East San Joaquin
WATER QUALITY COALITION
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www.esjcoalition.org

May 1, 2015

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

Dear Ms. Creedon,

The East San Joaquin Water Quality Coalition (Coalition or ESJWQC) is submitting the 2015 Annual Report for review by the Central Valley Regional Water Quality Control Board (CVRWQCB) as required by the Waste Discharge Requirements General Order for Growers within the Eastern San Joaquin River Watershed that are Members of ESJWQC (Order or WDR; R5-2012-0116-R2).

The 2015 Annual Report is being submitted to inform the Regional Board of the ESJWQC monitoring and reporting program and management of water quality within the Coalition region for the period of October 1, 2013 through September 30, 2014. Included in the Annual Report are updates of monitoring results, a status update of constituents and subwatersheds requiring a management plan, an evaluation of the current Management Plan strategy including a status update of high priority site subwatershed performance goals, a summary of outreach and education activities, and a summary of current and newly implemented management practices in high priority site subwatersheds. In addition, the Annual Report includes an evaluation of management practice effectiveness, a summary of required grower submittals, and an analysis of spatial trends of the relationship between exceedances and use of various pesticides or the presence of dairies.

Electronic files will be mailed including:

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

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

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

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

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

Submitted respectfully,

Parry Klassen
Executive Director
East San Joaquin Water Quality Coalition

Cc:
Susan Fregien, CVRWQCB
Yared Kebede, CVRWQCB
Michael Johnson, MLJ-LLC
Melissa Turner, MLJ-LLC

Annual Report

East San Joaquin
WATER QUALITY COALITION

October 2013 – September 2014

Submitted May 1, 2015

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LIST OF ACRONYMS

A	Assessment
AG	Agriculture
AI	Active Ingredient
AMR	Annual Monitoring Report
APN	Assessor Parcel Number
AWEP	Agricultural Water Enhancement Program
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
EC_{50}	Effective Concentration of 50% of the measured endpoint
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
FEP	Farm Evaluation Plan
FD	Field Duplicate
GAR	Groundwater Quality Assessment Report
HCH	Hexachlorocyclohexane
ILRP	Irrigated Lands Regulatory Program
K_{oc}	Organic Carbon Partitioning Coefficient
LABQA	Laboratory Quality Assurance
LC_{50}	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
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
TBD	To Be Determined
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
TUa	Toxic Unit (acute)
TUc	Toxic Unit (chronic)
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-R2 or 'The Order'
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	nanograms
NTU	Nephelometric Turbidity Units
sec	second
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).
Waiver – Central Valley Regional Water Quality Control Board Coalition Group Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands, Order No. R5-2008-0005 amending Order No. R5-2006-0053.
Waterbody –Standing or flowing water of any size that may or may not move into a larger body of water, including lakes, reservoirs, ponds, rivers, streams, tributaries, creeks, sloughs, canals, laterals and drainage ditches.
Watershed – The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point (EPA terms of environment: http://www.epa.gov/OCEPAterms/wterms.html).

ANNUAL REPORT REQUIREMENTS – SECTION KEY

REQUIRED 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)	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 Exceedance 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

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)	Section Name/Location – Annual Report
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 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

Table B. ESJWQC Management Plan Updates and Amendments Summary.

Item Number	Amendments Descriptions	Date Submitted[1]	Management Plan Page Number	Date Approved
	Original ESJWQC Management Plan Report	**October 30, 2008**		**November 25, 2008**
1	2009 Management Plan Update Report.	April 1, 2009	NA	September 28, 2009
2	Request to exchange priority sites: Hilmar Drain @ Central Ave for Bear Creek @ Kibby Rd	October 23, 2009	Table B Pages 23-25, 35-36	November 18, 2009
3	Request to modify Management Plan schedules to review status of current and the next set of high priority subwatersheds and proposed schedule for year of focused approach	June 5, 2009	Verbiage, Page 65, Table B	December 16, 2009
4	Request to exchange sites: Exchanged Mootz Drain @ Langworth Rd for Mootz Drain downstream of Langworth Pond	September 8, 2009	Table B	November 18, 2009
5	2010 Management Plan Update Report	April 1, 2010	NA	June 21, 2010
6	Request to modify Management Plan Performance Goal schedule to address the remaining site subwatersheds	June 5, 2010	Table 8, Table 9, Pages 28-31, Table 18, Pages 77-79	June 8, 2010
7	Request to exchange priority sites: Ash Slough @ Ave 21 with Lateral 2 ½ near Keyes Rd and update Management Plan Performance Goals table for 3rd priority	October 12, 2010	Table B	November 17, 2010
8	2011 Management Plan Update Report	April 1, 2011	NA	May 17, 2011
9	Request to update Management Plan Performance Goals for 4th priority	October 17, 2011	NA	November 14, 2011
10	Request to remove constituents from site specific management plans	January 6, 2012	NA	May 30, 2012
11	2012 Management Plan Update Report	April 1, 2012	NA	June 25, 2012
12	Request to extend 4th priority Management Plan Performance Goals deadlines for Performance Measures 2.1 and 2.2	July 23, 2012	NA	July 30, 2012
13	Request to update Management Plan Performance Goals for 5th priority	October 23, 2012	NA	November 1, 2012
14	Request to remove constituents from site specific management plans	November 7, 2012	NA	October 15, 2013
15	2013 Management Plan Update Report	April 1, 2013	NA	July 1, 2013
16	Request to extend 5th priority Management Plan Performance Goals deadlines for Performance Measures 2.1 and 2.2	May 30, 2013	NA	June 3, 2013
17	Second request to extend 5th priority Management Plan Performance Goals deadlines for Performance Measures 2.1 and 2.2	September 12, 2013	NA	September 23, 2013
18	Request to update Management Plan Performance Goals for 6th priority and exchange priority site Silva Drain @ Meadow Drive with Ash Slough @ Ave 21	September 23, 2013	NA	January 28, 2014
19	Request to remove Silva Drain @ Meadow Dr from monitoring and management plan.	June 4, 2013	NA	February 13, 2014
	Revised ESJWQC Management Plan Report	**May 1, 2014 (resubmitted March 10, 2015)**		**Pending**

[1] All deliverables are submitted electronically (Quarterly Data Submittal and Annual Report/ Management Plan Progress Report)
NA-Not applicable

EXECUTIVE SUMMARY

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

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

The ESJWQC area includes the portions of Stanislaus and Merced Counties east of the San Joaquin River, Madera, Tuolumne, and Mariposa Counties and the portion of Calaveras County that drains into the Stanislaus River. 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 types, land use, soil types, and precipitation. Zone names are based on the Core site locations within that 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, there are Core sites and Represented sites in 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 when an exceedance of a WQTL occurred at an associated Core site and schedules monitoring at the Represented sites, as necessary. Sampling occurred from October 2013 through September 2014 at Core, Represented, and Management Plan Monitoring (MPM) locations, including two storms and two sediment monitoring events. Total Maximum Daily Load (TMDL) monitoring also occurred at the three compliance points on the San

Joaquin River (SJR), once 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 TMDL Monitoring subsection in the Monitoring Objectives and Design and Status of Special Project sections of this report outlines the ESJWQC and the Westside Coalition's collaborative monitoring plan for assessing compliance with the Lower San Joaquin River concentration based loads at the six compliance points identified in the Basin Plan Amendment.

Monitoring Program Submittals Required by the WDR

The Coalition's Waste Discharge Requirements General Order R5-2012-0116-R2, adopted December 7, 2012, revised October 3, 2013 and March 27, 2014 (Order or WDR). Below is a list of the items the Coalition has submitted for compliance.

The Coalition submitted the Farm Evaluation Addendum to the 2014 Annual Report on July 1, 2014 (approval pending).

The Groundwater Assessment Report (GAR) was submitted on January 13, 2014 (conditionally approved on June 4, 2014), revised and resubmitted on November 7, 2014, and approved December 24, 2014. The Nitrogen Management Plan Template was resubmitted on December 18, 2014 and approved on December 23, 2014. The Sediment Discharge and Erosion Control Plan Template was submitted on April 11, 2013 (approval pending) and the Sediment Discharge and Erosion Assessment Report was submitted on January 13, 2014, revised and resubmitted on December 12, 2014 (approval pending).

As a coordinated effort with the Westside Water Quality Coalition and the San Joaquin County and Delta Water Quality Coalition, the ESJWQC is developing a Management Practice Evaluation Program (MPEP) Workplan. The Coalition submitted the MPEP Group Agreement on January 14, 2014 (conditionally approved March 13, 2014) and the MPEP-Identify Technical Experts on September 23, 2014.

The Coalition received approval on January 5, 2015 for the 2015 WY Monitoring Plan Update (MPU).

Monitoring Program Objectives

The primary objectives of the monitoring program are to characterize discharge from irrigated agriculture and to determine if the implementation of management practices can be effective in reducing or eliminating discharge and impairments of beneficial uses. In order to achieve the monitoring objectives, the Coalition monitored 28 sites during the 2014 WY. Of these 28 sites, MPM took place at 21 sites; all six Core sites were monitored for management plan constituents. Ten of the 21 sites had MPM only (Ash Slough @ Ave 21, Bear Creek @ Kibby Rd, Berenda Slough along Ave 18 ½, Black Rascal Creek @ Yosemite Rd, Deadman Creek @ Gurr Rd, Deadman Creek @ Hwy 59, Dry Creek @ Rd 18, Highline Canal @ Lombardy Rd, Livingston Drain @ Robin Ave, and Miles Creek @ Reilly Rd).

Based on the prioritization of exceedances, MPM was conducted for copper, lead, molybdenum, chlorpyrifos, diazinon, dimethoate, diuron, and water column toxicity to *Ceriodaphnia dubia, Pimephales promelas, Selenastrum capricornutum,* and sediment toxicity to *Hyalella azteca.*

Monitoring constituents are established by the Irrigated Lands Regulatory Program (ILRP) in the Order R5-2012-0116-R2 (Appendix B, Table 2). During the 214 WY, the Coalition sampled for numerous water quality parameters and constituents including organic pesticides, *E. coli*, physical parameters (total suspended solids (TSS) and turbidity), nine metals, total organic carbon, five nutrients, field parameters Dissolved Oxygen (DO), pH, and Specific Conductance (SC), 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,* sediment physical parameters (grain size and total organic carbon (TOC). When sediment toxicity is less than 80 percent survival, additional chemistry analysis for chlorpyrifos and pyrethroids is required.

The Coalition sampled for organochlorines, Group A pesticides, glyphosate and paraquat during one storm and one irrigation event on February 10 and August 12, 2014. Metals not applied by agriculture (arsenic, cadmium, lead and molybdenum) were monitored during two storm and two irrigation events on February 10, March 3, July 8, and August 12, 2014. Monitoring for metals under current management plans continues with the original approved MPM strategy.

Monitoring Program Compliance

For the 2014 WY, the Coalition was able to meet its monitoring program objectives by 1) determining the concentration and load of specific contaminants in surface waters, 2) evaluating compliance with existing narrative and numeric water quality limit triggers to determine if implementation of additional management practices is necessary to improve and/or protect water quality, and 3) assessing the impact of stormwater discharges from irrigated agriculture to surface water. The Coalition uses management practice survey results and Farm Evaluation surveys to determine which practices to implement in order to reduce discharge of specific wastes that impact water quality in receiving waters of the Coalition region. Results from 2014 indicate improved water quality.

Coalition monitoring during the 2014 WY resulted in exceedances of WQTLs for DO, *E. coli*, pH, SC, ammonia, nitrates, *E. coli*, arsenic, copper, molybdenum, chlorpyrifos, diuron, hexachlorocyclohexane (HCH-gamma), and malathion. Water column toxicity to *C. dubia, S. capricornutum, P. promelas,* and sediment toxicity to *H. azteca* also occurred. Monitoring results and a complete tally of all sites sampled, dry events, and exceedances that occurred during the 2014 WY are provided in Appendix III.

The exceedances of WQTLs for physical parameter included DO (75), pH (28), SC (82), and *E. coli* (12). Exceedances of the WQTLs also occurred for nitrate (7) and ammonia (1). Of the metals analyzed, there were five exceedances of the hardness based WQTL for dissolved copper and eight exceedances of the WQTL for molybdenum. Exceedances occurred for chlorpyrifos (3), diuron (1), HCH-delta (1) and malathion (1). Overall, exceedances of physical parameters and *E. coli* were much more common than exceedances of pesticides or metals.

Water column toxicity to *C. dubia* (2), *P. promelas* (3), and *S. capricornutum* (18) occurred during the 2014 WY. All toxicity results with 50% or less compared to the control Toxicity Identification Evaluations (TIEs) were initiated to determine the cause of toxicity. Three toxic samples collected at Deadman Creek

@ Gurr Rd (toxic to *C. dubia* and *P. promelas*) and the sample collected at Hatch Drain @ Tuolumne Rd (toxic to *P. promelas*) were most likely caused by high levels of ammonia. *C. dubia* toxicity and *P. promelas* toxicity occurred at Duck Slough @ Gurr Rd in March; no TIE was conducted due to the percent effect being less than 50%. The toxicities coincided with an exceedance level detection of chlorpyrifos. The cause of *S. capricornutum* toxicities in samples collected from Highline Canal @ Hwy 99 in June and July, Levee Drain @ Carpenter Rd in June, and Lower Stevinson @ Faith Home Rd in June was non-polar organics and metals. The cause of toxicity to *S. capricornutum* in samples collected at Lateral 5 ½ @ South Blaker Rd, Lateral 6 and 7 @ Central Ave, Levee Drain @ Carpenter Rd, Lower Stevinson @ Faith Home Rd, and Prairie Flower Drain @ Crows Landing Rd could not be determined because no TIE was conducted (percent effect being less than 50%) or toxicity was not persistent.

Sediment toxicity to *H. azteca* occurred in five of 50 samples collected during storm and irrigation sediment monitoring. The sediment toxicity occurred once at Mootz Drain downstream of Langworth Pond, twice at Hatch Drain @ Tuolumne Rd, and once each at Levee Drain @ Carpenter Rd and Lateral 6 and 7 @ Central Ave. Three of the five toxic sediment samples had survival less than 80% compared to the control and therefore additional chemistry analysis was required. Samples collected from Hatch Drain @ Tuolumne Rd on March 4 and September 9, 2014 resulted in 56% and 52% survival compared to the control, respectively. The sample collected from Levee Drain @ Carpenter Rd resulted in 76% survival; chlorpyrifos and pyrethroids were detected in all three samples.

As a result of the 2014 WY monitoring, several new site/constituent specific management plans are required including:

- DO
    - Highline Canal @ Hwy 99
    - Lateral 6 and 7 @ Central Ave
    - Unnamed Drain @ Hogin Rd
- pH
    - Lateral 5 ½ @ South Blaker Rd
    - Lower Stevinson @ Faith Home Rd
    - Miles Creek @ Reilly Rd
    - Prairie Flower Drain @ Crows Landing Rd (reinstate management plan)
- SC
    - Duck Sough @ Gurr Rd (reinstate management plan)
    - Lateral 2 ½ near Keyes Rd
    - Lateral 5 ½ @ South Blaker Rd
    - Lateral 6 and 7 @ Central Ave
    - Lower Stevinson @ Faith Home Rd
    - Unnamed Drain @ Hogin Rd
    - Unnamed Drain @ Hwy 140
- Chlorpyrifos
    - Duck Slough @ Gurr Rd (reinstate management plan)
- Water column toxicity to *P. promelas*

    - Duck Slough @ Gurr Rd
- Water column toxicity to *S. capricornutum*
    - Lateral 5 ½ @ South Blaker Rd
    - Levee Drain @ Carpenter Rd
    - Lower Stevinson @ Faith Home Rd
- Sediment toxicity to *H. azteca*
    - Levee Drain @ Carpenter Rd

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

The Coalition prioritized constituents and site subwatersheds to allow for focused source identification, outreach, and evaluation. The Coalition prioritized site subwatersheds based on the number, frequency, and magnitude of chlorpyrifos and diazinon exceedances. Other factors considered included size of the site subwatershed and known improvements in management practices that had already been implemented in those areas. Although the Coalition focused on chlorpyrifos and diazinon exceedances and associated applications, management practices implemented to reduce the runoff of these constituents will also reduce the runoff of other pesticides, nutrients, salts, and metals.

Management Plan Strategy

The Coalition developed High Priority Site Subwatershed Performance Goals (hereafter referred to as Performance Goals) for its high priority site subwatersheds. The Coalition submitted Performance Goals on November 24, 2008 in an amendment to the Management Plan. The Coalition revised the Performance Goals in the 2014 Surface Water Quality Management Plan (SQMP) (submitted May 1, 2014, resubmitted March 10, 2015; approval pending). These goals were developed with coordination from Regional Board staff after evaluation of the effectiveness of the Coalition's Management Plan strategy. Performance goals are submitted for approval each time a new set of site subwatersheds rotate into high priority status and are built on the following actions essential to the Management Plan strategy:

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

As described in the Coalition's MPM strategy in the 2008 Management Plan, the Coalition contacts individuals within the site subwatersheds who have the potential for direct drainage and have applied constituents of concern. The purpose of grower outreach is to review current farm management practices, determine if additional management practices are applicable, and document implementation of any new practices. Individual meetings inform growers of current water quality concerns and management practices that can be implemented to reduce impairments of water quality due to agricultural discharge.

The first through fifth priority subwatersheds Performance Goals 1-5 are complete. Focused outreach began during late 2012 and ended in early 2015 in the fifth priority site subwatersheds: Hatch Drain @ Tuolumne Rd, Highline Canal @ Lombardy Rd, Merced River @ Santa Fe, and Miles Creek @ Reilly Rd. In 2015, follow-up contacts are scheduled with growers from the sixth priority subwatersheds to document implementation of new practices.

For the seventh priority site subwatersheds, Howard Lateral @ Hwy 140, Mootz Drain downstream of Langworth Pond, and Levee Drain @ Carpenter Rd, the Coalition requested to utilize the revised Performance Goals (request submitted November 19, 2014, approved on January 5, 2015). The Coalition is in the process of initiating focused outreach in the seventh priority site subwatersheds. Further analysis of the first through seventh high priority site subwatersheds is included in Appendices I and II of this report.

Additionally, the ESJWQC established monitoring and management activities for TMDL constituents as required in the Regional Board's Basin Plan for the Sacramento and San Joaquin River basins. Monitoring design, as well as an assessment of the Coalition's compliance with TMDL Objectives, are reported in detail in the San Joaquin River Chlorpyrifos and Diazinon TMDL 2014 WY AMR (submitted May 1, 2015).

Conclusions

Monitoring results from the 2014 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 most common exceedances of WQTLs involved field and physical parameters (such as DO and salts) and *E. coli* resulting in impaired Agricultural and Aquatic Life beneficial uses (BUs) and the Recreation Beneficial Use. Other constituents that impaired Aquatic Life BUs occurred as a result of chlorpyrifos, ammonia, and dissolved copper. Impairment to the Municipal and Domestic Supply BU were elevated concentrations of diuron, nitrate/nitrite, and ammonia. The most common exceedances involve constituents for which irrigated agriculture may not be the driving factor despite the fact that the landscape consists primarily of irrigated agriculture.

Conclusions from data provided in the Management Practice Effectiveness, Farm Evaluations, Coalition Wide Evaluation, Status of TMDL Constituents, and Spatial and Temporal trends 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. Results from the 2014 WY monitoring indicate fewer exceedances overall in high priority site subwatersheds where both general and focused outreach occurred, as well as in site subwatersheds where only general outreach occurred.
6. Remaining exceedances may be difficult to eliminate because the cause/source of the problems may not be irrigated agriculture and if they are, management practices that are very effective in eliminating exceedances of pesticides are not effective in reducing exceedances of WQTLs for parameters such as DO, SC (salts), *E. coli*, ammonia/nitrates, or pH.
7. Agriculture may not be the only cause of water quality impairments that are the result of elevated concentrations of copper in the Coalition region.
8. The Coalition's focused management practice outreach and tracking strategy is effective at improving water quality. The Coalition received approval on October 15, 2013 to remove eight specific site subwatershed/ constituent pairs from the active management plan of seven site subwatersheds.
9. Continued improvements in water quality are expected based on past grower outreach efforts and upcoming focused outreach in new priority subwatersheds.
10. Water quality impairments will continue if there remain growers in the Coalition region who do not have to comply with discharge requirements.

Based on the information provided in the response to the programmatic questions, the Coalition will pursue the following during the 2015 WY:

1. Monitor according to the WDR adopted in December 2012 and the monitoring outline in the Monitoring Plan Update (MPU).
2. Continue to document and assess management practices implemented by Coalition growers.
3. Continue to focus outreach and education efforts around constituents applied by agriculture while also educating growers about non-conserved constituents such as dissolved oxygen and salinity.

The Coalition identified several areas in which 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 within priority subwatersheds that are using chlorpyrifos and/or copper which may be affecting downstream beneficial uses.
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 difficult issues such as contamination of surface waters by *E. coli*.
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.

1. 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-R2), the East San Joaquin Water Quality Coalition (ESJWQC or Coalition) is submitting the Annual Report for monitoring results from October 2013 through September of the 2014 Water Year (WY).

The 2015 Annual Report is the second report submitted by the ESJWQC reporting on the monitoring activities under the WDR. The Annual Report includes sections which address the reporting requirements for the Monitoring Report (Attachment B to General Order R5-2012-0116-R1) and Management Plan Progress Report (Appendix MRP-1). The Annual Report Requirements – Section Key (Page xvi) lists the required components from both reports and which section of this report they are addressed in. The Annual Report includes the previous WY monitoring results and activities as well as the status of management plan implementation schedules and timelines in order determine whether discharges from irrigated lands are protective of beneficial uses meeting water quality objectives as well as whether management practices implemented by irrigated agriculture are effective (Attachment A to Order R5-2012-0116-R2, Page 10-11).

2. ESJWQC GEOGRAPHICAL AREA

The ESJWQC area includes the portions of Stanislaus and Merced Counties east of the San Joaquin River, Madera County, the portion of Fresno County that drains directly into the San Joaquin River, and the portion of San Joaquin County that drains directly into the Stanislaus River. The eastern counties within the boundary include Tuolumne, Mariposa, and the portions of Calaveras and Alpine Counties that drain into the Stanislaus River. Drainage is determined using the CA 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.

2.A. IRRIGATED LAND

Although exact acreage is difficult to estimate due to rapidly changing land use, the Coalition area contains approximately 5,742,910 acres of which 983,251 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) estimates the acreage of irrigated crops for the entirety of 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) than the Agricultural Land and Water Use data but is updated less often. Because Land Use Survey data are available in GIS shape files, the information 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 San Joaquin, Stanislaus, Merced, Madera, Fresno, Alpine and Calaveras Counties, the Coalition utilized DWR Land Use Survey data to determine irrigated land area as only portions of these counties are included in the Coalition boundary or the data were more current. For Tuolumne and Mariposa Counties, data from Agricultural Land and Water Use 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. For 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	84,714	0		2001
Calaveras	120,257	871		2000
Fresno*	607,413	0		2000*
Madera*	1,377,560	350,926		2001*
Mariposa	935,270	900	2005	1998
Merced	668,092	364,986		2002
San Joaquin	9,013	6,295		1996
Stanislaus	483,221	258,163		2004
Tuolumne	1,457,370	1,110	2005	1997
Total	**5,742,910**	**983,251**		

[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.

2.B. 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 Core Monitoring location 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 Figures 2-7.

Figure 1. ESJWQC zone boundaries and Core sites.

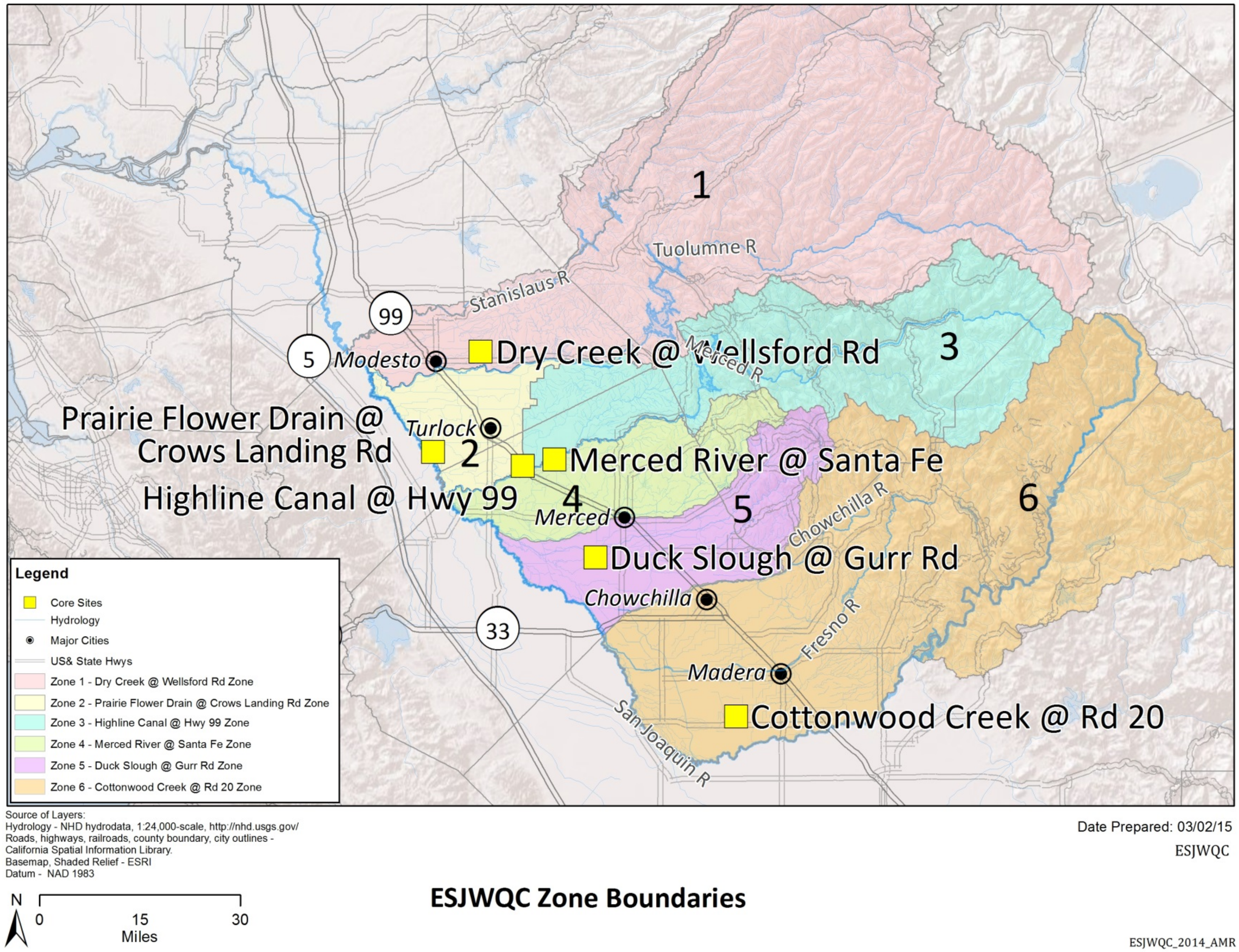


Table 2. ESJWQC 2013 total and irrigated acreages for Zones 1-6.

