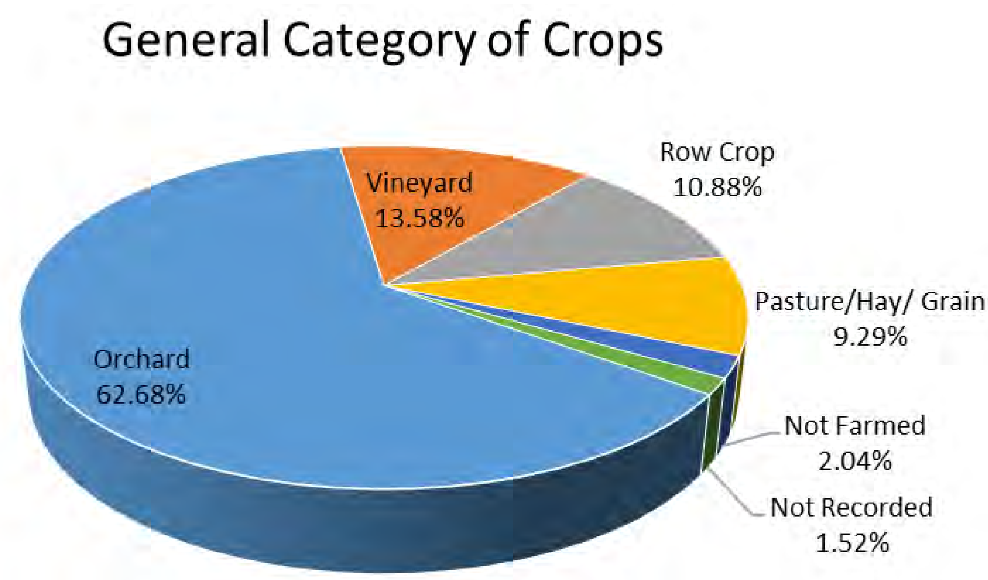


Figure 25. A summary of the type of orchards associated with 2015 Farm Evaluations, displayed as percent of acres reported.

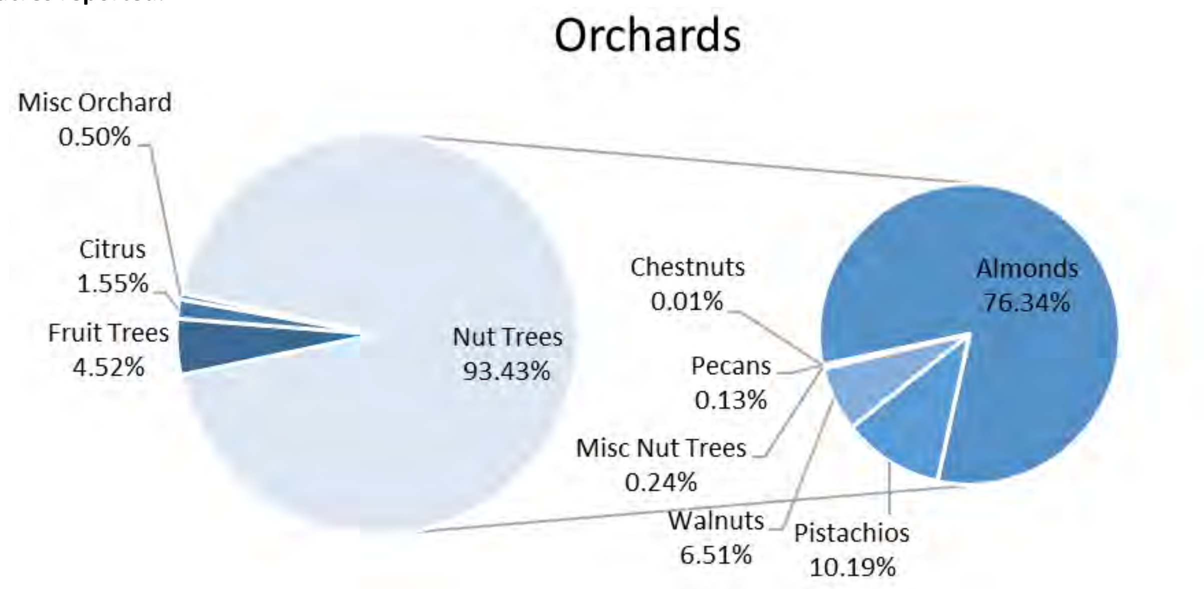


Figure 26. Secondary crops reported where the primary crop is almonds, displayed in parcel acreage.

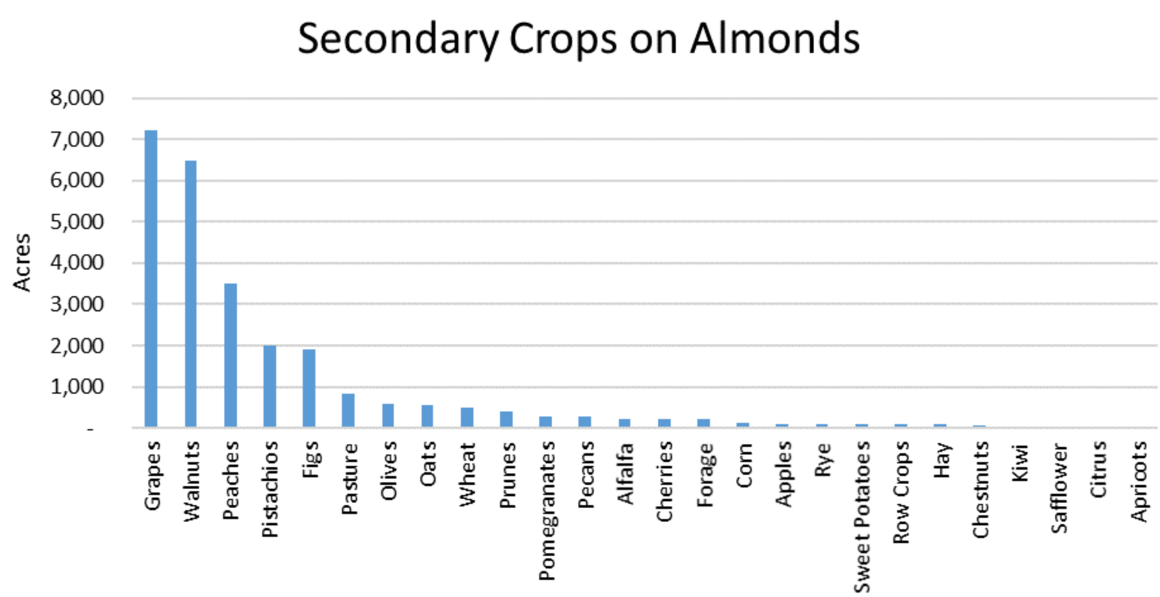


Figure 27. A summary of the type of row crops associated with 2015 Farm Evaluations, displayed as percent of acres reported.

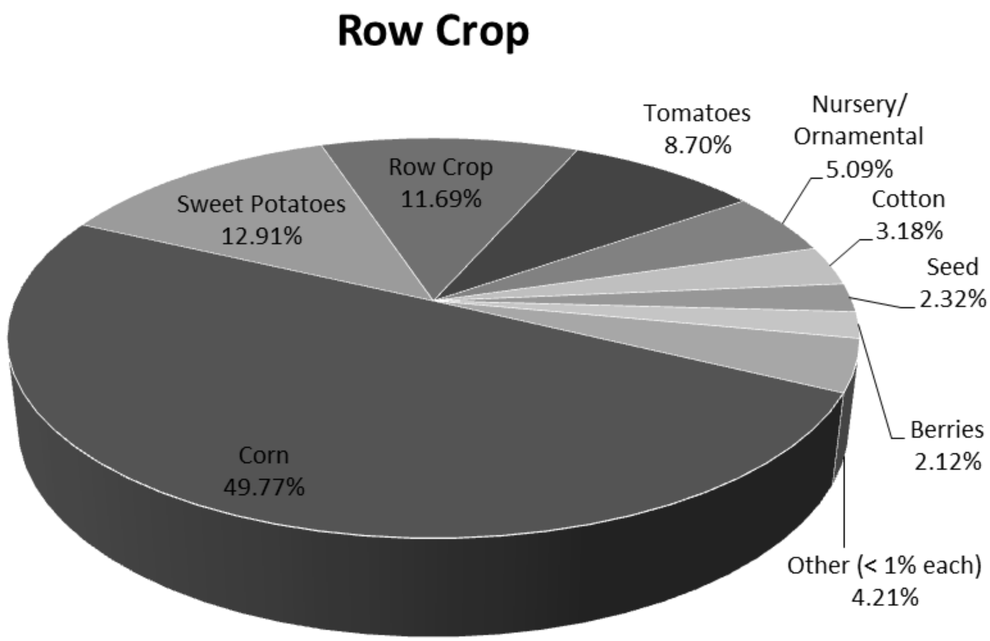


Table 69. Crop standardization table used for analysis of reported crops, shown with the percent of total reported acres per primary crop.

General Category	Sub Category	Primary (Crop 1)	Reported Acres	Percent of Total Acres
Not Farmed	Habitat	Forage	560	0.10%
Not Farmed	Habitat	Wetland	15	< 0.01%
Not Farmed	None	Dry	63	0.01%
Not Farmed	None	Fallow	3,865	0.67%
Not Farmed	None	No Crop	6,090	1.05%
Not Farmed	None	No Irrigation	1,929	0.33%
Not Farmed	None	Worm Farm	29	< 0.01%
Not Recorded	Not Recorded	Not Recorded	8,803	1.52%
Orchard	Citrus	Citrus	2,184	0.38%
Orchard	Citrus	Mandarins	705	0.12%
Orchard	Citrus	Oranges	2,686	0.46%
Orchard	Citrus	Tangelos	40	0.01%
Orchard	Fruit Trees	Apples	513	0.09%
Orchard	Fruit Trees	Apricots	182	0.03%
Orchard	Fruit trees	Cherries	1,169	0.20%
Orchard	Fruit trees	Figs	6,638	1.15%
Orchard	Fruit trees	Fruit Trees	405	0.07%
Orchard	Fruit trees	Olives	697	0.12%
Orchard	Fruit Trees	Peaches	4,978	0.86%
Orchard	Fruit Trees	Pears	0	< 0.01%
Orchard	Fruit trees	Persimmons	28	< 0.01%
Orchard	Fruit Trees	Plums	412	0.07%
Orchard	Fruit trees	Pomegranates	364	0.06%
Orchard	Fruit Trees	Prunes	973	0.17%
Orchard	Fruit trees	Stonefruit	48	0.01%

General Category	Sub Category	Primary (Crop 1)	Reported Acres	Percent of Total Acres
Orchard	Nut Trees	Almonds	276,869	47.79%
Orchard	Nut Trees	Chestnuts	35	0.01%
Orchard	Nut Trees	Nut Trees	869	0.15%
Orchard	Nut Trees	Pecans	485	0.08%
Orchard	Nut Trees	Pistachios	36,962	6.38%
Orchard	Nut Trees	Walnuts	23,620	4.08%
Orchard	Orchard	Orchards	17	< 0.01%
Orchard	Trees	Christmas Trees	3	< 0.01%
Orchard	Trees	Eucalyptus	10	< 0.01%
Orchard	Trees	Oak Trees	20	< 0.01%
Orchard	Trees	Palm Trees	10	< 0.01%
Orchard	Trees	Trees	1,750	0.30%
Pasture/Hay/Grain	Grain	Barley	346	0.06%
Pasture/Hay/Grain	Grain	Grain	113	0.02%
Pasture/Hay/Grain	Grain	Rice	1,309	0.23%
Pasture/Hay/Grain	Grain	Rye	857	0.15%
Pasture/Hay/Grain	Grain	Sorghum	237	0.04%
Pasture/Hay/Grain	Grain	Oats	4,466	0.77%
Pasture/Hay/Grain	Grain	Sudan	104	0.02%
Pasture/Hay/Grain	Grain	Wheat	6,866	1.19%
Pasture/Hay/Grain	Hay	Alfalfa	19,342	3.34%
Pasture/Hay/Grain	Hay	Hay	1,292	0.22%
Pasture/Hay/Grain	Pasture	Alfalfa	551	0.10%
Pasture/Hay/Grain	Pasture	Clover	395	0.07%
Pasture/Hay/Grain	Pasture	Grass	68	0.01%
Pasture/Hay/Grain	Pasture	Pasture	17,799	3.07%
Row Crop	Berries	Berries	606	0.10%
Row Crop	Berries	Blueberries	16	< 0.01%
Row Crop	Berries	Raspberries	29	0.01%
Row Crop	Berries	Strawberries	690	0.12%
Row Crop	Herbs/Spices	Basil	50	0.01%
Row Crop	Herbs/Spices	Cilantro	72	0.01%
Row Crop	Herbs/Spices	Oregano	28	< 0.01%
Row Crop	Herbs/Spices	Sage	0	< 0.01%
Row Crop	Herbs/Spices	Spearmint	1	< 0.01%
Row Crop	Herbs/Spices	Thyme	16	< 0.01%
Row Crop	Nursery/Ornamental	Decorative Greens	16	< 0.01%
Row Crop	Nursery/Ornamental	Flowers	39	0.01%
Row Crop	Nursery/Ornamental	Nursery	3,164	0.55%
Row Crop	Oil crop	Safflower	200	0.03%
Row Crop	Row Crop	Artichokes	19	< 0.01%
Row Crop	Row Crop	Asparagus	43	0.01%
Row Crop	Row Crop	Assorted Crops	789	0.14%
Row Crop	Row Crop	Beans	196	0.03%
Row Crop	Row Crop	Bell Peppers	50	0.01%
Row Crop	Row Crop	Chinese Greens	10	< 0.01%
Row Crop	Row Crop	Corn	31,306	5.40%
Row Crop	Row Crop	Cotton	2,010	0.35%
Row Crop	Row Crop	Cover Crop	238	0.04%
Row Crop	Row Crop	Endives	64	0.01%
Row Crop	Row Crop	Garlic	386	0.07%
Row Crop	Row Crop	Onions	459	0.08%
Row Crop	Row Crop	Potatoes	237	0.04%
Row Crop	Row Crop	Row Crop	6,582	1.14%

General Category	Sub Category	Primary (Crop 1)	Reported Acres	Percent of Total Acres
Row Crop	Row Crop	Silage	559	0.10%
Row Crop	Row Crop	Squash	26	< 0.01%
Row Crop	Row Crop	Sweet Potatoes	8,091	1.40%
Row Crop	Row Crop	Tomatoes	5,503	0.95%
Row Crop	Row Crop	Zucchini	10	< 0.01%
Row Crop	Seed	Carrots	1,298	0.22%
Row Crop	Seed	Tomatoes	169	0.03%
Vineyard	Grapes	Grapes	78,476	13.55%
Vineyard	Kiwis	Kiwis	88	0.02%

Irrigation Management Practices

Many members utilized several practices to efficiently manage irrigation. A third of the responses indicated that parcels were irrigated according to need. Just over a fifth of the responses specified that moisture probes are used (Table 70 and Figure 28). Drip and micro sprinklers were the two most utilized primary irrigation methods in 2015; each method included close to a third of the reported acreage. Border strip irrigation was the least common primary irrigation method (Table 70 and Figure 29). Most members do not utilize secondary irrigation methods, although flood irrigation was reported as the most common secondary system (Table 70 and Figure 29). Coalition members are following many BMPs by managing their water usage and leveling their fields. Irrigation practices have remained consistent between years.

Table 70. Acreage associated with 2015 irrigation management questions and responses.

Survey Section	Question	Response	Acreage	Response Count
B	Irrigation Efficiency Practices			
		Scheduled to need	510,576	2,377
		Use of moisture probe	324,194	850
		Use of ET in scheduling	293,974	697
		Laser Leveling	272,136	1,317
		Pressure Bomb	55,373	197
		Soil Moisture Neutron Probe	44,196	133
		Other	36,914	233
		No Selection	20,106	207
B	Primary Irrigation Practices			
		Drip	251,378	808
		Micro Sprinkler	235,723	934
		Flood	152,194	1,418
		Sprinkler	53,112	403
		Furrow	37,352	161
		Border Strip	9,354	44
		No Selection	2,170	24
B	Secondary Irrigation Practices			
		No Selection	378,925	2,158
		Flood	94,444	494
		Drip	45,317	157
		Micro Sprinkler	36,261	146
		Sprinkler	24,552	97
		Furrow	21,043	72
		Border Strip	8,484	23

Figure 28. Sum of reported acreage associated with irrigation efficiency practices.

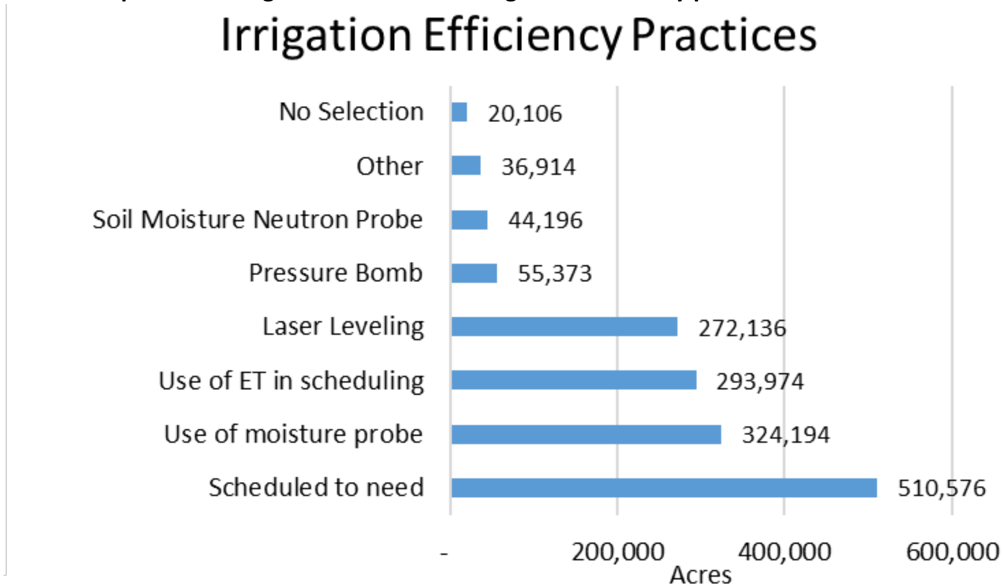
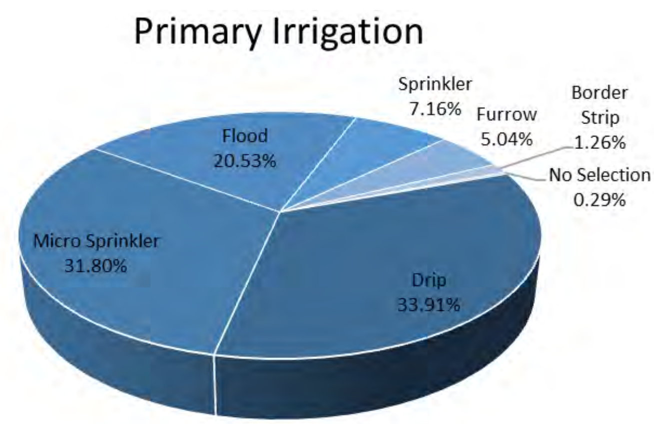
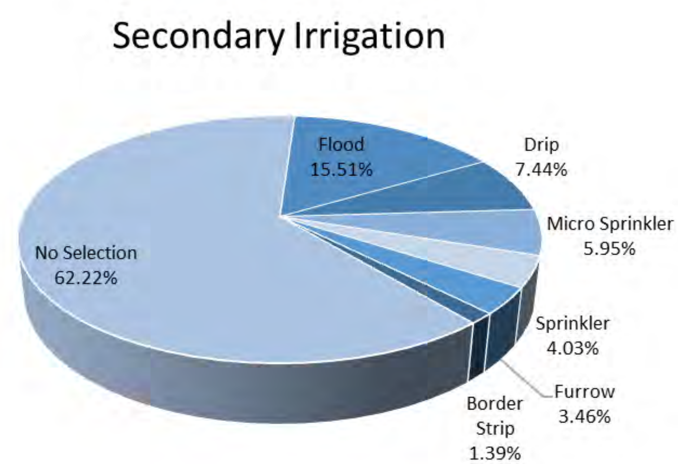


Figure 29. Type of primary and secondary irrigation practices reported by members, shown in percent acreage.





Sediment Management Practices

The majority of Coalition members use management practices to control the movement of sediment; members typically employ more than one method on a parcel (Table 71). Increasing water penetration into the soil through amendments such as deep ripping and aeration was the top reported cultural sediment management practice in both 2014 and 2015. Reducing tillage to a minimum and allowing native vegetation to stabilize soils were also commonly reported sediment management practices (Table 71 and Figure 30). Drip/microirrigation was also commonly used to reduce sediment discharge and erosion, being reported on 419,488 acres in the Coalition region. The second most reported practice was coordinated pesticide application and irrigation timing. This was a change from previous survey years, where the prominence of these two practices was reversed. Shortened irrigation runs were also frequently noted (Table 71 and Figure 31).

Table 71. Acreage associated with 2015 sediment management practice questions and responses.

Survey Section	Question	Response	Acreage	Response Count
A	Does your farm have the potential to discharge sediment to off-farm surface waters?			
		No	440,017	2,594
		Yes	122,484	251
		No Selection	14,623	65
D	Cultural Practices to Manage Sediment and Erosion			
		Soil water penetration has been increased through amendments.	430,094	1,401
		Minimum tillage incorporated to minimize erosion.	364,695	1,599
		Cover crops or native vegetation are used to reduce erosion.	339,706	1,292
		No storm drainage due to field or soil conditions.	239,492	1,773
		Crop rows are graded to optimize the use of rain and irrigation water.	236,344	874
		Storm water is captured using field borders.	194,592	912
		Berms capture runoff and trap sediment.	173,276	804
		Field is lower than surrounding terrain.	136,857	800
		Vegetated ditches to remove sediment, pesticides, and fertilizers.	108,036	245
		Vegetative filter strips and buffers are used to capture flows.	107,287	277
		Subsurface pipelines are used to channel runoff water.	99,660	201
		Hedgerows/trees help stabilize soils & trap sediment movement.	86,988	306
		Sediment basins / holding ponds settle out sediment & pesticides.	86,165	181
		Creek banks and stream banks have been stabilized.	81,814	194
		No Selection	7,542	122
D	Irrigation Practices for Managing Sediment and Erosion			
		Use drip or micro-irrigation to eliminate irrigation drainage.	419,488	1,402
		Time is increased between pesticide applications and irrigation.	369,219	1,560
		No irrigation drainage due to field or soil conditions.	272,089	1,892
		Shorter irrigation runs are used with checks to manage and capture flows.	176,786	791
		Tailwater Return System.	127,686	278
		Catchment Basin.	96,633	202
		Use of flow dissipaters to minimize erosion at discharge point.	58,025	130
		In-furrow dams used to increase infiltration and settle sediment.	55,070	194
		PAM used to bind sediment & increase infiltration.	8,554	27
		No Selection	5,476	93
		Other	238	1

Figure 30. Acreage reported for cultural practices to manage sediment and erosion.