ZONES	TOTAL ACRES[1] (FROM ARCGIS)	IRRIGATED ACRES[2] (FROM LAND USE)
Zone 1: Dry Creek @ Wellsford Rd Zone	1,932,383	119,247
Zone 2: Prairie Flower Drain @ Crows Landing Rd Zone	195,780	145,393
Zone 3: Highline Canal @ Hwy 99 Zone	857,618	84,460
Zone 4: Merced River @ Santa Fe Zone	338,903	118,681
Zone 5: Duck Slough @ Gurr Rd Zone	396,501	160,601
Zone 6: Cottonwood Creek @ Rd 20 Zone	2,015,328	353,008
Total	**5,736,513**	**981,390**

[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 2001.

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

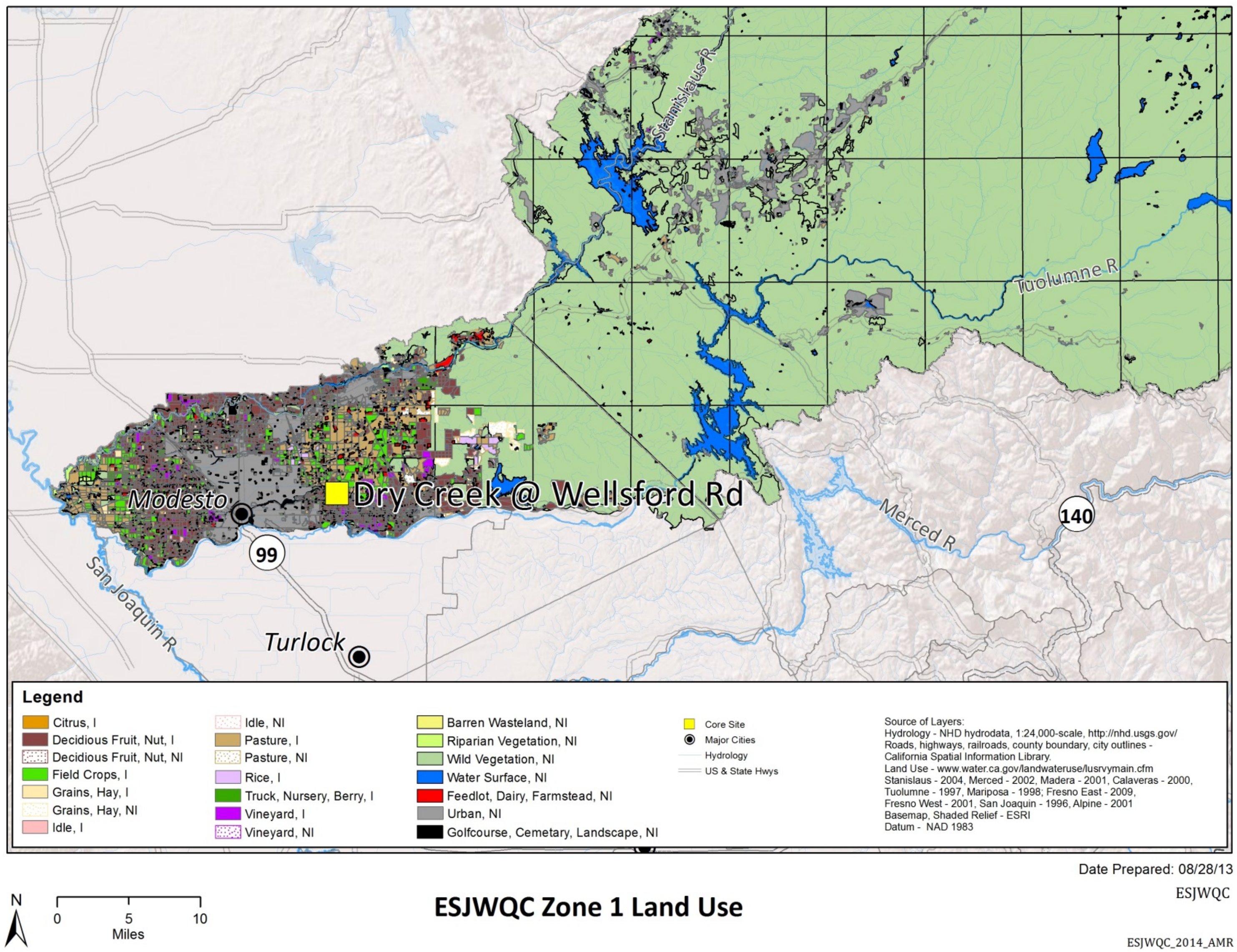


Figure 3. Prairie Flower Drain @ Crows Landing Zone (Zone 2) Land Use.

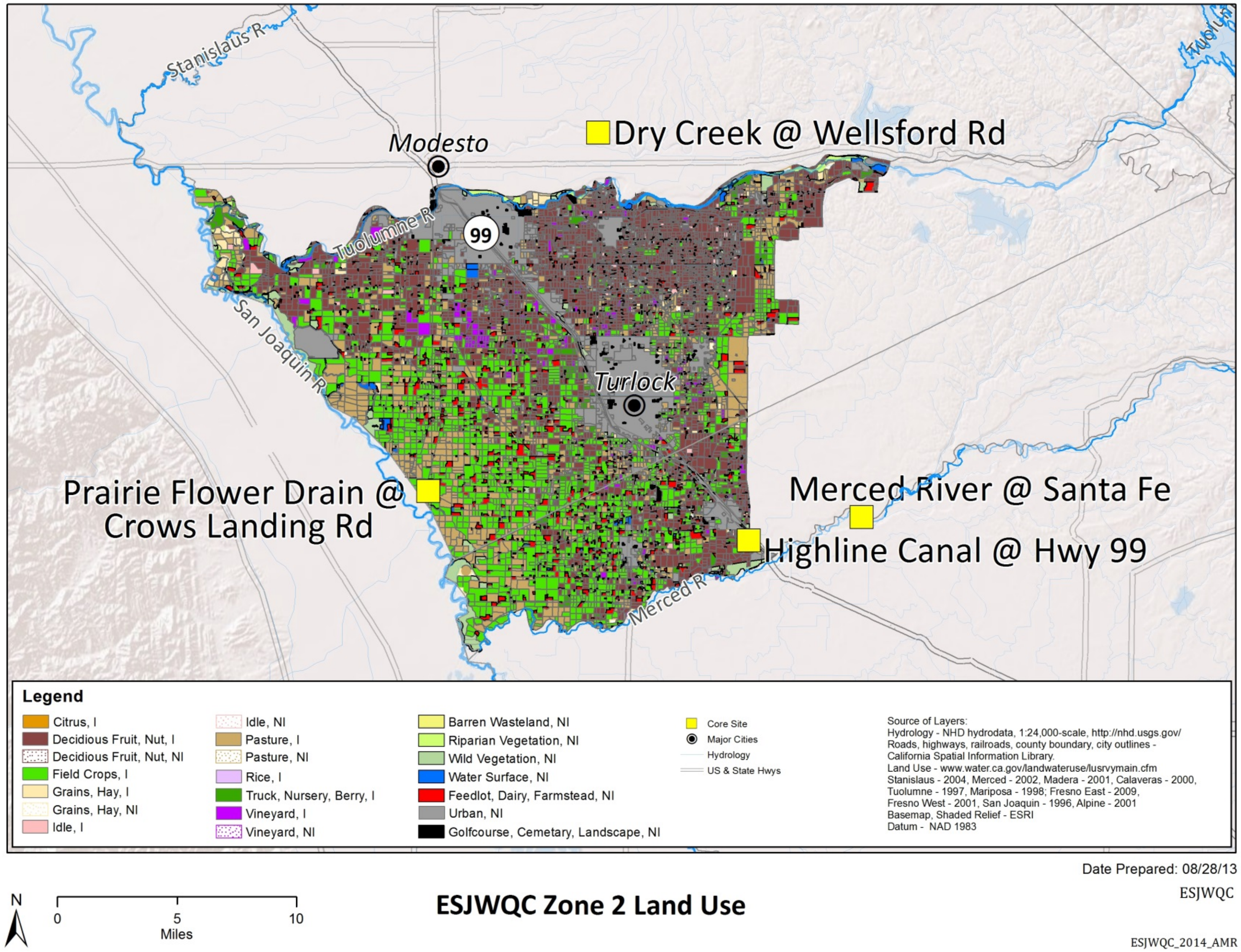


Figure 4. Highline Canal @ Hwy 99 Zone (Zone 3) Land Use.

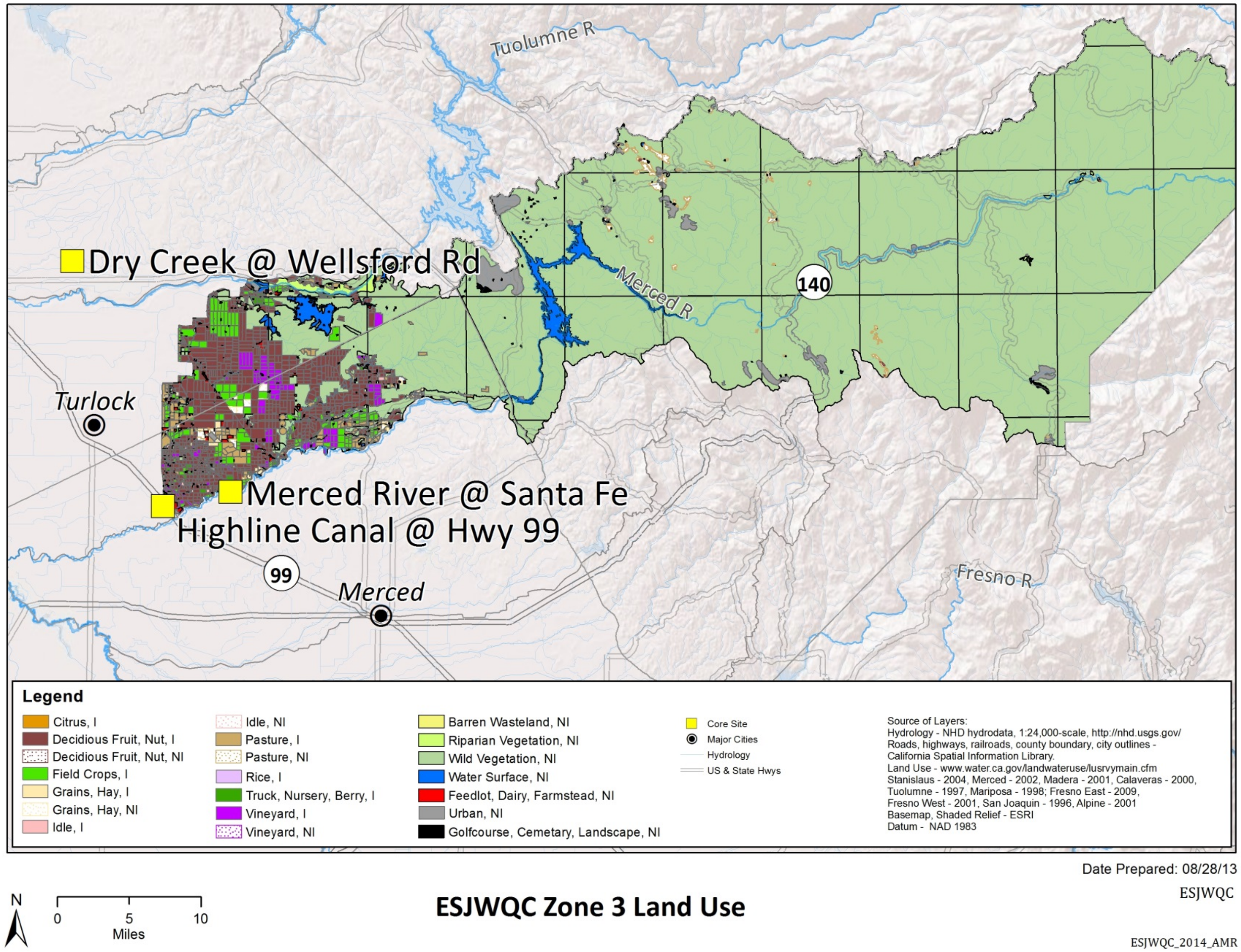


Figure 5. Merced River @ Santa Fe Zone (Zone 4) Land Use.

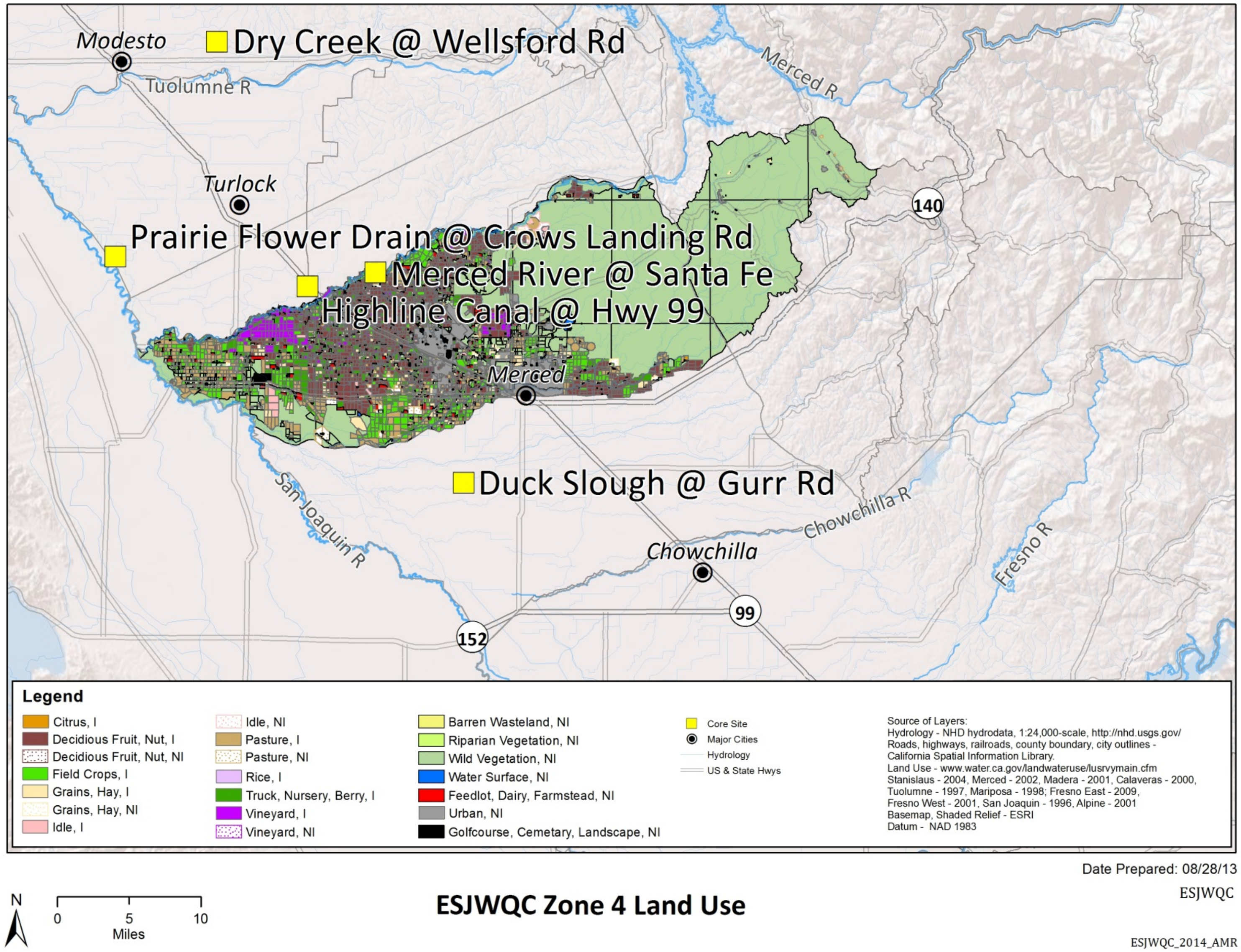


Figure 6. Duck Slough @ Gurr Rd Zone (Zone 5) Land Use.

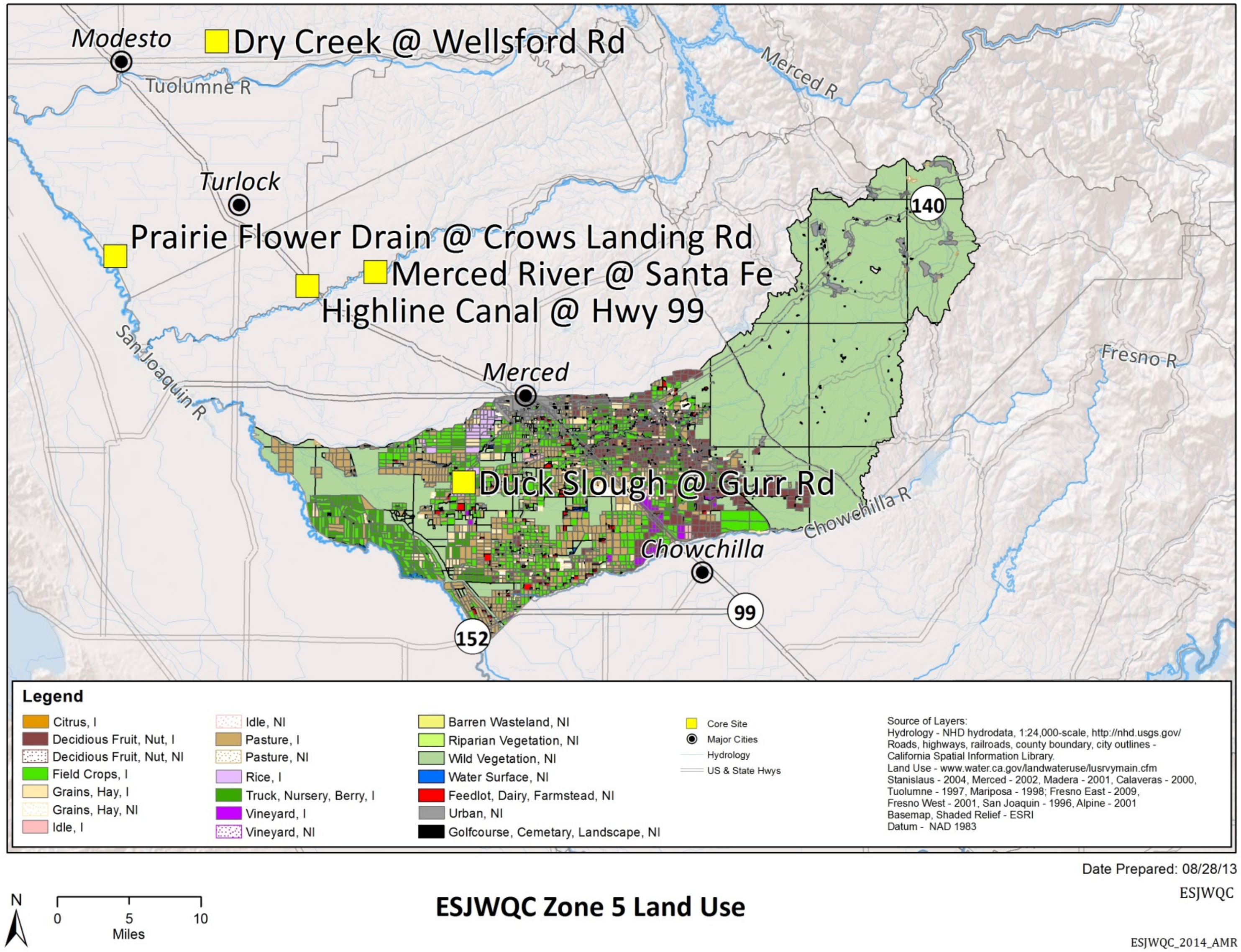
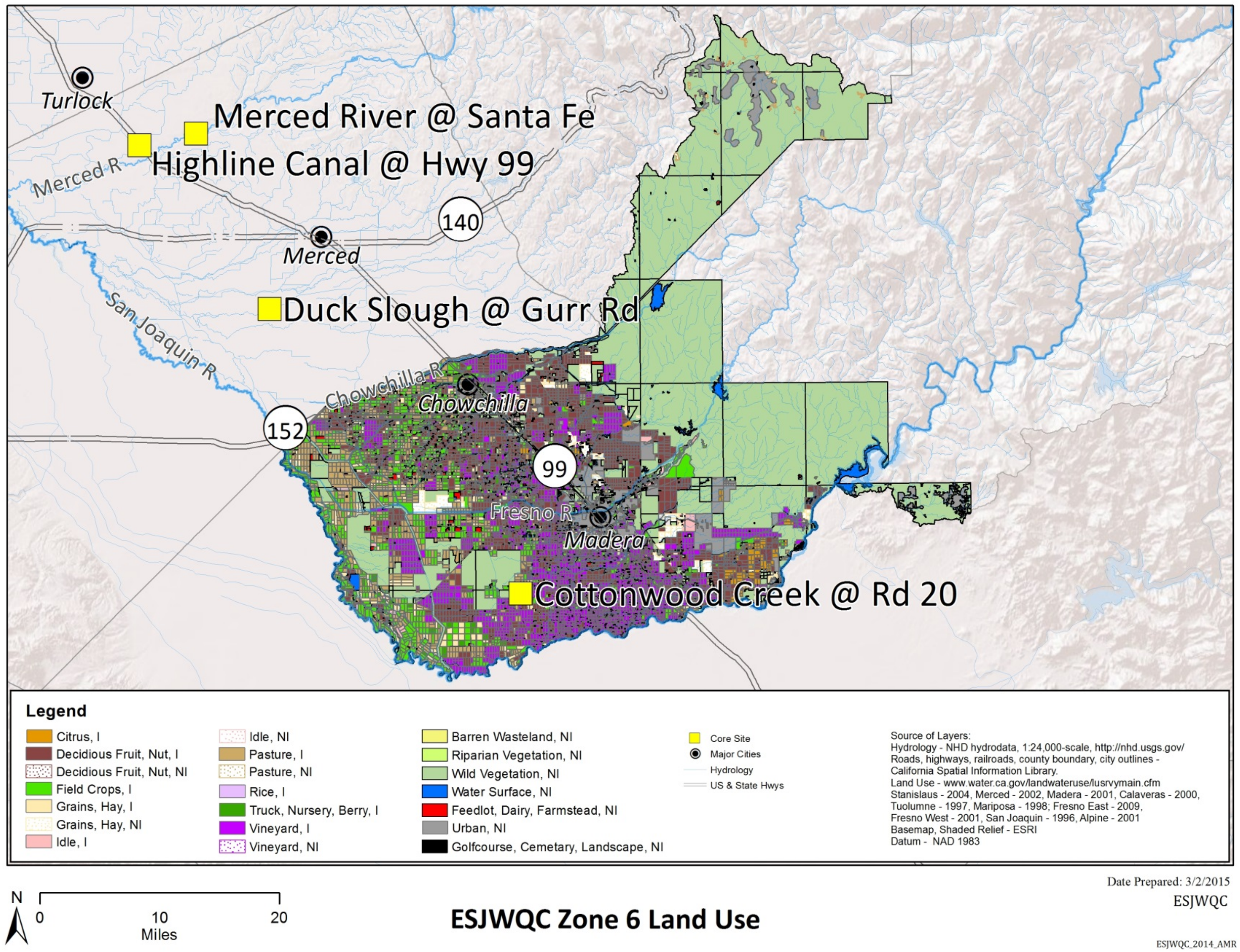


Figure 7. Cottonwood Creek @ Rd 20 Zone (Zone 6) Land Use.

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



3. SAMPLE SITE DESCRIPTIONS

The site names, zones, sample types, station codes, and locations of all sites monitored during the 2014 WY are provided in Tables 3 and 4. 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.

3.A. SAMPLE SITE LOCATIONS

Figure 8 is a map of all site subwatersheds (Core, Represented, and MPM) monitored during the 2014 WY. Zone boundaries are also provided for reference. Figure 9 is a map of the three chlorpyrifos and diazinon TMDL sites monitored by the ESJWQC for load capacity compliance.

Table 3. ESJWQC 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		Rodden Creek @ Rodden Rd	535XRCARD	37.79053	-120.80886
	Represented		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		Lateral 5 ½ @ South Blaker Rd	535LFHASB	37.45827	-120.9673
	Represented		Lateral 6 and 7 @ Central Ave	535LSSACA	37.39779	-120.9596
	Represented		Levee Drain @ Carpenter Rd	535XLDACR	37.48062	-121.03106
	Represented		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	X	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		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

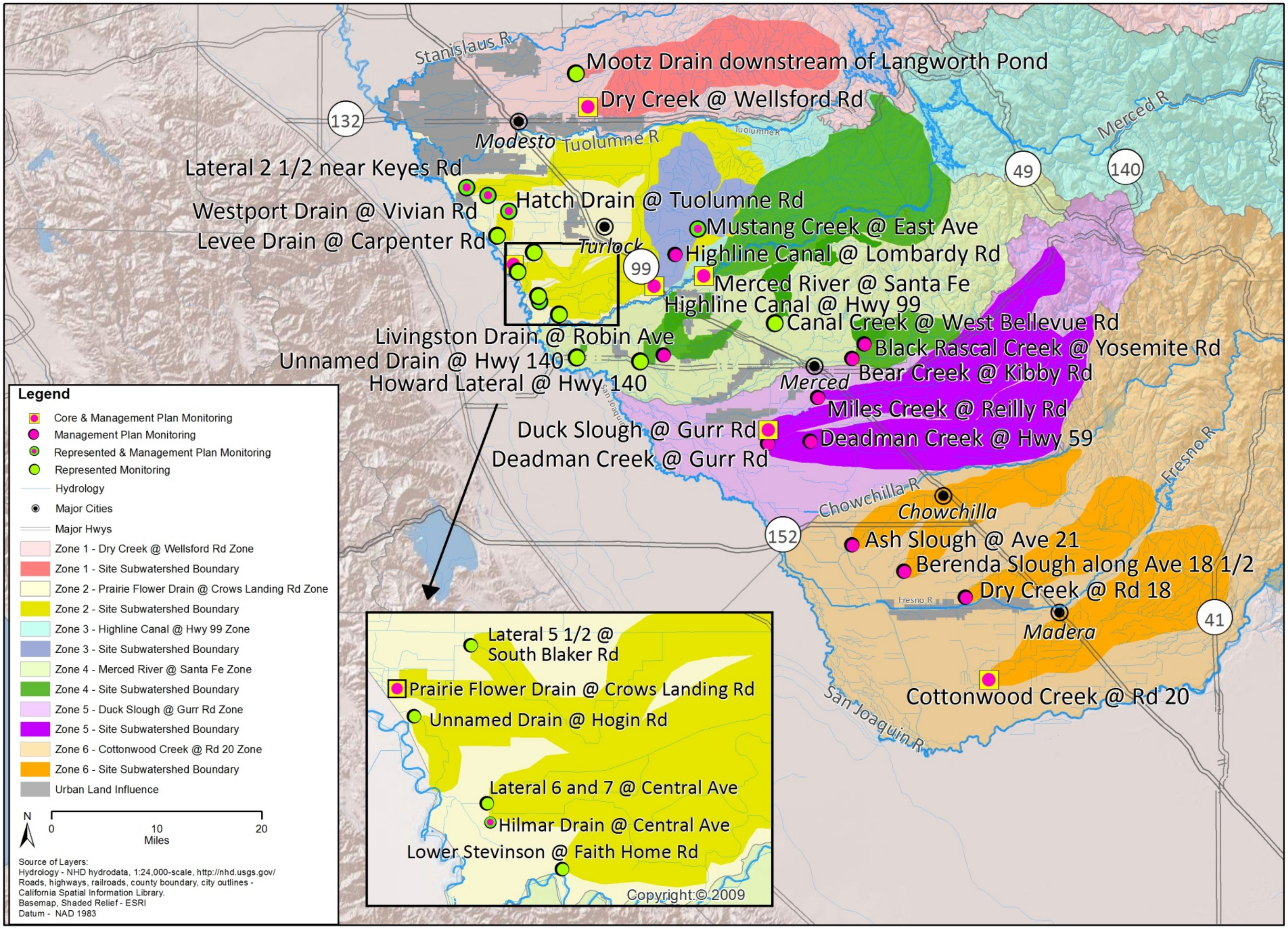
NA-Not Applicable
TMDL-Total Maximum Daily Load

Table 4. ESJWQC land use acreage of site subwatersheds (2014 WY).

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	8	48	58			580	7	7	418				76	76			36	110	110			96		45	3						
Citrus	NI										7						4	7				4		4								
Deciduous nut and fruit	I	6520	3424	13937	85	1745	9222	10609	10598	11084	8118	7010		20941	17091		3585	23297	22962	25627		7647	45174	3670	20681	2372		5625				456
Field crop	I	6857	1943	3046	377	654	3516	11876	10400	954	4674	4799	160	7152	6899	1288	440	3854	14098	18133	1362	773	19178	1573	5527	4073	111	2109	1951	50	462	574
Field crop	NI						314																		140							
Grain and hay	I	661	233	1855			837	2622	2425	439	215	603		583	583		262	100	214	236		484	777	524	701	461		32				
Grain and hay	NI	1	195	1414	39	83	1893	1166	1161	1212	2169	226		11	11			24	53				759	35	226	512		702				
Idle	I			237		169	1259	587	587	512	238	807		181	80		130	434	154	205		112	355	251	141	145						
Idle	NI																								292							
Riparian Vegetation	NI	223		322			22				704							102	136	136			18									
Wild vegetation	NI	3803	16142	8979	3711	7950	35881	55864	52589	12569	57835	27490		572	499		357	2325	2996	3228	23	559	7051	378	87838	35993		275		95	43	
Water surface	NI	167	70	272		29	717	359	335	264	316	158		184	184	22	6	435	576	776	31	13	880	34	671	117		8	30		16	
Pasture	I	3529	1501	1549	439	1142	954	9958	8714	552	7599	5155	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	53		353	353		9	12	69	87		106	519	9	69							
Rice	I							8			1186	340					25					25		25								
Feedlot, dairy, farmstead	NI	467	93	1018			559	839	655	412	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	376	636	141	96		73	3371	3348	119		1699		283	107			675	937	1022		2082	1266	1525	291	1010						
Urban	NI	1861		2191	34		10307	596	544	4538	530	406	6	678	423		892	4335	1794	1794	5	1330	3951	806	3498	1649	49	5				10
Golf Course, cemetery, landscape	NI			233			29			280				1	1		38	186	15	235		90	204	42	203	17	124					
Vineyard	I	3497		3630		98	20465	1379	1321	6702	1764			1311	975		206	717	882	909		249	4601	2206	3002			2538				190
Total acres		**27978**	**24283**	**38881**	**4747**	**12646**	**86630**	**99282**	**92702**	**40054**	**87976**	**49475**	**275**	**38667**	**33447**	**1855**	**8749**	**40587**	**56064**	**66037**	**2260**	**14088**	**98437**	**11792**	**128911**	**49081**	**1485**	**11504**	**3126**	**521**	**1074**	**1745**
Irrigated acres		**21448**	**7784**	**24452**	**997**	**3808**	**36906**	**40418**	**37400**	**20779**	**23794**	**20414**	**244**	**35476**	**30704**	**1686**	**7317**	**31810**	**47669**	**54703**	**1983**	**11670**	**80934**	**10109**	**34931**	**10183**	**1312**	**10383**	**2714**	**416**	**996**	**1544**

Figure 8. ESJWQC 2014 WY monitoring sites relative to zone boundaries.



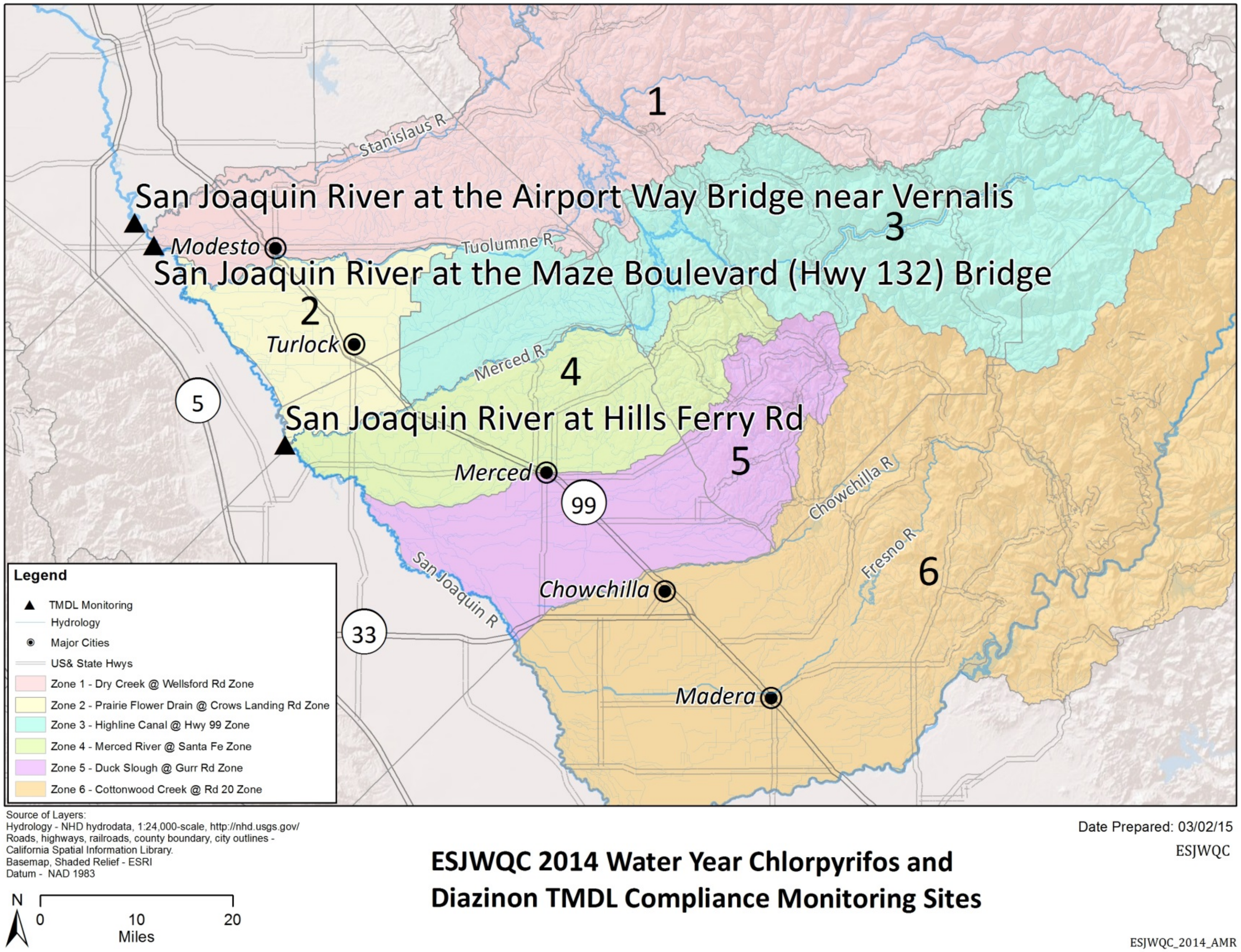
Date Prepared: 3/10/2015
ESJWQC

ESJWQC 2014 WY Monitoring Sites Zone Boundaries & Urban Land Influence

ESJWQC_2014_rpt

Figure 9. ESJWQC 2014 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 2014 TMDL AMR.



3.B. SITE SUBWATERSHED DESCRIPTIONS

Site descriptions, irrigated acreages and monitoring histories of ESJWQC sites monitored during the 2014 WY are listed alphabetically below. Water was not present at all sites during every 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 and subwatershed boundary modifications. Maps of land use in each site subwatershed are included in Appendix VII.

Ash Slough @ Ave 21 (21,448 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 includes vineyards, field crops, pasture and deciduous nuts. 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 (24,452 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 fruits and nut orchards, 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 (36,906 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 (20,779 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 (20,414 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 (becoming the Duck Slough @ Gurr Rd site subwatershed) 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. Located to the southwest of Merced, this site drains field crops, deciduous nuts and pasture. Treated wastewater from the city of Madera enters Duck Slough a few miles upstream of the Gurr Rd 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. There are dairies 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. There are dairies 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 and pasture and vines and a small amount 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 within the Merced River @ Santa Fe 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 drainages, 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 allocated as 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 salinity. Prairie Flower Drain intercepts this shallow groundwater and moves it to Harding Drain where it is then moved to the San Joaquin River.

Rodden Creek @ Rodden Rd (311 irrigated acres)- Rodden Creek @ Rodden Rd is located in the Dry Creek @ Wellsford Zone (Zone 1). Rodden Creek, fed by Rodden Lake, is located in the northern portion of Stanislaus County and drains into the Stanislaus River. The subwatershed is comprised of natural vegetation but also includes walnut orchards, irrigated and non-irrigated pasture, and a few row crops. There is a small residential area to the east of the sampling location along Rodden Road.

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 crops.

Westport Drain @ Vivian Rd (1544 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.

4. RAINFALL RECORDS

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 per year, except where a different frequency has been required or approved by the Regional Board. Stormwater runoff 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 during a month.

The Coalition sampled two storms from October 2013 through September 2014 (February 10, 2014 and March 3, 2014). Below is a description of all the storms that occurred from October 2013 through September 2014, and whether or not storm monitoring occurred (further described in the Monitoring Results and Sample Details section of this report).

Daily rainfall records are provided for the three major cities in the Coalition region: Modesto, Merced, and Madera (Figure 10, October through December 2013, Figure 11, January through March 2014, Figure 12, April through June 2014, and Figure 13, July through September 2014).

4.A. OCTOBER THROUGH DECEMBER 2013

No storms meeting the trigger limit were monitored October through December 2013.

During this time period, there were two measureable storms within the Coalition region. The first storm occurred November 19 through November 21, 2013. This event resulted in 0.62 inches of precipitation in Merced, 0.80 inches in Modesto, and 0.39 inches in Madera (Figure 10). The second storm occurred on December 7, 2013 and produced 0.28 inches in Merced, 0.23 inches in Modesto and 0.26 inches in Madera (Figure 10).

4.B. JANUARY THROUGH MARCH 2014

Two storms meeting the trigger limit were monitored from January through March 2014.

The first substantial storm system occurred over a four day period lasting from January 30 through February 2, 2014. During the four days, 0.32 inches of precipitation was reported in Merced, 0.5 inches in Modesto, and 0.35 inches in Madera (Figure 11). Although the January 30 through February 2 storm met the trigger limit in all three cities, sampling did not occur because the precipitation was not expected to exceed the trigger limit and there was no evidence of surface water runoff due to a lack of moisture in the soils.

Three storm systems brought measurable amounts of precipitation to the ESJWQC area in February and early March. The first storm occurred on February 6 and lasted until February 10, 2014; during this time-frame Merced reported 0.61 inches, Modesto 0.61 inches, and Madera 1.05 inches (Figure 11). The trigger limit was exceeded during this storm system and was captured with a sampling event that occurred on February 10. The second storm in February occurred on February 16, 2014. During this event Merced reported a total rainfall of 0.01 inches, Modesto 0.06 inches, and Madera 0.01 inches (Figure 11). The trigger limit was again exceeded during a storm system that occurred February 26 through March 6, 2014 (Figure 11). Merced reported a total of 1.72 inches, Modesto 0.99 inches, and Madera 1.17 inches (Figure 11). Normal Coalition sampling was rescheduled to capture this storm, and occurred on March 3.

During the remainder of the month of March, there were two additional storm systems in the ESJWQC area. During the first storm, which occurred March 10, 2014, Modesto reported a total rainfall of 0.09 inches while both Merced and Madera received 0.00 inches of precipitation (Figure 11). The second storm (March 26-April 2, 2014) resulted in a total rainfall of 1.00 inch in Merced, 0.64 inches in Modesto and 0.49 inches in Madera (Figures 11 and 12). Although this storm met the trigger limit of 0.25 inches in all three cities, sampling did not occur because two storms had previously been sampled during the 2014 water year.

4.C. APRIL THROUGH SEPTEMBER 2014

No storms meeting the trigger limit were monitored from April through June 2014.

During the months of April through June, there were only two measureable storms within the ESJWQC area. The first storm occurred April 25 and produced a total of 0.24 inches of precipitation in Merced, 0.36 inches in Modesto, and 0.54 inches in Madera (Figure 12). The second storm occurred May 6, and produced a total of 0.06 inches of precipitation in Merced, 0.01 inches in Modesto, and 0.00 inches in Madera (Figure 12). There were no measureable storms during the month of June 2014.

4.D. JULY THROUGH SEPTEMBER 2014

No storms meeting the trigger limit were monitored July through September 2014.

The East San Joaquin area had typical Mediterranean climate conditions in July through September with hot and dry weather and no precipitation. The only storm with measureable precipitation occurred September 25 through 28, 2014, with 0.0 inches reported in Merced, 0.3 inches in Modesto, and 0.03 inches reported in Madera (Figure 13).

Figure 10. Precipitation history for Modesto, Merced, and Madera, October through December 2013.
The shaded gray area represents the trigger to initiate sampling: 0.25"- 0.5" rain in 24 hours. All weather data reported on http://www.wunderground.com/.

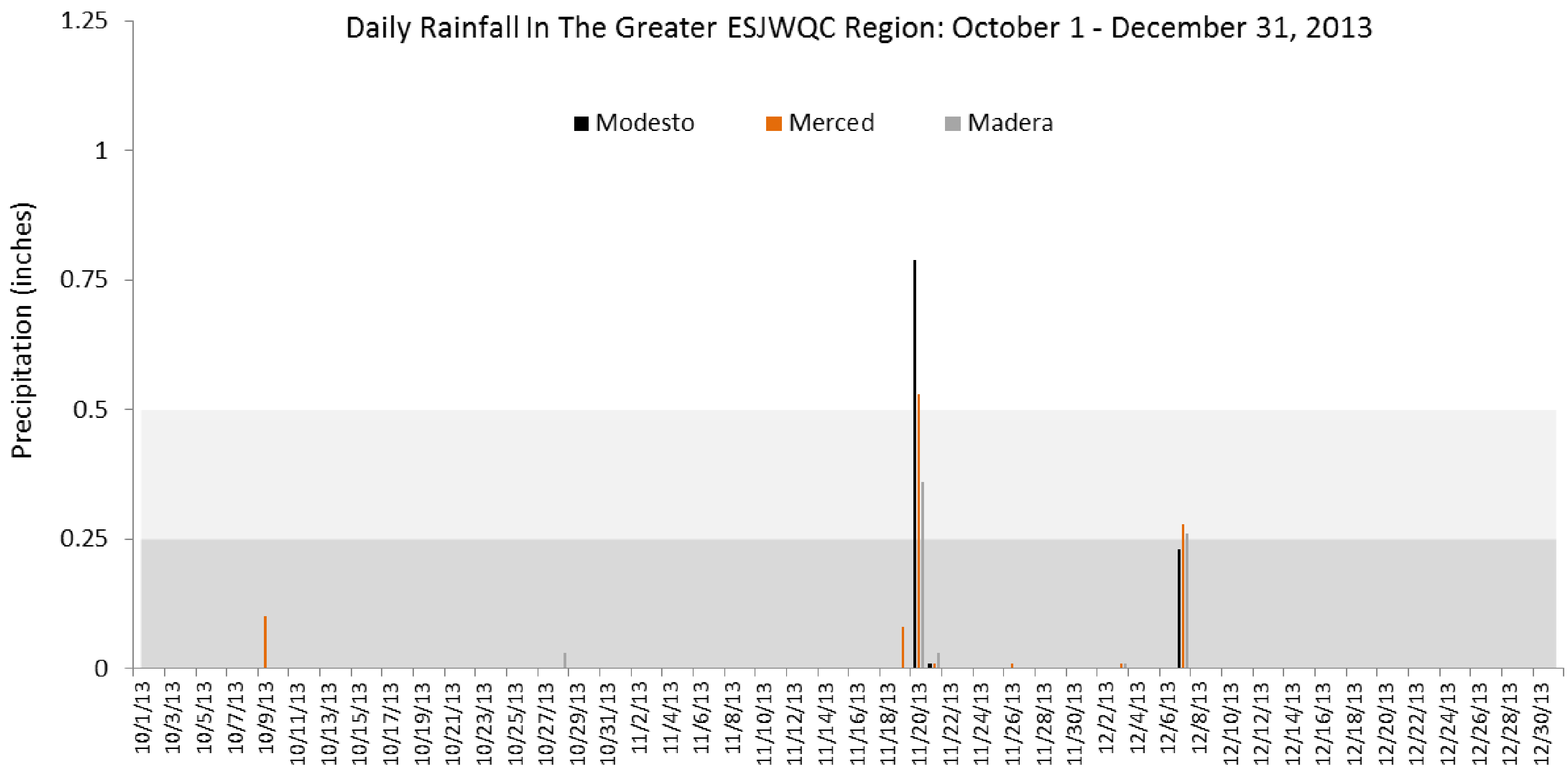


Figure 11. Precipitation history for Modesto, Merced, and Madera, January through March 2014.

The shaded gray area represents the trigger to initiate sampling: 0.25” - 0.5” rain in 24 hours. All data reported on http://www.wunderground.com/.

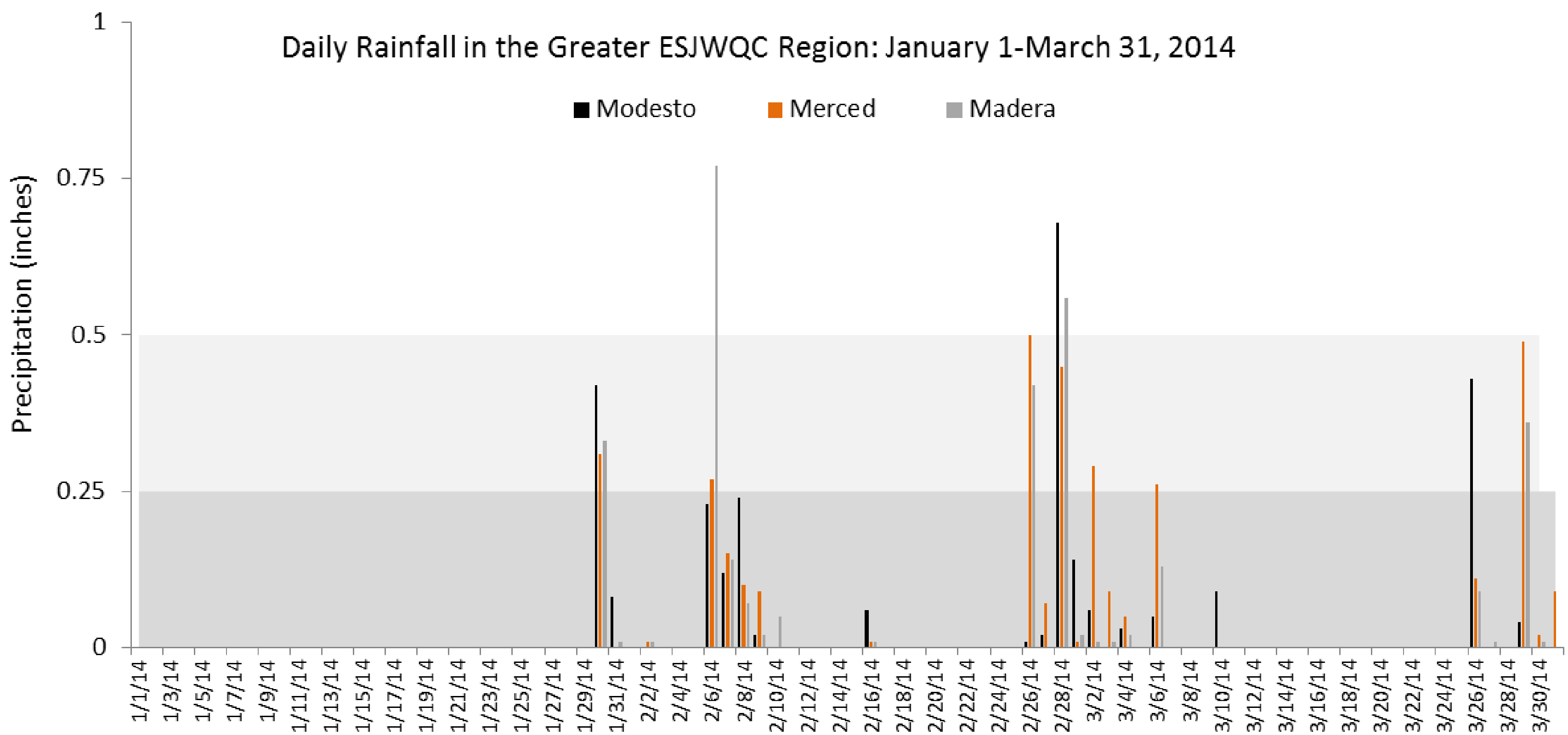


Figure 12. Precipitation history for Modesto, Merced, and Madera, April through June 2014.

The shaded gray area represents the trigger to initiate sampling: 0.25” - 0.5” rain in 24 hours. All data reported on http://www.wunderground.com/.

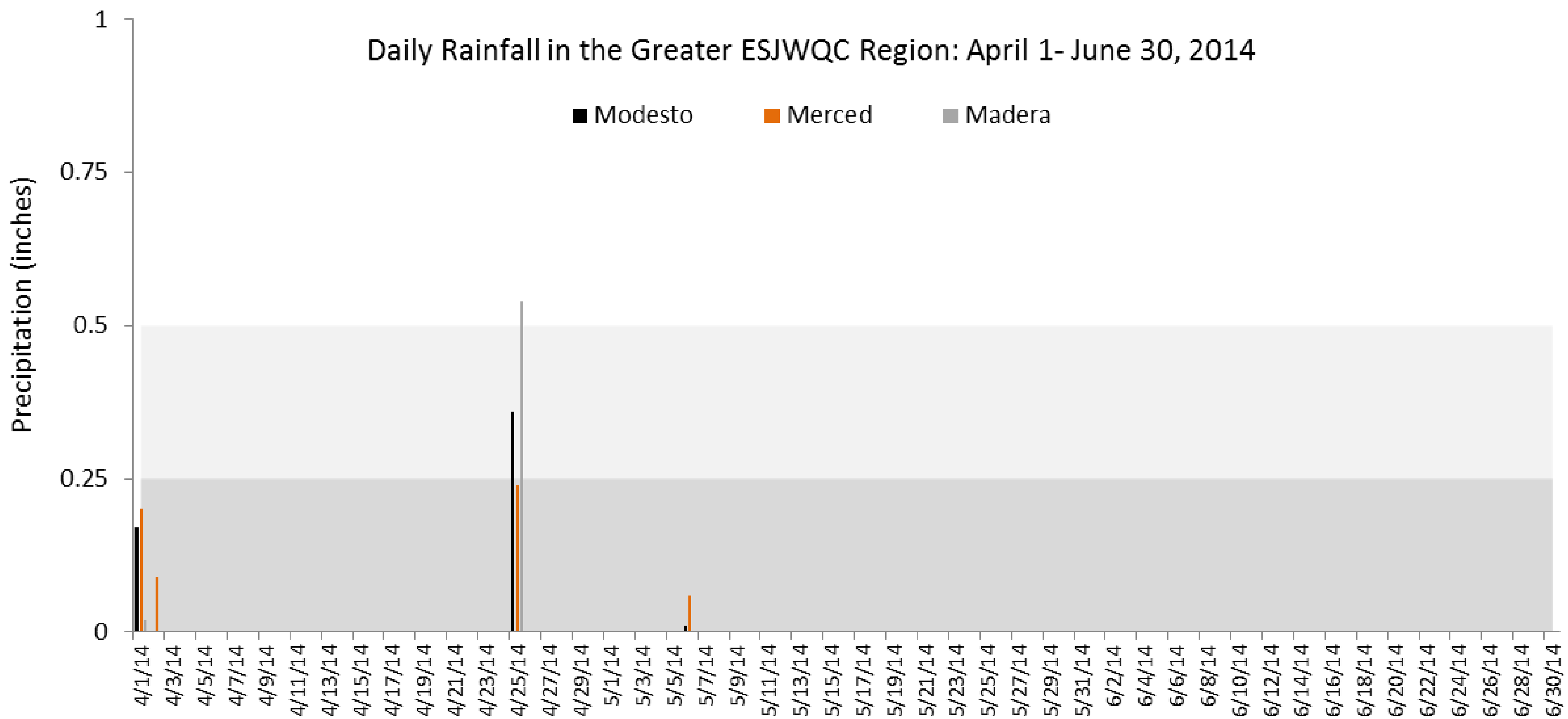
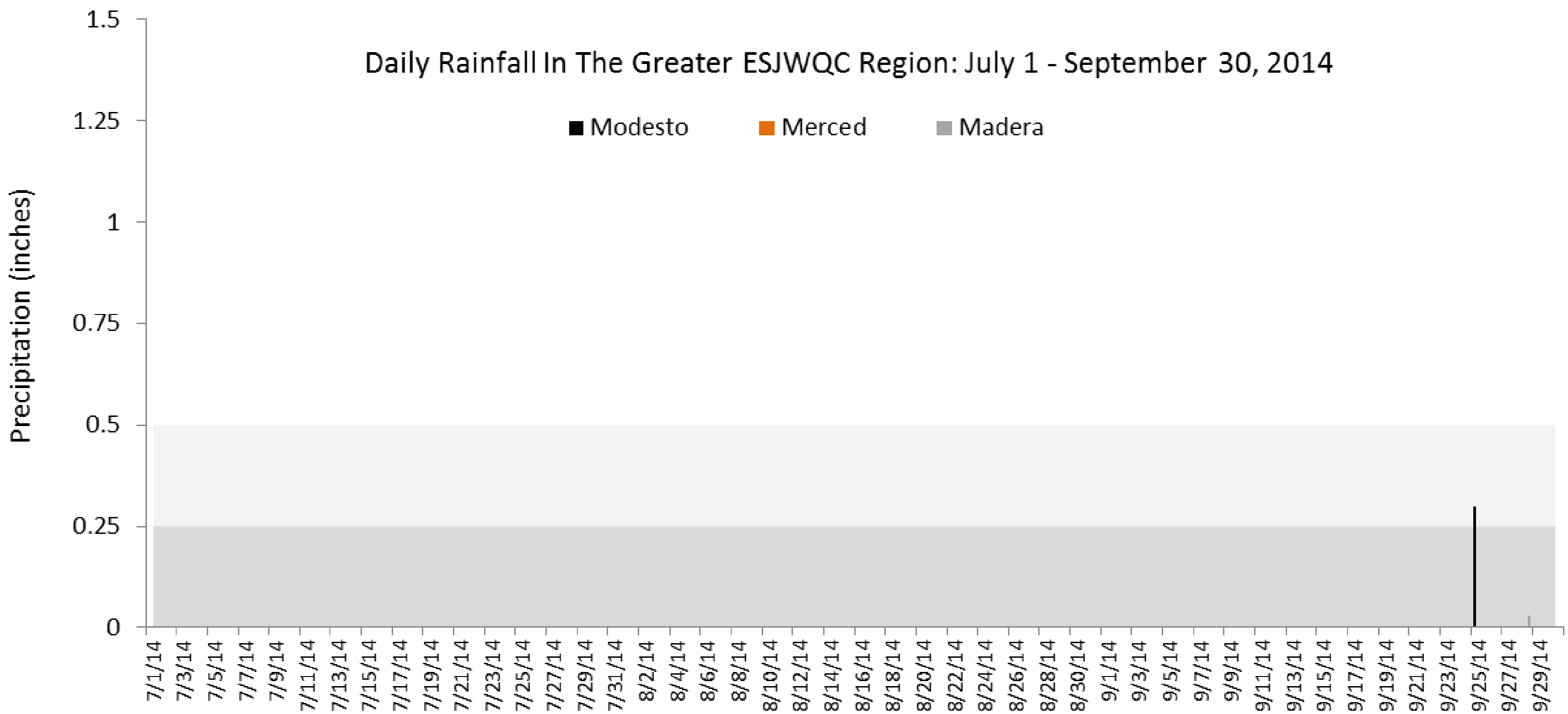


Figure 13. Precipitation history for Modesto, Merced, and Madera, July through September 2014.