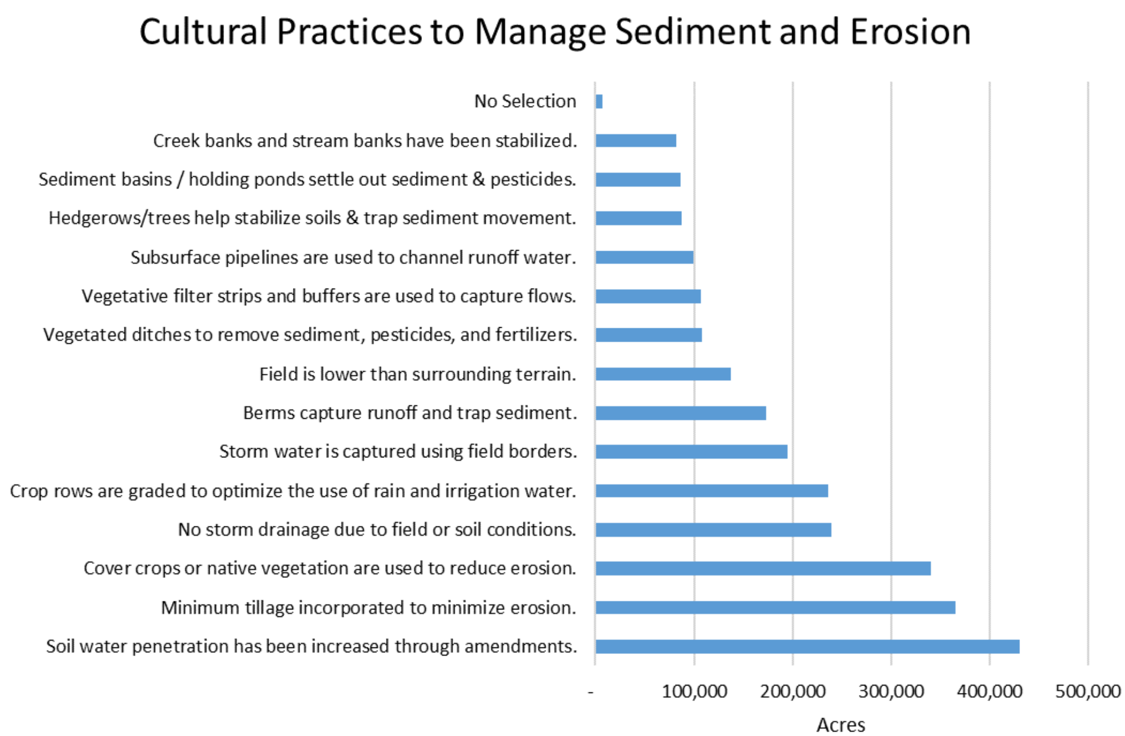
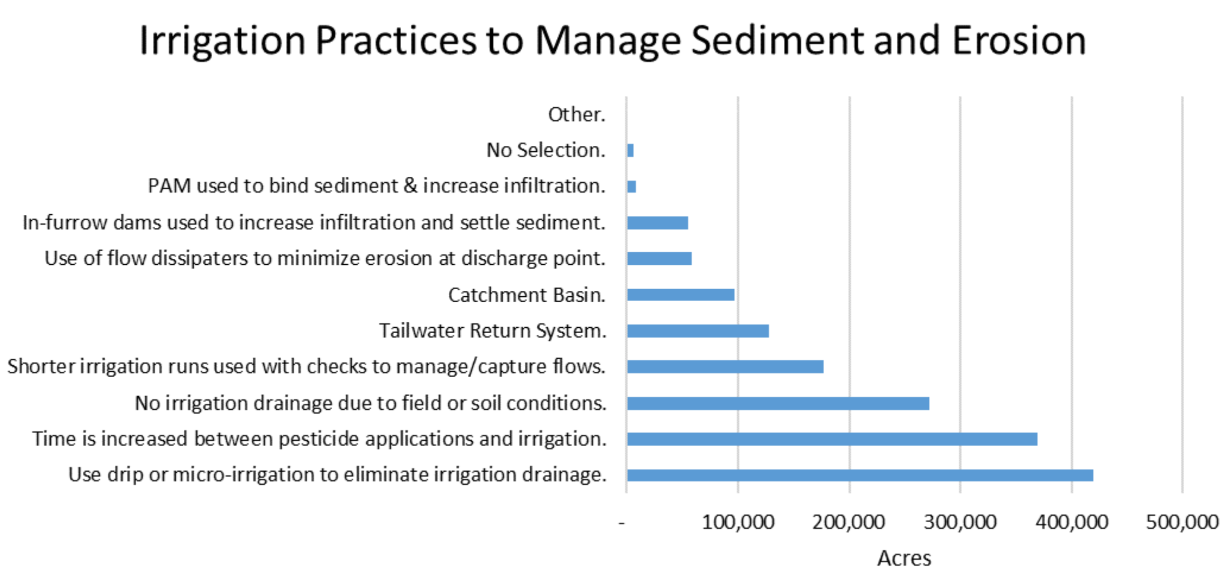


Figure 31. Acreage reported for irrigation practices to manage sediment and erosion.



Pesticide and Nutrient Management

ESJWQC members continue to employ several practices at one time to reduce the movement of pesticides and nutrients to surface waters (Table 72, Figure 32, and Figure 33). On average, members implemented eight different pesticide management practices. The three most reported pesticide management practices continue to be following county permit requirements, following label restrictions, and monitoring wind conditions (Table 72 and Figure 32).

As with previous surveys, a majority of the members employed PCAs and CCAs in 2015 to develop a crop fertility plan (Table 72). The two most reported nitrogen management practices continued to be testing soil and splitting up fertilizer applications throughout the growing season, which were mostly associated with Orchard crops. Tissue testing and applying nitrogen fertilizers through foliar treatments were also common (Figure 33). Pasture/Hay/Grain parcel acreage was 73% of the total reported acreage for "No Nitrogen Applied" and 63% of the total reported acreage for "No Pesticides Applied".

Table 72. Pesticide and nutrient management practices implemented by members shown in terms of associated parcel acreage and response count.

Survey Section	Question	Response	Acreage	Response Count
A	Pesticide Application Practices			
		County Permit Followed	558,223	2,542
		Follow Label Restrictions	556,647	2,555
		Monitor Wind Conditions	547,533	2,449
		Use PCA Recommendations	541,698	2,326
		End of Row Shutoff When Spraying	532,447	2,289
		Avoid Surface Water When Spraying	526,782	2,254
		Attend Trainings	517,917	2,080
		Monitor Rain Forecasts	517,641	2,229
		Use Appropriate Buffer Zones	479,670	1,944
		Use Drift Control Agents	434,103	1,538
		Sensitive Areas Mapped	330,534	1,222
		Reapply Rinsate to Treated Field	324,620	1,083
		Chemigation	257,209	609
		Use Vegetated Drain Ditches	139,293	341
		Target Sensing Sprayer used	118,010	429
		Other	42,579	248
		No Pesticides Applied	14,341	194
		No Selection	1,527	21
A	Who helps develop the crop fertility plan?			
		Pest Control Advisor (PCA)	521,617	2,262
		Certified Crop Advisor (CCA)	305,342	1,214
		Professional Agronomist	181,622	444
		Professional Soil Scientist	174,310	531
		UC Farm Advisor	134,245	400
		Independently Prepared by Member	85,088	376
		None of the above	21,381	299
		Certified Technical Service Providers by NRCS	18,271	109
		No Selection	1,637	21
B	Nitrogen Management Practices			
		Soil Testing	494,778	1,892
		Split Fertilizer Applications	464,116	1,912
		Tissue/Petiole Testing	447,362	1,536
		Foliar N Application	368,030	1,341
		Fertigation	335,936	900
		Irrigation Water N Testing	325,231	879
		Cover Crops	198,435	777
		Variable Rate Applications using GPS	59,370	120

Survey Section	Question	Response	Acreage	Response Count
		Other	39,482	240
		No Selection	16,685	227
		Do Not Apply Nitrogen	6,226	107

Figure 32. Pesticide management practices implemented by members shown in terms of reported parcel acreage.

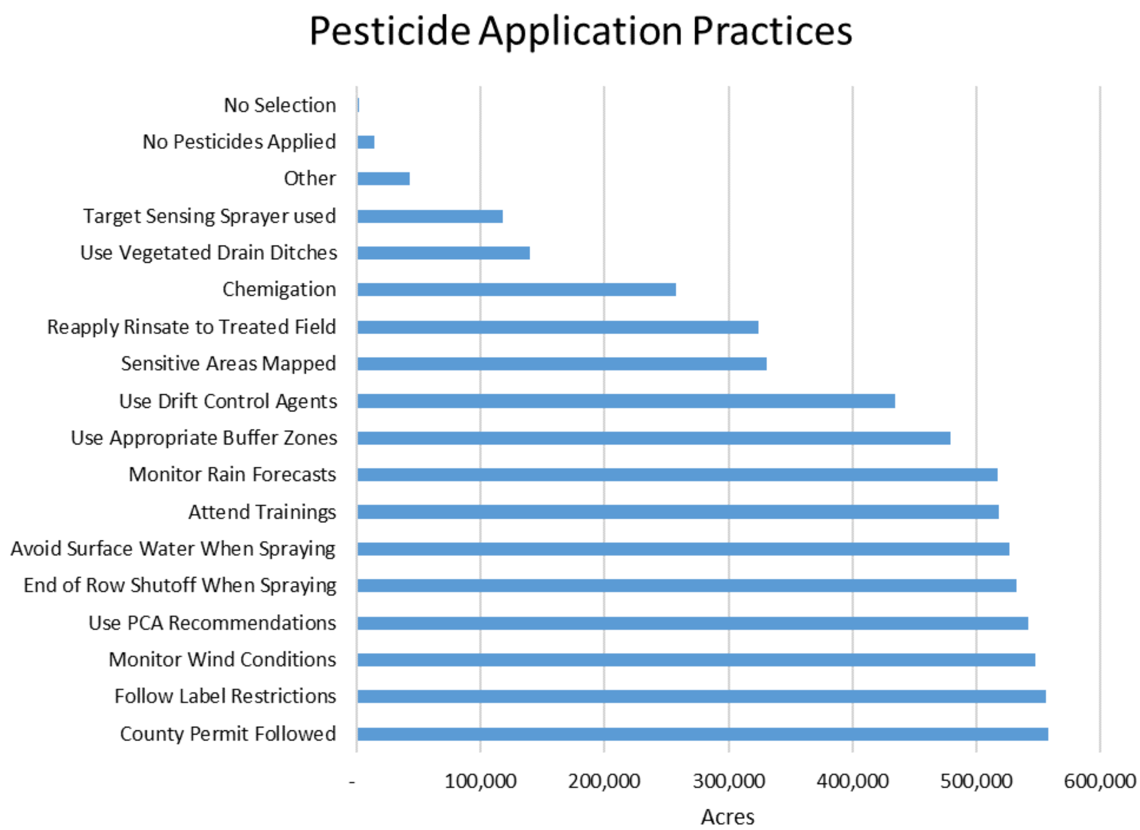
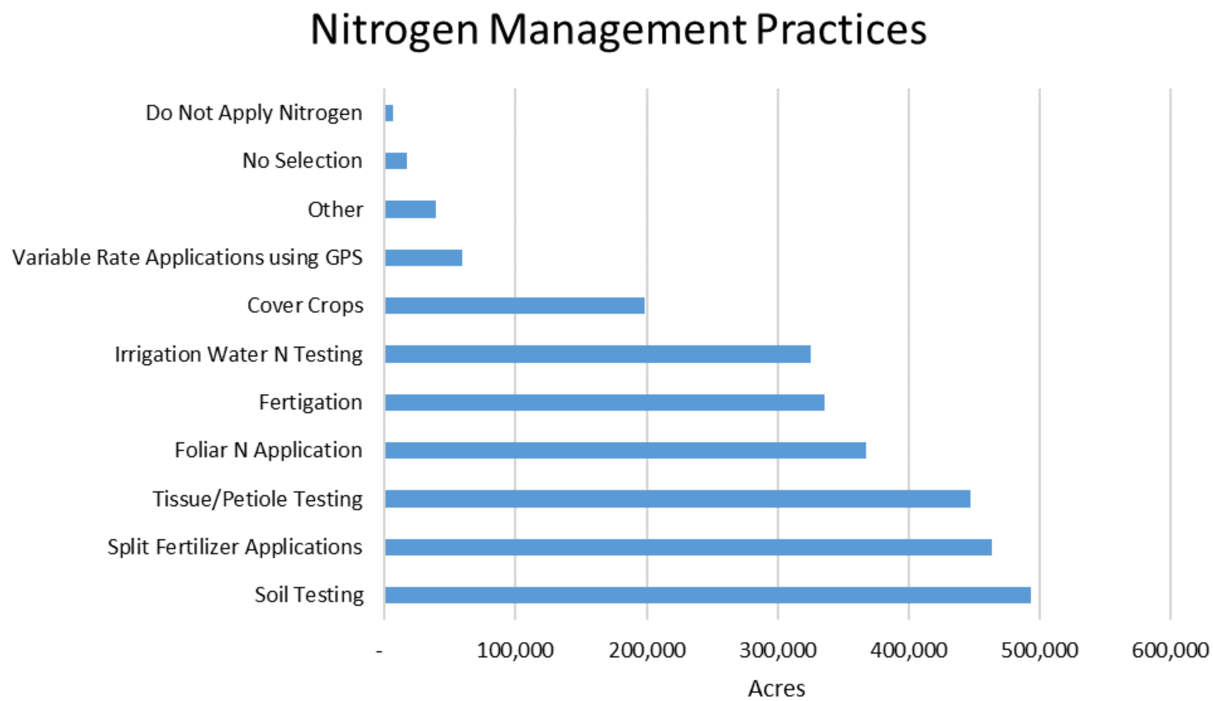


Figure 33. Nitrogen management practices implemented by members shown in terms of reported parcel acreage.



Well Management Practices

Irrigation Wells

The majority of enrolled parcels have at least one irrigation well; the total count of irrigation wells reported in 2015 is 5,123 (Table 73). Forty-eight members (<1% of the acreage reported on Farm Evaluation surveys) did not answer whether or not they had an irrigation well on their enrolled parcels (Table 73 and Figure 34). Wellhead protection practices implemented on active irrigation wells are meant to prevent pollution to the groundwater system through wellheads. Most wells were reported with three to four practices to prevent groundwater pollution. On 2015 surveys, similar to 2014 surveys, the most common practices used by members are following good housekeeping procedures, minimizing standing water surrounding the wellhead, and sloping ground away from the wellhead (Table 73 and Figure 35).

Table 73. Irrigation well info by membership acreage, member count, and well count. Acreage is not associated with Wellhead Protection Practices since these are well specific.

Survey Section	Question	Response	Acreage	Count
C	Do you have any irrigation wells on parcels associated with this Farm Evaluation?			Member
		Yes	519,178	1,769
		No	53,805	1,085
		No Selection	4,822	48
C	Wellhead Protection Practices			Well
		Good "Housekeeping" Practices	-	5,016

SURVEY SECTION	QUESTION	RESPONSE	ACREAGE	COUNT
		Standing water avoided around wellhead	-	4,790
		Ground Sloped Away from Wellhead	-	4,696
		Backflow Preventive / Check Valve	-	3,795
		Air Gap	-	2,365
		Cement Pad	-	120
			Unique Irrigation Wells	**5,123**

Figure 34. Percent acres associated with irrigation wells and count of wells with each management practice.

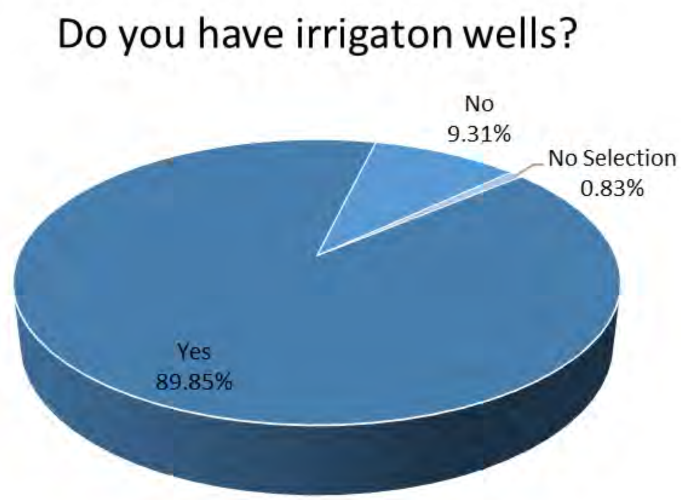
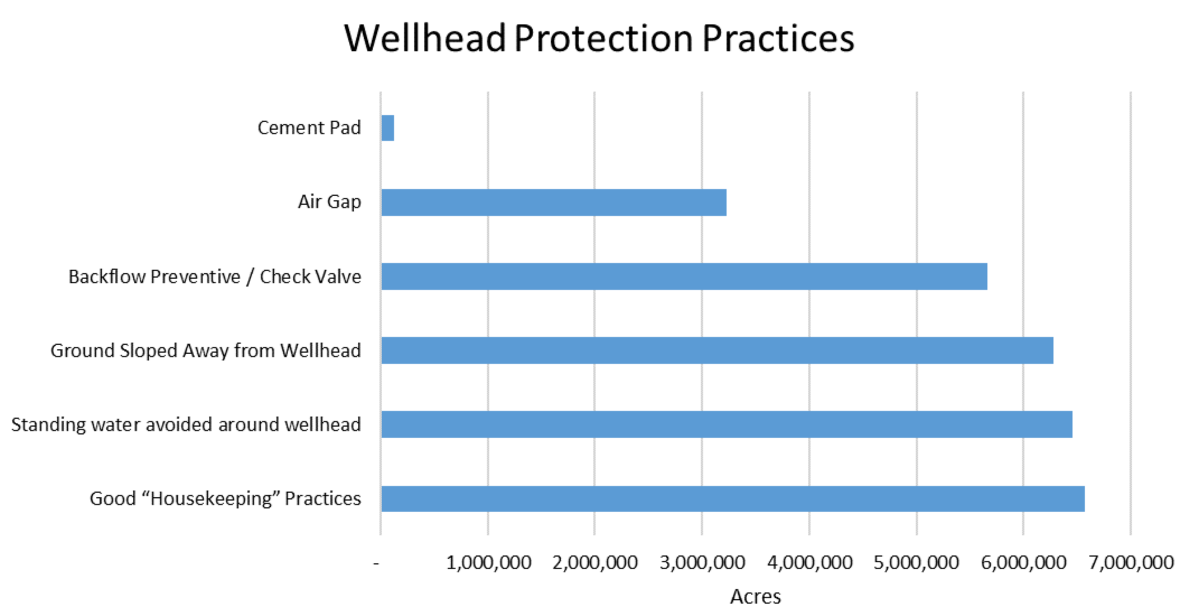


Figure 35. Count of wells reported with each wellhead protection practice.



Abandoned Wells

The Coalition region contains many abandoned wells; a large portion of these abandoned wells have been properly destroyed (Table 74, Figure 36, and Figure 37). The number of wells abandoned over the years has fluctuated. The greatest number of wells abandoned in a single year was 2015 when 25 wells were abandoned; however, 62 wells have an unknown year of abandonment (Table 75).

Table 74. Abandoned well practices to minimize the potential for ground water pollution by membership acreage, member count, and well count.

Survey Section	Question	Response	Acreage	Count
C	Are you aware of any known abandoned wells associated with this Farm Evaluation?			Member
		No	459,324	2,557
		Yes	81,367	227
		No Selection	37,342	116
C	Abandoned Well Practices			Wells
		Destroyed by licensed professional	-	116
		No Data Entered	-	246
		Destroyed - Unknown method	-	118
		Destroyed – certified by county	-	60

Table 75. Count of wells abandoned by year reported by members.

Survey Section	Question	Response	Count of Wells
C	Well Abandoned Year		
		1960	4
		1962	1
		1966	1
		1967	1
		1968	2
		1970	6
		1971	1
		1972	1
		1975	3
		1976	1
		1977	2
		1978	3
		1980	1
		1983	1
		1986	3
		1987	1
		1988	1
		1990	7
		1991	2
		1994	3
		1995	1
		1997	2
		1998	2
		2000	6
		2001	3

Survey Section	Question	Response	Count of Wells
		2002	4
		2003	2
		2004	4
		2005	4
		2006	5
		2007	3
		2008	6
		2009	5
		2010	8
		2011	5
		2012	13
		2013	15
		2014	11
		2015	25
		2016	3
		UNK	62
		Total	**234**

Figure 36. Percent acres associated with abandoned wells and count of abandoned wells associated with management practices.

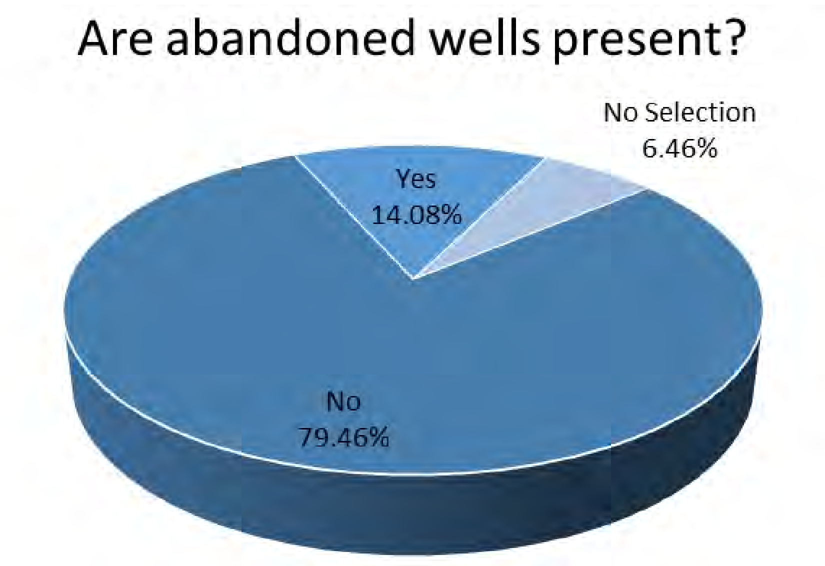
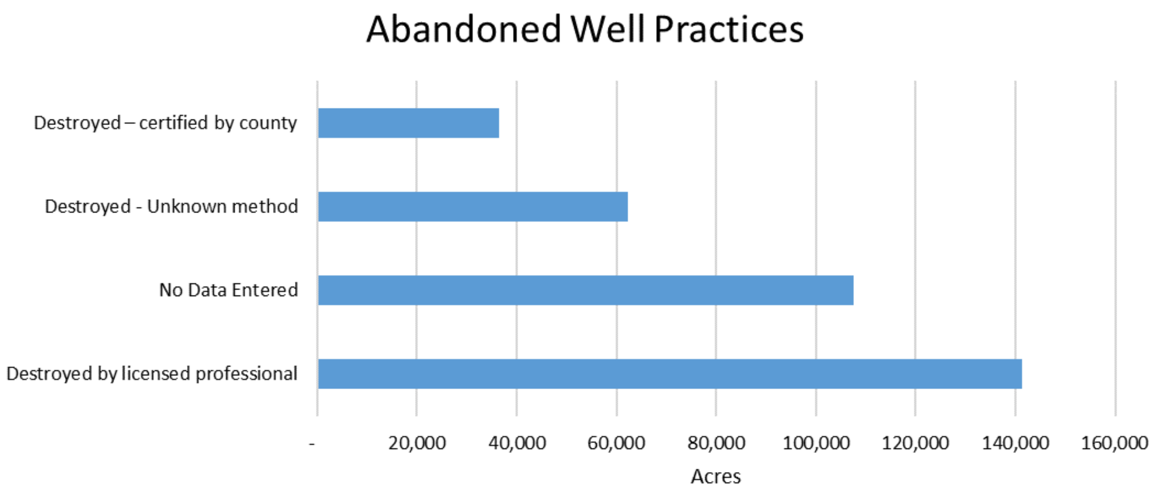


Figure 37. Count of wells associated with each abandoned well practice.



GROUNDWATER QUALITY ASSESSMENT AND PROGRAMS

For groundwater protection, the WDR requires: 1) a Groundwater Assessment Report, 2) a Groundwater Quality Management Plan, 3) a Groundwater Quality Trend Monitoring Program, and 4) a Management Practices Evaluation Program. Table 67 includes all deadlines associated with the Groundwater Quality Assessment Report and Evaluation/Monitoring Work Plans.

GROUNDWATER QUALITY ASSESSMENT REPORT

The ESJWQC GAR was conditionally approved on June 4, 2014, and final approval was received on December 24, 2014 (Table 67). The GAR contains details on the approach and methods applied to determine high and low vulnerability groundwater areas (HVAs and LVAs) in the ESJWQC region. The WDR stipulates criteria to be addressed in the GAR in order to provide information necessary for the design of the GQMP, GQTMP, and MPEP. Therefore, the GAR includes the following information and data analysis:

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 HVAs,
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, and a
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 and GAR addendum using existing hydrogeological characteristics, groundwater quality, models, and current studies. The HVAs were then prioritized and used in the development of the GQMP, GQTMP, and MPEP. Tentative HVAs were also identified and further examination of these areas is required to determine whether they should remain in the high groundwater vulnerability category.

GROUNDWATER QUALITY MANAGEMENT PLAN

All submittal/approval dates associated with the GQMP are included in Table 67. With the final approval of the GAR, the Coalition submitted its GQMP on February 23, 2015 (approval pending). The purpose of the GQMP is to develop a strategy for eliminating/reducing impairments of beneficial uses of groundwater due to agricultural practices. The ESJWQC strategy is informed by the GAR, GQTMP, MPEP, the Nitrogen Management Plan Technical Advisory Work Group (NMP TAWG) efforts, grower management practice and land use documentation, and groundwater monitoring. The Management Plan 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 Quality Assurance Project Plan (QAPP) for Trend Monitoring one year after the conditional approval of the GAR (June 4, 2015). All submittal/approval dates associated with the GQTM are included in Table 67. The GQTM Work Plan was submitted in two phases: Phase I was submitted on June 4, 2015 and resubmitted on January 29, 2016 along with Phase II (approval pending). The QAPP will be submitted 30 days after Phase I and Phase II of the GQTM Work Plan are approved. Phase III of the Work Plan will include specific information relating to each of the network wells. A status update on the progress of the Work Plan Phase III will be submitted to the Regional Board by May 1, 2016, with a proposed deadline for submittal in the summer of 2016.

As stated in the WDR, the objectives of the GQTM 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. The GQTM Work Plan outlines a monitoring program designed to meet the objectives stated above as well as objectives identified by the Coalition including: 1) understanding long-term temporal trends in regional groundwater quality, particularly as they relate to effects from irrigated agriculture on potential sources of drinking water for communities, 2) evaluating groundwater quality conditions in the Coalition area, particularly in the groundwater HVAs as identified in the GAR, and identifying differences in groundwater quality spatially, horizontally between areas and vertically in the aquifer system, and 3) distinguishing water quality changes associated with irrigated agriculture compared to other non-agricultural factors.

The design of the GQTM Work Plan includes the following considerations:

1. Groundwater vulnerability,
2. Prioritization of HVAs (as stated in the GAR),
3. Areas contributing to groundwater recharge for communities reliant on groundwater (including DACs and DUCs), and
4. Land use data for commodities within the GQTMP area.

The GQTM Work Plan emphasizes ongoing evaluation of the monitoring program and incorporation of modifications to the monitoring well network and program as necessary.