The shaded gray area represents the trigger to initiate sampling: 0.25" - 0.5" rain in 24 hours. All data reported on http://www.wunderground.com/.



5. MONITORING OBJECTIVES AND DESIGN

5.A. 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

5.B. MONITORING DESIGN

The Coalition conducts monitoring at Core and Represented sites to characterize discharge from irrigated agriculture, Management Plan Monitoring (MPM) to monitor constituents that require a management plan and Total Maximum Daily Load (TMDL) monitoring to assess TMDL compliance.

For the 2014 WY, sampling occurred monthly from October 2013 through September 2014, including two storms and two sediment monitoring events. The following sections describe the Coalition's monitoring objectives and design.

Sediment samples are collected twice each year at Core sites and during MPM for sediment toxicity. Sediment samples are collected after the winter rainfall events and before the height of the irrigation season (between March 1 and April 30). A second set of sediment samples are collected at the end of the irrigation season, when irrigation is mostly complete and water levels are low and safe enough to sample sediment (between August 15 and October 15). Sediment samples were collected on March 4, 2014 and September 9, 2014.

5.a. Monitoring at Core Sites

Monitoring occurs at designated Core sites monthly within each of the ESJWQC zones for two consecutive years (Table 5). After two years, monitoring will rotate to a second Core site, and will alternate continuously between the two Core sites.

At each Core site the Coalition monitors physical parameters, nutrients, bacteria, pesticides, metals, water column and sediment toxicity, as listed in Table 2, Attachment B of the Order. If the concentration of a constituent exceeds the WQTL at a Core site, the Core site will be monitored for an additional third consecutive year (Attachment B of the Order, Page 3).

Table 5. ESJWQC Core sites by zone.

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

5.b. Monitoring at Represented Sites

The Coalition evaluates the potential risk for water quality impairments at Represented sites when an exceedance of a WQTL occurs at an associated Core site (Attachment B of the Order, Page 3). Table 6 includes a list of the Represented sites in each zone. From this list, sites were identified for monitoring during the 2014 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 2013,
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), a management plan is initiated.

Table 6. ESJWQC Represented site locations by zone.

Zone	Site Type	Site Name	Station Code	Latitude	Longitude
1	Represented	Mootz Drain Downstream of Langworth Pond	535XMDDLP	37.70539	-120.89569
1	Represented	Rodden Creek @ Rodden Rd	535XRCARD	37.79053	-120.80886
2	Represented	Hatch Drain @ Tuolumne Rd	535XHDATR	37.51498	-121.01229
2	Represented	Hilmar Drain @ Central Ave	535XHDACA	37.39058	-120.95820
2	Represented	Lateral 2 1/2 near Keyes Rd	535LTHNKR	37.54766	-121.08509
2	Represented	Lateral 5 1/2 @ South Blaker Rd	535LFHASB	37.45827	-120.96730
2	Represented	Lateral 6 and 7 @ Central Ave	535LSSACA	37.39779	-120.95960
2	Represented	Levee Drain @ Carpenter Rd	535XLDACR	37.48062	-121.03106
2	Represented	Lower Stevinson @ Faith Home Rd	535LSAFHR	37.37248	-120.92324
2	Represented	Unnamed Drain @ Hogin Rd	535XUDAHR	37.43120	-120.99475
2	Represented	Westport Drain @ Vivian Rd	535XWDAVR	37.53682	-121.04861
3	Represented	Highline Canal @ Lombardy Rd	535XHCALR	37.45547	-120.72181
3	Represented	Mustang Creek @ East Ave	535XMCAEA	37.49180	-120.68390
4	Represented	Bear Creek @ Kibby Rd	535XBCAKR	37.31230	-120.41535
4	Represented	Black Rascal Creek @ Yosemite Rd	535BRCAYR	37.33202	-120.39435
4	Represented	Canal Creek @ West Bellevue Rd	535CCAWBR	37.36090	-120.54940
4	Represented	Howard Lateral @ Hwy 140	535XHLAHO	37.30790	-120.78200
4	Represented	Livingston Drain @ Robin Ave	535XLDARA	37.31693	-120.74229
4	Represented	McCoy Lateral @ Hwy 140	535XMLAHO	37.30968	-120.78771
4	Represented	Unnamed Drain @ Hwy 140	535XUDAHO	37.31331	-120.89218
5	Represented	Deadman Creek @ Gurr Rd	535XDCAGR	37.19514	-120.56147

Zone	Site Type	Site Name	Station Code	Latitude	Longitude
5	Represented	Deadman Creek @ Hwy 59	535DMCAHF	37.19755	-120.48763
5	Represented	Miles Creek @ Reilly Rd	535XMCARR	37.25830	-120.47524
6	Represented	Ash Slough @ Ave 21	545XASAAT	37.05448	-120.41575
6	Represented	Berenda Slough along Ave 18 1/2	545XBSAAE	37.01820	-120.32650
6	Represented	Dry Creek @ Rd 18	545XDCARE	36.98180	-120.22056

5.c. Special Projects

In addition to Normal Monitoring (NM) at Core and Represented sites, the Coalition will conduct site specific monitoring to address parameters associated with a TMDL and MPM to address sites in a management plan.

5.c.i. Management Plan Monitoring

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
6. Development of a process and schedule for evaluating management practice effectiveness

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

Management plans are required as a result of a single exceedance of the Water Quality Trigger Limit (WQTL) of a TMDL constituent (SC, boron, chlorpyrifos, and diazinon), or more than one exceedance of a WQTL for all other constituents within a three year time period. The Coalition received approval on October 15, 2013 to remove specific site/constituent pairs from active management plans for eight site specific constituents at seven high priority subwatershed locations. The Coalition petitioned to remove six site specific constituents from 11 site subwatersheds on June 5, 2014. This request included summaries of improved water quality demonstrating no exceedances of WQTLs for the specific site/constituent pairs for at least three years. Table 61 in the Management Plan Status section of this report lists all of the specific site/constituent pairs approved for removal from active management plans and MPM 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 MPUR. Due to the extensive amount of monitoring conducted within the Coalition region, the Coalition is focusing its efforts on documenting changes in management practices and performing outreach at both an individual and group level. The ESJWQC 2008 Management Plan (approved November 25, 2008) and 2010 MPUR (approved June 21, 2010) can be referenced for further details on the Coalition's Management Plan Monitoring Strategy, Management Practice Tracking Strategy, Prioritization of Constituents with Exceedances, and Priority Site Management.

A revised ESJWQC Surface Water Quality Management Plan (SQMP) was submitted on May 1, 2014 (resubmitted on March 10, 2015; approval pending). The SQMP identifies when and where constituent-specific monitoring will occur to identify sources, evaluate effectiveness of management practices, assess performance goals and measures, and report on compliance time schedules. In addition, it includes management plan implementation schedules and timelines for reporting to the Regional Board on the effectiveness of the management plan strategy.

Although Management Plans are developed for individual subwatersheds and constituents of concern, the strategy employed by the Coalition in the revised SQMP is to address the same constituents across the entire Coalition region in as timely a manner as practicable. In the 2008 Management Plan, site subwatersheds were prioritized for focused outreach, implementation of management practices, and MPM. Constituents were grouped into one of five categories, A-E, which determined the amount of outreach and monitoring in the site subwatersheds where exceedances of WQTLs had occurred. Constituents in categories A, B, and C had the highest priority for Coalition action while categories D and E were the lowest priority. This strategy allowed the Coalition to allocate resources to outreach and monitoring over time while addressing the most significant problems first. Alternatively, for those constituents that are not easily tracked to a source, in place of a compliance schedule, a timetable is included for providing work plans to develop source identification studies to the Regional Board. The Management Plan approach involves source identification, outreach to all members who are potential sources of exceedances to provide recommendations about potential management practices that are known to be efficacious in managing discharges, and monitoring to evaluate the efficacy of implemented management practices.

Management Plan Development Timelines

The Coalition developed a schedule establishing when sites become high priority and undergo a focused management plan approach (Table 7). This schedule was submitted as an addendum to the ESJWQC Management Plan which was approved on November 25, 2008 and is evaluated and updated each year for 1) any new sites requiring a management plan, and 2) changes to the years scheduled for focused outreach. Based on the Management Plan process, any new site that requires a management plan due to the previous year's exceedances is added to the bottom of the schedule. Changes such as time extensions, removal of sites and/or changing the year of prioritization must be approved by the Regional Board's Executive Officer.

The ESJWQC management plan list has been updated to include Lateral 5 ½ @ South Blaker Rd, Lateral 6 and 7 @ Central Ave, Lower Stevinson @ Faith Home Rd, and Unnamed Drain @ Hogin Rd due to exceedances of: DO (Lateral 6 and 7 @ Central Ave), pH (Lateral 5 ½ @ South Blaker Rd, Lower Stevinson

@ Faith Home Rd, Unnamed Drain @ Hogin Rd), and SC WQTLs (Lateral 5 ½ @ South Blaker Rd, Lateral 6 and 7 @ Central Ave, Lower Stevinson @ Faith Home Rd, Unnamed Drain @ Hogin Rd) and toxicity to *S. capricornutum* (Lateral 5 ½ @ South Blaker Rd, Lower Stevinson @ Faith Home Rd). The site subwatersheds were monitored for the first time in the 2014 WY as Represented sites and the constituents have been added to each site subwatershed management plan.

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

Site Subwatershed Name	Priority Set	Year for Focused Approach
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
McCoy Lateral @ Hwy 140	Eighth Priority	2016-2018
Rodden Creek @ Rodden Rd		2016-2018
Unnamed Drain @ Hwy 140		2016-2018
Lateral 5 ½ @ South Blaker Rd	Ninth Priority	2017-2019
Lateral 6 and 7 @ Central Ave		2017-2019
Lower Stevinson @ Faith Home Rd		2017-2019
Unnamed Drain @ Hogin Rd		2017-2019
Re-evaluate All Site Subwatersheds and Revise Schedule		Annually

[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).

2015 WY MPM Schedule

The monitoring schedule is submitted annually in the Monitoring Plan Update (MPU) which is due August 1 prior to the upcoming water year. The Coalition submitted its second MPU on August 1, 2014 which was revised on September 23, 2014 (approved January 5, 2015). In order to determine when, what and where monitoring should occur, the Coalition reviews available monitoring results and PUR data. Due to the submittal of the MPU on August 1, the Coalition is only able to review data up through

June of that year. Therefore, an addendum to the MPU for the 2015 WY will be included in the Annual Report and will assess monitoring results from July through September from the previous WY (Appendix VIII).

5.c.ii. TMDL Monitoring

In October 2005, the Regional Board finalized the Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Runoff into the Lower San Joaquin River (hereafter 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. The Westside Coalition conducts monitoring at the other three compliance points. The two Coalitions submit a joint report on TMDL compliance.

Monitoring design, as well as an assessment of the Coalition's compliance with TMDL Objectives, are reported in detail in the San Joaquin River Chlorpyrifos and Diazinon TMDL 2014 WY AMR (submitted May 1, 2015).

6. MONITORING RESULTS

In order to achieve the monitoring objectives, the Coalition monitored 28 sites during the 2014 WY. Of these 28 sites, MPM took place at 21 sites. Ten of the 21 sites had MPM only (Ash Slough @ Ave 21, Bear Creek @ Kibby Rd, Berenda Slough along Ave 18 ½, Black Rascal Creek @ Yosemite Rd, Deadman Creek @ Gurr Rd, Deadman Creek @ Hwy 59, Dry Creek @ Rd 18, Highline Canal @ Lombardy Rd, Livingston Drain @ Robin Ave, and Miles Creek @ Reilly Rd).

Based on the 2014 WY MPU (approved February 13, 2014), the Coalition only monitored for the dissolved fraction of copper and lead during MPM. The dissolved fraction of cadmium, copper, lead, nickel, zinc, and the total fraction for arsenic, boron, molybdenum, and selenium were monitored at Core sites during two storm and two irrigation events.

On October 15, 2013, the Regional Board approved the removal of copper from the Bear Creek @ Kibby Rd management plan, chlorpyrifos and toxicity to *C. dubia* from the Highline Canal @ Lombardy Rd management plans, chlorpyrifos from the Cottonwood Creek @ Rd 20 management plan, diazinon from the Dry Creek @ Rd 18 management plan, lead from the Livingston Drain @ Robin Ave management plan, and toxicity to *S. capricornutum* from the Deadman Creek @ Hwy 59 management plan.

The Coalition sampled for chlorpyrifos at Howard Lateral @ Hwy 140 in November 2013 and January 2014; however, the site is a 7th priority site subwatershed and outreach will not begin until 2015. The Coalition updated the MPU report and removed Howard Lateral @ Hwy 140 from the 2014 WY monitoring schedule. MPM will occur during the 2015 WY to coincide with focused outreach.

There were two instances where samples were recollected due to laboratory issues. Bacteria samples collected at Core sites on October 15, 2013 were recollected on October 21, 2013 due to laboratory Quality Control (QC) failure. Toxicity samples collected during November 12, 2013 at Deadman Creek @ Gurr Rd for MPM were recollected on November 13, 2013 as soon as the laboratory notified the Coalition that the toxicity tests for *P. promelas* had not been started within hold time.

6.A. SAMPLING AND ANALYTICAL METHODS

Sample collection procedures and descriptions of the field instruments are provided in Tables 8 and 9 respectively. Site-specific discharge methods are provided in Table 10. 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 (QAPP) amended on February 23, 2011 (QAPP; Appendix I-XXXVII). Any deviations from these procedures are documented in the Precision, Accuracy, and Completeness section of this report.

Table 8. Sampling procedures.

Groups	Analytical Parameter	Sample Volume[1]	Sample Container	Initial Preservation/Holding Requirements	Holding Time[2]
Physical Parameters[3]	Total Suspended Solids	2000 mL	1x 2000 mL Polyethylene	Store at ≤6°C	7 Days
	Turbidity	2000 mL			7 Days
	Soluble Orthophosphate[3]	2000 mL			48 Hours
Nutrients	Ammonia and Nitrate-Nitrite as N	500 mL	1x 500 mL Polyethylene	Store at ≤6°C, with H_2SO_4	48 Hours
	Metals/Trace Elements, Hardness	500 mL	1x 500 mL Polyethylene	store at ≤6°C, pH≤2 with H_2SO_4	28 Days
Metals/ Trace Elements	*E. coli* (pathogens)	150 mL	1x 150 mL Polyethylene	Filter as necessary; preserve to ≤pH 2 with HNO_3, store at ≤6°C	180 Days
Drinking Water	Total Organic Carbon	120 mL	1x 150 mL Polyethylene	Preserved with $Na_2S_2O_3$, store at <8 °C	24 Hours[4]
	Carbamates	2 L	3x 40 mL Amber glass VOA with PTFE-lined cap	Preserve with HCl, store at ≤6°C	28 Days
Pesticides	Organochlorines	2 L	2x L Amber Glass Jar	Store at ≤6°C; extract within 7 days	40 Days
	Organophosphates	2 L	2x L Amber Glass Jar	Store at ≤6°C; extract within 7 days	40 Days
	Herbicides	2 L	2x L Amber Glass Jar	Store at ≤6°C; extract within 7 days	40 Days
	Herbicides (paraquat)	500 mL	1X 500 mL polyethylene	Store at ≤6°C; extract within 7 days	40 Days
	Herbicides (glyphosate)	80 mL	1x L Brown Polyethylene	Store at ≤6°C; extract within 7 days	21 days
	Aquatic Toxicity	3 Gallons	3X 1 Gallon Amber Glass Jar	Store at ≤6°C; freeze (-20°C) within 2 weeks	6 Months
Water and Sediment Column Toxicity	Sediment Toxicity	2 L	2x 1L Clear Glass Jar	Store at ≤6°C	36 Hours
	Sediment Grain Size	8 oz.	1x 8 oz. Clear Glass Jar	Store at ≤6°C, do not freeze	14 Days
	Sediment Total Organic Carbon	8 oz.	1x 8 oz. Clear Glass Jar	Store at ≤6°C, do not freeze	28 days
	Sediment Chemistry	8 oz.	1 X Clear Glass Jar	Store at ≤6°C (not frozen), analyze or freeze (-20C) within 28 days	28 days (not frozen) 12 Months (frozen)

[1] Additional volume may be required for Quality Control (QC) analyses. The sample volume listed for aquatic toxicity represents the volume collected for a single species.
[2] Holding time is after initial preservation or extraction.
[3] Volume of water necessary to analyze the physical parameters and soluble orthophosphate is typically combined in one 2000 mL polyethylene bottle, which provides sufficient volume for re-analyses and lab spike duplicates.
[4] Samples for bacteria 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 2014 WY.

Site	Discharge Method[1]	Meter/ Gauge
Ash Slough @ Ave 21		
Bear Creek @ Kibby Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Berenda Slough along Ave 18 1/2	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
Howard Lateral @ Hwy 140	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Lateral 2 ½ near Keyes Rd	USGS R2Cross Streamflow Method	Marsh McBirney Flo-Mate 2000
Later 5 ½ @ 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 Rd	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 Rd	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 @ 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	RL	MDL	Analytical Method
Physical Parameters	Flow	Fresh Water	Field Measure	1 cfs	NA	USGS R2Cross Streamflow Method
	pH	Fresh Water	Field Measure	0.1 pH units	NA	EPA 150.1
	Specific Conductivity	Fresh Water	Field Measure	100 µmhos/cm	NA	EPA 120.1
	Dissolved Oxygen	Fresh Water	Field Measure	0.1 mg/L	NA	SM 4500-O
	Temperature	Fresh Water	Field Measure	0.1 °C	NA	SM 2550
	Turbidity	Fresh Water	Caltest	0.05 NTU	0.15 NTU	EPA 180.1
	Total Suspended Solids	Fresh Water	Caltest	3 mg/L	2 mg/L	SM 2540 D
Inorganics	Hardness	Fresh Water	Caltest	5 mg/L	1.7 mg/L	SM2340C
	Total Organic Carbon	Fresh Water	Caltest	0.5 mg/L	0.30 mg/L	SM 5310 B
Bacteria	*E. coli*	Fresh Water	Caltest	1 MPN/100 mL	1 MPN/100 mL	SM 9223
Toxicity	Water Column Toxicity	Fresh Water	AQUA-Science	NA	NA	EPA 821-R-02-012
		Fresh Water	AQUA-Science	NA	NA	EPA 821-R-02-013
	Sediment Toxicity	Sediment	AQUA-Science[1]	NA	NA	EPA 600/R-99-064
Carbamates	Aldicarb	Fresh Water	APPL Inc	0.4 µg/L	0.20 µg/L	EPA 8321A
	Carbaryl	Fresh Water	APPL Inc	0.07 µg/L	0.050 µg/L	EPA 8321A
	Carbofuran	Fresh Water	APPL Inc	0.07 µg/L	0.050 µg/L	EPA 8321A
	Methiocarb	Fresh Water	APPL Inc	0.4 µg/L	0.20 µg/L	EPA 8321A
	Methomyl	Fresh Water	APPL Inc	0.07 µg/L	0.050 µg/L	EPA 8321A
	Oxamyl	Fresh Water	APPL Inc	0.4 µg/L	0.20 µg/L	EPA 8321A
Organochlorines	DDD	Fresh Water	APPL Inc	0.01 µg/L	0.003 µg/L	EPA 8081A
	DDE	Fresh Water	APPL Inc	0.01 µg/L	0.004 µg/L	EPA 8081A
	DDT	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
	Dicofol	Fresh Water	APPL Inc	0.1 µg/L	0.01 µg/L	EPA 8081A
	Dieldrin	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
	Endrin	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
	Methoxychlor	Fresh Water	APPL Inc	0.01 µg/L	0.008 µg/L	EPA 8081A
Group A Pesticides	Aldrin	Fresh Water	APPL Inc	0.01 µg/L	0.009 µg/L	EPA 8081A
	Chlordane	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
	Heptachlor	Fresh Water	APPL Inc	0.01 µg/L	0.008 µg/L	EPA 8081A
	Heptachlor Epoxide	Fresh Water	APPL Inc	0.01 µg/L	0.007 µg/L	EPA 8081A
	Hexachlorocyclohexane (alpha-BHC)	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
	Hexachlorocyclohexane (beta-BHC)	Fresh Water	APPL Inc	0.01 µg/L	0.008 µg/L	EPA 8081A
	Hexachlorocyclohexane (gamma-BHC; Lindane)	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
	Hexachlorocyclohexane (delta-BHC)	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
	Endosulfan I	Fresh Water	APPL Inc	0.01 µg/L	0.005 µg/L	EPA 8081A
	Endosulfan II	Fresh Water	APPL Inc	0.01 µg/L	0.004 µg/L	EPA 8081A
	Toxaphene	Fresh Water	APPL Inc	0.5 µg/L	0.380 µg/L	EPA 8081A
Organophosphates	Azinphos-methyl	Fresh Water	APPL Inc	0.1 µg/L	0.02 µg/L	EPA 8141A
	Chlorpyrifos	Fresh Water	APPL Inc	0.015 µg/L	0.0026 µg/L	EPA 8141A
	Diazinon	Fresh Water	APPL Inc	0.02 µg/L	0.004 µg/L	EPA 8141A
	Dichlorvos	Fresh Water	APPL Inc	0.1 µg/L	0.02 µg/L	EPA 8141A
	Dimethoate	Fresh Water	APPL Inc	0.1 µg/L	0.08 µg/L	EPA 8141A
	Demeton-s	Fresh Water	APPL Inc	0.1 µg/L	0.01 µg/L	EPA 8141A

Group	Constituent	Matrix	Analyzing Laboratory	RL	MDL	Analytical Method
	Disulfoton	Fresh Water	APPL Inc	0.05 µg/L	0.02 µg/L	EPA 8141A
	Malathion	Fresh Water	APPL Inc	0.1 µg/L	0.03 µg/L	EPA 8141A
	Methamidophos	Fresh Water	APPL Inc	0.2 µg/L	0.1 µg/L	EPA 8321A
	Methidathion	Fresh Water	APPL Inc	0.1 µg/L	0.04 µg/L	EPA 8141A
	Parathion, methyl	Fresh Water	APPL Inc	0.1 µg/L	0.075 µg/L	EPA 8141A
	Phorate	Fresh Water	APPL Inc	0.1 µg/L	0.07 µg/L	EPA 8141A
	Phosmet	Fresh Water	APPL Inc	0.2 µg/L	0.06 µg/L	EPA 8141A
Herbicides	Atrazine	Fresh Water	APPL Inc	0.5 µg/L	0.10 µg/L	EPA 8141A
	Cyanazine	Fresh Water	APPL Inc	0.5 µg/L	0.15 µg/L	EPA 8141A
	Diuron	Fresh Water	APPL Inc	0.4 µg/L	0.2 µg/L	EPA 8321A
	Glyphosate	Fresh Water	NCL Ltd	5 µg/L	1.3 µg/L	EPA 547
	Linuron	Fresh Water	APPL Inc	0.4 µg/L	0.2 µg/L	EPA 8321A
	Paraquat	Fresh Water	NCL Ltd	0.4 µg/L	0.19 µg/L	EPA 549.2M
	Simazine	Fresh Water	APPL Inc	0.5 µg/L	0.12 µg/L	EPA 8141A
	Trifluralin	Fresh Water	APPL Inc	0.05 µg/L	0.05 µg/L	EPA 8141
Metals	Arsenic	Fresh Water	Caltest	0.5 µg/L	0.060 µg/L	EPA 200.8 (ICPMS)
	Boron	Fresh Water	Caltest	10 µg/L	2.0 µg/L	EPA 200.8 (ICPMS)
	Cadmium	Fresh Water	Caltest	0.1 µg/L	0.05 µg/L	EPA 200.8 (ICPMS Collision Cell)
	Copper	Fresh Water	Caltest	0.5 µg/L	0.15 µg/L	EPA 200.8 (ICPMS Collision Cell)
	Lead	Fresh Water	Caltest	0.25 µg/L	0.03 µg/L	EPA 200.8 (ICPMS Collision Cell)
	Molybdenum	Fresh Water	Caltest	0.25 µg/L	0.07 µg/L	EPA 200.8 (ICPMS Collision Cell)
	Nickel	Fresh Water	Caltest	0.5 µg/L	0.06 µg/L	EPA 200.8 (ICPMS Collision Cell)
	Selenium	Fresh Water	Caltest	1 µg/L	0.07 µg/L	EPA 200.8 (ICPMS)
	Zinc	Fresh Water	Caltest	1 µg/L	0.7 µg/L	EPA 200.8 (ICPMS)
Nutrients	Nitrate + Nitrite (as N)	Fresh Water	Caltest	0.05 mg/L	0.02 mg/L	EPA 353.2
	Total Ammonia	Fresh Water	Caltest	0.1 mg/L	0.040 mg/L	SM 4500-NH3C
	Soluble Orthophosphate	Fresh Water	Caltest	0.01 mg/L	0.006 mg/L	SM 4500-P E
Sediment	Bifenthrin	Sediment	Caltest	0.33 ng/g dw	0.1 ng/g dw	GCIS/NCI/SIM
	Cyfluthrin	Sediment	Caltest	0.33 ng/g dw	0.11 ng/g dw	GCIS/NCI/SIM
	Cypermethrin	Sediment	Caltest	0.33 ng/g dw	0.1 ng/g dw	GCIS/NCI/SIM
	Deltamethrin: Tralomethrin	Sediment	Caltest	0.33 ng/g dw	0.12 ng/g dw	GCIS/NCI/SIM
	Esfenvalerate	Sediment	Caltest	0.33 ng/g dw	0.13 ng/g dw	GCIS/NCI/SIM
	Lambda-Cyhalothrin	Sediment	Caltest	0.33 ng/g dw	0.06 ng/g dw	GCIS/NCI/SIM
	Permethrin	Sediment	Caltest	0.33 ng/g dw	0.11 ng/g dw	GCIS/NCI/SIM
	Fenpropathrin	Sediment	Caltest	0.33 ng/g dw	0.07 ng/g dw	GCIS/NCI/SIM
	Chlorpyrifos	Sediment	Caltest	0.33 ng/g dw	0.12 ng/g dw	GCIS/NCI/SIM
	Piperonyl Butoxide	Sediment	Caltest	0.34 ng/g dw	0.031 ng/g dw	GCIS/NCI/SIM
	Total Organic Carbon	Sediment	Caltest[2]	200 mg/kg	100 mg/kg dw	Walkley Black
	Grain Size	Sediment	Caltest[2]	1% sand, silt, clay, gravel	0.4 µm	ASTM D422, ASTM D4464M-85

cfs- Cubic Feet per Second
MDL- Minimum Detection Limit
MPN- Most Probable Number
NA- Not applicable
RL- Reporting Limit
[1] Subcontracted to Nautilus Laboratories.
[2] Subcontracted to PTS Laboratories.