The Coalition used a multi-phase approach in developing a GQTM Work Plan. Phase I outlines the monitoring design and the anticipated schedule for completion of Phase II. Phase II provides the preliminary determination of specific wells to be included within the monitoring well network. Candidate wells for the network were prioritized based on criteria such as location, construction, historical water quality record, and monitoring status. Candidate wells were determined as highly ranked for inclusion in the GQTMP network by obtaining confidential well completion reports, verifying the well location, verifying the overall site suitability (e.g., depth to water, wellhead and proximity conditions, sample access), and coordination with the well owner or monitoring entity.

The GQTM Work Plan includes analysis and reporting of Trend Monitoring results on an annual basis. Annual GQTM includes analysis of nitrate as N and measurements of the following field parameters: DO, SC, pH, and temperature. Although not required by the WDR, additional potential water quality parameters including oxidation-reduction potential (ORP) and turbidity will be considered for analysis when possible and if these data are not available elsewhere. More detailed analysis and reporting of monitoring data will occur every five years and, in addition to those constituents monitored annually, will include the following constituents: TDS, major anions (carbonate, bicarbonate, chloride sulfate), and major cations (boron, calcium, sodium, magnesium, and potassium). Data obtained from GQTM activities will be used in conjunction with data from the GQMP and MPEP to understand the connections between irrigated agriculture and groundwater quality.

MANAGEMENT PRACTICES EVALUATION PROGRAM

The goal of the MPEP is to evaluate which management practices are protective of groundwater quality. All submittal/approval dates associated with the MPEP are included in Table 67. As part of its MPEP, the ESJWQC is required to develop an MPEP Work Plan within two years of the conditional approval of the GAR by the Regional Board (by June 4, 2016). The MPEP Work Plan will include the tools and methods to be used to determine which agricultural management practices protective of groundwater quality.

On January 14, 2014, the ESJWQC, along with the San Joaquin County and Delta Water Quality Coalition and Westside San Joaquin River Watershed Coalition, requested approval from the Regional Board to form an MPEP Group (referred hereafter as the MPEP Group Coordinating Committee or MPEP GCC), as outlined in the WDR. The request to form the MPEP GCC was revised on May 8, 2014 and September 25, 2014, and granted final approval on June 17, 2015. The 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 requested an expansion of the GCC to include the Sacramento Valley Water Quality Coalition and the Westlands Water Quality Coalition (approved on March 7, 2016). Currently, the MPEP GCC includes: the ESJWQC, Sacramento Valley Water Quality Coalition, San Joaquin County and Delta Water Quality Coalition, Westlands Water District Coalition, and the Westside San Joaquin River Watershed Coalition.

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

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, and
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 ESJWQC's GQMPs as practices to recommend to growers. Results from MPEP and GQTM studies, along with updates in the GAR, will be used to determine if implemented management practices are likely to result 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; Phase I focused on the development of the MPEP studies (study designs, locations, crops, and management practices to be evaluated), and Phase II and III 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

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 the knowledge gaps and held a series of meetings with the 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. 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. Comments on the Study Plan were received from the CVRWQCB on January 19, 2016. A meeting was held on February 4, 2016 between Regional Board staff, Coalition leads, and consultants to discuss the comments. The Coalition submitted a Response to Comments document on February 19, 2016 and March 29, 2016, the Regional Water Board conditionally approved the revised Study Plan. This approval was contingent upon the Coalition submitting by July 2016 the summarized crop-specific A/R information to the Regional Board and providing a timeline for when growers shall receive their specific A/R ratio.

Growers in high vulnerability groundwater areas are required to prepare and implement a Nitrogen Management Plan by March 1 of each year (NMP template approved December 23, 2015). Growers in high vulnerability areas with more than 60 acres were required to submit a NMP Summary Report to the Coalition by March 1, 2016 (NMP Summary Report template was approved December 23, 2015).

On the NMP Summary Report, growers report the total amount of nitrogen applied (pounds), and 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. The Coalition will convert A/Y to A/R where R is the amount of N-removed in harvested material. Once the data are aggregated, the Coalition will provide N-removed estimates to growers. This is the first year that the NMP Summary Report information is being collected and the Coalition is developing a format for reporting information back to growers. Information sent to growers could include box and whisker plots of the ratio of total applied nitrogen to nitrogen removed, 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 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 76). 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. In July 2016 the Coalitions will submit a Work Plan for expanding/revising the Y-to-R conversions.

Table 76. 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%**

Central Valley crop acreage is based off of USDA/NASS Quick Stats 2.0 (https://quickstats.nass.usda.gov/).
Nitrogen removed calculators are located on FREP's website (https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Guidelines.html).

In February 2016, the Coalition mailed NMP Summary Reports to 1,264 members for the 2015 crop year; these members have more than 60 acres enrolled and have one or more parcels in areas that are highly vulnerable to groundwater contamination. Members were asked to provide acreage, specific crop type, nitrogen applied per acre, the A/Y ratio and the production unit of yield. Survey responses were recorded in an Access database and linked to an APN and TRS.

The following actions were taken to assist growers with completing their NMP Summary Report forms:

- Workshops were held at local Farm Bureaus that allowed Coalition representatives to help members with questions and responses. Providing assistance with answering questions was important to ensure that the member was able to fill in the survey accurately.
- Members were contacted by phone for follow-up when there were unclear responses on nitrogen applications, yield, and/or acreage.

During the data entry process, reviewing responses indicated several areas of concern:

- Some APNs were not included on returned NMP Summary Reports or groups of APNs were unclear. Personnel cannot accurately assume that omitted parcels were fallowed or accidentally omitted on the forms. As many members as possible were contacted to resolve these issues.
- Many members did not accurately calculate the A/Y ratio. Based on follow-up responses this was due to misunderstanding about which year to report on, not reporting on a per acre basis, and reporting the wrong values for nitrogen applied. Additionally, many growers have to contact their

PCA, CCA, or other personnel that manage nitrogen applications, which can add another layer of misunderstanding.

As of April 22, 2016, NMP Summary Reports were returned by 596 members covering 182,453 acres (47% returned, Table 77). The Coalition updated the NMP Summary Report requirement status to “Not Required” for 29 members due to the following reasons: changes in irrigated acreage (no longer > 60 acres), they are no longer members, or crop type for all parcels is pasture or rice. The Coalition created an online NMP Summary Report form to facilitate compliance; 107 of 596 NMP Summary Reports were completed online. On returned Summary Reports, 97 management units representing 8,191 acres reported no yield and/or had a zero A/Y ratio due to no nitrogen applications. An additional 191 management units representing 10,008 acres reported a nonbearing crop.

The ESJWQC is in the process of developing the appropriate comparisons using information from the member’s Farm Evaluation surveys. These data are being linked to the NMP Summary Reports, but it is not clear, a priori, what constitutes similar soils (soils maps can be broken down to either a few soil types or a large number of soil types) or similar practices that will allow for a meaningful comparison of the amount of nitrogen applied, the A/Y ratio, nitrogen removed, and A/R ratio among growers. The ESJWQC is working to develop appropriate “categories of similar practices” that allow identification of growers whose nitrogen removed information can be legitimately compared. The ESJWQC is also developing appropriate comparisons for crops and crop categories for which only one or a few members report nitrogen applied and A/Y. For example, for fig trees in year 2 of growth, only one member reported applied nitrogen and A/Y for 16 acres. The ESJWQC is working to identify an appropriate comparison that will provide the grower with the nitrogen management planning tool that was envisioned when the program was developed.

Once the ESJWQC completes the identification of appropriate categories of similar crops, the remaining analyses can be performed in a relatively straightforward manner. The ESJWQC will be able to submit the remaining data; including A/R ratios for those crops with available N removed calculators, and an accompanying interpretation of the quality of the data by May 30, 2016.

Below is a brief evaluation of data submitted prior to April 23, 2016. Table 76 lists the nitrogen removed values for the 17 calculators on the FREP website. Table 77 lists the sum of acreage and count of members that were required to complete a NMP Summary Report for the 2015 WY. Figure 38 illustrates the percentage of reported acreage for the top ten primary crops listed by members on returned NMP Summary Reports. Over half of the acreage is occupied by almonds (52%), 16% percent by grapes, 9% percent by pistachios, walnuts and corn both accounted for 5% of the acreage. Table 78 lists the specific crop types reported to the Coalition and the count of responses, reported acreage, sum of nitrogen applied and the minimum, maximum, mean, and median of the applied versus yield ratios.

Table 77. Sum of acreage and count of members that were required to complete a NMP Summary Report for the 2015 WY.

Required 2016 NMP Summary Reports	Count of Members	Sum of Acreage
Received	596	182,453
Not Received[1]	668	179,905
Total	**1,264**	**378,074**
% Received of Total	**47%**	**48%**

[1]Includes 29 members who are now classified as "Not Required" based on information received after the NMP Summary Reports were mailed out to members.

Figure 38. Percentage of acreage for top 10 primary crops associated with returned NMP Summary Reports.

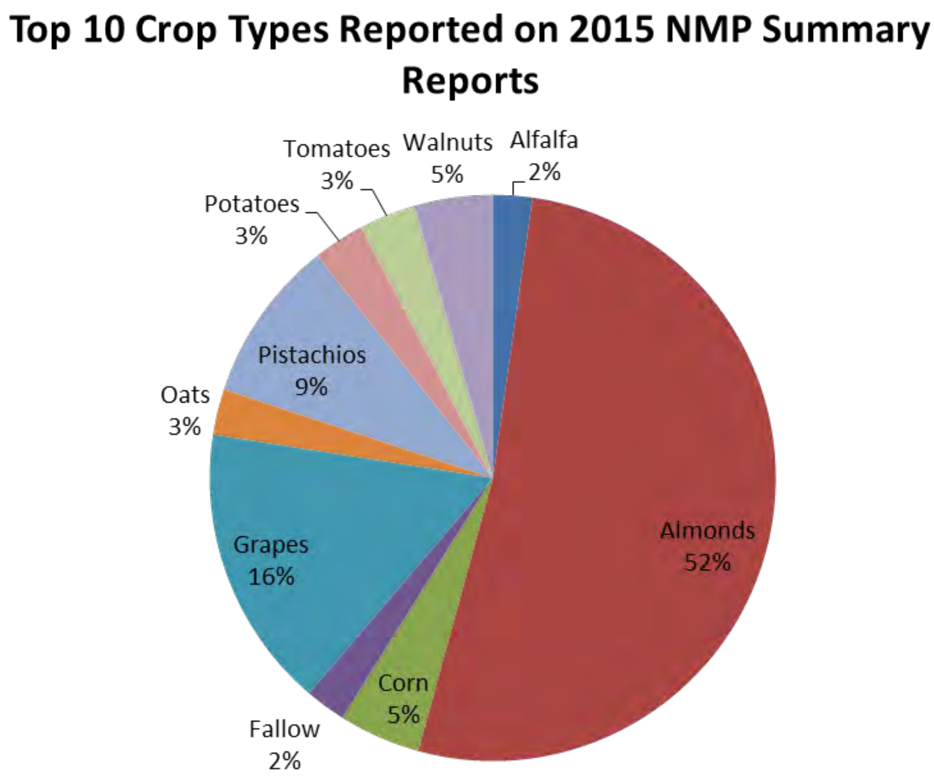


Table 78. Applied N over yield (pounds per acre) minimum, maximum, mean, and median for specific crop type. Count of responses reflects number of management units reported for each specific crop type. Acreage and N applied values are summed by specific crop type. Data reflect NMP Summary Reports submitted to the Coalition as of April 23, 2016. Acreages associated with responses of no yield, nonbearing, or no nitrogen applications are excluded from this table.

Specific Crop Type	Count of Responses	Reported Acreage	Sum of Nitrogen Applied	A/Y (Min)	A/Y (Max)	A/Y (Mean)	A/Y (Median)
ALMONDS /YEAR > 4	961	82583.06	633123.73	0.00003	2450.00000	20.81984	0.09500
ALMONDS /YEAR 1	16	496.65	2214.90	0.00004	0.50000	0.09041	0.06992
ALMONDS /YEAR 2	21	1437.61	2895.31	0.03400	5.20000	0.47172	0.10900
ALMONDS /YEAR 3	49	3669.42	6415.98	0.04000	0.82000	0.19315	0.13260
ALMONDS /YEAR 4	16	1406.25	3241.50	0.03400	0.25700	0.13121	0.12050
ALMONDS /YEAR NR	50	3640.40	9130.20	0.02460	14.66667	0.73658	0.11800
APRICOTS /YEAR > 4	1	20.00	70.00	0.00226	0.00226	0.00226	0.00226
APRICOTS /YEAR NR	1	10.00	108.15	0.01400	0.01400	0.01400	0.01400
BARLEY, IRRIGATED	3	381.60	388.98	0.02600	0.03600	0.03200	0.03400
BEANS, BLACK EYED	3	140.00	907.80	0.00003	0.22960	0.10254	0.07800
BEANS, DRY EDIBLE	1	19.00	142.00	0.07167	0.07167	0.07167	0.07167
CHERRY, SWEET /YEAR > 4	6	144.00	469.00	0.00417	0.06500	0.01708	0.00786
CHERRY, SWEET /YEAR NR	1	4.00	363.00	0.20200	0.20200	0.20200	0.20200
CITRUS, MANDARINS /YEAR > 4	7	1261.50	922.24	0.00250	0.02109	0.01010	0.00650
CITRUS, ORANGES /YEAR > 4	3	545.00	325.80	0.00475	0.00475	0.00475	0.00475
CITRUS, ORANGES /YEAR NR	2	180.00	222.50	0.18000	0.18000	0.18000	0.18000
CITRUS, TANGELO /YEAR NR	1	315.00	220.32	0.00950	0.00950	0.00950	0.00950
CORN, GRAIN	9	882.00	1556.00	0.00001	0.01335	0.00429	0.00390
CORN, SILAGE	63	5953.14	14538.49	0.00005	0.51176	0.01220	0.00388
COTTON	2	288.90	321.72	0.00006	0.03300	0.01653	0.01653
COTTON, UPLAND	2	275.00	280.00	0.07000	0.07000	0.07000	0.07000
FIGS /YEAR > 4	10	1370.00	899.01	0.01200	0.04200	0.02294	0.02150
FIGS /YEAR 2	1	16.00	133.48	0.16800	0.16800	0.16800	0.16800
FIGS /YEAR NR	4	83.00	500.00	0.00694	0.05208	0.03219	0.03486
GARLIC	2	294.00	500.00	0.01900	0.01900	0.01900	0.01900
GRAPES, RAISINS	41	4523.30	2247.56	0.00050	0.13800	0.01708	0.01215
GRAPES, TABLE /YEAR > 4	14	934.49	1077.67	0.00005	0.15200	0.01621	0.00306
GRAPES, TABLE /YEAR 3	7	768.00	459.00	0.00186	0.00375	0.00254	0.00227
GRAPES, TABLE /YEAR NR	6	890.00	2253.84	0.00004	0.32000	0.10920	0.02655
GRAPES, WINE /YEAR > 4	112	24574.07	7698.94	0.00027	7.83250	0.08772	0.00333
GRAPES, WINE /YEAR 1	3	927.35	99.75	0.00214	0.01391	0.00606	0.00802
GRAPES, WINE /YEAR 2	1	73.93	105.00	0.00175	0.00175	0.00175	0.00175
GRAPES, WINE /YEAR 3	1	126.00	45.00	0.00250	0.00250	0.00250	0.00250
GRAPES, WINE /YEAR 4	1	75.00	53.00	0.01760	0.01760	0.01760	0.01760
GRAPES, WINE /YEAR NR	18	1752.10	1381.52	0.00190	0.00585	0.00312	0.00307

Specific Crop Type	Count of Responses	Reported Acreage	Sum of Nitrogen Applied	A/Y (Min)	A/Y (Max)	A/Y (Mean)	A/Y (Median)
GRASS MIX/ FORAGE/PASTURE	3	568.09	108.00	0.00360	0.00360	0.00360	0.00360
HAY, ALFALFA	39	2492.20	17123.39	0.00001	0.02865	0.00672	0.00470
HAY, SMALL GRAIN	11	693.40	1107.48	0.00001	0.01660	0.00856	0.00600
HAY, TAME, (EXCL ALFALFA & SMALL GRAIN)	1	177.00	150.00	0.12600	0.12600	0.12600	0.12600
HAY, WILD	1	12.00	70.00	0.00700	0.00700	0.00700	0.00700
HAYLAGE, (EXCL ALFALFA)	4	290.50	312.90	0.00175	0.00641	0.00365	0.00469
HAYLAGE, ALFALFA	2	291.00	95.00	0.00150	0.00540	0.00345	0.00345
OATS	51	4297.52	7413.00	0.00001	0.01500	0.00414	0.00335
OLIVES /YEAR > 4	2	80.00	99.00	0.00308	0.00346	0.00327	0.00327
OLIVES /YEAR NR	1	34.00	9.90	0.00107	0.00107	0.00107	0.00107
ONIONS, SEED	1	10.00	222.00	0.81000	0.81000	0.81000	0.81000
PEACHES, FRESH MARKET /YEAR > 4	19	240.00	1906.00	0.00020	0.04000	0.00367	0.00160
PEACHES, FRESH MARKET /YEAR NR	1	38.00	90.00	0.00173	0.00173	0.00173	0.00173
PEACHES, PROCESSING /YEAR > 4	16	482.43	1906.00	0.00105	0.14474	0.01756	0.00287
PEACHES, PROCESSING /YEAR 2	1	21.00	81.00	0.01008	0.01008	0.01008	0.01008
PEACHES, PROCESSING /YEAR 3	1	31.00	135.00	0.00865	0.00865	0.00865	0.00865
PEACHES, PROCESSING /YEAR NR	3	56.00	285.00	0.00096	0.00580	0.00386	0.00483
PERSIMMONS /YEAR 4	1	5.00	100.00	0.00095	0.00095	0.00095	0.00095
PISTACHIOS /YEAR > 4	52	10785.97	94243.50	0.01500	1.35000	0.23130	0.08000
PISTACHIOS /YEAR 1	3	842.57	215.97	0.04299	75.00000	43.34766	55.00000
PISTACHIOS /YEAR 2	2	678.00	130.00	55.00000	75.00000	65.00000	65.00000
PISTACHIOS /YEAR NR	2	187.50	245.00	0.11000	0.38000	0.24500	0.24500
POMEGRANATES /YEAR > 4	2	234.40	40.00	0.00083	0.00364	0.00223	0.00223
PRUNES /YEAR > 4	1	281.00	150.00	0.00535	0.00535	0.00535	0.00535
SORGHUM, SILAGE	1	20.00	291.00	0.00728	0.00728	0.00728	0.00728
SUDAN, SILAGE	3	305.50	846.00	0.00588	0.00588	0.00588	0.00588
SWEET POTATOES	27	2404.75	4749.00	0.00250	0.01000	0.00513	0.00508
TOMATOES, FRESH MARKET	6	1332.70	1242.10	0.00468	0.05000	0.01227	0.00480
TOMATOES, PROCESSING	4	1323.23	1408.42	0.00202	0.00390	0.00296	0.00390
TRITICALE, IRRIGATED	2	184.80	206.50	0.01100	0.02000	0.01550	0.01550
WALNUTS, ENGLISH /YEAR > 4	110	6056.22	18087.72	0.00002	0.11000	0.04133	0.03901
WALNUTS, ENGLISH /YEAR 1	4	174.00	343.09	0.02540	0.25000	0.14124	0.14477
WALNUTS, ENGLISH /YEAR 2	5	223.00	346.00	0.02900	1.00670	0.42568	0.04300
WALNUTS, ENGLISH /YEAR 4	2	89.00	169.00	0.03500	0.06800	0.05150	0.05150
WALNUTS, ENGLISH /YEAR NR	13	616.52	2059.15	0.00002	0.12500	0.04566	0.03000
WHEAT, IRRIGATED	24	2850.10	3089.13	0.00002	0.04500	0.01196	0.00545

SEDIMENT DISCHARGE AND EROSION CONTROL PLAN

All Coalition members are required to implement effective sediment discharge and erosion prevention practices. The Coalition is required to provide a SDEAR to determine areas susceptible to erosion and discharge of sediment that could impact receiving water. All submittal/approval dates associated with the SDEAR are included in Table 67.

The Coalition submitted the SDEAR on May 15, 2015 (conditional approval July 24, 2015). The SDEAR identifies the areas within the Coalition region where growers will be required to complete SECPs. In addition, the Farm Evaluations include questions which address erosion potential and allow members to self-identify as potential dischargers of sediment to surface waters. The Coalition, on behalf of all coalitions, submitted a SECP 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).

Members identified as having high potential to discharge sediment are required to prepare a SECP in one of the following ways:

1. The SECP must adhere to the site-specific recommendation from the Natural Resources Conservation Service (NRCS), NRCS technical service provider, the University of California Cooperative Extension, the local Resource Conservation District; or conform to a local county ordinance applicable to erosion and sediment control on agricultural lands. The Member must retain written documentation of the recommendation provided and certify that they are implementing the recommendation, or
2. The plan must be prepared and self-certified by the member, who has completed a training program that the Executive Officer concurs provides necessary training for SECP 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 WDR.

In order for the Coalition to receive approval, the Coalition submitted a work plan with a timeline to address the proximity to surface waters factor on December 1, 2015 (conditional approval December 24, 2015). In response to the conditional approval, the Coalition submitted an assessment of parcels within proximity to major waterbodies on March 24, 2016. Additionally, with the conditional approval of the SDEAR, the Coalition contacted all members located in areas identified as having a high potential for erosion and requested that those members complete an SECP. The document must be maintained onsite at the member's farming operation, updated as conditions change, and be accessible by the Regional Board staff if requested during inspections. Growers located in areas with high potential for erosion are required to complete and implement an SECP by January 22, 2016 (farm operations greater than or equal to 60 irrigated acres) or July 23, 2016 (small farm operations less than 60 irrigated acres).

MITIGATION MONITORING REPORT

As stated on Page 9 of the WDR, environmental impacts may occur as a result of member's 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 ESJWQC 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 (Attachment A, Page 10). Each of the six questions is answered using an assessment of water quality data and management practice information. Improvements in water quality throughout the Coalition region has been determined using historical data and monitoring data from the 2015 WY collected from Core and Represented sites and during MPM events, as outlined in the 2015 WY MPU. 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, receiving waters to which discharge from irrigated lands must support 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). In 2008, the Regional Board developed a list of WQTLs based on numeric water quality objectives and standards from the Basin Plan including interpretation of the narrative water quality objectives (Table 33). The Coalition uses this list of WQTLs to determine exceedances and impairments of BUs. In the WDR, a table of WQTLs is included in Attachment B, Page 27. The WDR states that additional trigger limits may be developed by the Executive Officer utilizing water quality criteria to interpret narrative water quality objectives.

Beneficial uses are listed in the Basin Plan for waterbodies; however, not all of the waterbodies upstream of the Coalition's monitoring sites are listed. Therefore, BUs assigned to Coalition waterbodies are applied based on the BU assigned to the most immediate downstream waterbody listed in the Basin Plan (tributary rule). 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 be from agricultural irrigated lands. Until all sources that impair BUs of waterbodies are addressed, meeting all water quality objectives and Basin Plan provisions may be difficult to achieve.

Protection of Beneficial Uses

Receiving waters to which irrigated lands discharge, are considered protected if no exceedances of WQTLs occur during monitoring events. Multiple exceedances of WQTLs impairing BUs occurred during the 2015 WY (Table 79); therefore, not all receiving waters are meeting applicable WQOs and Basin Plan provisions. Figure 39 includes percentages of exceedances of constituent specific WQTLs that impaired BUs based on the 2015 WY monitoring results in the Coalition region. Not all constituents have a WQTL associated with a BU including pH, orthophosphate (soluble), TOC, TSS, carbofuran, demeton-s, dicofol, malathion, and methyl-parathion. These constituents are not included in the assessment of BU protection (Table 79 and Table 80) and are addressed separately.

The most common exceedances of the WQTLs were for field parameters (DO, SC), resulting in impaired Agricultural and Aquatic Life BUs. Other constituents with exceedances of their respective WQTLs that impaired Aquatic Life BUs were ammonia, chlorpyrifos, and dissolved copper. Impairment of the Municipal BU resulted from elevated concentrations of arsenic, ammonia, dimethoate, and nitrate. There were numerous exceedances of the WQTL for *E. coli* which resulted in an impaired Recreational BU (Table 79). *E. coli* is the only constituent monitored by the Coalition that can cause impairment to Recreational BU and therefore *E. coli* is not included in the figures or discussion below. Even though improvements are evident from the 2015 WY monitoring results, water quality is still not entirely protective of all BUs across the Coalition region.

Table 79. Exceedances of WQOs and number of times beneficial uses were impaired during the 2015 WY.

Beneficial Use	DO	SC	Ammonia[1]	*E. coli*	Nitrate	Dissolved Metals (copper)	Total Metals (arsenic)	Total Molybdenum	Pesticides[2] (Chlorpyrifos, Dimethoate)
AQ Life	69		4			4			8
AG		64						9	
MUN			4		9		1		1
REC 1				14					

[1]Ammonia concentrations over the WQTL of 1/5 mg/L impair the MUN BU; concentrations that impair the AQ Life BU are variable based on temperature and pH.

[2] Different WQTLs apply to different BUs; different pesticides affect different BUs; see Table 33.

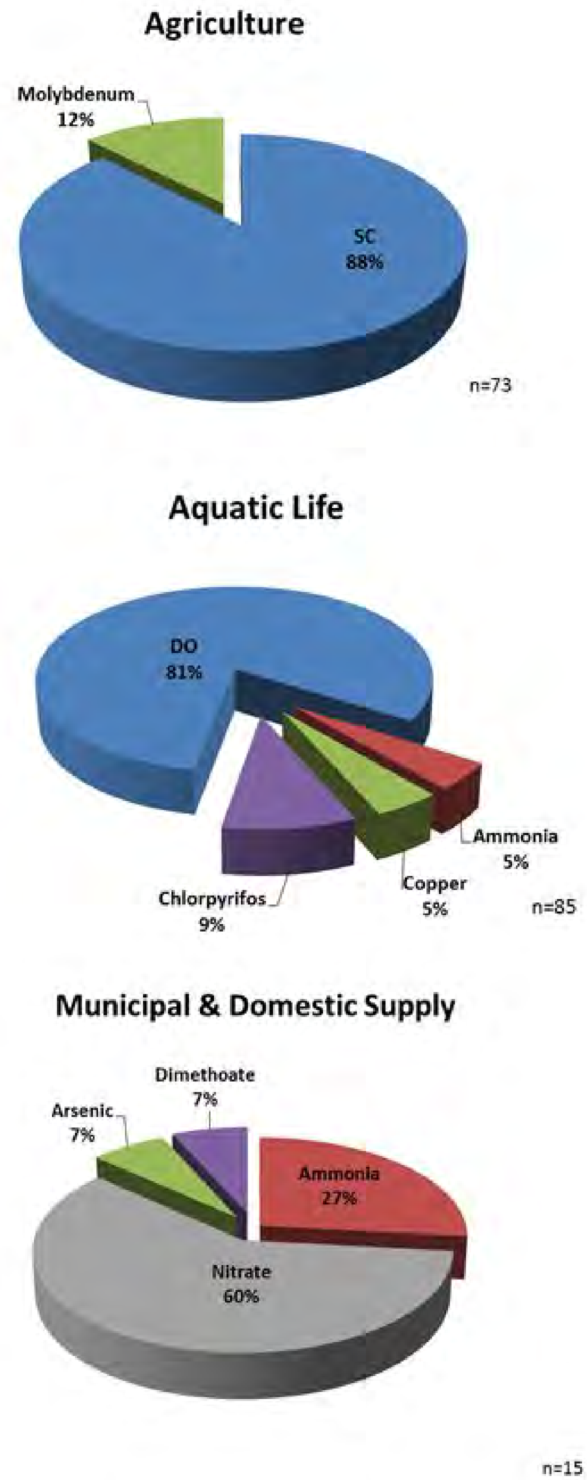
AQ Life-Aquatic Life (includes cold freshwater habitat spawning, warm freshwater habitat, and freshwater habitat).

AG-Agricultural

MUN-Municipal and Domestic Supply

REC 1-Water Contact Recreation

Figure 39. Percentages of impairments of BUs due to exceedances of WQTLs 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

During the 2015 WY, exceedances of the WQTLs for SC (88%) and molybdenum (12%) resulted in impairment of the Agricultural BU (Figure 39). Fifty-five of the 64 exceedances of the WQTL for SC occurred in Zone 2 (Appendix III, Table 2). Managing the concentration of salts is beyond the scope of what the Coalition can control through agricultural management practices and is the focus of the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) process.

Exceedances of the WQTL for total molybdenum only occurred in samples collected from Prairie Flower Drain @ Crows Landing Rd in Zone 2. There are no registered products containing molybdenum currently in use in the Coalition area. The western portion of the ESJWQC region is naturally elevated in molybdenum and it can be flushed into surface waters during periods of high rainfall. Drains such as Prairie Flower Drain (which were constructed to drain shallow groundwater and allow agriculture) can develop elevated concentrations of molybdenum when the groundwater is driven into the channel. The preliminary study submitted to the Regional Board on March 23, 2016 concluded that molybdenum is naturally occurring; it is found in water entering the Coalition's agricultural regions from the Sierra, and from shallow groundwater that is drained off by the major drains on the west side of the Coalition region.

Aquatic Life BU

Exceedances of the WQTLs for DO (81%), chlorpyrifos (9%), ammonia (5%), and dissolved copper (5%) resulted in impairments to the Aquatic Life BU (Figure 39).

Dissolved oxygen is a non-conserved constituent, meaning it can increase or decrease in concentration as water moves downstream. Processes affecting DO in waterways include stream flow, fluctuations in temperature, loss of vegetation around streams, geography (region, morphology of stream channels and land surface, and patterns of flow) as well as excessive nutrients resulting in algal growth and decomposition. During education and outreach, growers in the Coalition region are recommended management practices designed to prevent the offsite movement of constituents (including pesticides and sediment) into the waterway by reducing irrigation tailwater and storm runoff. As growers implement management practices to reduce discharge of constituents, the amount of water flowing into tributaries is also reduced. When growers decrease the amount of water entering tributaries, water flows and potentially DO concentrations are subsequently lowered. Of the exceedances of the WQTLs for DO, 15 were measured from non-contiguous waterbodies and 43 were measured from waterbodies with discharge recorded as less than 1 cfs.

Exceedances of the WQTL for chlorpyrifos occurred at three sites located in three different zones (Zone 2, Zone 3, and Zone 5) resulting in impaired Aquatic Life BU (Appendix III, Table 2). Management plans have been established for chlorpyrifos at all sites where exceedances occurred during the 2015 WY. The ESJWQC monitors for chlorpyrifos across the Coalition region, in addition to three locations in the San Joaquin River to assess compliance with the San Joaquin River Chlorpyrifos and Diazinon TMDL.

The WQO for ammonia is based the BU; there are two BUs for ammonia, the Aquatic Life BU and the Municipal and Domestic Supply BU. The WQO to protect the Aquatic Life BU is variable based on pH and temperature. Three samples collected from Prairie Flower Drain @ Crows Landing Rd and one sample collected from Duck Slough @ Gurr Rd contained concentrations of ammonia above the WQTL. Exceedances of the WQTL for ammonia can be associated with water column toxicity; two of the five samples with ammonia concentrations above the WQTL also coincided with water column toxicity to *S. capricornutum*. The same four samples also exceeded the WQTL for the Municipal and Domestic Supply BU.

Pesticides containing copper are applied by agriculture; however, applications of copper containing pesticides and exceedances of the hardness based WQTL for dissolved copper do not appear to be correlated. A total of four exceedances of the hardness based WQTL for dissolved copper occurred in samples collected from locations in Zones 3 and 4, impairing the Aquatic Life BU (Appendix III, Table 2). All four exceedances occurred in samples collected from sites already in management plans for copper.

Municipal and Domestic Supply BU

Exceedances of the WQTL for nitrate (60%), ammonia (27%), arsenic (7%), and dimethoate (7%) resulted in impairments to Municipal and Domestic Supply BUs (Figure 39).

During the 2015 WY, a total of nine exceedances of the WQTL for nitrate + nitrite occurred in samples collected from Prairie Flower Drain @ Crows Landing Rd in Zone 2 (Appendix III, Table 2). Prairie Flower Drain @ Crows Landing Rd is currently in a management plan as a result of past nitrate exceedances. 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 originating from dairies and fertilizer applications could be intercepted by field and surface drains resulting in exceedances of the WQTL for nitrate.

A single exceedance of the total arsenic WQTL occurred in samples collected from Duck Slough @ Gurr Rd. This was the second exceedance of the WQTL to occur at the site; therefore, a management plan for arsenic is required. The registrations of all agricultural products containing arsenic as an active ingredient have been cancelled. In addition, arsenic is a naturally occurring metal in the Coalition area. Therefore, the exceedances of the arsenic WQO are more likely the result of the mobilization of arsenic in the soils in the Coalition region.

A single exceedance of the WQTL for dimethoate occurred in samples collected from Unnamed Drain @ Hogin Ave. This was the first exceedance of the WQTL for dimethoate to occur at the site and therefore a management plan is not required. Exceedances of the dimethoate WQTL are minimal and have only ever occurred in samples collected from sites located in Zone 2.

The WQO for ammonia to protect the Municipal and Domestic Supply BU is 1.5 mg/L; four samples collected during the 2015 WY exceeded the 1.5 mg/L WQTL. The same four samples also exceeded the WQTL for the Aquatic Life BU.

Overall Frequency of Exceedances

Improved water quality from 2008 through the 2015 WY is evident. Monitoring results indicate declines in the frequency of exceedances of WQTLs of applied pesticides. The Coalition began focused outreach at first priority site subwatersheds in 2008. Management practices were recommended to targeted growers and the process continued through 2015 in the sixth priority site subwatersheds. Management practices implemented as a result of focused outreach are improving the water quality in the Coalition region. Table 80 lists the sites where the Coalition has conducted monitoring and lists by year the BU categories and if they are protected or not.

There are currently 31 site subwatersheds in management plans in the Coalition region. Seventeen of the 31 site subwatersheds have been approved for management plan completion for at least one constituent (Table 58). Improvements in water quality resulting in protected BUs can be correlated to site subwatersheds where focused outreach and education occurred, including Dry Creek @ Wellsford Rd, Hilmar Drain @ Central Ave, Lateral 2 ½ near Keyes Rd, Highline Canal @ Hwy 99, Highline Canal @ Lombardy Rd, Mustang Creek @ East Ave, Merced River @ Santa Fe, Deadman Creek @ Gurr Rd, Deadman Creek @ Hwy 59, Miles Creek @ Reilly Rd, Ash Slough @ Ave 21, Berenda Slough along Ave 18 ½, and Cottonwood Creek @ Rd 20 (blue Highlights, Table 80).

Waste discharged from irrigated lands is one of many possible sources of impairments to BUs. In many instances, other sources or natural conditions could potentially be the cause of impairment in waterways monitored by the Coalition. The difference in geology and geography between Coalition zones influences constituents such as SC and dissolved copper. As result, sites in Zones 3, 4, and 6 commonly do not meet Aquatic Life BU. Geological and geographical factors influencing salts and copper in the waterways are outside the scope of what the Coalition is capable of improving through modified agricultural practices.

Exceedances of WQTLs of Constituents Not Associated with Beneficial Use

During the 2015 WY, there were exceedances of the WQOs for two constituents that are not associated with a BU, pH (19) and malathion (1).

pH

There were 19 exceedances of the WQTL for pH during the 2015 WY; 18 were exceedances of the upper WQTL (8.5) and one of the lower WQTL (6.5; Appendix III, Table 2). The exceedances of the WQTLs for pH occurred in every zone in the Coalition region with the exceptions of Zone 1 and Zone 4. The majority (10) of exceedances occurred in Zone 2. Exceedances of the WQTLs for pH occurred in nine site subwatersheds; eight are currently in a management plan for pH.

Malathion

Samples collected from Duck Slough @ Gurr Rd in March resulted in an exceedance of the WQTL for malathion (2.0 µg/L). There is a prohibition of discharge of this constituent and the Coalition continues to address malathion and all pesticides during education and outreach and recommends management practices designed to reduce discharge of agricultural constituents. Duck Slough @ Gurr Rd is currently in a management plan for malathion and the Coalition will discuss all constituents with growers in this site subwatershed during 2016 Focused Outreach.

Table 80. Evaluation of beneficial uses applied to 2008-2015 WY monitoring locations (alphabetical by Zone).
'X' indicates no sampling occurred during the years specified. Blue highlights indicate a protected BU in the 2015 WY when the same BU and monitoring site was impaired in one or more previous years.

Zone	Monitoring Site (Focused Outreach Timeline)	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 WY Meets BUs?	Status 2015 WY Meets BUs?
1	Dry Creek @ Wellsford Rd (2008-2013, 2016-2018)	Tuolumne River (New Don Pedro Dam to SJ River)	MUN	No	No	Yes	Yes	Yes	No	Yes	Yes
			AG	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
			REC 1	No	No	No	No	Yes	No	No	No
			AQ Life	No	No	No	No	No	No	No	No
	Mootz Drain downstream of Langworth Pond[1] (2015-2017)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	X	Yes	No	X	X	Yes	X	Yes
			AG	X	Yes	Yes	X	X	Yes	Yes	Yes
			REC 1	X	No	No	X	X	No	X	X
			AQ Life	X	No	No	X	X	No	No	No
2	Hatch Drain @ Tuolumne Rd (2013-2015)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	X	X	X	X	X	Yes	X	Yes
			AG	X	X	X	X	X	No	No	No
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	No	No	No
	Hilmar Drain @ Central Ave (2012-2014)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	No	Yes	X	X	Yes	Yes	Yes	Yes
			AG	No	No	X	X	No	No	No	No
			REC 1	No	Yes	X	X	X	X	X	X
			AQ Life	No	Yes	X	X	Yes	Yes	No	No
	Lateral 2 ½ near Keyes Rd (2011-2013)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	No	No	Yes	Yes	X	Yes	X	Yes
			AG	Yes	No	Yes	Yes	X	No	No	Yes
			REC 1	No	No	Yes	Yes	X	X	X	X
			AQ Life	No	No	No	Yes	X	Yes	No	Yes
	Lateral 5 ½ @ South Blaker Rd (2017-2019)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	X	X	X	X	X	X	X	Yes
			AG	X	X	X	X	X	X	No	No
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	Yes	No
	Lateral 6 and 7 @ Central Ave (2017-2019)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	X	X	X	X	X	X	X	Yes
			AG	X	X	X	X	X	X	No	No
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	No	No
	Levee Drain @ Carpenter Rd (2016-2018)	San Joaquin River (Merced River to Tuolumne River) / Merced River (McSwain Reservoir to SJR)	MUN	X	X	X	X	No	No	X	Yes
			AG	X	X	X	X	No	No	No	No
			REC 1	X	X	X	X	No	No	X	X
			AQ Life	X	X	X	X	No	No	No	No

Zone	Monitoring Site (Focused Outreach Timeline)	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 WY Meets BUs?	Status 2015 WY Meets BUs?
	Lower Stevinson @ Faith Home Rd (2017-2019)	San Joaquin River (Merced River to Tuolumne River) / Merced River (McSwain Reservoir to SJR)	MUN	X	X	X	X	X	X	X	Yes
			AG	X	X	X	X	X	X	No	No
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	No	No
	Prairie Flower Drain @ Crows Landing Rd (2008-2010, 2016-2018)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	No	No	No	No	No	No	No	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
	Unnamed Drain @ Hogin Rd (2017-2019)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	X	X	X	X	X	X	X	No
			AG	X	X	X	X	X	X	No	No
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	No	No
	Westport Drain @ Vivian Rd (2014-2016)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	No	X	X	X	X	X	X	X
			AG	No	X	X	X	X	X	No	No
			REC 1	No	X	X	X	X	X	X	X
			AQ Life	No	X	X	X	X	X	No	No
3	Highline Canal @ Hwy 99 (2010-2012, 2016-2018)	San Joaquin River (mouth of Merced River to Vernalis) / Merced River (McSwain Reservoir to SJR)	MUN	No	No	Yes	No	Yes	Yes	Yes	Yes
			AG	No	No	Yes	Yes	Yes	Yes	Yes	No
			REC 1	No	No	No	No	Yes	No	No	Yes
			AQ Life	No	No	Yes	Yes	No	No	No	No
	Highline Canal @ Lombardy Rd (2013-2015)	San Joaquin River (mouth of Merced River to Vernalis) / Merced River (McSwain Reservoir to SJR)	MUN	No	Yes	No	Yes	Yes	Yes	X	Yes
			AG	No	Yes	Yes	Yes	Yes	Yes	Yes	No
			REC 1	No	X	Yes	No	Yes	X	X	X
			AQ Life	No	Yes	No	No	No	No	No	No
	Mustang Creek @ East Ave (2014-2016)	San Joaquin River (mouth of Merced River to Vernalis) / Merced River (McSwain Reservoir to SJR)	MUN	No	No	Yes	X	X	Yes	X	No
			AG	No	No	No	X	X	Yes	Yes	Yes
			REC 1	No	No	No	X	X	Yes	X	X
			AQ Life	No	No	No	X	X	No	No	No
4	Bear Creek @ Kibby Rd (2010-2012)	San Joaquin River (Bear Creek to SJ River)	MUN	No	X	Yes	Yes	Yes	X	X	X
			AG	Yes	X	Yes	Yes	Yes	Yes	Yes	X
			REC 1	No	X	X	X	X	X	X	X
			AQ Life	No	X	Yes	Yes	Yes	Yes	Yes	X

Zone	Monitoring Site (Focused Outreach Timeline)	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 WY Meets BUs?	Status 2015 WY Meets BUs?
	Black Rascal Creek @ Yosemite Rd (2012-2014)	Merced River (McSwain Reservoir to SJ River)	MUN	No	X	X	X	X	Yes	X	Yes
			AG	Yes	X	X	X	X	Yes	Yes	Yes
			REC 1	No	X	X	X	X	X	X	X
			AQ Life	No	X	X	X	X	No	No	No
	Canal Creek @ West Bellevue Rd	Merced River (McSwain Reservoir to SJ River)	MUN	X	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	Yes	Yes
			REC 1	X	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	No	No
	Howard Lateral @ Hwy 140 (2015-2017)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	X	No	Yes	Yes	X	Yes	X	X
			AG	X	No	Yes	Yes	X	Yes	Yes	No
			REC 1	X	No	No	X	X	X	X	X
			AQ Life	X	No	No	No	X	No	Yes	No
	Livingston Drain @ Robin Ave (2011-2013)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	X	X	Yes	Yes	Yes	X	No
			AG	Yes	X	X	Yes	Yes	Yes	Yes	Yes
			REC 1	No	X	X	X	X	X	X	X
			AQ Life	No	X	X	No	No	Yes	Yes	No
	McCoy Lateral @ Hwy 140 (2016-2018)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	X	X	X	Yes	Yes	Yes	X	X
			AG	X	X	X	Yes	Yes	Yes	X	X
			REC 1	X	X	X	Yes	No	X	X	X
			AQ Life	X	X	X	No	No	No	X	X
	Merced River @ Santa Fe Rd (2013-2015)	Merced River (McSwain Reservoir to SJ River)	MUN	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
			AG	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
			REC 1	Yes	Yes	No	No	Yes	No	No	Yes
			AQ Life	No	No	Yes	Yes	Yes	No	Yes	No
	Unnamed Drain @ Hwy 140 (2016-2018)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	X	X	X	X	X	Yes	X	X
			AG	X	X	X	X	X	Yes	No	Yes
			REC 1	X	X	X	X	X	No	X	X
			AQ Life	X	X	X	X	X	No	No	Yes
5	Deadman Creek @ Gurr Rd (2012-2014)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	No	No	X	Yes	Yes	X	X
			AG	Yes	No	No	X	Yes	Yes	No	Yes
			REC 1	No	No	No	X	X	X	X	X
			AQ Life	No	No	No	X	Yes	No	No	Yes
	Deadman Creek @ Hwy 59 (2012-2014)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	X	X	Yes	No	Yes	X	X
			AG	Yes	X	X	Yes	Yes	Yes	Yes	Yes
			REC 1	No	X	X	No	No	X	X	X
			AQ Life	No	X	X	No	No	Yes	Yes	Yes
	Duck Slough @ Gurr Rd (2010-2012)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	Yes	No	Yes	Yes	Yes	No	Yes	No
			AG	Yes	No	Yes	Yes	Yes	No	No	No
			REC 1	Yes	No	No	No	No	No	No	No

Zone	Monitoring Site (Focused Outreach Timeline)	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 WY Meets BUs?	Status 2015 WY Meets BUs?
			AQ Life	No*	No	No*	No	Yes	No	No	No
	Miles Creek @ Reilly Rd (2013-2015)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	X	X	X	X	X	Yes	X	Yes+
			AG	X	X	X	X	X	No	Yes	Yes+
			REC 1	X	X	X	X	X	No	X	X
			AQ Life	X	X	X	X	X	No	No	Yes+
6	Ash Slough @ Ave 21 (2015-2017)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	Yes	Yes	Yes	X	X	X	X	Yes+
			AG	Yes	Yes	Yes	X	X	X	Yes	Yes+
			REC 1	Yes	Yes	Yes	X	X	X	X	X
			AQ Life	Yes	No	No	X	X	X	Yes	Yes+
	Berenda Slough along Ave 18 ½ (2011-2013)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	X	X	X	Yes	Yes	Yes	X	Yes+
			AG	X	X	X	Yes	Yes	Yes	Yes	Yes+
			REC 1	X	X	X	No	Yes	X	X	Yes+
			AQ Life	No	X	X	No	No	No	Yes	Yes+
	Cottonwood Creek @ Rd 20 (2010-2012)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	Yes	Yes	Yes	Yes	Yes+	Yes	Yes+	Yes
			AG	Yes	Yes	Yes	Yes	Yes+	Yes	Yes+	Yes
			REC 1	Yes	No	No	No	Yes+	No	Yes+	X
			AQ Life	No	Yes	No	No	Yes+	No	Yes+	Yes
	Dry Creek @ Rd 18 (2011-2013)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	X	X	Yes	Yes	Yes	No	Yes
			AG	Yes	X	X	Yes	Yes	Yes	Yes	Yes
			REC 1	No	X	X	X	X	No	X	No
			AQ Life	No	X	X	No	Yes	No	No	No

AG- Agriculture
AQ Life-Aquatic Life (cold freshwater habitat spawning, warm freshwater habitat, and freshwater habitat).
MUN- Municipal and Domestic Supply
REC 1- Water Contact Recreation
*Does not meet BUs requirements due to sediment toxicity to *H. azteca* in one or more occurrences.
Yes+-Site was dry during all monitoring events.
[1]-The evaluation of BUs for Mootz Drain considers results from both the upstream (@ Langworth Pond) and downstream (downstream of Langworth Pond) locations.

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?

Field Parameters:

The most common exceedances of the WQTLs during the 2015 WY were field parameters DO, pH, and SC (69, 19, and 64 exceedances of the WQTLs, respectively). The Coalition submitted a preliminary analysis of possible sources most likely to influence DO and pH in the ESJWQC region (submitted February 2, 2016). The analysis indicates both DO and pH are controlled by numerous interacting factors, some controllable through management practices implemented by growers, but the majority are uncontrollable. The primary controllable factor is phosphate. Although phosphate can originate from sediment delivered to surface waters from agricultural fields and, it is also naturally occurring, originating from the streambed itself. Because of management plans for pesticides and toxicity, the Coalition provides outreach to members aimed at controlling the movement of soil to surface water. However, doing so also reduces the amount of water reaching surface water which can decrease the stream flow and therefore reduce DO and increase exceedances.

During the 2015 WY, locations in the western portion of the Coalition region (Zone 2) had the highest occurrence of exceedances of the WQTL for SC (66% of samples measured in Zone 2; Appendix III, Table III-2). The construction of drains such as Prairie Flower Drain and Levee Drain occurred in the late 1800s to lower the shallow groundwater table to a level where crops can be grown. Groundwater in the region is very salty and the water in Prairie Flower Drain, for a large portion of the year, is not discharged by agriculture. Because of the elevated salt content, the water used for irrigation is not recirculated and must be discharged leading to the potential for exceedances of the WQTL for SC.

Nitrate and Ammonia:

During the 2015 WY, exceedances of the WQTL for nitrate accounted for 13% of all samples collected and analyzed for nitrate, and exceedances of the WQTL for ammonia accounted for 6% of all samples collected and analyzed for ammonia (Appendix III-Table III-2). Exceedances of nutrient (e.g. ammonia and nitrate) WQTLs are a major cause of impairment of the MUN BU. The preliminary analysis of possible sources that influence nutrients in the ESJWQC region (submitted April 4, 2016) concluded that it is highly unlikely that exceedances of the WQTL for ammonia are the result of fertilizer applications, and are most likely the result of discharges from dairies or feedlots. Elevated concentrations of nitrate only occurred in the Prairie Flower Drain site subwatershed where surface drains intercept shallow groundwater with high concentrations of nitrate derived from decades of discharge from dairy operations. The Coalition does not typically contact non-members, however due to the increase in water quality impairments from the 2015 WY, outreach was extended to dairy farmers in the Prairie Flower Drain @ Crows Landing Rd site subwatershed in October 2015.

Pesticides:

During the 2015 WY, there were eight exceedances of the WQTL for chlorpyrifos (7% of all samples collected and analyzed for chlorpyrifos), and one exceedance each of the WQTLs for dimethoate and malathion in the Coalition region (1% of all samples collected for each constituent; Appendix III, Table III-3). The Coalition identifies potential sources of toxicity through PUR data analysis, assessment of water quality data, and evaluation of current management practices. The Coalition's strategy for identifying sources of pesticides that can cause toxicity is further described in the ESJWQC Management Plan. Agricultural pesticide applications may result in pesticides entering surface waters as a result of spray drift or runoff in either stormwater or irrigation return flows. Management of spray drift, irrigation practices, and sediment runoff by Coalition members has resulted in overall improved water quality. However, the Coalition does not conduct outreach with growers that are not members and it is was determined that non-member practices contributed to the pesticide exceedances that occurred during the 2015 WY.