6.B. MONITORING SEASONS

Fall monitoring (October – December) occurs after irrigation is finished across the majority of crops in the Coalition region and generally before dormant sprays. Winter monitoring occurs from January through March when dormant sprays and significant rainfalls are expected. Irrigation monitoring (April – September) characterizes the discharge from irrigated agriculture 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 Sampling Site Descriptions and Rainfall Records section of this report.

The Coalition attempts to sample two storms per year. Storm samples were collected at sites in the ESJWQC on February 10 and March 3, 2014. A description of the rainfall that occurred between October 1, 2013 and September 30, 2014, including when samples were collected relative to the amount of precipitation, is included in the Sample Site Descriptions and Rainfall Records section. Table 13 provides the locations and seasons of Coalition monitoring and indicates if a site was dry for one or more months in a season.

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.

Table 13. ESJWQC Sites monitored during the 2014 WY.

	2013	2014		
Station Name	Fall	Winter	Storm	Irrigation
Ash Slough @ Ave 21		Dry	Dry	Dry
Bear Creek @ Kibby Rd				
Berenda Slough along Ave 18 1/2	Dry	Dry	Dry	Dry
Black Rascal Creek @ Yosemite Rd				Dry
Cottonwood Creek @ Rd 20	Dry	Dry	Dry	Dry
Deadman Creek @ Hwy 59		Dry		Dry
Deadman Creek @ Gurr Rd				
Dry Creek @ Rd 18	Dry	Dry		Dry
Dry Creek @ Wellsford Rd				
Duck Slough @ Gurr Rd		Dry		
Hatch Drain @ Tuolumne Rd				
Highline Canal @ Hwy 99	Dry	Dry	Dry	Dry
Highline Canal @ Lombardy Rd	Dry	Dry		
Howard Lateral @ Hwy 140		Dry		
Hilmar Drain @ Central Ave				
Lateral 2 ½ near Keyes Rd	Dry	Dry		Dry
Lateral 5 ½ @ South Blaker Rd				
Lateral 6 and 7 @ Central Ave				
Levee Drain @ Carpenter Rd				

Station Name	2013 Fall	2014 Winter	2014 Storm	2014 Irrigation
Lower Stevinson @ Faith Home Rd				
Livingston Drain @ Robin Ave	Dry	Dry	Dry	Dry
Merced River @ Santa Fe				
Miles Creek @ Reilly Rd				
Mootz Drain downstream of Langworth Pond				
Mustang Creek @ East Ave	Dry	Dry	Dry	Dry
Prairie Flower Drain @ Crows Landing Rd				
Unnamed Drain @ Hogin Rd				
Westport Drain @ Vivian Rd				Dry

Blank cells indicate no sampling occurred at that site during the specified season.
"Dry" indicates that the site was dry during one or more events during the specified monitoring season.

6.C. TABULATED RESULTS

Monitoring occurred monthly at sites in the ESJWQC during the 2014 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 that occurred during the 2014 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 corresponding flow data from the site. Monitoring data include results from samples taken for MPM, Normal Monitoring (NM), sediment monitoring, and TMDL compliance monitoring.

From the 2014 WY, the following sites were not sampled due to lack of water on the specified sample date:

- Ash Slough @ Ave 21 (Dry: 1/14/14, 2/10/14, 4/8/14, 5/13/14, 6/10/14, 7/8/14, 8/12/14, 9/9/14)
- Berenda Slough along Ave 18 ½ (Dry: 10/15/13, 11/12/13, 12/10/13, 1/14/14, 2/10/14, 3/5/14, 4/8/14, 5/13/14, 6/10/14, 7/8/14, 8/12/14, 9/9/14)
- Black Rascal Creek @ Yosemite Rd (Dry: 4/8/14, 5/13/14, 9/9/14)
- Cottonwood Creek @ Rd 20 (Dry: 10/15/13, 11/12/13, 12/10/13, 1/14/14, 2/10/14, 3/3/14, 3/5/14, 4/8/14, 5/13/14, 6/10/14, 7/8/14, 8/12/14, 9/9/14)
- Deadman Creek @ Hwy 59 (Dry: 1/14/14, 8/12/14, 9/9/14)
- Dry Creek @ Rd 18 (Dry: 12/10/13, 1/14/14, 4/8/14, 7/8/14, 8/12/14)
- Duck Slough @ Gurr Rd (Dry: 1/14/14)
- Highline Canal @ Hwy 99 (Dry: 11/12/13, 12/10/13, 1/14/14, 2/10/14, 4/8/14)
- Howard Lateral @ Hwy 140 (Dry: 11/12/13, 1/14/14)
- Lateral 2 ½ near Keyes Rd (Dry: 12/10/13, 1/14/14, 4/8/14)
- Livingston Drain @ Robin Ave (Dry: 12/10/13, 1/14/14, 2/10/14, 4/8/14, 5/13/14, 6/10/14, 9/9/14)
- Mustang Creek @East Ave (Dry: 10/15/13, 11/12/13, 1/14/14, 2/10/14, 9/9/14)
- Westport Drain @ Vivian Rd (Dry: 4/8/14)

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 grouped as "non-contiguous" in the database. All results, including field parameters, chemistry and toxicity, are therefore associated with the non-contiguous flag and any water quality exceedances should be evaluated with the understanding that the water was not connected to a downstream waterbody.

The following sites were sampled as non-contiguous waterbodies during the 2014 WY:

- Bear Creek @ Kibby Rd (1/14/14, 3/5/14, 4/8/14)
- Canal Creek @ West Bellevue Rd (11/12/13)
- Deadman Creek @ Gurr Rd (11/12/13, 11/13/13, 12/10/13, 1/14/14)
- Dry Creek @ Rd 18 (2/10/14, 3/5/14)
- Dry Creek @ Wellsford Rd (1/14/14, 2/10/14)
- Duck Slough @ Gurr Rd (12/10/13, 2/10/14, 3/5/14, 4/8/14, 7/8/14)
- Hatch Drain @ Tuolumne Rd (1/14/14, 7/8/14)
- Highline Canal @ Hwy 99 (2/12/13, 2/20/13)
- Highline Canal @ Lombardy Rd (4/8/14)
- Hilmar Drain @ Central Ave (1/14/14, 2/10/14, 4/8/14)
- Levee Drain @ Carpenter Rd (1/14/14)
- Mustang Creek @ East Ave (12/10/13, 4/8/14)
- Westport Drain @ Vivian Rd (2/10/14, 3/5/14)

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

6.D. QUARTERLY SUBMITTALS

As required in Attachment B to the General Order R5-2012-0116-R1, the Coalition submits the Quarterly Monitoring Report for the previous quarter's surface water monitoring results in an electronic format. Table 14 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 Custodies (COCs),
    d. Toxicity Reports with raw data including copies of the original bench sheets.

Table 14. 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 for monitoring that occurred for the 2014 WY. If any discrepancies between the COCs and sample delivery occurred, the issues were resolved and documented either directly on the COC or on an anomaly form filled out by the laboratory. All COC forms were faxed by the laboratories to Michael L. Johnson, LLC (MLJ-LLC) after samples were received. With six 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. Sample collection and delivery were performed according to the amended ESJWQC Quality Assurance Project Plan (2010 QAPP; Page 33). Table 15 includes a list and description of six instances where 2014 WY laboratory analyses did not match the COCs.

Table 15. ESJWQC COC discrepancies for the 2014 WY.

SAMPLE DATE	LABORATORY	ANOMALY DESCRIPTION	DATE OF RESOLUTION
10/15/2013	Caltest	Due to laboratory QC error, *E. coli* samples collected on 10/15/2013 were recollected on 11/21/2013 from Duck Slough @ Gurr Rd, Dry Creek @ Wellsford Rd, Highline Canal @ Hwy 99, Merced River @ Santa Fe, and Prairie Flower Drain @ Crows Landing Rd.	10/21/2013
11/12/2013	AQUA-Science	Due to the laboratory not receiving test species in time for analysis, 11/12/2014 samples were recollected from Deadman Creek @ Gurr Rd, Dry Creek @ Wellsford, Duck Slough @ Gurr Rd, Merced River @ Santa Fe, Prairie Flower Drain @ Crows Landing Rd on 11/13/2013.	11/13/2013
4/8/2014	Caltest	Copper analysis was halted for samples collected from Bear Creek @ Kibby Rd. The analysis was not necessary because the constituent was approved for removal from the site's management plan.	4/16/2014
5/13/2014	Caltest	The laboratory was contacted to correct the station codes on the samples and COCs for Dry Creek @ Rd 18, Ash Slough @ Ave 21, and Berenda Slough along Ave 18 ½.	6/2/2014
8/12/2014	Caltest	The laboratory filled out an anomaly form to exchange sample labels for mislabeled samples collected from Highline Canal @ Hwy 99.	8/13/2014
9/9/2014	APPL	The COCs for the September TMDL monitoring event incorrectly indicated all organophosphates were to be analyzed. Only chlorpyrifos and diazinon analyses were required in samples collected from San Joaquin River above Maze Boulevard, San Joaquin River at Airport Way near Vernalis, and SJR @ Hills Ferry. Upon contact, the laboratory completed the correct analysis.	9/23/2014
9/9/2014	Caltest	Due to a mislabeled COC, the laboratory was contacted to stop the analysis for hardness in the equipment blank for Duck Slough @ Gurr Rd.	9/23/2014

7. COMPLETENESS, PRECISION, AND ACCURACY

An assessment of completeness, precision, and accuracy is tabulated in Tables 16-32 for data analyzed for the 2014 WY. All data generated during this time are acceptable and useable. In a few instances, some data quality objectives (DQOs) were not met. However, the evaluation below demonstrates that the usability of data is not affected.

All results are tabulated in the Monitoring Results and Lab and Field Quality Control (QC) Results sections of this report (Appendix III and IV). Each result is flagged accordingly using California Environmental Data Exchange Network (CEDEN) codes if a DQO(s) is not met. The Coalition works with the Central Valley Regional Data Center (CV RDC) to ensure that all data remain SWAMP comparable and that all data are suitable to be uploaded to CEDEN. A copy of the database is submitted to the Regional Board with the hardcopy of this report. The database includes all data from the 2014 WY sampling events.

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

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

7.A. COMPLETENESS

Completeness is assessed on three levels: field and transport completeness, analytical completeness, and batch completeness (Tables 16-18). Field and transport completeness assesses how many of the scheduled samples were collected and sent for analysis. Field and transport completeness may be less than 100% for reasons such as bottle breakage during transportation to the laboratory or inability to access a site. Dry sites and sites too shallow to collect samples are considered “collected” and do not count against field and transport completeness. Analytical completeness assesses the number of samples that arrived at a laboratory and were analyzed. Analytical completeness may be less than 100% for various reasons including bottle breakage while the sample was stored at the laboratory or if analysis was not performed due to technician error. Batch completeness assesses whether chemistry and toxicity batches have the entire required laboratory QC. For batch completeness, the number of batches with complete laboratory QC is compared to the overall number of batches. Table 16 includes an evaluation of completeness for the three levels.

7.a. Field and Transport Completeness

Field and transport completeness is calculated by dividing the number of samples collected by the number of samples scheduled to be collected for each analyte. Dry sites and sites too shallow to collect samples are considered 'collected' and are included in the total number of samples collected. All sites and constituents were monitored as scheduled during the 2014 WY and 100% field and transport completeness was achieved (Table 16). Samples could not be collected during 68 site specific events; during 64 site specific events samples were not collected due to no water present and four of the site specific events were because the waterbodies were too shallow to collect. The constituents sampled during the 2014 WY are listed by site in Tables 5 and 6.

Field parameter measurements (DO, pH, SC, and temperature) were taken at each site for all sampling events whenever there was enough water to collect a sample. The field and transport completeness for DO, pH, SC, and temperature is over 100% because resampling events occurred due to laboratory errors that resulted in unscheduled sampling events. Samples from sites scheduled for *E. coli* analysis had to be collected again because the laboratory reported quality control errors. Samples were also recollected from sites scheduled for *P. promelas* toxicity testing because the test species were not delivered at the laboratory to initiate testing within hold time. There is one less SC measurement than the rest of the field parameters because one result was not recorded on a field sheet (Table 17).

Discharge was measured during 99.5% of site visits. Discharge was not measured at sites with water for one or more of the following reasons: 1) the water was too deep to safely measure discharge (1) or 2) the water was too shallow to measure discharge (1). Full documentation of why discharge was not taken at each site is included in Appendix III, Table III-1.

7.b. Analytical Completeness

Analytical completeness assesses the number of samples that arrived at a laboratory and were analyzed. Samples were preserved and analyzed according to the ESJWQC QAPP. Samples that were analyzed out of hold time or had failed laboratory QC were recollected and the recollected sample was evaluated for analytical completeness. A field duplicate and field blank (for chemistry analysis only) was collected during each sampling event . Overall, analytical completeness for field blanks, field duplicates, equipment blanks, and travel blanks for all constituents was over 5% (Table 18).

7.c. Batch Completeness

All chemistry and toxicity batches were reviewed for Quality Assurance/Control (QA/QC) completeness. A complete chemistry batch must have a minimum of one laboratory blank (method blank), laboratory duplicate, laboratory control spike (LCS) and matrix spike (MS) with the exception of turbidity, *E. coli*, and Total Suspended Solids (TSS), which do not require a MS. For the 2014 WY, 249 out of 250 chemistry and toxicity batches had 100% completeness. One batch was run without an MS or MSD and flagged accordingly.

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

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

7.d. Hold Time Compliance

Each constituent must be digested/extracted (if applicable) and analyzed within a specific time frame to meet hold time requirements. All hold time requirements are summarized in the ESJWQC QAPP and in Table 7 of this report. The overall hold time compliance for all chemistry analysis performed during the 2014 WY is 97% (Table 29).

One paraquat batch from the February sampling event was re-extracted and re-analyzed resulting in a total of nine out of 15 samples (60%) analyzed within hold time (Table 30). In the original paraquat batch, one of the two LCS and both MS samples recovered below the acceptable limit. Within the original batch, sample results were non-detect. The batch was re-extracted one day past hold time and re-analyzed. Both LCS samples in the re-extracted and re-analyzed batches recovered within the acceptable limits. Both MS samples in the re-extracted and re-analyzed batch did not recover within acceptable limits; however, improvements in recoveries occurred (47.9% and 51.8% in original batch vs. 62.5% and 65.7% in re-extracted batch). The associated environmental sample results were non-detect in the re-extracted batches. The Coalition accepted the data in the re-extracted batch due to improved recoveries.

The methamidophos batch for the November 12, 2013 sampling event was re-extracted because surrogates were not added to samples for analysis in the original batch. Within the original batch, all of the environmental sample results were non-detect and recoveries in the LCS and MS samples were within acceptable limits. The batch was re-extracted 15 days past hold time and all samples were analyzed with surrogates. All of the environmental results remained non-detect and the LCS and MS sample recoveries were within limits. The re-extracted batch was accepted because surrogates were added the batch.

The organophosphate batch for the March 3, 2014 sampling event was re-extracted due to several QC samples not meeting acceptability criteria. In the original batch, cyanazine and diazinon recovered below the acceptability criteria in the LCS and MS/MSD samples. In addition, tributylphosphate (surrogate) recovered above the acceptable limit in six out of 11 samples and triphenylphosphate (surrogate) recovered above the acceptable limit for one sample. There was one environmental sample with a detection of chlorpyrifos. In the re-extracted batch, all LCS samples recovered within acceptable limits. The MS samples had high recoveries for disulfoton, malathion, and phorate. The chlorpyrifos concentration in the environmental sample was the same between the original and re-extracted batch. The Coalition accepted the data from the re-extracted batch because: 1) the LCS recoveries were within acceptable limits, 2) recoveries above the acceptable limits in the MS were favored over the low recoveries in the original batch, and 3) there was no sign of degradation of the chlorpyrifos detection (concentration remained the same).

7.B. PRECISION AND ACCURACY

A review of the number of samples analyzed and the percentage of samples per analyte that meets acceptability criteria are listed in the tables following this section (Tables 16-32); DQOs are addressed as follows:

- Field and laboratory blank quality control sample evaluations (Tables 19-22)
- Equipment and travel blank quality control sample evaluations (Table 20)
- Field precision met by analyzing field duplicates (Tables 21-30)
- Laboratory accuracy met by analyzing LCS and MS percent recoveries (Tables 23, 25, 31)
- Laboratory precision met by analyzing laboratory duplicates (Tables 24,26,27)
- Surrogate recoveries (Table 28)
- Summary of holding time evaluations (Table 29)
- Laboratory quality assurance for water column toxicity tests (Tables 30-31)
- Laboratory and field precision met when analyzing sediment grain size (Table 32)

All pesticides, metals, and nutrients are grouped by the analytical group to which they belong and discussed together. Batches are approved by evaluating all measures of precision and accuracy. Although a single quality control sample may not have met its acceptable limits, the entire batch may be accepted due to the other DQOs within that batch being met. Overall, precision and accuracy criteria were met for more than 90% of the samples for all criteria and all data are considered usable.

7.a. Chemistry

E. coli: The precision of *E. coli* analysis is conducted by evaluating R_{log} values of environmental and duplicate samples with the R_{log} criterion developed by the laboratory using similar samples. The mean R_{log} for the laboratory was calculated to be 0.40. This value multiplied by 3.27 resulted in a precision criterion of 1.30. One hundred percent of *E. coli* QC (field blank, field duplicate, laboratory duplicate, and laboratory blank) met the acceptability criteria.

Hardness as CaCO3 (Dissolved): Hardness is analyzed in water collected from the same sample bottles from sites that are analyzed for dissolved metals. One hundred percent of hardness field blanks had concentrations below the reporting limit. One hundred percent of hardness field duplicates met the acceptability criterion. All laboratory blanks and LCS samples met laboratory QC criteria. All of MS samples met the acceptability criteria.

Inorganic analyses in sediment: Sediment grain size and total organic carbon (TOC) were analyzed in sediment samples collected on March 4, March 5, and September 9 2014. The Coalition QAPP lists the acceptable limit criterion for grain size duplicates as RSD ≤ 20%, where RSD is the relative standard deviation. The RSD is the standard deviation divided by the mean (equivalent to the Coefficient of Variation). The RSD of the environmental sample and the duplicate sample for grain size is the most suitable and accurate method for determining precision. Currently there is no standard method for evaluating precision of grain size analysis. Due to the nature of sediment grain size analysis, results should be evaluated with the understanding that samples are not homogenous 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:

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

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

Precision was calculated based on the relative percent difference between the standard deviation of the environmental sample and the standard deviation of a duplicate sample using the following formula:

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

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

Both sets of sediment samples analyzed for grain size met 100% acceptability criteria for field and laboratory duplicates (Table 32).

The criterion used in this report to assess precision for sediment TOC is RPD ≤ 20% and certified reference material (CRM) samples were analyzed in each batch to assess accuracy. One hundred percent of the sediment TOC laboratory blank samples had results less than the RL. One hundred percent of the field duplicate and laboratory duplicate samples were within acceptability criteria (RPD ≤ 20%). One hundred percent of the TOC CRMs were within acceptability criteria (PR 80-120%). Sediment inorganic samples (grain size and TOC analysis) are accepted and useable.

Metals (dissolved): All dissolved metals are analyzed following EPA method 200.8. During the 2014 WY, water was collected at Core sites for the analysis of dissolved cadmium, dissolved copper, dissolved lead, dissolved nickel, and dissolved zinc during High TSS events (two storm and two irrigation events). Additional samples for dissolved copper and dissolved lead were collected at sites for MPM.

One hundred percent of field, laboratory, and equipment blanks for dissolved metals met the acceptability criteria. The LCS and MS samples analyzed with dissolved metal batches also met all acceptability criteria.

Overall, 88% (30 of 34) of dissolved metal field duplicate samples met the acceptability criterion. One dissolved cadmium and two dissolved lead field duplicate samples exceeded the acceptable RPD limit of 20%. All of the field duplicates were collected from sites that had murky water and two of the sites had no flow conditions reported on the field sheets. In addition, all results but one (dissolved lead) were below the RL. When results are reported below the RL, the reported result can be variable because these results are considered estimates. The RPD likely exceeded 20% in these samples due to the combination of 1) results being reported below the RL, and 2) conditions at the site location may have resulted in heterogeneity in the water column from where the two samples were collected. Since all other QC acceptability criteria for dissolved metals batches were met, dissolved metal results are useable.

Metals (total): All total metals are analyzed following EPA method 200.8. During the 2014 WY, water was collected at Core sites for the analysis of arsenic, boron, total copper, total lead, molybdenum, and selenium during High TSS events (two storm and two irrigation events). Additional samples for total copper and total lead were collected at sites for MPM through April 2014. Beginning in May 2014, total fractions for metals were no longer analyzed for copper or lead as outlined in the 2013 MPU.

One hundred percent of field, laboratory, and travel blanks for total metals met acceptability criteria. The LCS and MS samples analyzed with total metal batches also met all the acceptability criteria. Overall, total metals met the acceptability criterion for field duplicates in 94% of the samples (32 of 34 total samples) collected. Field duplicate RPD exceeded the acceptable 20% for total copper and total lead once each.

Total copper and total lead field duplicates met the acceptability criterion at a frequency of 88% (7 of 8) and 50% (1 of 2), respectively. The RPD exceeded the 20% for total copper when samples were collected at Dry Creek @ Rd 18 during the November 12, 2013 sampling event. The RPD for the environmental and field duplicate samples was 85%. All sampling SOPs were followed to ensure that field duplicates were collected at the same time and manner as the associated environmental sample. The site was shallow during collection and substrate disturbance in the waterbody may have occurred, resulting in heterogeneity in water collected between the environmental and field duplicate samples. The total copper results for the environmental and field duplicate samples were reported below the RL which are associated with high variability because they are estimates. The RPD exceeded 20% for one total lead field duplicate sample at the Merced River @ Santa Fe site location in January 14, 2014. The

RPD for the field duplicate and environmental sample was 29%. The RPD for total lead likely exceeded 20% due to both of the results being reported below the RL.

Nutrients: One hundred percent of ammonia as N field blanks met the acceptable criterion. Seventy-five percent of field duplicates (9 of 12) had a RPD above 20%. The RPDs for the three samples that did not meet the acceptability criterion were 44% (Prairie Flower Drain @ Crows Landing Rd on December 10, 2013), 36% (Prairie Flower Drain @ Crows Landing Rd on February 10, 2014), and 33% (Merced River @ Santa Fe on April 8, 2014). Matrix spike, MSD, and LCS samples were analyzed with each ammonia batch. One hundred percent of ammonia LCS samples and 97% of the ammonia MS samples met the acceptability criteria.

The water at Prairie Flower Drain @ Crows Landing Rd was reported as murky with no observable flow while collecting samples on December 10, 2013 and February 10, 2014. The ammonia concentrations in the environmental and field duplicate samples for the December 10, 2013 sampling event were 0.18 mg/L and 0.26 mg/L, respectively. The ammonia concentrations in the environmental and field duplicate samples for the February 10, 2014 were 0.22 mg/L and 0.14 mg/L, respectively. The turbid, stagnant water collected from Prairie Flower Drain @ Crows Landing Rd indicates that the water column may not have been homogenous resulting in different concentrations of ammonia in the environmental and field duplicate samples which resulted in high RPDs. The ammonia results for the samples collected from Merced River @ Santa Fe on April 8, 2014 were below the RL and the high RPD is likely due the variability associated with results reported below the RL. All other QC in each of the three ammonia batches met acceptability criteria and data are considered useable.

Unionized ammonia values were determined by calculating the fraction of unionized ammonia in the total ammonia result provided by the laboratory based on field temperature and pH. Unionized ammonia values were calculated with the following formula:

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

Where:

f = unionized ammonia fraction of total ammonia

= 1/(10(pK_a-pH)+ 1

pK_a = the temperature related equilibrium constant

= 0.0901821 + (2729.92/T_k)

T_k = temperature in degrees Kelvin

= field temperature (°C) +273.2

pH = field pH

Ammonia and calculated unionized ammonia results are found in Table 8 in Appendix III.

One hundred percent of nitrate + nitrite as N field blank results and 100% of laboratory blank results were below the RL. Ninety-two percent of field duplicates had RPDs equal to or below 20%. Laboratory Control Spike and MS samples were run with each batch. One hundred percent of the LCS samples met acceptability criteria for accuracy (PR 90-110) and 76% (32 of 42) of MS/MSD samples recovered within acceptable limits (PR 90-110).

Ten out of 42 nitrate + nitrite as N MS/MSD samples recovered outside the percent recovery limit of 90-110%. All ten MS samples recoveries ranged from 0% to 113%. Eight nitrate + nitrite as N MS/MSD samples recovered below the percent recovery QC limit due to possible matrix interference. Two MS/MSD samples recovered above the QC limit at 113% and 111%; a slight increase above the upper limit of 110%. One hundred percent of MS/MSD samples met the acceptability requirement for precision (RPD $\leq$ 20%).

Ninety-two percent of orthophosphate as P field blanks and field duplicates met acceptability criteria. Laboratory blanks were run with every batch and 100% of results were less than the RL. The LCS samples were within the QC limits for all batches. All MS/MSD met precision and accuracy criteria.

Pesticides in water: Pesticides were analyzed in eight different groups: organochlorines and group A pesticides (EPA 8081A), organophosphates and triazines (EPA 8141A), carbamates and methamidophos (EPA 8321A), paraquat (EPA 549.2M), and glyphosate (EPA 547M). Organochlorines, group A pesticides, glyphosate, and paraquat are only sampled during one storm and one irrigation event per year as outlined in the 2013 MPU.

One hundred percent of the field blanks were reported below the RL. One hundred percent of field and laboratory blank samples were below the RL. The RPDs for all pesticide field duplicate samples were less than 256%. Matrix spike and LCS samples were analyzed in each batch to assess accuracy as well as possible matrix interference. Overall, 94% of the MS and 97% of the LCS samples recovered within the acceptable limits.

Surrogates were run for each applicable pesticide analysis (surrogates are not performed for glyphosate and paraquat analysis). One batch was originally run without surrogates but was re-extracted and re-analyzed with the surrogates. The samples were flagged accordingly as being analyzed outside of hold time. Surrogates are run with every type of sample in a batch. When a surrogate is recovered outside of the acceptability criteria, the associated environmental sample is flagged as well. Surrogates are compounds that share similar chemical and physical properties to the target analytes. Surrogate data are used to evaluate laboratory capabilities to carry out the methods to detect the target analytes. All surrogate recoveries were within the acceptability criteria for more than 97% of all samples analyzed (Table 28).

Three MS samples run with EPA method 8141 did not meet the acceptability criteria in more than 90% of the samples; demeton-s (16 of 24, 67%), disulfoton (17 of 24, 71%), and malathion (19 out of 24, 79%). These analytes did not meet acceptability for batches run for the following sample dates: November 12, 2013 (disulfoton and demeton-s), January 14, 2014 (disulfoton and demeton-s), and February 10, 2014 (disulfoton and demeton-s), March 3, 2014 (disulfoton and malathion), July 8, 2014 (demeton-s and malathion) and August 12, 2014 (malathion).

In the batch run for the November 12, 2013 sampling event, demeton-s and disulfoton recovered below the QC limit in the MS sample and atrazine, demeton-s, and disulfoton recovered below the QC limit in the MSD sample. The RPD for atrazine, cyanazine, demeton-s, diazinon, and simazine for the MS/MSD exceeded 25% also. In the batch run for the January 14, 2014 sampling event, in addition to demeton-s and disulfoton recovering below the acceptable limit in the MS samples, the RPD for the MS/MSD samples exceeded 25%. In the batch run for the February 10, 2014 sampling event, dementon-s and disulfoton recovered below the acceptable limit in the MS/MSD. Dimethoate recovered below the MSD sample only. The surrogate triphenyl phosphate recovered above QC limit in samples collected from Dry Creek @ Rd 18 and Miles Creek @ Reilly Rd. In the batch run for the August 12, 2014 sampling event, malathion recovered above the QC limit in the LCS and the MS/MSD. In addition the RPD for dichlorvos in the MS/MSD samples exceeded 25%. The data in these batches were accepted because all of the sample results were non-detect and both the surrogate recoveries and LCS sample recoveries were within control limits.

The batch run for the March 3, 2014 sampling event was re-extracted and re-analyzed past hold time. The re-extracted batch was accepted. Complete details on the original batch are provided in the hold time compliance section. In the accepted batch, disulfoton, malathion, and phorate recovered above the QC limit in MSD. In addition, the surrogate triphenylphosphate run with the samples, Duck Slough @ Gurr Rd, Prairie Flower Drain @ Crows Landing Rd, Dry Creek @ Wellsford Rd, Highline Canal @ Hwy 99, and Merced River @ Santa Fe recovered above the QC limit. The other surrogate, tributylphosphate recovered above the QC limit in samples, Prairie Flower Drain @ Crows Landing Rd and Highline Canal @ Hwy 99. One detection of chlorpyrifos occurred in the Duck Slough @ Gurr Rd sample. The detection did not change in the original and re-extracted batch. The data in the re-extracted batch were accepted because the overall QC recoveries improved and the detection did not show signs of degradation in the concentration detected in the sample.

In the batch run for the July 8, 2014 sampling event, chlorpyrifos, malathion, and phosmet recovered above the QC limits in the MS/MSD samples. Demeton-s and phorate recovered above the QC limits in the MSD sample. One sample collected from Lateral 2 ½ near Keyes Rd had a detection of chlorpyrifos in this batch. The MS sample was collected from Highline Canal @ Hwy 99 and all results were non-detect. Even though chlorpyrifos recovered high in the MS sample, the non-detect result in the associated environmental sample indicate there were likely no false positive detections of chlorpyrifos (or any other analytes). Therefore, the concentration of chlorpyrifos in the Lateral 2 ½ near Keyes Rd sample was not an artifact of high percent recoveries in the MS sample. All surrogate and LCS recoveries met acceptability.

One pair of the group A pesticide, HCH delta, recovered above the acceptable limit in the MS/MSD samples; there were no detections in the environmental samples. In the same batch, the HCH delta LCS also recovered above the acceptable limit. Group A pesticide data are considered useable.

Three (out of four) MS samples recovered paraquat below the acceptable limit (70-130%). The MS/MSD RPDs were greater than 25% for paraquat in 50% of samples. Paraquat strongly binds to suspended organic particles in the water column and the efficacy of the extraction process is low when levels of particles are high. The site, Prairie Flower Drain @ Crows Landing Rd was sampled for the paraquat MS on February 10, 2014. Turbidity results at the site from the February monitoring event was 90 NTU; both paraquat MS/MSD samples recovered below the acceptable limit. Highline Canal @ Hwy 99 was sampled for the paraquat MS on August 12, 2014. The MSD met recovery criteria, however, the MS recovered below the acceptable limit at 65.3% (lower acceptable limit is 70%). The turbidity result at this site was 10 NTU from the August 12, 2014 monitoring event. All LCS recoveries for paraquat were within acceptable limits. All paraquat data are considered useable.

One hundred percent of glyphosate LCS samples recovered within the acceptable limits. All RPDs met precision requirements for glyphosate MSD and LCD samples. All glyphosate data were useable.

Overall, 96% of acceptability criteria were met for all pesticides in water analyses for the 2014 WY. In the few instances in which acceptability criteria were not met for some analytes, the entire batch was accepted because other QC demonstrated the sample collection and laboratory procedures were effective. Therefore, all water pesticide data are useable.

Sediment Pesticides: Sediment pesticides were analyzed for in sediment samples with *H. azteca* toxicity if survival of the test species was less than 80% in the sample compared to the control. Two sediment samples in March 2014 and one sediment sample in September 2014 were analyzed for pyrethroids, piperonyl butoxide, and chlorpyrifos.

One hundred percent of laboratory blank results were below the RL. Overall, 72% of the field duplicates had RPDs less than or equal to 25%. The RPDs in field duplicate samples exceeded 25% once each for chlorpyrifos (RPD 41%), cyfluthrin (RPD 102%), lambda cyhalothrin (RPD 34%), cypermethrin (RPD 30.3%), and permethrin (RPD 36.8%). The laboratory homogenizes all samples prior to analysis to increase the precision of the sediment RPDs; however, due to the affinity sediment pesticides have to organic matter, binding occurs in an inconsistent manner even when samples are homogenized. Of the field duplicates with RPDs greater than 25%, results for cyfluthrin and permethrin were reported below the RL, which are results associated with high variability because they are considered estimates.

One hundred percent of the MS analytes recovered within acceptable limits except for chlorpyrifos (2 of 4, 50%) and piperonyl butoxide (2 of 4, 50%). Both the MS and MSD sample collected in March 2014 did not recovery within acceptable criteria. The laboratory diluted the sample by a factor of 5 to quantify the chlorpyrifos result in the environmental sample (20 ng/g dw). The chlorpyrifos level (2.5 ng/g) spiked in the MS sample was too low compared to the concentration in the environmental sample and the spike concentration was essentially diluted out. Therefore, calculating a percent recovery was not done. Both the MS and MSD samples collected in September 2014 recovered above the acceptable limit for piperonyl butoxide. There were no piperonyl butoxide detections in the environmental sample or the laboratory blank; these data are considered useable.

One hundred percent of the LCS samples recovered within the acceptable limits except deltamethrin: tralomethrin (3 of 4, 75%). Fifty percent of the sediment LCS/LCSD RPDs were within acceptable limits; all LCS/LCSD RPDs exceeded 25% for the September 9, 2014 analysis. The RPDs ranged from 27% to 31%. The laboratory did not re-run the LCS/LCSD because the acceptable laboratory RPDs for sediment range between 35-50% due to the inconsistent binding nature of sediments.

Surrogates were run for each sediment pesticide analysis. Surrogate recoveries were within the specific acceptability criteria for 100% of all samples analyzed. All sediment pesticide data are accepted and useable.

Total Organic Carbon (TOC): One hundred percent of field and laboratory blanks met acceptability criteria. One hundred percent of field and laboratory duplicates had RPDs less than or equal to 20%. One hundred percent of LCS and LCSD samples met acceptability criteria. All TOC data are accepted and useable.

Total Suspended Solids (TSS): One hundred percent of field and laboratory blanks met acceptability criteria. One hundred percent of laboratory duplicates had RPDs less than or equal to 20%. Fifty-eight percent (7 of 12) of field duplicates had RPDs less than or equal to 20%. The five samples that resulted in RPDs greater than 20% were collected on December 10, 2013 (Prairie Flower Drain @ Crows Landing Rd), January 14, 2014 (Prairie Flower Drain @ Crows Landing Rd), March 3, 2014 (Prairie Flower Drain @ Crows Landing Rd), May 13, 2014 (Highline Canal @ Hwy 99), and September 9, 2014 (Highline Canal @ Hwy 99). The TSS results from the September 2014 monitoring event were at the RL which can have high variability between the environmental and field duplicate samples. The other four samples were collected from sites that also had high turbidity results. The associated environmental and field duplicate samples collected on March 3, 2014 also had turbidity RPD exceed 20%. One hundred percent of LCS samples met acceptability criteria. Matrix spike samples are not performed for analysis of TSS. All TSS data are accepted and useable.

Turbidity: All batches were run with field and laboratory blanks and 100% of results were below the RL. One hundred percent of laboratory duplicates had RPDs within 20%. Eighty-three percent (10 of 12) of field duplicates had RPDs less than or equal to 20%. Samples collected from Prairie Flower Drain @ Crows Landing Rd on March 3, 2014 and Highline Canal @ Hwy 99 on July 8, 2014 resulted in turbidity RPDs exceeding 20%. The environmental grab and field duplicate levels were diluted by different factors for both sampling dates. The environmental sample collected on March 3, 2014 was diluted by a factor of 10 while the field duplicate was diluted by a factor of 5; different dilution factors likely contributed to a higher RPD for these samples. Laboratory Control Spikes and MS/MSD are not performed for turbidity analyses. All turbidity data are accepted and useable.

7.a.i. Toxicity

For aquatic toxicity testing, the acceptability of test results is determined primarily by performance-based criteria for test organisms, culture and test conditions, and the results of control bioassays. Control bioassays include monthly reference toxicant testing and negative and solvent controls for

Toxicity Identification Evaluations (TIEs). Test acceptability requirements are documented in the method documents for each bioassay method and are included in the ESJWQC QAPP.

Water Column Toxicity: Field duplicates were collected during each monitoring event and were tested for toxicity to *C. dubia*, *S. capricornutum* and *P. promelas*. One hundred percent of field duplicates were within the acceptability criteria for *C. dubia* and *P. promelas* toxicity. Sixty-nine percent (9 of 13) of *S. capricornutum* toxicity field duplicate sample pairs were within the QC limit (Table 30).

The toxicity field duplicates with RPDs exceeding 25% were collected for the following sampling dates: October 15, 2013, January 14, 2014, June 10, 2014, and July 8, 2014; all environmental and field duplicate sample pairs collected were toxic to *S. capricornutum* except for the January 2014 event. Field duplicate samples collected on October 15, 2013 and January 14, 2014 were collected from Prairie Flower Drain @ Crows Landing Rd with no observed flow and a muddy substrate. Toxicity samples are collected after *E. coli*, physical parameters, and metals samples. It is possible that the lack of flow and disturbances in the muddy substrate during sample collection resulted in heterogeneity of suspended particles within the water column for toxicity sample collection. Field duplicate samples were collected from Highline Canal @ Hwy 99 for the June 10th and July 8th sampling events. This site is an agricultural supply channel with steep concrete walls and the sampling crew are unable to safely collect environmental and field duplicate samples side by side. Instead, they alternate sample collection between the environmental and field duplicate samples until the appropriate volume is collected for each series of analyses. The turbidity at the site on June 10th was 3.9 and 3.7 NTUs in the environmental and field duplicate samples, respectively. The flow was calculated as 37.03 cfs. Samples were also collected from the site for herbicides (atrazine, cyanazine, diuron, and simazine) and there were no detections. However, other non-target analytes/herbicides that the Coalition does not monitor could have been present in the sample at sufficient enough levels to cause differences in growth inhibition to *S. capricornutum* between the two sample types. The turbidity RPD at Highline Canal @ Hwy 99 was 124% for the July 8, 2014 sampling, indicating the water column was not homogenous during collection.

Negative controls (CNEGs) were performed with each toxicity batch for each species and 100% met acceptability criteria (Table 31). All water column toxicity tests are acceptable and useable.

Sediment Toxicity: Sediment toxicity samples were collected on March 4th and 5th and September 9th during the 2014 WY. Field duplicates were collected for these three events and all RPDs were within 25%. One hundred percent of the sediment samples had negative controls and survival of *H. azteca* was within acceptability criteria. All sediment toxicity tests are acceptable and useable.

7.C. CORRECTIVE ACTIONS

Corrective actions are decisions made by the laboratory to demonstrate laboratory capabilities to carry out analyses and maintain the integrity of the data. Corrective actions were performed by Coalition laboratories as outlined in the ESJWQC QAPP for QA/QC results that did not meet acceptance criteria in the 2014 WY. If corrective actions occurred (e.g. reanalysis), details are included in the above sections.

Hold time violations occurred for 3% of all Coalition samples collected during the 2014 WY. Hold time violations occurred to correct the acceptability of QC samples in original batches. The Coalition accepted data with hold time violations because 1) there was no observed significant degradation in the concentrations detected in samples and 2) the recoveries of the QC samples met the acceptability criteria upon re-extractions outside of hold time. In some cases recoveries in the re-extracted samples did not meet all acceptability criteria and data were accepted based on an overall assessment of QC performed in the batch.

Table 16. ESJWQC field and transport and analytical completeness: environmental sample counts and percentages.

Samples collected during the 2014WY. The table counts environmental grabs only; field duplicates are not included. Each analyte is sorted by method and in alphabetical order. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Env. Samples Scheduled	Dry sites	Env. Samples Collected (Total)	Field and Transport Completeness (%)	Env. Samples Analyzed (Total)	Analytical Completeness (%)
EPA 8321A CARB	Aldicarb	72	18	54	100.00	54	100.00
EPA 8321A CARB	Carbaryl	72	18	54	100.00	54	100.00
EPA 8321A CARB	Carbofuran	72	18	54	100.00	54	100.00
EPA 8321A CARB	Methiocarb	72	18	54	100.00	54	100.00
EPA 8321A CARB	Methomyl	72	18	54	100.00	54	100.00
EPA 8321A CARB	Oxamyl	72	18	54	100.00	54	100.00
EPA 8321A CARB	Diuron	79	19	60	100.00	60	100.00
EPA 8321A CARB	Linuron	72	18	54	100.00	54	100.00
EPA 547M	Glyphosate	12	3	9	100.00	9	100.00
EPA 549.2M	Paraquat	12	3	9	100.00	9	100.00
EPA 8081A	DDD(p,p')	12	3	9	100.00	9	100.00
EPA 8081A	DDE(p,p')	12	3	9	100.00	9	100.00
EPA 8081A	DDT(p,p')	12	3	9	100.00	9	100.00
EPA 8081A	Dicofol	12	3	9	100.00	9	100.00
EPA 8081A	Dieldrin	12	3	9	100.00	9	100.00
EPA 8081A	Endrin	12	3	9	100.00	9	100.00
EPA 8081A	Methoxychlor	12	3	9	100.00	9	100.00
EPA 8081A	Aldrin	12	3	9	100.00	9	100.00
EPA 8081A	Chlordane	12	3	9	100.00	9	100.00
EPA 8081A	Heptachlor	12	3	9	100.00	9	100.00
EPA 8081A	Heptachlor epoxide	12	3	9	100.00	9	100.00
EPA 8081A	HCH, alpha	12	3	9	100.00	9	100.00
EPA 8081A	HCH, beta	12	3	9	100.00	9	100.00
EPA 8081A	HCH, delta	12	3	9	100.00	9	100.00
EPA 8081A	HCH, gamma	12	3	9	100.00	9	100.00
EPA 8081A	Endosulfan I	12	3	9	100.00	9	100.00
EPA 8081A	Endosulfan II	12	3	9	100.00	9	100.00
EPA 8081A	Toxaphene	12	3	9	100.00	9	100.00
EPA 8141A	Azinphos methyl	72	18	54	100.00	54	100.00
EPA 8141A	Chlorpyrifos	127	39	88	100.00	88	100.00
EPA 8141A	Diazinon	74	18	56	100.00	56	100.00
EPA 8141A	Dichlorvos	72	18	54	100.00	54	100.00
EPA 8141A	Dimethoate	88	18	70	100.00	70	100.00
EPA 8141A	Demeton-s	72	18	54	100.00	54	100.00
EPA 8141A	Disulfoton	72	18	54	100.00	54	100.00
EPA 8141A	Malathion	72	18	54	100.00	54	100.00
EPA 8141A	Methidathion	72	18	54	100.00	54	100.00
EPA 8141A	Parathion, Methyl	72	18	54	100.00	54	100.00
EPA 8141A	Phorate	72	18	54	100.00	54	100.00
EPA 8141A	Phosmet	72	18	54	100.00	54	100.00
EPA 8141A	Trifluralin	72	18	54	100.00	54	100.00
EPA 8141A	Atrazine	72	18	54	100.00	54	100.00
EPA 8141A	Cyanazine	72	18	54	100.00	54	100.00
EPA 8141A	Simazine	72	18	54	100.00	54	100.00
EPA 8321A	Methamidophos	72	18	54	100.00	54	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	110	52	58	100.00	58	100.00
EPA 180.1	Turbidity	72	18	54	100.00	54	100.00
SM 4500-NH3 C v20	Ammonia as N	72	18	54	100.00	54	100.00
EPA 353.2	Nitrate + Nitrite as N	72	18	54	100.00	54	100.00
SM 4500-P E	OrthoPhosphate as P	72	18	54	100.00	54	100.00
SM 5310 B	Total Organic Carbon (Water)	72	18	54	100.00	54	100.00

Method	Analyte	Env. Samples Scheduled	Dry sites	Env. Samples Collected (Total)	Field and Transport Completeness (%)	Env. Samples Analyzed (Total)	Analytical Completeness (%)
SM 9223B	*E. coli*	72	18	54	100.00	54	100.00
EPA 200.8	Arsenic	22	3	19	100.00	19	100.00
EPA 200.8	Boron	22	3	19	100.00	19	100.00
EPA 200.8	Copper (Total)	51	29	22	100.00	22	100.00
EPA 200.8	Lead (Total)	13	6	7	100.00	7	100.00
EPA 200.8	Molybdenum	30	3	27	100.00	27	100.00
EPA 200.8	Selenium	22	3	19	100.00	19	100.00
EPA 200.8	Cadmium (Dissolved)	21	2	19	100.00	19	100.00
EPA 200.8	Copper (Dissolved)	104	51	53	100.00	53	100.00
EPA 200.8	Lead (Dissolved)	52	13	39	100.00	39	100.00
EPA 200.8	Nickel (Dissolved)	22	3	19	100.00	19	100.00
EPA 200.8	Zinc (Dissolved)	22	3	19	100.00	19	100.00
Walkley-Black	Total Organic Carbon (Sediment)	39	3	36	100.00	36	100.00
ASTM D4464M,ASTM D422	Sediment Grain Size	39	3	36	100.00	36	100.00
EPA 8270M_NCI	Bifenthrin	3	0	3	100.00	3	100.00
EPA 8270M_NCI	Chlorpyrifos	3	0	3	100.00	3	100.00
EPA 8270M_NCI	Cyfluthrin	3	0	3	100.00	3	100.00
EPA 8270M_NCI	Cyhalothrin, lambda	3	0	3	100.00	3	100.00
EPA 8270M_NCI	Cypermethrin	3	0	3	100.00	3	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin	3	0	3	100.00	3	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	3	0	3	100.00	3	100.00
EPA 8270M_NCI	Fenpropathrin	3	0	3	100.00	3	100.00
EPA 8270M_NCI	Permethrin	3	0	3	100.00	3	100.00
EPA 8270	Piperonyl butoxide	3	0	3	100.00	3	100.00
EPA 821/R-02-012	*Ceriodaphnia dubia*	99	19	80	100.00	80	100.00
EPA 821/R-02-012	*Pimephales promelas*	88	18	70	100.00	70	100.00
EPA 821/R-02-013	*Selenastrum capricornutum*	149	30	119	100.00	119	100.00
EPA 600/R-99-064	*Hyalella azteca*	46	3	43	100.00	43	100.00
	TOTAL	**3533**	**887**	**2646**	**100.00**	**2646**	**100.00**

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Table 17. ESJWQC field and transport completeness: field parameter counts and percentages.

Samples collected during the 2014 WY; sorted by method. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Samples Scheduled[1,2]	Dry Sites	Total Measurements[3]	Completeness (%)
USGS R2Cross streamflow	Discharge, cfs	199	68	130	99.50
SM 4500-O	Dissolved Oxygen, mg/L	265	68	225	110.57
EPA 150.1	pH	265	68	225	110.57
EPA 120.1	Specific Conductivity, uS/cm	265	68	224	110.19
SM 2550	Temperature, Deg C	265	68	225	110.57
	TOTAL	**1259**	**340**	**1029**	**108.74**

[1]Samples were collected for copper analysis from Bear Creek @ Kibby Rd after the copper was removed from the sites' s management plan. The Coalition stopped copper analysis. However, the field parameters counts are included in the samples scheduled column.

[2]Due to sampling error, SC was not recorded on the field sheet for Unnamed Drain @ Hwy 140 on January 14, 2014. An extra set of field parameters (DO, pH, SC and water temperature) were measured on 10/21/2013 and 11/13/2013 because samples were re-collected due to laboratory error.

Table 18. ESJWQC QC batch completeness: counts and percentages of collected field quality control samples.

Samples collected during the 2014 WY. The environmental sample count does not include the field duplicate. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Env. Samples Analyzed (Total)	Env. and Field QC Samples (Total)	Field Blanks (Total)	Field Blank Completeness (%)	Field Duplicate (Total)	Field Duplicate Completeness (%)	Equipment Blanks (Total)	Equipment Blank Completeness (%)	Travel Blanks (Total)	Travel Blank Completeness (%)
EPA 8321A CARB	Aldicarb	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8321A CARB	Carbaryl	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8321A CARB	Carbofuran	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8321A CARB	Methiocarb	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8321A CARB	Methomyl	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8321A CARB	Oxamyl	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8321A CARB	Diuron	60	86	13	15.12	13	15.12	NA	NA	NA	NA
EPA 8321A CARB	Linuron	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 547M	Glyphosate	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 549.2M	Paraquat	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	DDD(p,p')	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	DDE(p,p')	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	DDT(p,p')	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	Dicofol	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	Dieldrin	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	Endrin	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	Methoxychlor	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	Aldrin	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	Chlordane	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	Heptachlor	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	Heptachlor epoxide	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	HCH, alpha-	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	HCH, beta-	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	HCH, delta-	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	HCH, gamma-	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	Endosulfan I	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	Endosulfan II	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8081A	Toxaphene	9	13	2	15.38	2	15.38	NA	NA	NA	NA
EPA 8141A	Azinphos methyl	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8141A	Chlorpyrifos	88	114	13	11.40	13	11.40	NA	NA	NA	NA
EPA 8141A	Diazinon	56	80	12	15.00	12	15.00	NA	NA	NA	NA
EPA 8141A	Dichlorvos	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8141A	Dimethoate	70	94	12	12.77	12	12.77	NA	NA	NA	NA
EPA 8141A	Demeton-s	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8141A	Disulfoton	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8141A	Malathion	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8141A	Methidathion	54	78	12	15.38	12	15.38	NA	NA	NA	NA

Method	Analyte	Env. Samples Analyzed (Total)	Env. and Field QC Samples (Total)	Field Blanks (Total)	Field Blank Completeness (%)	Field Duplicate (Total)	Field Duplicate Completeness (%)	Equipment Blanks (Total)	Equipment Blank Completeness (%)	Travel Blanks (Total)	Travel Blank Completeness (%)
EPA 8141A	Parathion, Methyl	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8141A	Phorate	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8141A	Phosmet	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8141A	Trifluralin	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8141A	Atrazine	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8141A	Cyanazine	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8141A	Simazine	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 8321A	Methamidophos	54	78	12	15.38	12	15.38	NA	NA	NA	NA
SM 2340 C	Hardness as CaCO3 (Dissolved)	58	86	14	16.28	14	16.28	NA	NA	NA	NA
SM 2540 D	Total Suspended Solids	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 180.1	Turbidity	54	78	12	15.38	12	15.38	NA	NA	NA	NA
SM 4500-NH3 C v20	Ammonia as N	54	78	12	15.38	12	15.38	NA	NA	NA	NA
EPA 353.2	Nitrate + Nitrite as N	54	78	12	15.38	12	15.38	NA	NA	NA	NA
SM 4500-P E	OrthoPhosphate as P	54	78	12	15.38	12	15.38	NA	NA	NA	NA
SM 5310 B	Total Organic Carbon (Water)	54	78	12	15.38	12	15.38	NA	NA	NA	NA
SM 9223B	*E. coli*	19	43	12	27.91	12	27.91	NA	NA	NA	NA
EPA 200.8	Arsenic	19	31	4	12.90	4	12.90	NA	NA	4	12.90
EPA 200.8	Boron	22	34	4	11.76	4	11.76	NA	NA	4	11.76
EPA 200.8	Copper (Total)	7	29	8	27.59	8	27.59	NA	NA	6	20.69
EPA 200.8	Lead (Total)	27	33	2	6.06	2	6.06	NA	NA	2	6.06
EPA 200.8	Molybdenum	19	51	12	23.53	12	23.53	NA	NA	8	15.69
EPA 200.8	Selenium	19	31	4	12.90	4	12.90	NA	NA	4	12.90
EPA 200.8	Cadmium (Dissolved)	53	65	4	6.15	4	6.15	4	6.15	NA	NA
EPA 200.8	Copper (Dissolved)	39	78	13	16.67	13	16.67	13	16.67	NA	NA
EPA 200.8	Lead (Dissolved)	19	46	9	19.57	9	19.57	9	19.57	NA	NA
EPA 200.8	Nickel (Dissolved)	19	31	4	12.90	4	12.90	4	12.90	NA	NA
EPA 200.8	Zinc (Dissolved)	40	52	4	7.69	4	7.69	4	7.69	NA	NA
Walkley-Black	Total Organic Carbon (sediment)	36	39	NA	NA	3	7.69	NA	NA	NA	NA
ASTM D4464M, ASTM D422	Sediment Grain Size	36	38	NA	NA	2	5.26	NA	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	3	5	NA	NA	2	40.00	NA	NA	NA	NA
EPA 8270M_NCI	Chlorpyrifos	3	5	NA	NA	2	40.00	NA	NA	NA	NA
EPA 8270M_NCI	Cyfluthrin	3	5	NA	NA	2	40.00	NA	NA	NA	NA
EPA 8270M_NCI	Cyhalothrin, lambda	3	5	NA	NA	2	40.00	NA	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	3	5	NA	NA	2	40.00	NA	NA	NA	NA

Method	Analyte	Env. Samples Analyzed (Total)	Env. and Field QC Samples (Total)	Field Blanks (Total)	Field Blank Completeness (%)	Field Duplicate (Total)	Field Duplicate Completeness (%)	Equipment Blanks (Total)	Equipment Blank Completeness (%)	Travel Blanks (Total)	Travel Blank Completeness (%)
EPA 8270M_NCI	Deltamethrin: Tralomethrin	3	5	NA	NA	2	40.00	NA	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	3	5	NA	NA	2	40.00	NA	NA	NA	NA
EPA 8270M_NCI	Permethrin	3	5	NA	NA	2	40.00	NA	NA	NA	NA
EPA 8270	Piperonyl butoxide	3	5	NA	NA	2	40.00	NA	NA	NA	NA
EPA 821/R-02-012	*Ceriodaphnia dubia*	80	93	NA	NA	13	13.98	NA	NA	NA	NA
EPA 821/R-02-012	*Pimephales promelas*	70	83	NA	NA	13	15.66	NA	NA	NA	NA
EPA 821/R-02-013	*Selenastrum capricornutum*	119	132	NA	NA	13	9.85	NA	NA	NA	NA
EPA 600/R-99-064	*Hyalella azteca*	43	46	NA	NA	3	6.52	NA	NA	NA	NA
	TOTAL	**2683**	**3826**	**508**	**15.16**	**573**	**14.98**	**34**	**12.50**	**28**	**13.40**

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

Table 19. ESJWQC summary of field blank QC sample evaluations.