Metals:

During the 2015 WY, exceedances of the hardness-based WQTL for dissolved copper occurred four times across four subwatersheds (5% of all samples collected; Appendix III, Table III-2). Copper is applied by agriculture in a variety of forms, mostly as a fungicide. All five exceedances were associated with copper applications to almond, olive, cherry, grape, walnut, and peach orchards; four exceedances occurred in samples collected during storm monitoring and two occurred in non-contiguous samples. All site subwatersheds where exceedances occurred are currently in management plans for copper and additional practices have been implemented by targeted members in those subwatersheds to reduce the offsite movement of copper into downstream waterbodies. It is possible that copper in samples collected from these sites is the result of other sources. The preliminary analysis submitted to the Regional Board evaluated conditions most likely to result in exceedances of the WQTL for copper (submitted March 23, 2016). The study concluded that hardness is a main determinant of exceedances, copper concentration is secondary. Therefore, copper concentration and hardness are related, meaning when water originates in high mineral/high hardness regions and if copper concentration is sufficiently elevated, exceedances occur. Growers are unable to manage hardness, and therefore are unlikely to be able to prevent exceedances of the WQTL for copper in the Coalition region.

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

Monitoring from the 2015 WY resulted in exceedances of applied pesticides and metals for chlorpyrifos (8), copper (4), dimethoate (1), and malathion (1). This is still a significant decline in exceedances of applied pesticide WQTLs compared to results from 2008, especially because 6 of the 8 chlorpyrifos exceedances occurred at a single site in consecutive months.

Figure 40 includes 2008 through 2015 WY data in the form of 1) 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 were not included in the calculations. From 2008 through the 2015 WY, the majority of exceedances of WQTLs occurred for: 1) nutrients, physical parameters, and *E. coli* (32%), and 2) field parameters (44%); the percentages of exceedances of metals (10%), toxicity (9%), and pesticides (5%) were relatively small in comparison (Figure 40).

Applied Metals: 2008 – 2015 WY

Figure 40 includes the percent of applied metals exceedances from 2008 through the 2015 WY; metals applied by agriculture are copper and zinc. However, the graph only includes exceedances of the WQTL for copper because copper was the only applied metal to be detected above the hardness based WQTL from January 1, 2008 through September 30, 2015. The decline in exceedances of the metal's WQTLs from 2008 through 2009 can be attributed to the Coalition analyzing for both the total and dissolved fractions of metals to better characterize contamination in the water column. No exceedances of the WQTL for total copper occurred after September 2008. In 2009, the Coalition initiated focused outreach and education to members, documenting management practice implementation, and recommending management practices. Since 2009, exceedances of the hardness based WQTL for copper have occurred yearly, but have decreased in frequency. During the 2015 WY monitoring, there were four exceedances of the hardness based WQTL for dissolved copper across the Coalition region (4.8% of the samples analyzed for copper; Table 81). Compared to the 2014 WY, the percent of exceedances of the WQTL increased in the 2015 WY; however, the number of exceedances decreased. Fewer samples were required to be collected for copper analysis (155 in the 2014 WY compared to 84 in the 2015 WY) because the Coalition monitored only the dissolved fraction of copper for the 2015 WY.

The source of the copper causing the exceedances is not known but the relatively restricted geographic areas of exceedances, and the broader distribution of applications to the same commodities argues for a natural source that is restricted geographically. Copper exceedances are typical at sites located in Madera and Merced County (Zones 3-6 only) and typically occur after a storm.

Applied Pesticides: 2008 – 2015 WY

The most significant decline in exceedances of applied pesticides occurred directly after focused outreach began between 2008 and 2009 (Figure 40 and Table 81). The percent of exceedances of WQTLs for applied pesticides has remained less than 1% since 2009. In 2008, 1.3% of samples collected resulted in exceedances of WQTLs for pesticides compared to the 2015 WY where only 0.5% resulted in exceedances (Table 81).

Exceedances of WQTL for chlorpyrifos occurred from January through August 2015 in samples collected from Duck Slough @ Gurr Rd (July), Highline Canal @ Hwy 99 (January), and Prairie Flower Drain @ Crows Landing Rd (March through August). Six of the eight exceedances of the WQTL for chlorpyrifos occurred in samples collected from Prairie Flower Drain @ Crows Landing Rd. Since water at the site was not flowing during most of the six sampling events, it is likely that products containing chlorpyrifos washed into the waterbody during a storm event in February or early March and remained in the drain until finally degrading. It appears that the chlorpyrifos in the waterbody potentially came from applications in March and remained in the waterbody across multiple monitoring events until finally degrading to the point of non-detection.

In addition, samples collected from Duck Slough @ Gurr Rd in March 2015 resulted in an exceedance the WQTL for malathion and for dimethoate in samples collected from Unnamed Drain @ Hogin Rd. The increase in exceedances of the WQTL for chlorpyrifos during the 2015 WY (0.5%) compared to the 2014 WY (0.2%) is most likely due to an increase in applications from dairies not enrolled in the Coalition, applications from members not previously contacted during focused outreach, and non-member applications.

Of the applied pesticides, chlorpyrifos has been one of the pesticides for which the Coalition has focused its outreach to encourage members to implement additional management practices. Overall, monitoring results from 2008 through the 2015 WY indicate that individual visits and the implementation of management practices are resulting in improved water quality; hence, multiple management plans have been approved for completion. As of 2015, chlorpyrifos management plans in 12 site subwatersheds have been completed. The Coalition will continue to conduct focused outreach in 2016 in the site subwatershed where recent exceedances of the WQTLs for pesticides have occurred: Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99, and Prairie Flower Drain @ Crows Landing Rd.

Figure 40. Percentages of exceedances of WQTLs from 2008-2015 WY in the ESJWQC.
Pie chart includes percentages of all exceedances from 2008 through September 2015 by constituent group. Samples collected during toxicity resampling and 2008 upstream MPM are excluded. The bar graphs includes percentages of exceedances of 'applied pesticides' or 'applied metals' which are applied constituents only.

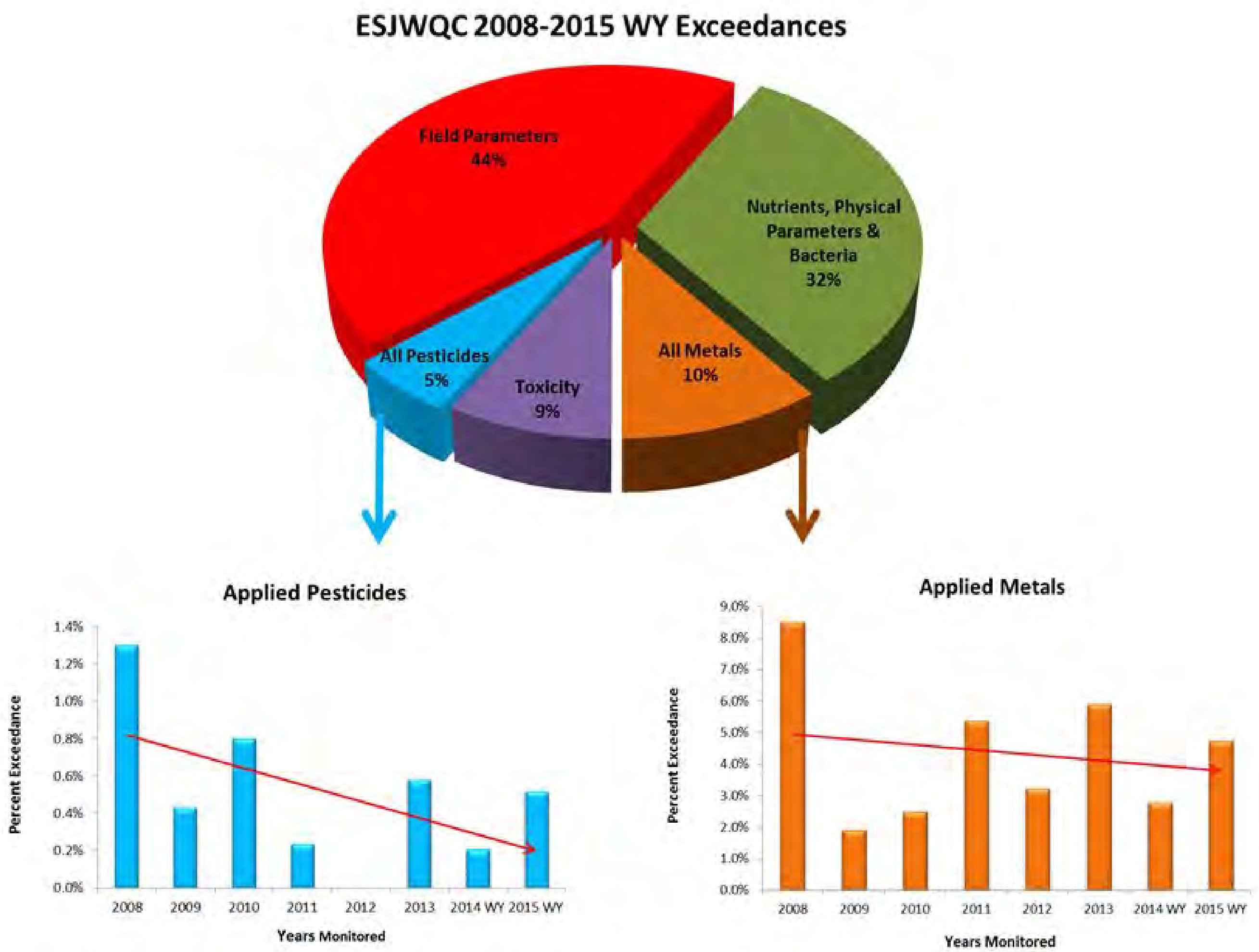


Table 81. Percentages of exceedances of WQTLs for applied metals and applied pesticides from 2008-2015 WY.
Table excludes toxicity resampling events and 2008 upstream MPM that was conducted as part of source evaluation.

Years	Applied Pesticides			Applied Metals		
	Exceedances	Sampled	% of Exceedances	Exceedances	Sampled	% of Exceedances
2008	45	3,460	1.3%	39	459	8.5%
2009	6	1,380	0.4%	6	310	1.9%
2010	10	1,249	0.8%	8	318	2.5%
2011	5	2,101	0.2%	30	556	5.4%
2012	0	951	0.0%	9	278	3.2%
2013	4	687	0.6%	13	222	5.9%
2014 WY	4	1,893	0.2%	5	155	3.2%
2015 WY	10	1,915	0.5%	4	84	4.8%

Spatial Trends

In the 2014 and 2015 May 1 Annual Reports, the Coalition evaluated monitoring data in order to identify potential trends and patterns in surface water quality that could be associated with discharge from irrigated lands. The Coalition reviewed PUR data of the top applied constituents from 2009 through September 2015 and tallied the number of times those constituents have exceeded the WQTLs (Table 82). The Coalition reviewed the most frequently applied pesticides that have been historically related to water quality impairments (chlorpyrifos, copper, and diuron), constituents applied by agriculture for which there are no application records (ammonia and nitrate), and constituents not applied by agriculture (DO, SC, and *E. coli*). To determine if there has been an improvement or degradation of water quality relative to these constituents, the Coalition compared water quality results from 2009 and the 2015 WY.

Data from 2009 represent water quality in the Coalition region at the beginning of focused outreach; in 2009 growers began implementing management practices designed to improve water quality. Monitoring data from the 2015 WY reflect water quality 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 monitoring data) includes an assessment of whether exceedances occur more frequently during a specific time period during the monitoring year. Improvements are noted as a direct result of outreach and growers implementing management practices designed to reduce discharge of applied agricultural constituents such as chlorpyrifos, pesticides containing copper, and diuron.

Constituents Applied by Agriculture

Pesticides may be found in the water column or in sediment as a result of applications to fields that have tailwater discharge, have runoff after rainfall events, and/or drift to surface waters. Heavily applied pesticides may be discharged to surface waters at levels that cause water quality impairments.

The spatial trends analysis is utilized to gain an understanding of trends in water quality of the three top applied constituents that were sampled in 2009 and during the 2015 WY. The 2009 and the 2015 WY data are used to: 1) evaluate differences in the magnitude of detections, and 2) assess monitoring and PUR data for changes that could contribute to the observed trends (discharge measurements, crop type, acreages, applications, implemented management practices to reduce runoff).

The Coalition uses monitoring data to calculate the frequency and magnitude of exceedances to determine changes in the concentrations of chlorpyrifos, diuron, and copper. By calculating the frequency of exceedances, the Coalition can evaluate the overall water quality associated with the top applied constituents in the ESJWQC region. The magnitude of chlorpyrifos, diuron, and copper exceedances is used to evaluate the degree of the concentrations detected compared to the WQTLs. Magnitude is calculated by dividing the concentration of the constituent by the WQTL of that constituent. A magnitude less than one represents a detection of an analyte in the water sample that is not considered an exceedance of the WQTL for that constituent. A magnitude calculation that is greater than one represents a concentration that is an exceedance of the WQTL for the constituent. The magnitude of an exceedance represents how many times greater the concentration is compared to the WQTL. Magnitude is used as a site-specific indicator for water quality.

Table 82. Top 10 ESJWQC agriculturally applied constituents from 2009-2015 WY and exceedance totals.
Constituents organized in descending use. Three constituents with greatest amount of use and number of exceedance level detections are in **red bold**.

Constituent	Total Applied (lbs AI)			Total Exceedances of the WQTLs		
	Jan 2009-Sept 2015	2009	2015 WY	Jan 2009-Sept 2015	2009	2015 WY
Glyphosate	10,150,189.45	1,001,249.027	1,755,244.06	0	0	0
Copper[1]	**3,589,283.78**	**348,288.18**	**704,461.41**	**75**	**6**	**4**
Paraquat	1,115,123.53	122,311.59	207,620.73	0	0	0
Chlorpyrifos	**745,726.29**	**143,579.08**	**81,065.78**	**29**	**5**	**8**
Simazine	319,664.08	65,484.03	24,202.49	0	0	0
Diuron	**182,709.19**	**26,178.08**	**21,595.96**	**4**	**1**	**0**
Trifluralin	179,326.15	34,709.96	27,339.31	0	0	0
Malathion	159,316.26	19,551.95	17,986.42	3	0	1
Dimethoate	91,670.77	12,668.20	13,853.27	3	0	1
Zinc	2,710.71	34.21	878.38	0	0	0

[1]Exceedance count for copper only includes exceedances of the hardness based WQTL for dissolved copper.

Table 83. Frequency of exceedances of WQTLs for the top applied constituents in the ESJWQC region in 2009 and 2015 WY.
The total number of samples collected includes dry sites that were scheduled to monitor for the constituent listed. Field duplicates are not included unless the exceedance occurred in the duplicate only.

Analyte	Year	Total Exceedances of WQTL	Total Samples Collected	Frequency (% Exceedance)
Chlorpyrifos	2009	5	99	5.05%
Chlorpyrifos	2015 WY	8	119	6.72%
Diuron	2009	1	72	1.43%
Diuron	2015 WY	0	93	0%
Dissolved Copper	2009	6	95	6.32%
Dissolved Copper	2015 WY	4	84	4.76%

Chlorpyrifos

Since the adoption of the WDR, monitoring for chlorpyrifos occurs frequently; 119 samples were collected for chlorpyrifos analysis in the 2015 WY compared to 99 in 2009 (Table 83). Since 2009, the Coalition has conducted focused outreach in 22 site subwatersheds in the ESJWQC region. Of the seven sites where chlorpyrifos was detected in samples, only two sites sampled in both 2009 and the 2015 WY resulted in detections of chlorpyrifos (Highline Canal @ Hwy 99 and Duck Slough @ Gurr Rd). The magnitude of chlorpyrifos decreased when comparing 2009 and the 2015 WY results from Highline Canal @ Hwy 99 and increased in samples from Duck Slough @ Gurr Rd (Table 84). All chlorpyrifos results collected during the 2015 WY from Dry Creek @ Wellsford Rd, Lateral 2 ½ near Keyes Rd, Mootz Drain downstream of Langworth Pond, and Miles Creek @ Reilly Rd were non-detect; demonstrating a significant decrease in the detections of chlorpyrifos since 2009. All chlorpyrifos results in 2009 from Prairie Flower Drain @ Crows Landing Rd were non-detect; demonstrating a significant increase in the magnitude of chlorpyrifos in the 2015 WY (Table 84).

Prior to the 2015 WY, there was a decreasing trend of chlorpyrifos detections in the waterways. Overall, the water quality impairments related to chlorpyrifos have declined throughout the ESJWQC region through the 2014 WY. The increase of exceedances of the WQTL for chlorpyrifos in the 2015 WY is due to the high number of exceedances of the WQTL in samples collected from Prairie Flower Drain @ Crows Landing Rd (6 of the 8 exceedances). The six exceedances of the WQTL detected in samples collected from Prairie Flower Drain @ Crows Landing Rd from March through August can be attributed to applications made by non-members in February and March; after March, the magnitude of chlorpyrifos decreased significantly in the drain across multiple monitoring events until finally degrading to the point of non-detection (Table 84).

The greatest chlorpyrifos use occurred from March through August in both 2009 and the 2015 WY. Overall, chlorpyrifos use within the Coalition region decreased significantly when comparing the 2015 WY to 2009 (Table 82 and Figure 41). Table 85 compares crop type, pounds AI applied, and acres treated per year and month in 2009 and the 2015 WY. The table only includes site subwatersheds where detections of chlorpyrifos occurred in the 2015 WY and only the top applications to crops in both years to demonstrate if current water quality impairments can be attributed to a change in crop type or amount of use in each site subwatershed. In the Duck Slough @ Gurr Rd site subwatershed, chlorpyrifos was applied to alfalfa in both 2009 and the 2015 WY, with a 30% increase in use in the 2015 WY (Table 85).

In the Highline Canal @ Hwy 99 site subwatershed, chlorpyrifos was applied to alfalfa, almonds, corn, and walnuts, with a decrease in use in almonds, corn, and walnuts compared to 2009 (applications to almonds decreased by 77%, to corn by 94%, and to walnuts by 60%); however, there was a 478% increase in applications to alfalfa in the 2015 WY (213 lbs AI applied in 2009 vs. 1,232 lbs AI applied in the 2015 WY; Table 85). The greatest amount of pounds AI applied in the 2015 WY in the site subwatershed occurred in March 2015 to alfalfa, after the single exceedance of the WQTL for chlorpyrifos occurred in the site subwatershed in January. A single application was made in January to parcels that do not directly drain to the waterway. Therefore, the increase in applications to alfalfa during the 2015 WY did not cause water quality impairments; the exceedance was most likely the result of non-reported applications prior to the January sampling event.

In the Prairie Flower Drain @ Crows Landing Rd site subwatershed, chlorpyrifos was applied to alfalfa in both the 2009 and the 2015 WY, with a 120% increase in use in the 2015 WY (185 lbs AI were applied in February and March 2015, compared to 76 lbs AI applied in March 2009; Table 85).

In 2009, in site subwatersheds where concentrations of chlorpyrifos were highest were also the sites with the highest annual applications of chlorpyrifos. For example, chlorpyrifos applications were greatest in the Highline Canal @ Hwy 99 (10,741 lbs AI) and Lateral 2 ½ near Keyes Rd (11,836 lbs AI) site subwatersheds in 2009, and the chlorpyrifos concentrations detected in samples collected from those sites were the highest for that year (Table 84). During the 2015 WY, the relationship between high annual use and chlorpyrifos concentrations detected in samples is less clear. During the 2015 WY, the largest quantity of chlorpyrifos use where detections of chlorpyrifos occurred was in the Highline Canal @ Hwy 99 site subwatershed (3,432 lbs AI) and yet chlorpyrifos was detected at the highest concentration in samples collected from Prairie Flower Drain @ Crows Landing Rd (only had 185 lbs AI applied in the 2015 WY). Chlorpyrifos was detected above the WQTL once in samples collected from Highline Canal @ Hwy 99, despite a greater quantity of chlorpyrifos applied compared to the rest of sites with detections of chlorpyrifos in samples from the 2015 WY. The spatial trends evaluation for chlorpyrifos suggests that any trends in use do not necessarily reflect trends in water quality associated with chlorpyrifos.

Table 84. Magnitude of detections of chlorpyrifos in 2009 and the 2015 WY.

Field duplicates are not included unless the exceedance occurred in the duplicate only. Exceedances of the WQTLs are in **red bold**. Magnitude is calculated by dividing the concentration of the constituent by the WQTL.

Zone	Site Subwatershed	Year	Sample Date	Chlorpyrifos Result (μg/L)	Chlorpyrifos WQTL (μg/L)	Magnitude
1	Dry Creek @ Wellsford Rd[1]	2009	7/21/2009	0.013	0.015	0.87
			8/18/2009	**0.027**	0.015	1.80
	Mootz Drain @ Langworth Pond[1]	2009	6/16/2009	**0.033**	0.015	2.20
2	Lateral 2 1/2 near Keyes Rd[1]	2009	7/21/2009	**0.049**	0.015	3.27
	Prairie Flower Drain @ Crows Landing Rd[2]	2015 WY	3/10/2015	**4.2**	0.015	280
			4/14/2015	**0.20**	0.015	13.33
			5/12/2015	**0.20**	0.015	13.33
			6/9/2015	**0.061**	0.015	4.07
			7/14/2015	**0.044**	0.015	2.93
			8/11/2015	**0.017**	0.015	1.13
3	Highline Canal @ Hwy 99	2009	7/21/2009	**0.093**	0.015	6.20
		2015 WY	1/13/2015	**0.070**	0.015	4.67
5	Duck Slough @ Gurr Rd	2009	1/20/2009	0.012	0.015	0.80
		2015 WY	7/14/2015	**0.19**	0.015	12.67
	Miles Creek @ Reilly Rd[1]	2009	7/21/2009	**0.028**	0.015	1.87

[1] Dry Creek @ Wellsford Rd, Lateral 2 ½ near Keyes Rd, Mootz Drain downstream of Langworth Pond and Miles Creek @ Reilly Rd were monitored during the 2015 WY; all chlorpyrifos results were non-detect.

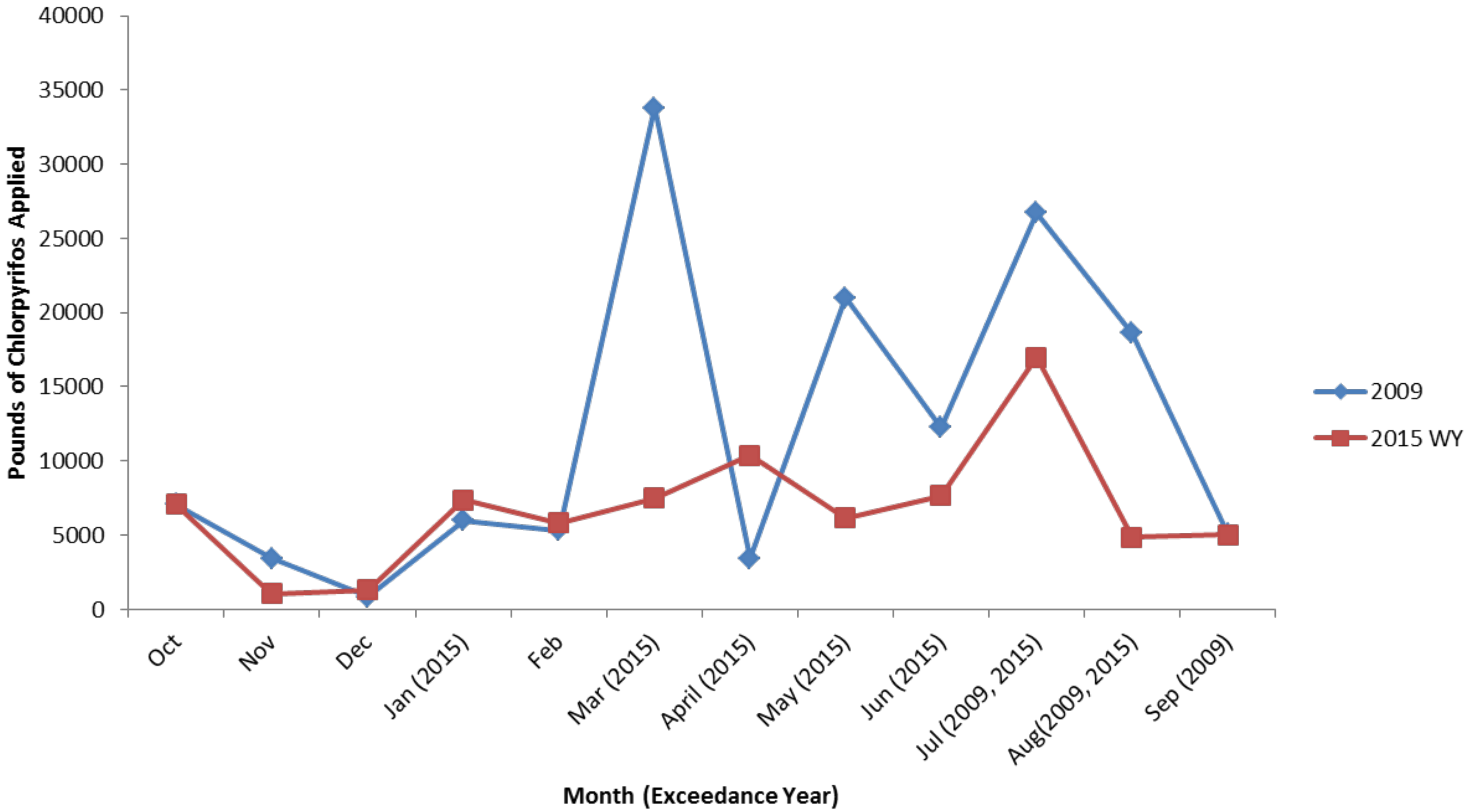
[2] Prairie Flower Drain @ Crows Landing Rd was monitored for chlorpyrifos in 2009; all results were non-detect.

Table 85. Comparison of applications of chlorpyrifos in total lbs and lbs per acre to crops in 2009 and the 2015 WY.
Table includes site subwatersheds where detections of chlorpyrifos occurred in samples collected in the 2015 WY and only the top applications to crops that occurred in both years are listed. An asterisk on the month indicates when an exceedance of the WQTL occurred.

Zone	Site Subwatershed	Crop	Year	Month	Acres Treated	Total Lbs per Acre	Total AI Applied	Percent of Total Lbs Applied	Percent Change in Total Lbs Applied per Crop
2	Prairie Flower Drain @ Crows Landing Rd	Alfalfa	2009	Mar	150	0.51	76.26	17.98%	120%
			2015 WY	Feb	384	3.35	167.58	39.51%	
				Mar	70	0.25	17.62	4.15%	
3	Highline Canal @ Hwy 99	Alfalfa	2009	Mar	275	1.95	143.05	1.01%	478%
				Aug	135	0.50	67.60	0.48%	
				Jun	5	0.50	2.50	0.02%	
			2015 WY	Feb	387	6.42	211.31	1.49%	
				Mar	325	9.19	954.07	6.73%	
				Aug	129	0.50	64.29	0.45%	
		Almond	2009	Jan	2040	11.27	3831.12	27.03%	-77%
				May	39	4.00	78.04	0.55%	
				Jun	35	2.34	40.19	0.28%	
				Jul*	74	2.03	150.48	1.06%	
				Aug	649	2.46	1274.57	8.99%	
			2015 WY	Jan*	50	4.01	100.22	0.71%	
				May	27	3.76	50.39	0.36%	
				Jun	421	17.37	688.98	4.86%	
				Jul	245	2.69	408.80	2.88%	
				Aug	30	0.47	14.09	0.10%	
		Corn (Forage - Fodder)	2009	Mar	25	1.27	31.83	0.22%	-94%
				May	129	3.00	129.06	0.91%	
				Jun	164	0.75	122.62	0.87%	
				Jul*	1218	9.66	1030.42	7.27%	
				Aug	11	0.10	1.05	0.01%	
				Sep	65	1.78	59.63	0.42%	
			2015 WY	May	53	0.94	49.79	0.35%	
				Jun	38	1.88	35.70	0.25%	
		Walnut	2009	May	164	13.79	322.58	2.28%	-60%
				Jun	50	2.03	101.68	0.72%	
				Jul*	284	15.86	557.91	3.94%	
				Aug	163	19.88	321.17	2.27%	
			2015 WY	Apr	148	6.12	301.96	2.13%	
				Jun	40	0.93	37.12	0.26%	

Zone	Site Subwatershed	Crop	Year	Month	Acres Treated	Total Lbs per Acre	Total AI Applied	Percent of Total Lbs Applied	Percent Change in Total Lbs Applied per Crop
				Aug	41	5.57	76.10	0.54%	
				Sep	75	6.61	109.93	0.78%	
5	Duck Slough @ Gurr Rd	Alfalfa	2009	Mar	890	5.96	356.15	13.17%	30%
				Jul	140	1.00	70.10	2.59%	
				Sep	227	1.00	57.16	2.11%	
			2015 WY	Feb	90	0.69	62.36	2.31%	
				Mar	365	3.76	193.55	7.16%	
				Jul*	439	2.55	193.31	7.15%	
				Aug	538	2.64	170.83	6.32%	

Figure 41. Sum of pounds of chlorpyrifos applied in 2009 and the 2015 WY.
The PUR data are available through September 2015.



Diuron

Diuron is highly water soluble (K_{oc} of 480) and is therefore likely to be transported to surface waters with rainfall. Applications of diuron have decreased slightly over the years; 26,178 pounds AI were applied in 2009 compared to 21,596 pounds AI were applied in the 2015 WY (Table 82). Applications occurred mostly during October through January (Figure 42).

The total number of exceedances of the WQTL for diuron decreased from one exceedance in 2009 to no exceedances during the 2015 WY; four exceedances of the WQTL occurred from 2009 through the 2015 WY (Table 82). In addition, more samples were collected and analyzed for diuron during the 2015 WY (93 samples from 13 sites) compared to 2009 (72 samples from six sites). In 2009, there were two detections of diuron in samples collected from Mootz Drain; one resulted in an exceedance of the WQTL on February 7, 2009. During the 2015 WY, there was a detection of diuron under the WQTL at Prairie Flower Drain @ Crows Landing (Table 86).

No diuron use was reported in the Mootz Drain site subwatershed during 2009 and no applications occurred in the Prairie Flower @ Crows Landing Rd site subwatershed during the 2015 WY. Although detections typically occur during the winter months and those months are also when applications often occur, there is a no spatial trend related to diuron applications and detections in the water column. A spatial trend associated with diuron applications, detections, and/or exceedances of the WQTL is not apparent because there is little to no reported agricultural use of diuron in the site subwatersheds where exceedances occurred. However, diuron is used by numerous other entities such as Counties, Caltrans, railroads, and private non-agricultural businesses. Diuron will continue to be analyzed in samples collected monthly at Core sites and during MPM from Dry Creek @ Rd 18 and Hilmar Drain @ Central Ave during the 2016 WY.

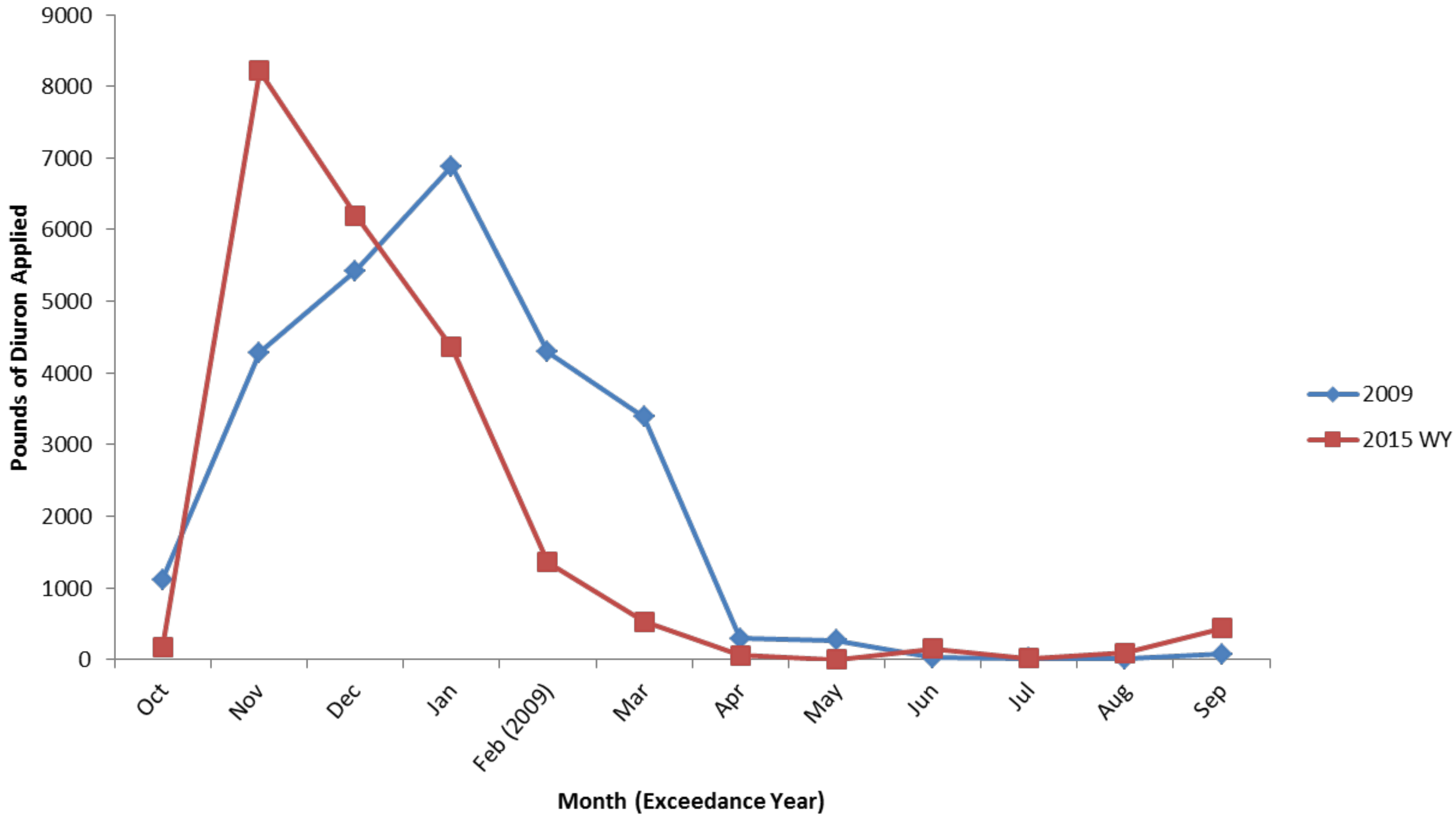
Table 86. Magnitude of detections of diuron in 2009 and the 2015 WY.

Field duplicates are not included unless the exceedance occurred in the duplicate only. Exceedances of the WQTLs are in **red bold.** Magnitude is calculated by dividing the concentration of the constituent by the WQTL.

Zone	Site Subwatershed	Year	Sample Date	Diuron Result (µg/L)	Diuron WQTL (µg/L)	Magnitude
1	Mootz Drain[1]	2009	2/7/2009	**2.1**	2	1.05
			3/17/2009	0.86	2	0.43
3	Prairie Flower Drain @ Crows Landing Rd	2015 WY	2/10/2015	0.37	2	0.185

[1]After November 2009 the Coalition switched monitoring sites to the downstream site, Mootz Drain downstream of Langworth Pond. Both sites are referenced as Mootz Drain in this section.

Figure 42. Sum of pounds of diuron applied in 2009 and the 2015 WY.
The PUR data are available through September 2015.



Copper

Pesticides containing copper are applied to a variety of agricultural crops as a fungicide or applied for aquatic weed control. The Coalition measures dissolved copper because it is the fraction that is bioavailable to aquatic organisms. In addition, copper is a management plan constituent whose concentration can be the result of many interacting processes. Because it is not easily sourced, the 2014 SQMP provides a timetable for developing work plans that could be used to inform management plans. On March 23, 2016, the Coalition submitted to the Regional Board an evaluation of water quality parameters associated with copper exceedances in the ESJWQC region as a preliminary analysis of potential sources of copper. The goal of the study was to evaluate water quality conditions most likely to result in exceedances of the copper.

Copper was found throughout all six zones in the Coalition region. In both 2009 and the 2015 WY; concentrations of copper that resulted in exceedances of the hardness based WQTL only occurred in Zone 3 through Zone 6. While there is some variation within stations with respect to the concentration of dissolved copper within a monitoring location, there is much more variation in the concentration of copper in the samples among stations (Table 87). There does not appear to be any spatial trend in copper concentration or exceedances except for the monitoring locations in Zone 6, where over time, monitoring has resulted in a higher number of exceedances. Those exceedances are not the result of greatly elevated concentrations of copper but water that has the lowest hardness in the ESJWQC region.

Table 88 compares crop type, pounds AI applied, and acres treated per year and month in 2009 and the 2015 WY. The table only includes site subwatersheds where detections of copper occurred in the 2015 WY and only the top applications to crops in both years to determine if current water quality impairments can be attributed to a change in crop type or amount of use in each site subwatershed.

According to the preliminary analysis provided in the special study on copper, hardness is a main determinant of exceedances, copper concentration is secondary. Copper concentration and hardness are related, meaning when water originates in high mineral/high hardness regions and if copper concentration is sufficiently elevated, exceedances occur. Discharges from agriculture seem not to be a factor, even if the discharge is simply tailwater. For several waterbodies there are no exceedances during the irrigation season. For other sites, there are exceedances during both the irrigation season and the non-irrigation season. In addition, the concentration of copper remains constant across the year, arguing against agricultural discharge having higher concentrations of copper than non-agriculture discharge (e.g. natural discharge from stormwater). Figure 43 compares chlorpyrifos applications in 2009 vs. the 2015 WY, and demonstrates that use has remained consistent, with a slight increase in the 2015 WY. Even when there are no exceedances, the concentration of copper in surface waters appears to be similar during the irrigation season compared to the non-irrigation season (Figure 43). Because the main determinant of exceedances is hardness, growers are unable to manage hardness and are unlikely to be able to prevent exceedances of the WQTL for copper in the Coalition region. The amount of copper itself is a result of the natural copper in the soils and the heterogeneity in the concentration of copper in the soils is responsible for the variation in the concentration of copper in the water. Whether that concentration is an exceedance of the WQTL is determined by hardness.

Table 87. Magnitude of detections of dissolved copper in 2009 and the 2015 WY.
Field duplicates are not included unless the exceedance occurred in the duplicate only. Exceedances of the WQTLs are in **red bold.** Magnitude is calculated by dividing the concentration of the constituent by the WQTL.

Zone	Site Subwatershed	Year	Sample Date	Copper Result(µg/L)	WQTL[1] (µg/L)	Magnitude
1	Mootz Drain[2]	2009	2/7/2009	3	12.664	0.24
			3/17/2009	3.5	15.499	0.23
			4/21/2009	3.4	6.279	0.54
			5/19/2009	2.8	8.029	0.35
			6/16/2009	3	6.441	0.47
			7/21/2009	2.5	5.29	0.47
			8/18/2009	2.3	6.279	0.37
			9/22/2009	1.8	6.279	0.29
			10/20/2009	3.1	5.122	0.61
			11/17/2009	1.9	8.956	0.21
			12/15/2009	1.6	11.939	0.13
2	Hilmar Drain @ Central Ave	2015 WY	1/13/2015	5	27.39	0.18
			2/10/2015	5.3	25.48	0.21
			3/10/2015	5.5	32.38	0.17
			7/14/2015	6.2	19.59	0.32
	Lateral 2 1/2 near Keyes Rd	2009	4/21/2009	0.69	3.918	0.18
			5/19/2009	0.57	10.466	0.05
			6/16/2009	0.57	11.939	0.05
			7/21/2009	0.36	11.939	0.03
			8/18/2009	0.49	16.883	0.03
			9/22/2009	0.1	5.87	0.02
			10/20/2009	0.7	1.669	0.42
3	Highline Canal @ Hwy 99	2015 WY	1/13/2015	15	15.5	0.97
			4/14/2015	0.85	2.07	0.41
	Highline Canal @ Lombardy Rd	2009	8/18/2009	0.58	1.871	0.31
		2015 WY	1/13/2015	16	22.9	0.70
			2/10/2015	5.8	14.8	0.39
			3/10/2015	3	14.8	0.20
			5/12/2015	0.78	1.87	0.42
			8/11/2015	0.63	1.87	0.34
			8/11/2015	**2.5**	1.87	1.34
	Mustang Creek @ East Ave	2009	2/7/2009	**25**	20.927	1.19
			3/17/2009	21	29.279	0.72
			10/20/2009	**44**	24.197	1.82
			12/15/2009	**25**	22.898	1.09
		2015 WY	12/3/2014	**18**	6.44	2.80
			1/13/2015	8.8	10.47	0.84
			2/10/2015	8.3	15.5	0.54
			3/10/2015	6.5	11.21	0.58
	Howard Lateral @ Hwy 140	2009	4/21/2009	4	7.322	0.55
			5/19/2009	2.3	18.247	0.13
			6/16/2009	2	5.953	0.34
			7/21/2009	3.2	6.684	0.48
			8/18/2009	2	2.739	0.73
			9/22/2009	2.2	2.645	0.83
			10/20/2009	**3.3**	1.567	2.11
	Livingston Drain @ Robin Ave	2015 WY	12/3/2014	**4.8**	2.07	2.32
			7/14/2015	3.3	11.21	0.29
	Merced River @ Santa Fe	2009	1/20/2009	0.4	2.645	0.15

ZONE	SITE SUBWATERSHED	YEAR	SAMPLE DATE	COPPER RESULT(µG/L)	WQTL[1] (µG/L)	MAGNITUDE
			2/7/2009	0.49	2.456	0.2
			3/17/2009	0.73	3.018	0.24
			4/21/2009	0.79	2.739	0.29
			5/19/2009	0.7	2.456	0.29
			6/16/2009	0.58	2.167	0.27
			7/21/2009	0.8	2.264	0.35
			8/18/2009	0.76	2.167	0.35
			9/22/2009	0.28	1.97	0.14
			10/20/2009	0.61	1.97	0.31
			11/17/2009	0.35	1.669	0.21
			12/15/2009	0.54	5.122	0.11
4	Howard Lateral @ Hwy 140	2015 WY	10/14/2014	2	6.12	0.33
			1/13/2015	5.7	13.38	0.43
			2/10/2015	**5.7**	1.57	3.63
			7/14/2015	3.2	7.56	0.42
5	Deadman Creek @ Gurr Rd	2009	1/20/2009	4.3	22.244	0.19
			2/7/2009	4.9	37.239	0.13
			3/17/2009	0.5	16.193	0.03
			4/21/2009	1.3	8.726	0.15
			5/19/2009	1.6	7.48	0.21
			6/16/2009	1.2	6.441	0.19
			7/21/2009	2.1	4.953	0.42
			8/18/2009	1	2.167	0.46
			9/22/2009	0.62	3.741	0.17
			10/20/2009	1.6	3.383	0.47
			11/17/2009	4	9.716	0.41
			12/15/2009	2.5	24.841	0.1
	Duck Slough @ Gurr Rd	2009	1/20/2009	0.2	14.094	0.01
			2/7/2009	7.6	13.382	0.57
			3/17/2009	4.6	8.879	0.52
			4/21/2009	2.6	8.262	0.31
			5/19/2009	**7.3**	6.116	1.19
		2015 WY	4/14/2015	5.9	20.93	0.28
			6/9/2015	0.85	24.2	0.04
			7/14/2015	2.4	5.46	0.44
			8/11/2015	0.41	20.26	0.02
	Miles Creek @ Reilly Rd	2009	7/21/2009	1.5	3.018	0.5
			8/18/2009	1.6	4.268	0.37
		2015 WY	2/10/2015	1.5	5.12	0.29
			8/11/2015	0.93	11.94	0.08
6	Ash Slough @ Ave 21	2009	5/19/2009	**3.00**	2.167	1.38
	Dry Creek @ Rd 18	2015 WY	2/10/2015	2.5	10.47	0.24
			4/14/2015	5	14.09	0.35
			5/12/2015	4.5	15.5	0.29

[1]The WQTL for dissolved copper is variable based on hardness.

[2]After November 2009 the Coalition switched monitoring sites to the downstream site, Mootz Drain downstream of Langworth Pond. Both sites are referenced as Mootz Drain in this section.

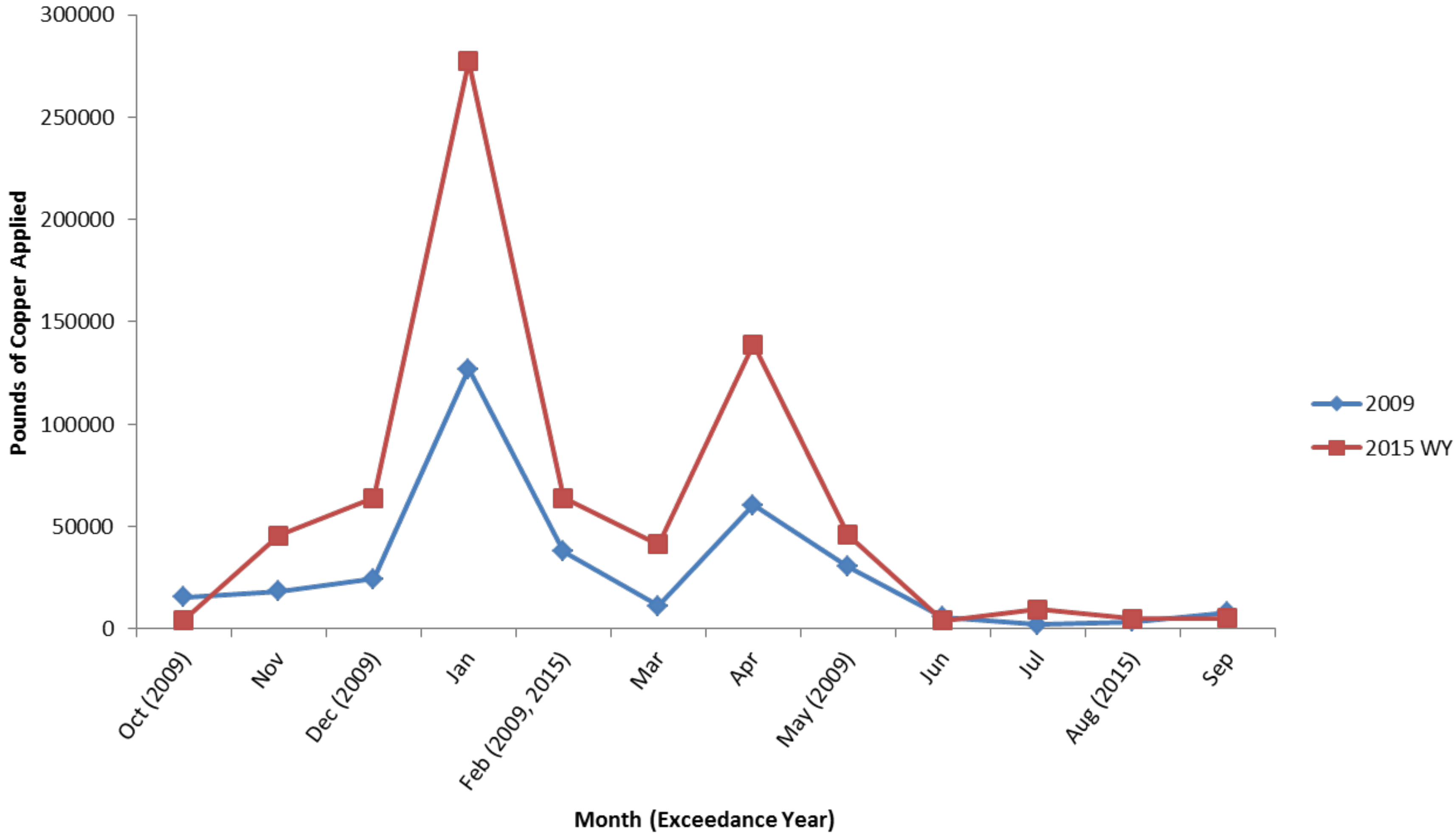
Table 88. Comparison of applications of pesticides containing copper in total lbs and lbs per acre to commodities in 2009 and the 2015 WY.

Table includes site subwatersheds where exceedances of the WQTL occurred in samples collected in the 2015 WY and only the top applications to crops that occurred in both years are listed.

Zone	Site Subwatershed	Crop	Year	Month	Acres Treated	Total Lbs per Acre	Total AI Applied	Percent of Total Lbs Applied	Percent Change in Total Lbs Applied per Crop
3	Highline Canal @ Lombardy Rd	Almond	2009	Jan	4048	102.58	20004.24	79.46%	43%
				Feb	2010	70.98	3114.77	12.37%	
				Mar	715	8.47	634.48	2.52%	
				Aug	13	7.92	99.00	2.52%	
				Nov	1000	2.15	1076.00	4.27%	
				Dec	230	2.15	247.48	0.98%	
			2015 WY	Jan	3535	234.73	17899.35	49.55%	
				Feb	7387	94.64	8237.85	22.80%	
				Mar	478	10.41	401.56	1.11%	
				Nov	1670	19.59	5027.30	13.92%	
				Dec	1051	39.07	4557.76	12.62%	
		Peach	2009	Jan	200	64.51	2220.42	74.28%	101%
				Feb	131	60.36	594.27	19.88%	
				Mar	126	8.07	101.68	3.40%	
				Dec	21	8.01	72.75	2.43%	
			2015 WY	Feb	310	26.92	617.36	10.27%	
				Dec	649	186.08	5394.01	89.73%	
		Walnut	2009	Mar	90	15.06	391.35	7.10%	61%
				Apr	1063	147.02	4166.73	75.56%	
				May	251	27.59	680.56	12.34%	
				Jun	75	3.68	275.85	5.00%	
			2015 WY	Feb	51	13.86	236.59	2.67%	
				Mar	111	25.57	319.45	3.60%	
				Apr	1678	198.15	6348.40	71.62%	
				May	705	39.79	1908.93	21.54%	
				Oct	30	1.69	50.61	0.57%	
	Mustang Creek @ East Ave	Almonds	2009	Jan	1172	30.00	4627.33	70.34%	294%
				Feb	2348	15.96	1950.87	29.66%	
			2015 WY	Jan	2639	76.22	13338.86	51.44%	
				Feb	4850	14.21	4597.87	17.73%	
				Mar	320	0.77	245.66	0.95%	
				Nov	1691	17.06	4809.20	18.55%	

Zone	Site Subwatershed	Crop	Year	Month	Acres Treated	Total Lbs per Acre	Total AI Applied	Percent of Total Lbs Applied	Percent Change in Total Lbs Applied per Crop
				Dec	630	25.12	2937.34	11.33%	
		Grapes	2009	Apr	3258	8.47	2497.75	100.00%	26%
			2015 WY	Mar	2830	15.96	1572.15	49.96%	
				Apr	822	5.34	1574.69	50.04%	
4	Howard Lateral @ Hwy 140	Almond	2009	Jan	857	144.64	4501.65	76.75%	78%
				Feb	345	41.27	1012.59	17.26%	
				Mar	120	8.32	351.35	5.99%	
			2015 WY	Jan	1202	287.74	6623.83	63.50%	
				Feb	445	59.72	1629.96	15.62%	
				Mar	36	2.62	94.30	0.90%	
				Apr	10	0.84	8.39	0.08%	
				Dec	376	60.22	2075.29	19.89%	
		Grape	2009	Apr	58	2.10	60.83	2.29%	855%
				Jun	64	5.98	191.23	7.19%	
			2015 WY	Feb	11	2.13	23.46	0.88%	
				Mar	58	2.10	60.83	2.29%	
				Jun	278	12.83	706.22	26.56%	
				Jul	691	27.62	1616.17	60.79%	
	Livingston Drain @ Robin Ave	Almond	2009	Jan	3452	418.63	16993.46	83.98%	-25%
				Feb	1312	131.52	3046.86	15.06%	
				Mar	320	7.48	171.96	0.85%	
				Apr	52	0.89	23.10	0.11%	
			2015 WY	Jan	1757	418.86	10344.17	67.80%	
				Feb	728	91.84	2489.22	16.31%	
				Mar	36	2.62	94.30	0.62%	
				Apr	10	0.84	8.39	0.05%	
				Dec	416	72.54	2321.69	15.22%	
		Peach	2009	Jan	342	72.12	1569.84	67.35%	-37%
				Feb	472	35.51	761.16	32.65%	
			2015 WY	Jan	92	29.05	364.46	24.66%	
				Mar	63	19.37	204.43	13.83%	
				Dec	133	59.40	909.14	61.51%	
			2015 WY	Mar	2830	15.96	1572.15	49.96%	
				Apr	822	5.34	1574.69	50.04%	

Figure 43. Sum of pounds of pesticides containing copper applied in 2009 and through the 2015 WY.
The PUR data are available through September 2015.