Samples collected during the 2014 WY, sorted by method and analyte. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Field Blanks (Total)	Field Blanks within Control Limits (Total)	Field Blanks within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	<RL or < (env sample/5)	12	12	100.0
EPA 8321A CARB	Carbaryl	<RL or < (env sample/5)	12	12	100.0
EPA 8321A CARB	Carbofuran	<RL or < (env sample/5)	12	12	100.0
EPA 8321A CARB	Methiocarb	<RL or < (env sample/5)	12	12	100.0
EPA 8321A CARB	Methomyl	<RL or < (env sample/5)	12	12	100.0
EPA 8321A CARB	Oxamyl	<RL or < (env sample/5)	12	12	100.0
EPA 8321A CARB	Diuron	<RL or < (env sample/5)	13	13	100.0
EPA 8321A CARB	Linuron	<RL or < (env sample/5)	12	12	100.0
EPA 547M	Glyphosate	<RL or < (env sample/5)	2	2	100.0
EPA 549.2M	Paraquat	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	DDD(p,p')	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	DDE(p,p')	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	DDT(p,p')	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	Dicofol	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	Dieldrin	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	Endrin	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	Methoxychlor	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	Aldrin	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	Chlordane	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	Heptachlor	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	Heptachlor epoxide	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	HCH, alpha	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	HCH, beta	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	HCH, delta	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	HCH, gamma	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	Endosulfan I	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	Endosulfan II	<RL or < (env sample/5)	2	2	100.0
EPA 8081A	Toxaphene	<RL or < (env sample/5)	2	2	100.0
EPA 8141A	Azinphos methyl	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Chlorpyrifos	<RL or < (env sample/5)	13	13	100.0
EPA 8141A	Diazinon	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Dichlorvos	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Dimethoate	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Demeton-s	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Disulfoton	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Malathion	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Methidathion	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Parathion, Methyl	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Phorate	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Phosmet	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Trifluralin	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Atrazine	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Cyanazine	<RL or < (env sample/5)	12	12	100.0
EPA 8141A	Simazine	<RL or < (env sample/5)	12	12	100.0
EPA 8321A	Methamidophos	<RL or < (env sample/5)	12	12	100.0
SM 2340 C	Hardness as CaCO3 (Dissolved)	<RL or < (env sample/5)	14	14	100.0
EPA 160.2	Total Suspended Solids	<RL or < (env sample/5)	12	12	100.0
EPA 180.1	Turbidity	<RL or < (env sample/5)	12	12	100.0
EPA 350.2	Ammonia as N	<RL or < (env sample/5)	12	12	100.0
EPA 353.2	Nitrate + Nitrite as N	<RL or < (env sample/5)	12	12	100.0
EPA 365.2	OrthoPhosphate as P	<RL or < (env sample/5)	12	11	91.7
EPA 415.1	Total Organic Carbon (Water)	<RL or < (env sample/5)	12	12	100.0
SM 9223B	*E. coli*	<RL or < (env sample/5)	12	12	100.0
EPA 200.8	Arsenic	<RL or < (env sample/5)	4	4	100.0

Method	Analyte	Data Quality Objective	Field Blanks (Total)	Field Blanks within Control Limits (Total)	Field Blanks within Acceptable Limits (%)
EPA 200.8	Boron	<RL or < (env sample/5)	4	4	100.0
EPA 200.8	Copper (Total)	<RL or < (env sample/5)	8	8	100.0
EPA 200.8	Lead (Total)	<RL or < (env sample/5)	2	2	100.0
EPA 200.8	Molybdenum	<RL or < (env sample/5)	12	12	100.0
EPA 200.8	Selenium	<RL or < (env sample/5)	4	4	100.0
EPA 200.8	Zinc (Total)	<RL or < (env sample/5)	4	4	100.0
EPA 200.8	Cadmium (Dissolved)	<RL or < (env sample/5)	4	4	100.0
EPA 200.8	Copper (Dissolved)	<RL or < (env sample/5)	13	13	100.0
EPA 200.8	Lead (Dissolved)	<RL or < (env sample/5)	9	9	100.0
EPA 200.8	Nickel (Dissolved)	<RL or < (env sample/5)	4	4	100.0
Walkley-Black	Total Organic Carbon (Sediment)	NA	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	NA	NA	NA	NA
EPA 8270M_NCI	Chlorpyrifos	NA	NA	NA	NA
EPA 8270M_NCI	Cyfluthrin	NA	NA	NA	NA
EPA 8270M_NCI	Cyhalothrin, lambda	NA	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	NA	NA	NA	NA
EPA 8270M_NCI	Deltamethrin:Tralomethrin	NA	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	NA	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	NA	NA	NA	NA
EPA 8270M_NCI	Permethrin	NA	NA	NA	NA
EPA 8270	Piperonyl butoxide	NA	NA	NA	NA
		TOTAL	**508**	**507**	**99.88%**

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

Table 20. ESJWQC summary of travel blank (total metals) and equipment blanks (dissolved metals) QC sample evaluations.

Samples collected during the 2014 WY, sorted by method and analyte. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Blanks (Total)	Blanks Within Control Limits (Total)	Blanks within Acceptable Limits (%)
EPA 200.8	Arsenic (Total)	<RL or < (env sample/5)	4	4	100.00
EPA 200.8	Boron (Total)	<RL or < (env sample/5)	4	4	100.00
EPA 200.8	Copper (Total)	<RL or < (env sample/5)	6	6	100.00
EPA 200.8	Lead (Total)	<RL or < (env sample/5)	2	2	100.00
EPA 200.8	Molybdenum (Total)	<RL or < (env sample/5)	8	8	100.00
EPA 200.8	Selenium (Total)	<RL or < (env sample/5)	4	4	100.00
		TRAVEL BLANK TOTAL	**28**	**28**	**100.00**
EPA 200.8	Cadmium (Dissolved)	<RL or < (env sample/5)	4	4	100.00
EPA 200.8	Copper (Dissolved)	<RL or < (env sample/5)	13	13	100.00
EPA 200.8	Lead (Dissolved)	<RL or < (env sample/5)	9	9	100.00
EPA 200.8	Nickel (Dissolved)	<RL or < (env sample/5)	4	4	100.00
EPA 200.8	Zinc (Dissolved)	<RL or < (env sample/5)	4	4	100.00
		EQUIPMENT BLANK TOTAL	**34**	**34**	**100.00**

Table 21. ESJWQC summary of field duplicate QC sample evaluations.

Samples collected during the 2014 WY, sorted by method and analyte. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Field Duplicate Samples (Total)	Samples Within Control Limits (Total)	Samples within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	RPD ≤ 25	12	12	100.00
EPA 8321A CARB	Carbaryl	RPD ≤ 25	12	12	100.00
EPA 8321A CARB	Carbofuran	RPD ≤ 25	12	12	100.00
EPA 8321A CARB	Methiocarb	RPD ≤ 25	12	12	100.00
EPA 8321A CARB	Methomyl	RPD ≤ 25	12	12	100.00
EPA 8321A CARB	Oxamyl	RPD ≤ 25	12	12	100.00
EPA 8321A CARB	Diuron	RPD ≤ 25	13	13	100.00
EPA 8321A CARB	Linuron	RPD ≤ 25	12	12	100.00
EPA 547M	Glyphosate	RPD ≤ 25	2	2	100.00
EPA 549.2M	Paraquat	RPD ≤ 25	2	2	100.00
EPA 8081A	DDD(p,p')	RPD ≤ 25	2	2	100.00
EPA 8081A	DDE(p,p')	RPD ≤ 25	2	2	100.00
EPA 8081A	DDT(p,p')	RPD ≤ 25	2	2	100.00
EPA 8081A	Dicofol	RPD ≤ 25	2	2	100.00
EPA 8081A	Dieldrin	RPD ≤ 25	2	2	100.00
EPA 8081A	Endrin	RPD ≤ 25	2	2	100.00
EPA 8081A	Methoxychlor	RPD ≤ 25	2	2	100.00
EPA 8081A	Aldrin	RPD ≤ 25	2	2	100.00
EPA 8081A	Chlordane	RPD ≤ 25	2	2	100.00
EPA 8081A	Heptachlor	RPD ≤ 25	2	2	100.00
EPA 8081A	Heptachlor epoxide	RPD ≤ 25	2	2	100.00
EPA 8081A	HCH, alpha	RPD ≤ 25	2	2	100.00
EPA 8081A	HCH, beta	RPD ≤ 25	2	2	100.00
EPA 8081A	HCH, delta	RPD ≤ 25	2	2	100.00
EPA 8081A	HCH, gamma	RPD ≤ 25	2	2	100.00
EPA 8081A	Endosulfan I	RPD ≤ 25	2	2	100.00
EPA 8081A	Endosulfan II	RPD ≤ 25	2	2	100.00
EPA 8081A	Toxaphene	RPD ≤ 25	2	2	100.00
EPA 8141A	Azinphos methyl	RPD ≤ 25	12	12	100.00
EPA 8141A	Chlorpyrifos	RPD ≤ 25	13	13	100.00
EPA 8141A	Diazinon	RPD ≤ 25	12	12	100.00
EPA 8141A	Dichlorvos	RPD ≤ 25	12	12	100.00
EPA 8141A	Dimethoate	RPD ≤ 25	12	12	100.00
EPA 8141A	Demeton-s	RPD ≤ 25	12	12	100.00
EPA 8141A	Disulfoton	RPD ≤ 25	12	12	100.00
EPA 8141A	Malathion	RPD ≤ 25	12	12	100.00
EPA 8141A	Methidathion	RPD ≤ 25	12	12	100.00
EPA 8141A	Parathion, Methyl	RPD ≤ 25	12	12	100.00
EPA 8141A	Phorate	RPD ≤ 25	12	12	100.00
EPA 8141A	Phosmet	RPD ≤ 25	12	12	100.00
EPA 8141A	Trifluralin	RPD ≤ 25	12	12	100.00
EPA 8141A	Atrazine	RPD ≤ 25	12	12	100.00
EPA 8141A	Cyanazine	RPD ≤ 25	12	12	100.00
EPA 8141A	Simazine	RPD ≤ 25	12	12	100.00
EPA 8321A	Methamidophos	RPD ≤ 25	12	12	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 20	14	14	100.00
SM 2540 D	Total Suspended Solids	RPD ≤ 20	12	7	**58.33**
EPA 180.1	Turbidity	RPD ≤ 20	12	10	**83.33**
SM 4500-NH3 C v20	Ammonia as N	RPD ≤ 20	12	9	**75.00**
EPA 353.2	Nitrate + Nitrite as N	RPD ≤ 20	12	11	91.67
SM 4500-P E	OrthoPhosphate as P	RPD ≤ 20	12	11	91.67
SM 5310 B	Total Organic Carbon (Water)	RPD ≤ 20	12	12	100.00
SM 9223 B	*E. coli*	$R_{log} \leq 1.30$	12	12	100.00
EPA 200.8	Arsenic	RPD ≤ 20	4	4	100.00
EPA 200.8	Boron	RPD ≤ 20	4	4	100.00

METHOD	ANALYTE	DATA QUALITY OBJECTIVE	FIELD DUPLICATE SAMPLES (TOTAL)	SAMPLES WITHIN CONTROL LIMITS (TOTAL)	SAMPLES WITHIN ACCEPTABLE LIMITS (%)
EPA 200.8	Copper (Total)	RPD ≤ 20	8	7	**87.50**
EPA 200.8	Lead (Total)	RPD ≤ 20	2	1	**50.00**
EPA 200.8	Molybdenum	RPD ≤ 20	12	12	100.00
EPA 200.8	Selenium	RPD ≤ 20	4	4	100.00
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 20	4	3	**75.00**
EPA 200.8	Copper (Dissolved)	RPD ≤ 20	13	12	92.31
EPA 200.8	Lead (Dissolved)	RPD ≤ 20	9	7	**77.78**
EPA 200.8	Nickel (Dissolved)	RPD ≤ 20	4	4	100.00
EPA 200.8	Zinc (Dissolved)	RPD ≤ 20	4	4	100.00
Walkley-Black	Total Organic Carbon (Sediment)	RPD ≤ 20	3	2	**66.67**
ASTM D4464M,ASTM D422	Sediment Grain Size	RSD ≤ 25	2	2	100.00
EPA 8270M_NCI	Bifenthrin	RPD < 25	2	2	100.00
EPA 8270M_NCI	Chlorpyrifos	RPD < 25	2	1	**50.00**
EPA 8270M_NCI	Cyfluthrin	RPD < 25	2	1	**50.00**
EPA 8270M_NCI	Cyhalothrin, lambda	RPD < 25	2	1	**50.00**
EPA 8270M_NCI	Cypermethrin	RPD < 25	2	1	**50.00**
EPA 8270M_NCI	Deltamethrin:Tralomethrin	RPD < 25	2	2	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	RPD < 25	2	2	100.00
EPA 8270M_NCI	Fenpropathrin	RPD < 25	2	2	100.00
EPA 8270M_NCI	Permethrin	RPD < 25	2	1	**50.00**
		TOTAL	**531**	**507**	**95.48**

Table 22. ESJWQC summary of method blank QC sample evaluations.

Samples analyzed in batches with samples collected during the 2014 WY, sorted by method and analyte. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Number of Samples	Method Blanks within Control Limits	Method Blanks within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	<RL	12	12	100.00
EPA 8321A CARB	Carbaryl	<RL	12	12	100.00
EPA 8321A CARB	Carbofuran	<RL	12	12	100.00
EPA 8321A CARB	Methiocarb	<RL	12	12	100.00
EPA 8321A CARB	Methomyl	<RL	12	12	100.00
EPA 8321A CARB	Oxamyl	<RL	12	12	100.00
EPA 8321A CARB	Diuron	<RL	13	13	100.00
EPA 8321A CARB	Linuron	<RL	12	12	100.00
EPA 547M	Glyphosate	<RL	2	2	100.00
EPA 549.2M	Paraquat	<RL	2	2	100.00
EPA 8081A	DDD(p,p')	<RL	2	2	100.00
EPA 8081A	DDE(p,p')	<RL	2	2	100.00
EPA 8081A	DDT(p,p')	<RL	2	2	100.00
EPA 8081A	Dicofol	<RL	2	2	100.00
EPA 8081A	Dieldrin	<RL	2	2	100.00
EPA 8081A	Endrin	<RL	2	2	100.00
EPA 8081A	Methoxychlor	<RL	2	2	100.00
EPA 8081A	Aldrin	<RL	2	2	100.00
EPA 8081A	Chlordane	<RL	2	2	100.00
EPA 8081A	Heptachlor	<RL	2	2	100.00
EPA 8081A	Heptachlor epoxide	<RL	2	2	100.00
EPA 8081A	HCH, alpha	<RL	2	2	100.00
EPA 8081A	HCH, beta	<RL	2	2	100.00
EPA 8081A	HCH, delta	<RL	2	2	100.00
EPA 8081A	HCH, gamma	<RL	2	2	100.00
EPA 8081A	Endosulfan I	<RL	2	2	100.00
EPA 8081A	Endosulfan II	<RL	2	2	100.00
EPA 8081A	Toxaphene	<RL	2	2	100.00
EPA 8141A	Azinphos methyl	<RL	12	12	100.00
EPA 8141A	Chlorpyrifos	<RL	14	14	100.00
EPA 8141A	Diazinon	<RL	12	12	100.00
EPA 8141A	Dichlorvos	<RL	12	12	100.00
EPA 8141A	Dimethoate	<RL	13	13	100.00
EPA 8141A	Demeton-s	<RL	12	12	100.00
EPA 8141A	Disulfoton	<RL	12	12	100.00
EPA 8141A	Malathion	<RL	12	12	100.00
EPA 8141A	Methidathion	<RL	12	12	100.00
EPA 8141A	Parathion, Methyl	<RL	12	12	100.00
EPA 8141A	Phorate	<RL	12	12	100.00
EPA 8141A	Phosmet	<RL	12	12	100.00
EPA 8141A	Trifluralin	<RL	12	12	100.00
EPA 8141A	Atrazine	<RL	12	12	100.00
EPA 8141A	Cyanazine	<RL	12	12	100.00
EPA 8141A	Simazine	<RL	12	12	100.00
EPA 8321A	Methamidophos	<RL	12	12	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	<RL	15	15	100.00
SM 2540 D	Total Suspended Solids	<RL	13	13	100.00
EPA 180.1	Turbidity	<RL	12	12	100.00
SM 4500-NH3 C v20	Ammonia as N	<RL	19	19	100.00
EPA 353.2	Nitrate + Nitrite as N	<RL	15	15	100.00
SM 4500-P E	OrthoPhosphate as P	<RL	13	13	100.00
SM 5310 B	Total Organic Carbon (Water)	<RL	16	16	100.00
SM 9223 B	*E. coli*	<RL	12	12	100.00
EPA 200.8	Arsenic	<RL	4	4	100.00
EPA 200.8	Boron	<RL	4	4	100.00

Method	Analyte	Data Quality Objective	Number of Samples	Method Blanks within Control Limits	Method Blanks within Acceptable Limits (%)
EPA 200.8	Copper (Total)	<RL	9	9	100.00
EPA 200.8	Lead (Total)	<RL	3	3	100.00
EPA 200.8	Molybdenum	<RL	13	13	100.00
EPA 200.8	Selenium	<RL	4	4	100.00
EPA 200.8	Cadmium (Dissolved)	<RL	4	4	100.00
EPA 200.8	Copper (Dissolved)	<RL	13	13	100.00
EPA 200.8	Lead (Dissolved)	<RL	9	9	100.00
EPA 200.8	Nickel (Dissolved)	<RL	4	4	100.00
EPA 200.8	Zinc (Dissolved)	<RL	4	4	100.00
Walkley-Black	Total Organic Carbon	<RL	4	4	100.00
EPA 8270M_NCI	Bifenthrin	<RL	2	2	100.00
EPA 8270M_NCI	Chlorpyrifos	<RL	2	2	100.00
EPA 8270M_NCI	Cyfluthrin	<RL	2	2	100.00
EPA 8270M_NCI	Cyhalothrin, lambda	<RL	2	2	100.00
EPA 8270M_NCI	Cypermethrin	<RL	2	2	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin	<RL	2	2	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	<RL	2	2	100.00
EPA 8270M_NCI	Fenpropathrin	<RL	2	2	100.00
EPA 8270M_NCI	Permethrin	<RL	2	2	100.00
EPA 8270	Piperonyl butoxide	<RL	2	2	100.00
		TOTAL	**554**	**554**	**100.00**

Table 23. ESJWQC summary of LCS QC sample evaluations.
Laboratory control spikes and laboratory control spike duplicates analyzed in batches with samples collected from during the 2014 WY, sorted by method and analyte. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Laboratory Control Spikes (Total)	Laboratory Control Spikes within Control Limits (Total)	Laboratory Control Spikes within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	PR 31-133	12	12	100.00
EPA 8321A CARB	Carbaryl	PR 44-133	12	11	91.67
EPA 8321A CARB	Carbofuran	PR 36-165	12	12	100.00
EPA 8321A CARB	Methiocarb	PR 35-142	12	12	100.00
EPA 8321A CARB	Methomyl	PR 23-152	12	12	100.00
EPA 8321A CARB	Oxamyl	PR 10-117	12	12	100.00
EPA 8321A CARB	Diuron	PR 52-136	13	13	100.00
EPA 8321A CARB	Linuron	PR 49-144	12	12	100.00
EPA 547M	Glyphosate	PR 84-113	4	4	100.00
EPA 549.2M	Paraquat	PR 70-130	4	4	100.00
EPA 8081A	DDD(p,p')	PR 38-135	2	2	100.00
EPA 8081A	DDE(p,p')	PR 21-134	2	2	100.00
EPA 8081A	DDT(p,p')	PR 18-145	2	2	100.00
EPA 8081A	Dicofol	PR 40-135	2	2	100.00
EPA 8081A	Dieldrin	PR 48-121	2	2	100.00
EPA 8081A	Endrin	PR 24-143	2	2	100.00
EPA 8081A	Methoxychlor	PR 30-163	2	2	100.00
EPA 8081A	Aldrin	PR 11-138	2	2	100.00
EPA 8081A	Chlordane	PR 44-152	2	2	100.00
EPA 8081A	Heptachlor	PR 24-124	2	2	100.00
EPA 8081A	Heptachlor epoxide	PR 58-109	2	2	100.00
EPA 8081A	HCH, alpha	PR 33-111	2	2	100.00
EPA 8081A	HCH, beta	PR 49-119	2	2	100.00
EPA 8081A	HCH, delta	PR 12-97	2	1	**50.00**
EPA 8081A	HCH, gamma	PR 40-114	2	2	100.00
EPA 8081A	Endosulfan I	PR 50-131	2	2	100.00
EPA 8081A	Endosulfan II	PR 55-128	2	2	100.00
EPA 8081A	Toxaphene	PR 23-140	2	2	100.00
EPA 8141A	Azinphos methyl	PR 36-189	14	14	100.00
EPA 8141A	Chlorpyrifos	PR 61-125	16	16	100.00
EPA 8141A	Diazinon	PR 57-130	14	12	**85.71**
EPA 8141A	Dichlorvos	PR 10-175	14	14	100.00
EPA 8141A	Dimethoate	PR 68-202	15	15	100.00
EPA 8141A	Demeton-s	PR 40-125	14	14	100.00
EPA 8141A	Disulfoton	PR 47-117	14	14	100.00
EPA 8141A	Malathion	PR 47-125	14	13	92.86
EPA 8141A	Methidathion	PR 50-150	14	14	100.00
EPA 8141A	Parathion, Methyl	PR 55-164	14	14	100.00
EPA 8141A	Phorate	PR 44-117	14	14	100.00
EPA 8141A	Phosmet	PR 50-150	14	14	100.00
EPA 8141A	Trifluralin	PR 40-148	14	14	100.00
EPA 8141A	Atrazine	PR 39-156	14	13	92.86
EPA 8141A	Cyanazine	PR 22-172	14	12	**85.71**
EPA 8141A	Simazine	PR 21-179	14	14	100.00
EPA 8321A	Methamidophos	PR 25-136	13	12	92.31
SM 2340 C	Hardness as CaCO3 (Dissolved)	PR 80-120	16	16	100.00
SM 2540 D	Total Suspended Solids	PR 80-120	13	13	100.00
EPA 180.1	Turbidity	PR 90-110	12	12	100.00
SM 4500-NH3 C v20	Ammonia as N	PR 90-110	37	37	100.00
EPA 353.2	Nitrate + Nitrite as N	PR 90-110	15	15	100.00
SM 4500-P E	OrthoPhosphate as P	PR 90-110	13	13	100.00
SM 5310 B	Total Organic Carbon	PR 80-120	17	17	100.00
SM 9223 B	*E. coli*	NA	NA	NA	NA
EPA 200.8	Arsenic	PR 85-115	4	4	100.00
EPA 200.8	Boron	PR 85-115	4	4	100.00

Method	Analyte	Data Quality Objective	Laboratory Control Spikes (Total)	Laboratory Control Spikes within Control Limits (Total)	Laboratory Control Spikes within Acceptable Limits (%)
EPA 200.8	Copper (Total)	PR 85-115	9	9	100.00
EPA 200.8	Lead (Total)	PR 85-115	3	3	100.00
EPA 200.8	Molybdenum	PR 85-115	13	13	100.00
EPA 200.8	Selenium	PR 85-115	4	4	100.00
EPA 200.8	Cadmium (Dissolved)	PR 85-115	4	4	100.00
EPA 200.8	Copper (Dissolved)	PR 85-115	13	13	100.00
EPA 200.8	Lead (Dissolved)	PR 85-115	9	9	100.00
EPA 200.8	Nickel (Dissolved)	PR 85-115	4	4	100.00
EPA 200.8	Zinc (Dissolved)	PR 85-115	4	4	100.00
Walkley-Black	Total Organic Carbon (Sediment)	NA	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	PR 10-160	4	4	100.00
EPA 8270M_NCI	Chlorpyrifos	PR 10-160	4	4	100.00
EPA 8270M_NCI	Cyfluthrin	PR 10-160	4	4	100.00
EPA 8270M_NCI	Cyhalothrin, lambda	PR 10-160	4	4	100.00
EPA 8270M_NCI	Cypermethrin	PR 10-160	4	4	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin	PR 10-160	4	3	**75.00**
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	PR 10-160	4	4	100.00
EPA 8270M_NCI	Fenpropathrin	PR 10-160	4	4	100.00
EPA 8270M_NCI	Permethrin	PR 10-160	4	4	100.00
EPA 8270	Piperonyl butoxide	PR 10-160	4	4	100.00
		TOTAL	**615**	**604**	**98.21**

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

Table 24. ESJWQC summary of LCSD QC sample evaluations.