The Coalition conducted a spatial trends analysis for constituents not applied by agriculture: DO, SC, and *E. coli.* Ammonium/nitrate are constituents applied by agriculture but are not tracked by any state or local entity through a reporting system. The Coalition conducted a spatial analysis to determine if: 1) detections or exceedances of the WQTLs occurred more frequently in a zone, or 2) exceedances or detections occur more frequently in samples collected at a particular site subwatershed. Between the 2014 WY and the 2015 WY, exceedances of field parameters, bacteria, and nutrients have not changed significantly; therefore, the spatial analysis provided in the 2015 Annual Report (Page 275-289) for the 2014 WY is also representative of any spatial trends for the 2015 WY.

The temporal trends analysis focuses on the occurrence of detections and exceedances of WQTL across time. The analysis below includes a comparison between the frequency of exceedances in samples collected during all seasons (fall, winter, and irrigation) in 2009 and the 2015 WY (Table 89-Table 92). The purpose of the comparison is to determine if exceedances of the WQTLs for these constituents occur more frequently during a particular time of year. Discharge and water temperature are used to demonstrate how environmental factors play a role in the occurrence of exceedances of WQTLs of these constituents. Cow density and depth to groundwater data are utilized to evaluate how these factors influence water quality as they relate to exceedances if the WQTLs of ammonium, *E. coli,* and nitrate (cow density), and SC (groundwater depth).

As indicated in the 2014 SQMP, DO, SC, *E. coli,* copper, and nitrate are not possible to source. An evaluation of water quality parameters associated to exceedances of DO, pH, and nutrients in the ESJWQC region were submitted to the Regional Board as preliminary analysis of sources of each constituent; the DO study was submitted on February 2, 2016 and the nutrients study was submitted on April 4, 2016. The Coalition will address SC when the Basin Plan Amendment process and CV-SALTS development of a Salt and Nitrogen Management Plan process are concluded. The Coalition will participate in the joint source ID study as directed by the Executive Officer.

Dissolved Oxygen

The Coalition measures DO at all sites during every monitoring event when samples are collected. Dissolved oxygen is a non-conserved constituent meaning that it can increase or decrease in concentration as water moves downstream. Natural instream processes generate or remove DO from the waterbody without external inputs of agricultural constituents. Processes affecting DO in waterways include stream flow, fluctuations in temperature, loss of vegetation around streams, as well as excessive nutrients. The preliminary analysis submitted on February 2, 2016 concluded that discharge, TOC, PO4, SC, and TSS had the strongest correlations with DO exceedances in the ESJ region. The lack of flow (discharge) appears to be an important factor increasing the probability of exceeding the DO WQO when TOC or PO4 are present at moderate levels.

The Coalition evaluated the frequency of exceedances of the WQTL for DO in 2009 compared to the 2015 WY during winter (January through March), irrigation (April through September), and fall (October through December; Table 89). The frequency of exceedances of the WQTL for DO throughout all seasons during the 2015 WY increased by 8% compared to 2009 (34 in 2009 vs. 68 in the 2015 WY);

however, the number of sites and monitoring events have also increased in the 2015 WY (Table 89). Exceedances of the WQTL for DO were more common during the irrigation season when the average water temperature was 24°C in 2009 and 22°C in the 2015 WY. During the irrigation season, discharge was recorded as zero or low flow conditions at many ESJWQC sample locations. Without significant flow to replenish DO in the water column, DO may be depleted to levels that fall below the WQTL.

Dissolved oxygen measured throughout the ESJWQC region does not appear to have a spatial trend. However, a temporal trend on an annual basis is apparent and DO levels are strongly influenced by flow and temperature. Since most waterways in the Coalition region receive the majority of their flow from agricultural discharge during the irrigation season, reduction in discharge is going to exacerbate the flow-DO problem. As part of its outreach for pesticide and toxicity management plans, the Coalition encourages farmers to implement management practices that reduce tailwater discharge. But the analyses indicate that reducing discharge of irrigation tailwater and stormwater also reduce instream discharge, contributing to the elevated probability of a DO exceedance.

Table 89. Frequency of exceedances the WQTL for DO during all seasons for 2009 and the 2015 WY.
Environmental samples and dry sites included in counts; field duplicates not counted unless exceedance occurred in only that sample. The WQTL for DO is 7 mg/L for the sites listed below.

Zone	Site Subwatershed	Year	Season[1]	Total Exceedances	Total Samples Collected	Frequency
1	Dry Creek @ Wellsford Rd	2009	Irrigation	3	163	1.84%
			Fall	2	163	1.23%
			Winter	1	163	0.61%
		2015 WY	Fall	2	241	0.83%
			Irrigation	6	241	2.49%
			Storm	2	241	0.83%
			Winter	2	241	0.83%
	Mootz Drain[2]	2009	Irrigation	7	163	4.29%
			Fall	1	163	0.61%
			Winter	1	163	0.61%
		2015 WY	Irrigation	2	241	0.83%
			Storm	2	241	0.83%
			Winter	1	241	0.41%
2	Hatch Drain @ Tuolumne Rd	2015 WY	Irrigation	4	241	1.66%
			Winter	1	241	0.41%
	Hilmar Drain @ Central Ave	2015 WY	Irrigation	4	241	1.66%
			Storm	1	241	0.41%
			Winter	1	241	0.41%
	Lateral 5 1/2 @ South Blaker Rd	2015 WY	Winter	1	241	0.41%
	Lateral 6 and 7 @ Central Ave	2015 WY	Irrigation	1	241	0.41%
	Levee Drain @ Carpenter Rd	2015 WY	Irrigation	2	241	0.83%
			Storm	1	241	0.41%
	Lower Stevinson @ Faith Home Rd	2015 WY	Winter	1	241	0.41%
	Prairie Flower Drain @ Crows Landing Rd	2009	Irrigation	1	163	0.61%
		2015 WY	Irrigation	5	241	2.07%
			Storm	1	241	0.41%
			Winter	2	241	0.83%
	Unnamed Drain @ Hogin Rd	2015 WY	Irrigation	3	241	1.24%
			Storm	1	241	0.41%
			Winter	1	241	0.41%
	Westport Drain @ Vivian Rd	2015 WY	Irrigation	3	241	1.24%
			Storm	1	241	0.41%
3	Highline Canal @ Hwy 99	2015 WY	Fall	1	241	0.41%
	Highline Canal @ Lombardy Rd	2015 WY	Storm	1	241	0.41%

Zone	Site Subwatershed	Year	Season[1]	Total Exceedances	Total Samples Collected	Frequency
			Winter	1	241	0.41%
	Mustang Creek @ East Ave	2009	Irrigation	2	163	1.23%
		2015 WY	Irrigation	1	241	0.41%
			Storm	1	241	0.41%
4	Black Rascal Creek @ Yosemite Rd	2015 WY	Irrigation	4	241	1.66%
	Canal Creek @ West Bellevue Rd	2015 WY	Irrigation	1	241	0.41%
	Howard Lateral @ Hwy 140	2009	Irrigation	1	163	0.61%
		2015 WY	Irrigation	3	241	1.24%
			Winter	1	241	0.41%
	Merced River @ Santa Fe	2009	Irrigation	2	163	1.23%
		2015 WY	Irrigation	1	241	0.41%
5	Deadman Creek @ Gurr Rd	2009	Irrigation	3	163	1.84%
			Fall	1	163	0.61%
			Winter	2	163	1.23%
	Duck Slough @ Gurr Rd	2015 WY	Irrigation	2	241	0.83%
	Duck Slough @ Hwy 99	2009	Irrigation	1	163	0.61%
	Miles Creek @ Reilly Rd	2009	Irrigation	4	163	2.45%
6	Ash Slough @ Ave 21	2009	Irrigation	1	163	0.61%
	Cottonwood Creek @ Rd 21	2009	Irrigation	1	163	0.61%
2009 Totals			**Fall**	**4**	**163**	**2.45%**
			Winter	**4**	**163**	**2.45%**
			Irrigation	**26**	**163**	**15.95%**
2015 WY Totals			**Fall**	**3**	**241**	**1.24%**
			Winter	**12**	**241**	**4.98%**
			Storm	**11**	**241**	**4.56%**
			Irrigation	**42**	**241**	**17.43%**
			2009 Total	**34**	**163**	**20.86%**
			2015 WY Total	**68**	**241**	**28.22%**

[1]Storm events are included in the season it replaced.

[2]After November 2009 the Coalition switched monitoring sites to the downstream site, Mootz Drain downstream of Langworth Pond. Both sites are referenced as Mootz Drain in this section.

Specific Conductance

The Coalition monitors SC because it is a measurement of salts and elevated levels can affect crop productivity. Geological and geographical factors influencing salts in the waterways are the focus of the Valley-wide CV-SALTS process. In 2006, the State Water Board, Regional Board, and stakeholders initiated CV-SALTS, which is a collaborative effort to develop and implement a salinity and nitrate management program and Basin Plan Amendment. The Central Valley Salinity Coalition (CVSC) formed in July 2008 to organize, facilitate, and fund efforts needed to fulfill the goals of CV-SALTS. The Lower San Joaquin River Committee of CV-SALTS is tasked with reviewing relevant studies and developing the science and policy needed to justify a Basin Plan amendment for salt and boron in the San Joaquin River upstream of Vernalis. The Coalition continues to monitor SC until the CV-SALTS process is finalized.

The occurrence of exceedances of the WQTL for SC has increased from a total of 25 in 2009 to 64 in the 2015 WY, however; monitoring has also increased in the Coalition region (Table 90). Specific conductance levels exceeded the 700 µs/cm WQTL most frequently during the irrigation season for 2009 (6.1%) and the 2015 WY (14.5%; Table 90).

Most of the exceedances of the WQTL for SC occurred at sites in Zone 2 during both 2009 and the 2015 WY, which can be attributed to the hydrology of the groundwater in this area. Management of subsurface drainage is necessary to cope with shallow groundwater conditions which result in the accumulation of salts in the root zones of agricultural crops (http://www.water.ca.gov/drainage/index.cfm). The intrusions of shallow, salty groundwater contributes to elevated SC measurements at some locations of the ESJWQC region. Zone 2 has inadequate subsurface drainage conditions and tile drains have been installed to intercept rising groundwater. This water is moved to the larger drains that are sampled by the Coalition.

Table 90. Frequency of exceedances the WQTL for SC during all seasons for 2009 and the 2015 WY.
Environmental samples and dry sites included in counts; field duplicates not counted unless exceedance occurred in only that sample. The WQTL for SC is 700 µs/cm.

Zone	Site Subwatershed	Year	Season[1]	Total Exceedances	Total Samples Collected	Frequency
1	Dry Creek @ Wellsford Rd	2009	Winter	1	163	0.61%
2	Hatch Drain @ Tuolumne Rd	2015 WY	Irrigation	4	241	1.66%
			Storm	1	241	0.41%
			Winter	2	241	0.83%
	Hilmar Drain @ Central Ave	2009	Irrigation	2	163	1.23%
		2015 WY	Irrigation	5	241	2.07%
			Storm	1	241	0.41%
			Winter	2	241	0.83%
	Lateral 5 1/2 @ South Blaker Rd	2015 WY	Fall	1	241	0.41%
			Irrigation	2	241	0.83%
			Storm	1	241	0.41%
			Winter	2	241	0.83%
	Lateral 6 and 7 @ Central Ave	2015 WY	Irrigation	3	241	1.24%
			Storm	1	241	0.41%
			Winter	2	241	0.83%
	Levee Drain @ Carpenter Rd	2015 WY	Irrigation	4	241	1.66%
			Storm	2	241	0.83%
			Winter	1	241	0.41%
	Lower Stevinson @ Faith Home Rd	2015 WY	Irrigation	3	241	1.24%
			Winter	1	241	0.41%
	Prairie Flower Drain @ Crows Landing Rd	2009	Irrigation	6	163	3.68%
			Fall	3	163	1.84%
			Winter	3	163	1.84%
		2015 WY	Irrigation	6	241	2.49%
			Storm	2	241	0.83%
			Winter	2	241	0.83%
	Unnamed Drain @ Hogin Rd	2015 WY	Irrigation	3	241	1.24%
			Storm	1	241	0.41%
			Winter	1	241	0.41%
	Westport Drain @ Vivian Rd	2015 WY	Irrigation	1	241	0.41%
			Winter	1	241	0.41%
3	Highline Canal @ Hwy 99	2015 WY	Winter	1	241	0.41%
	Highline Canal @ Lombardy Rd	2015 WY	Winter	2	241	0.83%
	Mustang Creek @ East Ave	2009	Irrigation	1	163	0.61%
			Fall	2	163	1.23%
			Winter	2	163	1.23%
4	Howard Lateral @ Hwy 140	2009	Irrigation	1	163	0.61%
		2015 WY	Irrigation	1	241	0.41%
5	Deadman Creek @ Gurr Rd	2009	Fall	1	163	0.61%
			Winter	2	163	1.23%
		2015 WY	Storm	1	241	0.41%
	Duck Slough @ Gurr Rd	2009	Fall	1	163	0.61%
		2015 WY	Irrigation	3	241	1.24%
			Winter	1	241	0.41%
2009 Totals			**Fall**	**7**	**163**	**4.29%**
			Winter	**8**	**163**	**4.91%**

Zone	Site Subwatershed	Year	Season[1]	Total Exceedances	Total Samples Collected	Frequency
			Irrigation	**10**	**163**	**6.13%**
2015 WY Totals			**Fall**	**1**	**241**	**0.41%**
			Winter	**18**	**241**	**7.47%**
			Storm	**10**	**241**	**4.15%**
			Irrigation	**35**	**241**	**14.52%**
			2009 Total	**25**	**163**	**15.34%**
			2015 WY Total	**64**	**241**	**26.56%**

[1]Storm events are included in the season it replaced.

E. coli

E. coli are bacteria that exist naturally in ecosystems and also occur in the intestinal tracts of animals. The bacteria may persist naturally in the environment or when animals void the bacteria in or around a waterbody. Conditions that facilitate the bacteria to proliferate are warm, moist environments with the presence of oxygen. Any species of vertebrate can contribute to the presence of *E. coli* in surface waters, including humans.

Manure applied to crops is another potential source of *E. coli* in surface waters, if composting is not conducted appropriately. Even though landowners and operators are required to follow crop specific manure application practices and guidelines, contamination may occur. There are many dairies located in the Coalition region and although dairies are not allowed to discharge directly into the waterways, there have been several instances reported of dairies discharging in site subwatersheds of the Coalition area. The Coalition cannot source and monitor every occurrence of these contributions.

The monitoring design for *E. coli* has changed since the adoption of the WDR. Prior to the WDR, samples for *E. coli* analyses were collected monthly at six Assessment and six Core sites. During the 2015 WY, samples for *E. coli* analyses were collected monthly at six Core sites, which reduced the sample size, or the denominator in the calculation for the percent frequencies. Nonetheless, the total number of exceedances of the WQTL for *E. coli* declined considerably from 41 (26%) in 2009 to 14 (19%) in the 2015 WY. Exceedances of the WQTL for *E. coli* are the most frequent during the irrigation season for both 2009 and the 2015 WY; however, even the number of exceedances has decreased in the irrigation season (19 in 2009 vs. 6 in the 2015 WY; Table 91).

A spatial analysis between exceedances of the WQTL for *E. coli* and cow density was provided in the 2015 Annual Report (Pages 282-285). Samples collected from sites downstream of areas where cow density is greater than seven cows per acre resulted in exceedances more frequently than sites located elsewhere in the region (Figure 61-62; 2015 Annual Report).

Table 91. Frequency of exceedances the WQTL for *E. coli* during all seasons for 2009 and the 2015 WY. Environmental samples and dry sites included in counts; field duplicates not counted unless exceedance occurred in only that sample. The WQTL for *E. coli* is 235 MPN/100.

Zone	Site Subwatershed	Year	Season[1]	Total Exceedances	Total Samples Collected	Frequency
1	Dry Creek @ Wellsford Rd	2009	Irrigation	4	148	2.70%
			Fall	3	148	2.03%
			Winter	1	148	0.68%
		2015 WY	Fall	1	72	1.39%
			Storm	1	72	1.39%
			Winter	1	72	1.39%

			Irrigation	4	72	5.56%
	Mootz Drain[2]	2009	Irrigation	6	148	4.05%
			Storm	1	148	0.68%
			Fall	2	148	1.35%
2	Prairie Flower Drain @ Crows Landing Rd	2009	Irrigation	3	148	2.03%
			Fall	3	148	2.03%
		2015 WY	Winter	2	72	2.78%
			Storm	2	72	2.78%
			Irrigation	1	72	1.39%
3	Highline Canal @ Hwy 99	2009	Irrigation	1	148	0.68%
	Mustang Creek @ East Ave	2009	Fall	1	148	0.68%
4	Howard Lateral @ Hwy 140	2009	Irrigation	1	148	0.68%
			Fall	1	148	0.68%
5	Deadman Creek @ Gurr Rd	2009	Fall	3	148	2.03%
			Irrigation	3	148	2.03%
			Winter	3	148	2.03%
	Duck Slough @ Gurr Rd	2009	Fall	2	148	1.35%
			Irrigation	1	148	0.68%
		2015 WY	Storm	1	72	1.39%
			Irrigation	1	72	1.39%
6	Cottonwood Creek @ Rd 20	2009	Fall	1	148	0.68%
			Storm	1	148	0.69
2009 Totals			**Fall**	**16**	**148**	**10.81%**
			Winter	**4**	**148**	**2.70%**
			Storm	**2**	**148**	**1.35%**
			Irrigation	**19**	**148**	**12.84%**
2015 WY Totals			**Fall**	**1**	**72**	**1.39%**
			Winter	**3**	**72**	**4.17%**
			Storm	**4**	**72**	**5.56%**
			Irrigation	**6**	**72**	**8.33%**
			2009 Total	**41**	**148**	**26.35%**
			2015 WY Total	**14**	**72**	**19.44%**

[1]Storm events are included in the season it replaced.

[2]After November 2009 the Coalition switched monitoring sites to the downstream site, Mootz Drain downstream of Langworth Pond. Both sites are referenced as Mootz Drain in this section.

Ammonia and Nitrate

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. The preliminary analysis, submitted to the Regional Board on April 4, 2016, describes how ammonium can enter a waterbody from three sources: 1) direct discharge of agricultural fertilizers as anhydrous ammonium, 2) direct discharge of animal waste, and 3) discharge from wastewater treatment plants. The most common method of anhydrous ammonium applications to fertilize agricultural field is injection into the soil. Ammonium is transformed to nitrate by nitrifying bacteria over a short period of time. This argues against the idea that direct discharge to a receiving waterbody is a possible major contributor to exceedances of the WQTLs for ammonium. Ammonium can also be formed in the waterbody through the mineralization of organic nitrogen, which is naturally occurring. However, the amount of ammonium resulting from mineralization is low arguing against this process as the primary source of ammonium in surface waters.

In 2009, there were nine exceedances of the WQTL for ammonium (calculated as unionized ammonia) and 17 exceedances of the WQTL for nitrate. During the 2015 WY, there were three exceedances of the WQTL for ammonia and nine exceedances of the WQTL for nitrate; all exceedances of the nitrate WQTL occurred in samples collected from Prairie Flower Drain @ Crows Landing Rd (Table 92). Prairie Flower Drain @ Crows Landing Rd is in Zone 2 and downstream of a large concentration of dairies that consists of approximately eight cows per acre. Unless sophisticated isotopic analytical analyses are performed, it is not possible to distinguish nitrate originating from inorganic fertilizers applied to agricultural land from nitrate originating from dairies and feedlot operations.

Both ammonium and nitrate move easily through water and are commonly detected in groundwater samples. Nitrate is detected more frequently in groundwater than ammonium because of how quickly ammonium can be broken down into nitrate before reaching groundwater. Zone 2 has a shallow groundwater table and exceedances of the WQTL for ammonia and nitrate often occur in samples collected from sites due the hydrology beneath the area. Fertilizers are usually applied during the spring and due to the extreme solubility, nitrate in fertilizer could move to surface waters immediately after applications. Nitrate in shallow groundwater may result in exceedances of the WQTL for nitrate.

Table 92. Frequency of exceedances the WQTL for ammonia and nitrate during all seasons for 2009 and the 2015 WY.

Environmental samples and dry sites included in counts; field duplicates not counted unless exceedance occurred in only that sample.

Analyte	Zone	Site Subwatershed	Year	Season[1]	Total Exceedances	Total Samples Collected	Frequency
Ammonia	1	Mootz Drain[2]	2009	Fall	1	148	0.68%
	2	Prairie Flower Drain @ Crows Landing Rd	2009	Irrigation	3	148	2.03%
				Fall	1	148	0.68%
			2015 WY	Storm	2	72	2.78%
	3	Mustang Creek @ East Ave	2009	Fall	1	148	0.68%
	5	Deadman Creek @ Gurr Rd	2009	Fall	1	148	0.68%
				Winter	2	148	1.35%
		Duck Slough @ Gurr Rd	2015 WY	Winter	1	72	1.39%
				2009 Total	**9**	**148**	**6.08%**
				2015 WY Total	**3**	**72**	**4.17%**
Nitrate	2	Lateral 2 1/2 near Keyes Rd	2009	Irrigation	1	148	0.68%
		Prairie Flower Drain @ Crows Landing Rd	2009	Irrigation	6	148	4.05%
				Fall	3	148	2.03%
				Winter	3	148	2.03%
			2015 WY	Winter	2	72	2.78%
				Storm	1	72	1.39%
				Irrigation	6	72	8.33%
	3	Mustang Creek @ East Ave	2009	Winter	2	148	1.35%
	4	Howard Lateral @ Hwy 140	2009	Irrigation	1	148	0.68%
	5	Duck Slough @ Gurr Rd	2009	Winter	1	148	0.68%
				2009 Total	**17**	**148**	**11.49%**
				2015 WY Total	**9**	**72**	**12.50%**

[1]Storm events are included in the season it replaced.

[2]After November 2009 the Coalition switched monitoring sites to the downstream site, Mootz Drain downstream of Langworth Pond. Both sites are referenced as Mootz Drain in this section.

QUESTION 4: ARE IRRIGATED OPERATIONS OF MEMBERS IN COMPLIANCE WITH THE PROVISIONS OF THE WASTE DISCHARGE REQUIREMENT?

The Coalition evaluated if irrigated operations of members are in compliance with the 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 are the implemented management practices being applied.

Implemented Management Practices

The Coalition has identified eight general classifications of management practices that are effective at reducing the impacts of agricultural discharges on water quality including:

1. Reduction in application rates,
2. Spray drift management,
3. Change to low risk products,
4. Polyacrylamide (PAM),
5. Drip or microspray irrigation,
6. Recirculation/tailwater return system,
7. Retention pond/holding basin, and
8. Grass waterways or grass filter strips.

Where Management Practices Are Applied

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 2014, 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 Action section of this report includes a complete analysis of focused outreach results and implemented management practices. Table 64 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 2014, the Coalition sent out Farm Evaluation surveys to all members. Farm Evaluations are designed to describe how each member is implementing management practices that protect water quality while trend data are collected through monitoring. Management practices included in the Farm Evaluations are 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 2015 Farm Evaluations and management practices implemented by Coalition members is provided in the Farm Evaluations 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. When beneficial uses are impaired, a TMDL for the constituent may be adopted (SC, boron, chlorpyrifos, and diazinon). These TMDLs are designed limit the input of the constituents contributing to water quality impairments.

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 80 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 (complete evaluation of management practice effectiveness is provided in the Evaluation of Management Practice Effectiveness section of this report).

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 the Coalition has 100% membership, management practices implemented by members of the Coalition may not be enough to improve water quality due to discharges by non-members who have not implemented similar practices. In addition, managing constituents that are naturally occurring in the environment (salts, metals) is beyond the scope of what the Coalition can achieve through management practice implementation alone.

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

The Coalition's management plan strategy has been effective in addressing identified water quality impairments. A complete evaluation of the Coalition's management plans and effectiveness of outreach and management practices is included in the Management Plan Status section of this report. The Coalition conducts annual grower meetings and individual farm visits to keep growers informed of water quality in the region. These outreach efforts have resulted in additional management practices implemented by members. Management Plan Monitoring results indicate water quality continues to improve throughout the Coalition region. The Coalition has demonstrated the effectiveness of those practices with improved water quality and the completion of multiple management plans in sometimes as little as two years.

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

Monitoring results indicate the Coalition's management plan strategy along with focused outreach and management practice tracking have been effective in improving water quality across the Coalition region. Since the initiation of focused outreach, the Coalition has been approved for the completion of 56 management plans in 21 site subwatersheds. Overall, water quality in the ESJWQC has significantly improved due to the implementation of the Coalition's management plan strategy. Since focused outreach began in 2008, the number and percentage of exceedances for chlorpyrifos, copper, diazinon, and diuron have declined considerably (Table 93-Table 94, Figure 44-Figure 45). Below is an evaluation of the effectiveness of the Coalition's Management Plan in addressing the top agriculturally applied constituents detected above the WQTLs since in 2006.

Chlorpyrifos

Growers applied less chlorpyrifos across the Coalition region since outreach began; 116,038 lbs AI were applied in 2008, compared to 81,066 lbs of AI applied during the 2015 WY (Table 93). Monitoring results from the 2015 WY indicate 7% of the samples analyzed for chlorpyrifos resulted in an exceedance of the WQTL, compared to 12% in 2008.

Copper

Applications of copper across the Coalition region have increased; 418,841 lbs AI were applied in 2008, compared to 704,461 of AI during the 2015 WY. Even though applications have increased, monitoring results from the 2015 WY indicate 5% of samples analyzed for copper resulted in an exceedance of the hardness based WQTL, compared to 29% in 2008 (Table 93). Exceedances of the WQTL for copper decreased significantly after 2008 when the Coalition began analyzing for the dissolved fraction of copper only.

Diazinon

Growers applied less diazinon across the Coalition region since outreach began; 5,751 lbs of AI were applied in 2008, compared to 3,051 lbs of AI applied during the 2015 WY (Table 93). Exceedances of the WQTL for diazinon in the Coalition region have not occurred since 2013 and have only occurred in Zone 5 and Zone 6.

Diuron

Growers applied less diuron across the Coalition region since outreach began; 35,390 lbs of AI were applied in 2008, compared to 21,596 lbs of AI applied during the 2015 WY (Table 93). Overall, exceedances of the WQTL for diuron have deceased in the ESJWQC region. In 2008, seven exceedances of the WQTL occurred (5%), compared to no exceedances of the WQTL during the 2015 WY.

Malathion

Overall, growers applied less malathion across the Coalition region since outreach began; 22,896 lbs of AI were applied in 2008, compared to 17,986 lbs of AI applied during the 2015 WY. However, there was an increase in use from 2011 through 2013 (Table 93). Samples collected for malathion analysis have rarely resulted in exceedances of the WQTL in the ESJWQC region; malathion was detected in only six samples since monitoring began in 2006.

In the last three years, three exceedances have occurred in samples collected from Duck Slough @ Gurr Rd (2) and Miles Creek @ Reilly Rd (1). Due to the recent exceedances in samples collected from Duck Slough @ Gurr Rd, a management plan for malathion has been initiated and focused outreach will begin in 2016.

Toxicity

Management practices implemented by targeted growers are aimed at reducing the offsite movement of pesticides and other agricultural-related constituents impairing water quality. The use of pesticides has decreased throughout the Coalition region and management practices have been implemented to reduce runoff; the effects of growers' actions are reflected in the decreasing trend in toxicity for *P. promelas* and *H. azteca* (Table 94). Throughout the Coalition region, toxicity to *C. dubia* and *S. capricornutum* increased during the 2014 WY and 2015 WY. During the 2014 WY, toxicity to *C. dubia* only accounted for 2% of samples analyzed compared to 8% during the 2015 WY; toxicity primarily occurred in Zone 2 and Zone 5 (Figure 45). Toxicity to *S. capricornutum* only accounted for 6% of samples analyzed in 2013 compared to 12% in the 2014 WY and 15% during the 2015 WY. The increase in *C. dubia* and *S. capricornutum* toxicity in samples collected during the 2015 WY is mainly the result of an increase in chlorpyrifos and malathion samples detected above the WQTL.

Overall, the most significant reductions in exceedances in the Coalition region are seen in the frequency of samples toxic to *S. capricornutum* and *H. azteca*. In 2008, 26% of samples analyzed for *S. capricornutum* toxicity resulted in toxicity, compared to 15% during the 2015 WY. Additionally, 57% of samples analyzed for *H. azteca* toxicity resulted in toxicity in 2008 compared to 3% during the 2015 WY (Table 94).

Table 93. Count of exceedances of the WQTL and samples collected for pesticides from 2006 through 2015 WY across the ESJWQC region.

Year	Chlorpyrifos				Copper[1]				Diazinon				Diuron				Malathion			
	Count of Excd	Count of Samples[2]	% Excd	Lbs Applied[3]	Count of Excd	Count of Samples[2]	% Excd	Lbs Applied[3]	Count of Excd	Count of Samples[2]	% Excd	Lbs Applied[3]	Count of Excd	Count of Samples[2]	% Excd	Lbs Applied[3]	Count of Excd	Count of Samples[2]	% Excd	Lbs Applied[3]
2006	19	115	17%	201924	23	61	38%	936935	0	95	0%	13006	0	75	0%	10582	1	93	1%	20279
2007	21	180	12%	154640	54	119	45%	570981	1	129	1%	9845	7	125	6%	12411	0	191	0%	28394
2008	29	218	13%	116038	51	175	29%	418841	2	145	1%	5751	7	141	5%	35390	2	189	1%	22896
2009	5	97	5%	143579	6	79	8%	348288	0	72	0%	5610	1	72	1%	31860	0	93	0%	19552
2010	9	93	10%	114367	8	100	8%	489424	0	74	0%	3517	1	77	1%	29043	0	84	0%	18850
2011	3	147	2%	94790	30	170	18%	621776	0	145	0%	5172	1	146	1%	41304	0	144	0%	23350
2012	0	82	0%	86390	9	90	10%	455207	0	74	0%	3198	0	79	0%	28641	0	82	0%	23962
2013	1	92	1%	113398	13	129	10%	492922	1	72	1%	4158	1	74	1%	17354	1	66	1%	32635
2014 WY	3	126	3%	112137	5	92	5%	477204	0	75	0%	2411	1	79	1%	38112	1	72	1%	22980
2015 WY	8	119	7%	81066	4	84	5%	704461	0	73	0%	3051	0	93	0%	21596	1	72	1%	17986

[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 a site is scheduled for copper total and copper dissolved analysis, only one sample is counted for copper). Concentrations from a single sample collected from one site during one event have never exceeded both the total and dissolved copper WQTLs.

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

[3] All PUR data are considered preliminary until received from California Pesticide Information Portal (CalPIP); CalPIP data are available through December 2013.

Table 94. Count of toxicity and samples collected for toxicity from 2006 through 2015 WY across the ESJWQC region.

Year	*C. dubia* Toxicity			*P. promelas* Toxicity			*S. capricornutum* Toxicity			*H. azteca* Sediment Toxicity		
	Count of Toxicity	Count of Samples[1]	% Toxic	Count of Toxicity	Count of Samples[1]	% Toxic	Count of Toxicity	Count of Samples[1]	% Toxic	Count of Toxicity	Count of Samples[1]	% Toxic
2006	15	119	13%	3	107	3%	4	108	4%	2	30	7%
2007	10	144	7%	1	135	1%	14	146	10%	5	35	14%
2008	10	185	5%	4	174	2%	52	200	26%	11	58	19%
2009	2	74	3%	3	72	4%	5	82	6%	0	12	0%
2010	2	81	2%	2	72	3%	1	88	1%	1	16	6%
2011	1	146	1%	2	144	1%	6	152	4%	1	26	4%
2012	0	90	0%	0	75	0%	2	86	2%	1	17	6%
2013	4	95	4%	1	81	1%	6	106	6%	2	25	8%
2014 WY	2	100	2%	3	89	3%	16	132	12%	3	39	8%
2015 WY	8	97	8%	0	92	0%	18	126	14%	1	39	3%

[1] Samples refer to all samples collected for constituent analysis (dry sites included).

Figure 44. Percentage of exceedances of MPM constituents per Zone during the 2015 WY.

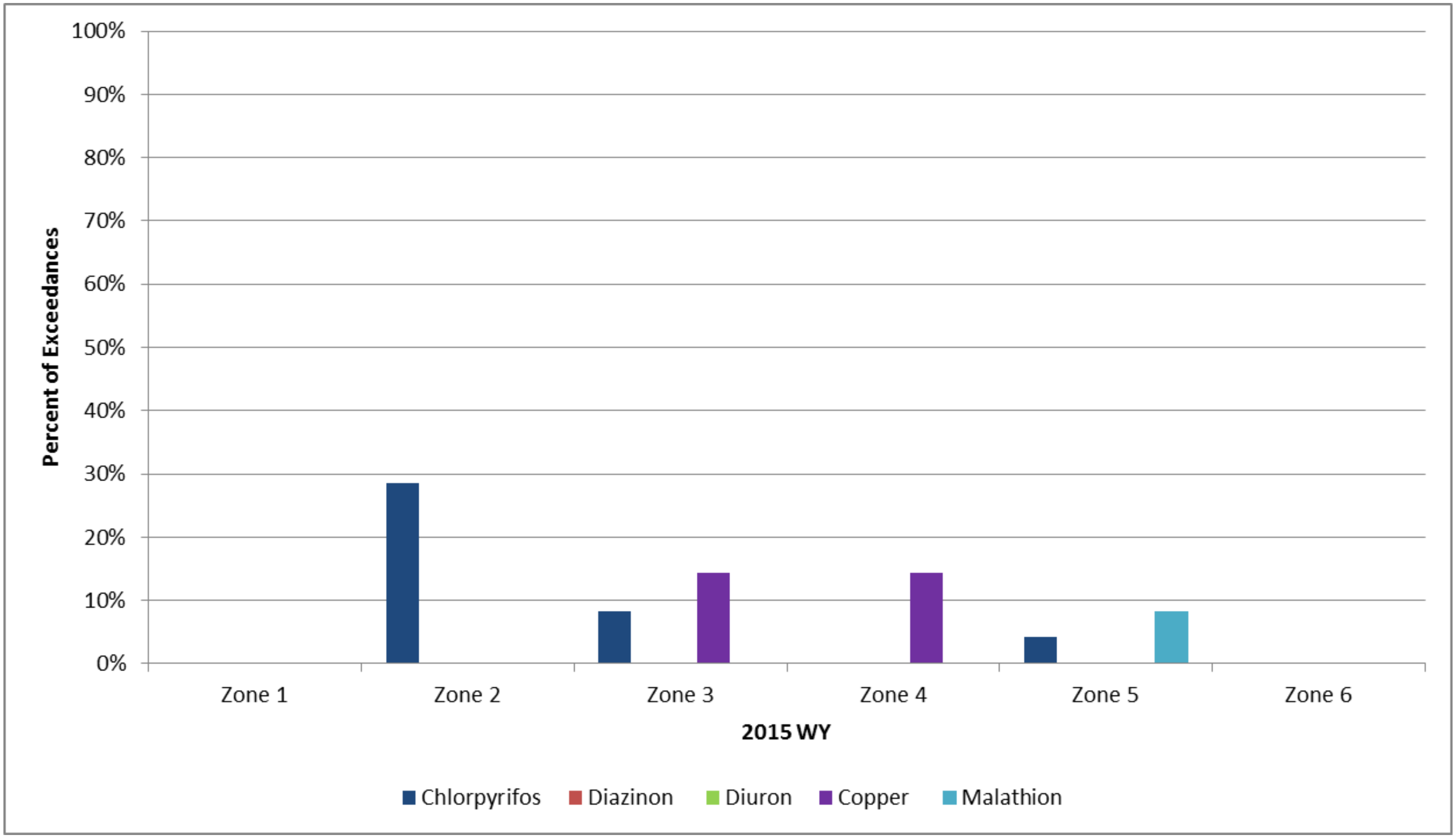
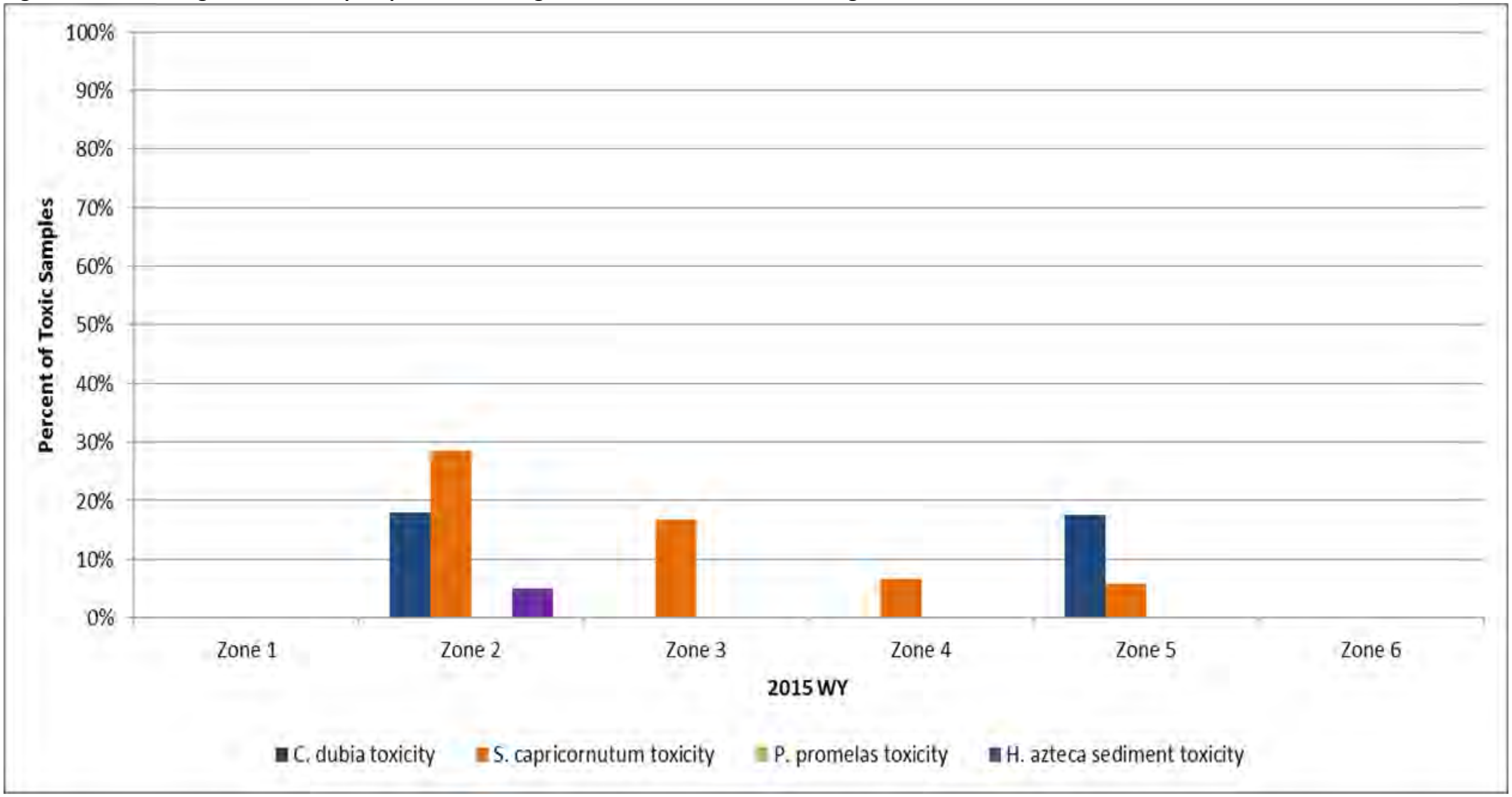


Figure 45. Percentage of toxic samples per Zone during the 2015 WY in the ESJWQC region.



Funding Resources

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 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 95 summarizes total contract acreage associated with EQIP and AWEP management practices awarded during the 2015 funding cycle in Madera, Merced, and Stanislaus Counties. Because available data are reported for the entire county, some of the practices included in the analysis for Stanislaus and Merced Counties may have been implemented outside of the Coalition region.

During the 2015 funding cycle, growers received funding to implement management practices in Madera (105 projects), Merced (255 projects), and Stanislaus (308 projects) Counties. Projects across the three counties benefited 20,406 acres of agricultural land (Table 95). Of the projects funded during the 2015 funding cycle, the top three categories belonged to irrigation related management practices (irrigation system, irrigation water conveyance, and irrigation water management; Table 95). These three categories together comprised a total of 480 projects benefiting 74% of the total acreage (Figure 46). More than half of those irrigation projects involved installation of microirrigation systems (252 projects; 6,444 acres, Table 95).

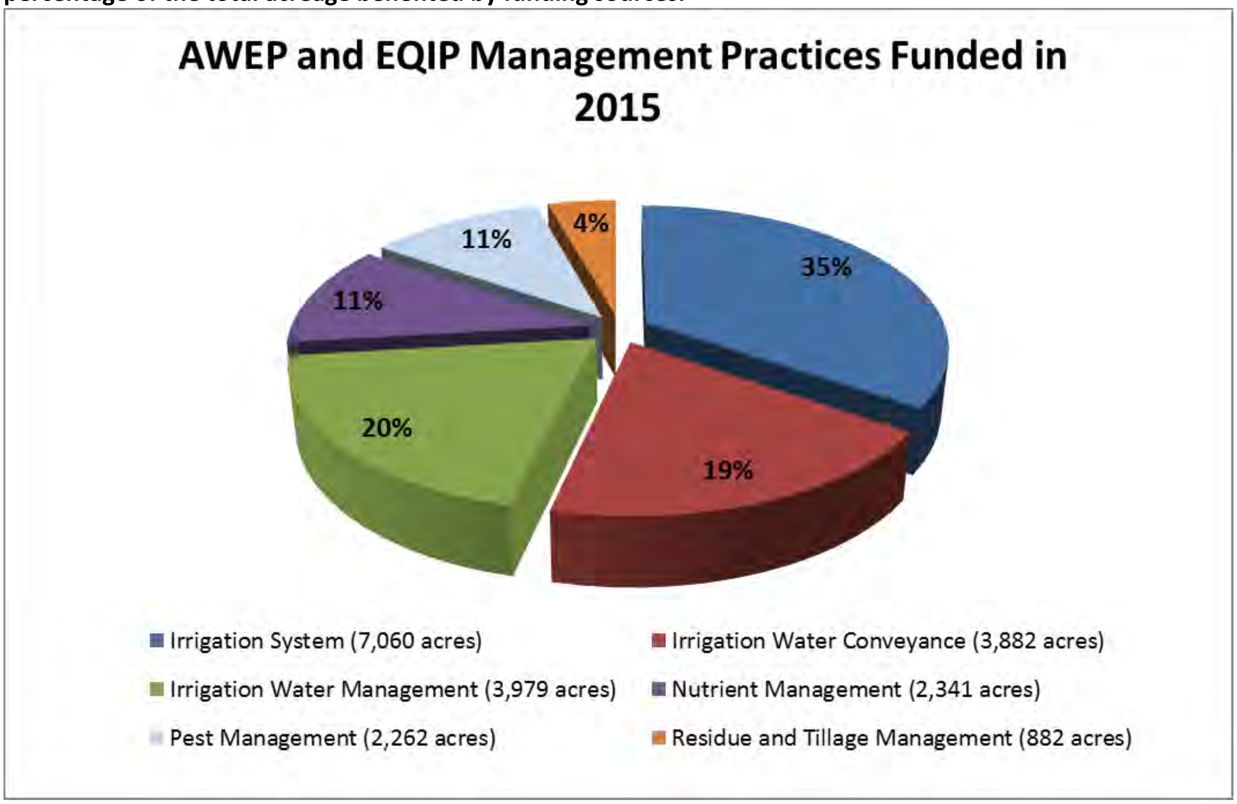
The management practices funded by AWEP and EQIP programs to date include several of the management practices recommended by the Coalition during focused outreach with targeted growers. Funding data indicate growers are utilizing financial resources to implement management practices designed to improve 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 95. Practices that received EQIP and AWEP funding in ESJWQC 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 Merced Counties may have been implemented outside of the ESJWQC region.

Practice Category	Practice Name	Units Implemented	Madera	Merced	Stanislaus	Total Projects	Total Acreage Benefited
Irrigation System	Microirrigation	acres	1,033	3,723	1,688	252	6,444
	Tailwater Recovery	number		3		3	180
	Sprinkler System	acres		436		10	436
						Total Irrigation System Acreage	**7,060**
Irrigation Water Conveyance	Irrigation Water Conveyance, Pipeline, Low-Pressure, Underground, Plastic	Feet		6,618	2,000	6	224
	Structure for Water Control	number	2	15	15	31	1,157
	Irrigation Pipeline	Feet	2,925	75,148	27,577	62	2,5001
						Total Irrigation Water Conveyance Acreage	**3,882**

PRACTICE CATEGORY	PRACTICE NAME	UNITS IMPLEMENTED	MADERA	MERCED	STANISLAUS	TOTAL PROJECTS	TOTAL ACREAGE BENEFITED
Irrigation Water Management	Irrigation Water Management	acres	689	1,702	789	92	3,179
	Irrigation Land Leveling	acres	181	603	16	24	800
						Total Irrigation Water Management Acreage	**3,979**
Nutrient Management	Cover Crop	acres	124	26	33	19	183
	Comprehensive Nutrient Management Plan - Written	number	1	3		4	281
	Nutrient Management	acres	500	795	582	52	1,877
						Total Nutrient Management Acreage	**2,341**
Pest Management	Precision Pest Control Application	acres			1,517	66	1,517
	Integrated Pest Management (IPM)	acres	630	115		15	745
						Total Pest Management Acreage	**2,262**
Residue and Tillage Management	Residue and Tillage Management, Reduced Till	acres			677	25	677
	Forage Harvest Management	acres		58		1	58
	Hedgerow Planting	Feet	4,950	1,607		5	147
						Total Residue and Tillage Management Acreage	**882**
					Grand Total	**667**	**20,406**

Figure 46. Main management practice categories that received funding during the 2015 funding cycle as percentage of the total acreage benefited by funding sources.



CONCLUSIONS AND RECOMMENDATIONS

Monitoring results from the 2015 WY indicate that although there are substantial improvements in water quality in many areas, water quality is still not protective of all beneficial uses across the entire Coalition region. The BUs impaired during the 2015 WY include:

- Aquatic Life (ammonia, chlorpyrifos, DO, dimethoate, and dissolved copper),
- Agriculture (molybdenum, SC),
- Municipal and Domestic Supply (ammonia, arsenic, nitrate),
- Recreational (*E. coli*).

The most common exceedances (DO, SC, and *E. coli*) are constituents for which irrigated agriculture may not be the driving factor despite the fact that the landscape consists primarily of irrigated agriculture.

Discharges from irrigated lands are only one of many possible sources of impaired beneficial uses. For many parameters it is not clear to what extent exceedances of WQTLs are a result of agricultural activities such as field parameters where source identification is difficult especially for non-conserved constituents (DO and pH). In 2016, the Coalition submitted preliminary analyses to evaluate water quality parameters most likely to influence DO, pH, arsenic, copper, molybdenum, ammonia, and nitrate in the ESJWQC region in order to identify and provide recommendations about management practices most likely to be effective in reducing exceedances.

In the event of exceedances of pesticide WQTLs or the occurrence of toxicity, the Coalition identifies sources through the analysis of preliminary PUR data, assessment of water quality data and evaluation of current management practices of targeted growers.

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

1. Individual grower visits 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 ESJWQC 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 ESJWQC region are taking advantage of available funding resources to implement management practices that improve water quality.
5. Remaining exceedances may be difficult to eliminate because the cause/source of the problems may not be due to agriculture; management practices effective in eliminating exceedances of pesticides are not effective in reducing exceedances of WQTLs for parameters such as DO, SC, *E. coli,* ammonia/nitrate, or pH.
6. Agriculture may not be the cause of water quality impairments associated with elevated concentrations of copper.

7. The Coalition's focused management practice outreach and tracking strategy is effective at improving water quality. The Coalition received approval on March 25, 2016 to remove 18 specific site subwatershed/ constituent pairs from the active management plan of 12 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 and the monitoring schedule outlined in the Monitoring Plan Update (2016 WY MPU; approved November 13, 2015 and March 7, 2016).
2. Continue to document and assess management practices implemented by Coalition growers.
3. Continue focused outreach and education efforts around constituents applied by agriculture while also educating growers about non-conserved constituents such as DO, pH, and SC.

The Coalition identified several areas in which CVRWQCB 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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