Laboratory control spike duplicates analyzed in batches with samples collected for the 2014 WY, sorted by method and analyte. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	LCS/D Pairs (Total)	LCS/D Within Control Limits (Total)	LCS/D pairs within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Carbaryl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Carbofuran	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Methiocarb	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Methomyl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Oxamyl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Diuron	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Linuron	RPD ≤ 25	NA	NA	NA
EPA 547M	Glyphosate	RPD ≤ 25	2	2	100.00
EPA 549.2M	Paraquat	RPD ≤ 25	2	2	100.00
EPA 8081A	DDD(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	DDE(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	DDT(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	Dicofol	RPD ≤ 25	NA	NA	NA
EPA 8081A	Dieldrin	RPD ≤ 25	NA	NA	NA
EPA 8081A	Endrin	RPD ≤ 25	NA	NA	NA
EPA 8081A	Methoxychlor	RPD ≤ 25	NA	NA	NA
EPA 8081A	Aldrin	RPD ≤ 25	NA	NA	NA
EPA 8081A	Chlordane	RPD ≤ 25	NA	NA	NA
EPA 8081A	Heptachlor	RPD ≤ 25	NA	NA	NA
EPA 8081A	Heptachlor epoxide	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, alpha	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, beta	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, delta	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, gamma	RPD ≤ 25	NA	NA	NA
EPA 8081A	Endosulfan I	RPD ≤ 25	NA	NA	NA
EPA 8081A	Endosulfan II	RPD ≤ 25	NA	NA	NA
EPA 8081A	Toxaphene	RPD ≤ 25	NA	NA	NA
EPA 8141A	Azinphos methyl	RPD ≤ 25	2	2	100.00
EPA 8141A	Chlorpyrifos	RPD ≤ 25	2	2	100.00
EPA 8141A	Diazinon	RPD ≤ 25	2	2	100.00
EPA 8141A	Dichlorvos	RPD ≤ 25	2	2	100.00
EPA 8141A	Dimethoate	RPD ≤ 25	2	2	100.00
EPA 8141A	Demeton-s	RPD ≤ 25	2	2	100.00
EPA 8141A	Disulfoton	RPD ≤ 25	2	2	100.00
EPA 8141A	Malathion	RPD ≤ 25	2	2	100.00
EPA 8141A	Methidathion	RPD ≤ 25	2	2	100.00
EPA 8141A	Parathion, Methyl	RPD ≤ 25	2	2	100.00
EPA 8141A	Phorate	RPD ≤ 25	2	2	100.00
EPA 8141A	Phosmet	RPD ≤ 25	2	2	100.00
EPA 8141A	Trifluralin	RPD ≤ 25	2	2	100.00
EPA 8141A	Atrazine	RPD ≤ 25	2	2	100.00
EPA 8141A	Cyanazine	RPD ≤ 25	2	2	100.00
EPA 8141A	Simazine	RPD ≤ 25	2	1	**50.00**
EPA 8321A	Methamidophos	RPD ≤ 25	1	1	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 20	1	1	100.00
SM 2540 D	Total Suspended Solids	NA	NA	NA	NA
EPA 180.1	Turbidity	NA	NA	NA	NA
SM 4500-NH3 C v20	Ammonia as N	RPD ≤ 20	18	18	100.00
EPA 353.2	Nitrate + Nitrite as N	NA	NA	NA	NA
SM 4500-P E	OrthoPhosphate as P	NA	NA	NA	NA
SM 5310 B	Total Organic Carbon (Water)	RPD ≤ 20	1	1	100.00
SM 9223 B	*E. coli*	NA	NA	NA	NA
EPA 200.8	Arsenic	RPD ≤ 20	NA	NA	NA
EPA 200.8	Boron	RPD ≤ 20	NA	NA	NA
EPA 200.8	Copper (Total)	RPD ≤ 20	NA	NA	NA

Method	Analyte	Data Quality Objective	LCS/D Pairs (Total)	LCS/D Within Control Limits (Total)	LCS/D pairs within Acceptable Limits (%)
EPA 200.8	Lead (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Molybdenum	RPD ≤ 20	NA	NA	NA
EPA 200.8	Selenium	RPD ≤ 20	NA	NA	NA
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Copper (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Lead (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Nickel (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Zinc (Dissolved)	RPD ≤ 20	NA	NA	NA
Walkley-Black	Total Organic Carbon (Sediment)	RPD ≤ 20	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	RPD ≤ 25	2	1	**50.00**
EPA 8270M_NCI	Chlorpyrifos	RPD ≤ 25	2	1	**50.00**
EPA 8270M_NCI	Cyfluthrin	RPD ≤ 25	2	1	**50.00**
EPA 8270M_NCI	Cyhalothrin, lambda	RPD ≤ 25	2	1	**50.00**
EPA 8270M_NCI	Cypermethrin	RPD ≤ 25	2	1	**50.00**
EPA 8270M_NCI	Deltamethrin:Tralomethrin	RPD ≤ 25	2	1	**50.00**
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	RPD ≤ 25	2	1	**50.00**
EPA 8270M_NCI	Fenpropathrin	RPD ≤ 25	2	1	**50.00**
EPA 8270M_NCI	Permethrin	RPD ≤ 25	2	1	**50.00**
EPA 8270	Piperonyl butoxide	RPD ≤ 25	2	1	**50.00**
		TOTAL	**77**	**66**	**85.71**

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

Table 25. ESJWQC summary of matrix spike QC sample evaluations.
Matrix spikes and matrix spike duplicates collected for the 2014 WY. Non project matrix spikes are included for batch Quality Assurance completeness purposes. Evaluations are sorted by method and analyte. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Matrix Spikes (Total)	Matrix Spike Samples Within Control Limits (Total)	Matrix Spike Samples Within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	PR 31-133	24	24	100.00
EPA 8321A CARB	Carbaryl	PR 44-133	24	22	91.67
EPA 8321A CARB	Carbofuran	PR 36-165	24	24	100.00
EPA 8321A CARB	Methiocarb	PR 35-142	24	24	100.00
EPA 8321A CARB	Methomyl	PR 23-152	24	24	100.00
EPA 8321A CARB	Oxamyl	PR 10-117	24	24	100.00
EPA 8321A CARB	Diuron	PR 52-136	26	26	100.00
EPA 8321A CARB	Linuron	PR 49-144	24	24	100.00
EPA 547M	Glyphosate	PR 84-113	4	4	100.00
EPA 549.2M	Paraquat	PR 70-130	4	1	**25.00**
EPA 8081A	DDD(p,p')	PR 38-135	4	4	100.00
EPA 8081A	DDE(p,p')	PR 21-134	4	4	100.00
EPA 8081A	DDT(p,p')	PR 18-145	4	4	100.00
EPA 8081A	Dicofol	PR 40-135	4	4	100.00
EPA 8081A	Dieldrin	PR 48-121	4	4	100.00
EPA 8081A	Endrin	PR 24-143	4	4	100.00
EPA 8081A	Methoxychlor	PR 30-163	4	4	100.00
EPA 8081A	Aldrin	PR 11-138	4	4	100.00
EPA 8081A	Chlordane	PR 44-152	4	4	100.00
EPA 8081A	Heptachlor	PR 24-124	4	4	100.00
EPA 8081A	Heptachlor epoxide	PR 58-109	4	4	100.00
EPA 8081A	HCH, alpha	PR 33-111	4	4	100.00
EPA 8081A	HCH, beta	PR 49-119	4	4	100.00
EPA 8081A	HCH, delta	PR 12-97	4	2	**50.00**
EPA 8081A	HCH, gamma	PR 40-114	4	4	100.00
EPA 8081A	Endosulfan I	PR 50-131	4	4	100.00
EPA 8081A	Endosulfan II	PR 55-128	4	4	100.00
EPA 8081A	Toxaphene	PR 23-140	4	4	100.00
EPA 8141A	Azinphos methyl	PR 36-189	24	24	100.00
EPA 8141A	Chlorpyrifos	PR 61-125	28	26	92.86
EPA 8141A	Diazinon	PR 57-130	24	22	91.67
EPA 8141A	Dichlorvos	PR 10-175	24	24	100.00
EPA 8141A	Dimethoate	PR 68-202	26	24	92.31
EPA 8141A	Demeton-s	PR 40-125	24	16	**66.67**
EPA 8141A	Disulfoton	PR 47-117	24	17	**70.83**
EPA 8141A	Malathion	PR 47-125	24	19	**79.17**
EPA 8141A	Methidathion	PR 50-150	24	24	100.00
EPA 8141A	Parathion, Methyl	PR 55-164	24	24	100.00
EPA 8141A	Phorate	PR 44-117	24	22	91.67
EPA 8141A	Phosmet	PR 50-150	24	22	91.67
EPA 8141A	Trifluralin	PR 40-148	24	24	100.00
EPA 8141A	Atrazine	PR 39-156	24	23	95.83
EPA 8141A	Cyanazine	PR 22-172	24	22	91.67
EPA 8141A	Simazine	PR 21-179	24	24	100.00
EPA 8321A	Methamidophos	PR 25-136	24	24	100.00
SM 2340 C	Hardness as CaCO3 (Dissolved)	PR 80-120	28	28	100.00
SM 2540 D	Total Suspended Solids	NA	NA	NA	NA
EPA 180.1	Turbidity	NA	NA	NA	NA
SM 4500-NH3 C v20	Ammonia as N	PR 90-110	38	37	97.37
EPA 353.2	Nitrate + Nitrite as N	PR 90-110	42	32	**76.19**
SM 4500-P E	OrthoPhosphate as P	PR 90-110	30	30	100.00
SM 5310 B	Total Organic Carbon	PR 80-120	34	32	94.12
SM 9223 B	*E. coli*	NA	NA	NA	NA

Method	Analyte	Data Quality Objective	Matrix Spikes (Total)	Matrix Spike Samples Within Control Limits (Total)	Matrix Spike Samples Within Acceptable Limits (%)
EPA 200.8	Arsenic	PR 85-115	8	8	100.00
EPA 200.8	Boron	PR 85-115	8	8	100.00
EPA 200.8	Copper (Total)	PR 85-115	24	23	95.83
EPA 200.8	Lead (Total)	PR 85-115	6	6	100.00
EPA 200.8	Molybdenum (Total)	PR 85-115	30	30	100.00
EPA 200.8	Selenium	PR 85-115	8	8	100.00
EPA 200.8	Cadmium (Dissolved)	PR 85-115	8	8	100.00
EPA 200.8	Copper (Dissolved)	PR 85-115	32	32	100.00
EPA 200.8	Lead (Dissolved)	PR 85-115	22	22	100.00
EPA 200.8	Nickel (Dissolved)	PR 85-115	8	8	100.00
EPA 200.8	Zinc (Dissolved)	PR 85-115	8	8	100.00
Walkley-Black	Total Organic Carbon (Sediment)	NA	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	PR 10-160	4	3	**75.00**
EPA 8270M_NCI	Chlorpyrifos	PR 10-160	4	2	**50.00**
EPA 8270M_NCI	Cyfluthrin	PR 10-160	4	4	100.00
EPA 8270M_NCI	Cyhalothrin, lambda	PR 10-160	4	4	100.00
EPA 8270M_NCI	Cypermethrin	PR 10-160	4	4	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin	PR 10-160	4	4	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	PR 10-160	4	4	100.00
EPA 8270M_NCI	Fenpropathrin	PR 10-160	4	4	100.00
EPA 8270M_NCI	Permethrin	PR 10-160	4	4	100.00
EPA 8270	Piperonyl butoxide	PR 10-160	4	2	**50.00**
		TOTAL	**1062**	**1003**	**94.44**

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

Table 26. ESJWQC summary of matrix spike duplicate QC sample evaluations.
Matrix spike duplicates collected for the 2014 WY. Non project matrix spike duplicates are included for batch Quality Assurance completeness purposes. Evaluations are sorted by method and analyte. Analytes that did not meet 90% acceptability are bolded.

METHOD	ANALYTE	DATA QUALITY OBJECTIVE	MS/D PAIRS (TOTAL)	MS/D WITHIN CONTROL LIMITS (TOTAL)	MS/D WITHIN ACCEPTABLE LIMITS (%)
EPA 8321A CARB	Aldicarb	RPD ≤ 25	12	11	91.67
EPA 8321A CARB	Carbaryl	RPD ≤ 25	12	12	100.00
EPA 8321A CARB	Carbofuran	RPD ≤ 25	12	12	100.00
EPA 8321A CARB	Methiocarb	RPD ≤ 25	12	12	100.00
EPA 8321A CARB	Methomyl	RPD ≤ 25	12	11	91.67
EPA 8321A CARB	Oxamyl	RPD ≤ 25	12	11	91.67
EPA 8321A CARB	Diuron	RPD ≤ 25	13	13	100.00
EPA 8321A CARB	Linuron	RPD ≤ 25	12	12	100.00
EPA 547M	Glyphosate	RPD ≤ 25	2	2	100.00
EPA 549.2M	Paraquat	RPD ≤ 25	2	1	**50.00**
EPA 8081A	DDD(p,p')	RPD ≤ 25	2	2	100.00
EPA 8081A	DDE(p,p')	RPD ≤ 25	2	2	100.00
EPA 8081A	DDT(p,p')	RPD ≤ 25	2	2	100.00
EPA 8081A	Dicofol	RPD ≤ 25	2	2	100.00
EPA 8081A	Dieldrin	RPD ≤ 25	2	2	100.00
EPA 8081A	Endrin	RPD ≤ 25	2	2	100.00
EPA 8081A	Methoxychlor	RPD ≤ 25	2	2	100.00
EPA 8081A	Aldrin	RPD ≤ 25	2	2	100.00
EPA 8081A	Chlordane	RPD ≤ 25	2	2	100.00
EPA 8081A	Heptachlor	RPD ≤ 25	2	2	100.00
EPA 8081A	Heptachlor epoxide	RPD ≤ 25	2	2	100.00
EPA 8081A	HCH, alpha	RPD ≤ 25	2	2	100.00
EPA 8081A	HCH, beta	RPD ≤ 25	2	2	100.00
EPA 8081A	HCH, delta	RPD ≤ 25	2	2	100.00
EPA 8081A	HCH, gamma	RPD ≤ 25	2	2	100.00
EPA 8081A	Endosulfan I	RPD ≤ 25	2	2	100.00
EPA 8081A	Endosulfan II	RPD ≤ 25	2	2	100.00
EPA 8081A	Toxaphene	RPD ≤ 25	2	2	100.00
EPA 8141A	Azinphos methyl	RPD ≤ 25	12	12	100.00
EPA 8141A	Chlorpyrifos	RPD ≤ 25	14	14	100.00
EPA 8141A	Diazinon	RPD ≤ 25	12	11	91.67
EPA 8141A	Dichlorvos	RPD ≤ 25	12	11	91.67
EPA 8141A	Dimethoate	RPD ≤ 25	13	13	100.00
EPA 8141A	Demeton-s	RPD ≤ 25	12	10	**83.33**
EPA 8141A	Disulfoton	RPD ≤ 25	12	11	91.67
EPA 8141A	Malathion	RPD ≤ 25	12	12	100.00
EPA 8141A	Methidathion	RPD ≤ 25	12	12	100.00
EPA 8141A	Parathion, Methyl	RPD ≤ 25	12	12	100.00
EPA 8141A	Phorate	RPD ≤ 25	12	12	100.00
EPA 8141A	Phosmet	RPD ≤ 25	12	12	100.00
EPA 8141A	Trifluralin	RPD ≤ 25	12	12	100.00
EPA 8141A	Atrazine	RPD ≤ 25	12	11	91.67
EPA 8141A	Cyanazine	RPD ≤ 25	12	11	91.67
EPA 8141A	Simazine	RPD ≤ 25	12	10	**83.33**
EPA 8321A	Methamidophos	RPD ≤ 25	12	11	91.67
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 20	14	14	100.00
SM 2540 D	Total Suspended Solids	NA	NA	NA	NA
EPA 180.1	Turbidity	NA	NA	NA	NA
SM 4500-NH3 C v20	Ammonia as N	RPD ≤ 20	19	19	100.00
EPA 353.2	Nitrate + Nitrite as N	RPD ≤ 20	20	20	100.00
SM 4500-P E	OrthoPhosphate as P	RPD ≤ 20	15	15	100.00
SM 5310 B	Total Organic Carbon (Water)	RPD ≤ 20	17	17	100.00
SM 9223 B	*E. coli*	NA	NA	NA	NA
EPA 200.8	Arsenic	RPD ≤ 20	4	4	100.00
EPA 200.8	Boron	RPD ≤ 20	4	4	100.00

METHOD	ANALYTE	DATA QUALITY OBJECTIVE	MS/D PAIRS (TOTAL)	MS/D WITHIN CONTROL LIMITS (TOTAL)	MS/D WITHIN ACCEPTABLE LIMITS (%)
EPA 200.8	Copper (Total)	RPD ≤ 20	12	12	100.00
EPA 200.8	Lead (Total)	RPD ≤ 20	3	3	100.00
EPA 200.8	Molybdenum	RPD ≤ 20	15	15	100.00
EPA 200.8	Selenium	RPD ≤ 20	4	4	100.00
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 20	4	4	100.00
EPA 200.8	Copper (Dissolved)	RPD ≤ 20	15	15	100.00
EPA 200.8	Lead (Dissolved)	RPD ≤ 20	11	11	100.00
EPA 200.8	Nickel (Dissolved)	RPD ≤ 20	4	4	100.00
EPA 200.8	Zinc (Dissolved)	RPD ≤ 20	4	4	100.00
Walkley-Black	Total Organic Carbon (Sediment)	NA	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	RPD < 25	2	2	100.00
EPA 8270M_NCI	Chlorpyrifos	RPD < 25	2	2	100.00
EPA 8270M_NCI	Cyfluthrin	RPD < 25	2	2	100.00
EPA 8270M_NCI	Cyhalothrin, lambda	RPD < 25	2	2	100.00
EPA 8270M_NCI	Cypermethrin	RPD < 25	2	2	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin	RPD < 25	2	2	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	RPD < 25	2	2	100.00
EPA 8270M_NCI	Fenpropathrin	RPD < 25	2	2	100.00
EPA 8270M_NCI	Permethrin	RPD < 25	2	2	100.00
EPA 8270	Piperonyl butoxide	RPD < 25	2	2	100.00
		TOTAL	**529**	**515**	**97.35**

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

Table 27. ESJWQC summary of laboratory duplicate QC sample evaluations.

Laboratory duplicates were analyzed in batches with samples collected for the 2014 WY. Non project samples are included for batch Quality Assurance completeness purposes. Evaluations sorted by method and analyte. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Laboratory duplicates (Total)	Laboratory Duplicates within Control Limits (Total)	Laboratory Duplicates within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Carbaryl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Carbofuran	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Methiocarb	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Methomyl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Oxamyl	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Diuron	RPD ≤ 25	NA	NA	NA
EPA 8321A CARB	Linuron	RPD ≤ 25	NA	NA	NA
EPA 547M	Glyphosate	RPD ≤ 25	NA	NA	NA
EPA 549.2M	Paraquat	RPD ≤ 25	NA	NA	NA
EPA 8081A	DDD(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	DDE(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	DDT(p,p')	RPD ≤ 25	NA	NA	NA
EPA 8081A	Dicofol	RPD ≤ 25	NA	NA	NA
EPA 8081A	Dieldrin	RPD ≤ 25	NA	NA	NA
EPA 8081A	Endrin	RPD ≤ 25	NA	NA	NA
EPA 8081A	Methoxychlor	RPD ≤ 25	NA	NA	NA
EPA 8081A	Aldrin	RPD ≤ 25	NA	NA	NA
EPA 8081A	Chlordane	RPD ≤ 25	NA	NA	NA
EPA 8081A	Heptachlor	RPD ≤ 25	NA	NA	NA
EPA 8081A	Heptachlor epoxide	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, alpha	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, beta	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, delta	RPD ≤ 25	NA	NA	NA
EPA 8081A	HCH, gamma	RPD ≤ 25	NA	NA	NA
EPA 8081A	Endosulfan I	RPD ≤ 25	NA	NA	NA
EPA 8081A	Endosulfan II	RPD ≤ 25	NA	NA	NA
EPA 8081A	Toxaphene	RPD ≤ 25	NA	NA	NA
EPA 8081A	Permethrin, cis-	RPD ≤ 25	NA	NA	NA
EPA 8081A	Permethrin, trans-	RPD ≤ 25	NA	NA	NA
EPA 8141A	Azinphos methyl	RPD ≤ 25	NA	NA	NA
EPA 8141A	Chlorpyrifos	RPD ≤ 25	NA	NA	NA
EPA 8141A	Diazinon	RPD ≤ 25	NA	NA	NA
EPA 8141A	Dichlorvos	RPD ≤ 25	NA	NA	NA
EPA 8141A	Dimethoate	RPD ≤ 25	NA	NA	NA
EPA 8141A	Demeton-s	RPD ≤ 25	NA	NA	NA
EPA 8141A	Disulfoton	RPD ≤ 25	NA	NA	NA
EPA 8141A	Malathion	RPD ≤ 25	NA	NA	NA
EPA 8141A	Methidathion	RPD ≤ 25	NA	NA	NA
EPA 8141A	Parathion, Methyl	RPD ≤ 25	NA	NA	NA
EPA 8141A	Phorate	RPD ≤ 25	NA	NA	NA
EPA 8141A	Phosmet	RPD ≤ 25	NA	NA	NA
EPA 8141A	Trifluralin	RPD ≤ 25	NA	NA	NA
EPA 8141A	Atrazine	RPD ≤ 25	NA	NA	NA
EPA 8141A	Cyanazine	RPD ≤ 25	NA	NA	NA
EPA 8141A	Simazine	RPD ≤ 25	NA	NA	NA
EPA 8321A	Methamidophos	RPD ≤ 25	NA	NA	NA
SM 2340 C	Hardness as CaCO3 (Dissolved)	RPD ≤ 20	NA	NA	NA
SM 2540 D	Total Suspended Solids	RPD ≤ 20	18	18	100.00
EPA 180.1	Turbidity	RPD ≤ 20	12	12	100.00
SM 4500-NH3 C v20	Ammonia as N	RPD ≤ 20	NA	NA	NA
EPA 353.2	Nitrate + Nitrite as N	RPD ≤ 20	NA	NA	NA

METHOD	ANALYTE	DATA QUALITY OBJECTIVE	LABORATORY DUPLICATES (TOTAL)	LABORATORY DUPLICATES WITHIN CONTROL LIMITS (TOTAL)	LABORATORY DUPLICATES WITHIN ACCEPTABLE LIMITS (%)
SM 4500-P E	OrthoPhosphate as P	RPD ≤ 20	NA	NA	NA
SM 5310 B	Total Organic Carbon (Water)	RPD ≤ 20	NA	NA	NA
SM 9223 B	*E. coli*	Rlog ≤ 1.3	12	12	100.00
EPA 200.8	Arsenic	RPD ≤ 20	NA	NA	NA
EPA 200.8	Boron	RPD ≤ 20	NA	NA	NA
EPA 200.8	Cadmium (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Copper (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Lead (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Molybdenum	RPD ≤ 20	NA	NA	NA
EPA 200.8	Nickel (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Selenium	RPD ≤ 20	NA	NA	NA
EPA 200.8	Zinc (Total)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Cadmium (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Copper (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Lead (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Nickel (Dissolved)	RPD ≤ 20	NA	NA	NA
EPA 200.8	Zinc (Dissolved)	RPD ≤ 20	NA	NA	NA
Walkley-Black	Total Organic Carbon (Sediment)	RPD ≤ 20	NA	NA	NA
EPA 8270M_NCI	Bifenthrin	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Chlorpyrifos	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Cyfluthrin	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Cyhalothrin, lambda	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Cypermethrin	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Deltamethrin:Tralomethrin	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Fenpropathrin	RPD ≤ 25	NA	NA	NA
EPA 8270M_NCI	Permethrin	RPD ≤ 25	NA	NA	NA
EPA 8270	Piperonyl Butoxide	RPD ≤ 25	NA	NA	NA
		TOTAL	**42**	**42**	**100.00**

NA; Not applicable, analysis was not conducted for constituent

Table 28. ESJWQC summary of surrogate recovery QC sample evaluations.

Surrogates were run with water sediment chemistry samples collected and Laboratory Quality Assurance (LABQA) analyzed for the 2014 WY for all organics except paraquat and glyphosate. Evaluation sorted by method and analyte. Analytes that did not meet 90% acceptability are bolded.

METHOD	ANALYTE	DATA QUALITY OBJECTIVE	SURROGATES ANALYZED (TOTAL)	SURROGATES WITH CONTROL LIMITS (TOTAL)	SURROGATES WITHIN ACCEPTABLE LIMITS (%)
EPA 8321A CARB	Tributylphosphate	PR 36-140	138	136	98.55
EPA 8321A	Diphenamid	PR 52-122	127	123	96.85
EPA 8081A	PCB 209	PR 27-110	21	21	100.00
EPA 8081A	Tetrachloro-m-xylene	PR 24-114	21	21	100.00
EPA 8141A	Tributylphosphate	PR 60-150	190	184	96.84
EPA 8141A	Triphenyl phosphate	PR 56-129	190	179	94.21
EPA 8270M_NCI	Esfenvalerate-d6-1	PR 63-134	8	8	100.00
EPA 8270M_NCI	Esfenvalerate-d6-2	PR 61-137	8	8	100.00
		TOTAL	**703**	**680**	**96.73**

Table 29. ESJWQC summary of holding time evaluations for environmental, field blank, field duplicate and matrix spike samples.

Samples collected during 2014 WY; sorted by method and analyte. Analytes that did not meet 90% acceptability are bolded.

Method	Analyte	Data Quality Objective	Samples Analyzed (Total)	Samples within Control Limits (Total)	Samples within Acceptable Limits (%)
EPA 8321A CARB	Aldicarb	7 days	90	90	100.00
EPA 8321A CARB	Carbaryl	7 days	90	90	100.00
EPA 8321A CARB	Carbofuran	7 days	90	90	100.00
EPA 8321A CARB	Methiocarb	7 days	90	90	100.00
EPA 8321A CARB	Methomyl	7 days	90	90	100.00
EPA 8321A CARB	Oxamyl	7 days	90	90	100.00
EPA 8321A CARB	Diuron	7 days	99	99	100.00
EPA 8321A CARB	Linuron	7 days	90	90	100.00
EPA 547M	Glyphosate	14 days	15	15	100.00
EPA 549.2M	Paraquat	7 days	15	9	**60.00**
EPA 8081A	DDD(p,p')	7 days	15	15	100.00
EPA 8081A	DDE(p,p')	7 days	15	15	100.00
EPA 8081A	DDT(p,p')	7 days	15	15	100.00
EPA 8081A	Dicofol	7 days	15	15	100.00
EPA 8081A	Dieldrin	7 days	15	15	100.00
EPA 8081A	Endrin	7 days	15	15	100.00
EPA 8081A	Methoxychlor	7 days	15	15	100.00
EPA 8081A	Aldrin	7 days	15	15	100.00
EPA 8081A	Chlordane	7 days	15	15	100.00
EPA 8081A	Heptachlor	7 days	15	15	100.00
EPA 8081A	Heptachlor epoxide	7 days	15	15	100.00
EPA 8081A	HCH, alpha	7 days	15	15	100.00
EPA 8081A	HCH, beta	7 days	15	15	100.00
EPA 8081A	HCH, delta	7 days	15	15	100.00
EPA 8081A	HCH, gamma	7 days	15	15	100.00
EPA 8081A	Endosulfan I	7 days	15	15	100.00
EPA 8081A	Endosulfan II	7 days	15	15	100.00
EPA 8081A	Toxaphene	7 days	15	15	100.00
EPA 8141A	Azinphos methyl	7 days	90	83	92.22
EPA 8141A	Chlorpyrifos	7 days	128	121	94.53
EPA 8141A	Diazinon	7 days	92	85	92.39
EPA 8141A	Dichlorvos	7 days	90	83	92.22
EPA 8141A	Dimethoate	7 days	107	100	93.46
EPA 8141A	Demeton-s	7 days	90	83	92.22
EPA 8141A	Disulfoton	7 days	90	83	92.22
EPA 8141A	Malathion	7 days	90	83	92.22
EPA 8141A	Methidathion	7 days	90	83	92.22
EPA 8141A	Parathion, Methyl	7 days	90	83	92.22
EPA 8141A	Phorate	7 days	90	83	92.22
EPA 8141A	Phosmet	7 days	90	83	92.22
EPA 8141A	Trifluralin	7 days	90	83	92.22
EPA 8141A	Atrazine	7 days	90	83	92.22
EPA 8141A	Cyanazine	7 days	90	83	92.22
EPA 8141A	Simazine	7 days	90	83	92.22
EPA 8321A	Methamidophos	7 days	90	84	93.33
SM 2340 C	Hardness as CaCO3 (Dissolved)	6 months	104	104	100.00
SM 2540 D	Total Suspended Solids	7 days	78	78	100.00
EPA 180.1	Turbidity	48 hours	78	78	100.00
SM 4500-NH3 C v20	Ammonia as N	Field acidify, 28 days	97	97	100.00
EPA 353.2	Nitrate + Nitrite as N	Field acidify, 28 days	98	98	100.00
SM 4500-P E	OrthoPhosphate as P	48 hours	93	93	100.00
SM 5310 B	Total Organic Carbon (Water)	28 days	95	95	100.00
SM 9223 B	*E. coli*	24 hours	78	78	100.00
EPA 200.8	Arsenic	Field acidify, 6 months	35	35	100.00

Method	Analyte	Data Quality Objective	Samples Analyzed (Total)	Samples within Control Limits (Total)	Samples within Acceptable Limits (%)
EPA 200.8	Boron	Field acidify, 6 months	35	35	100.00
EPA 200.8	Copper (Total)	Field acidify, 6 months	56	56	100.00
EPA 200.8	Lead (Total)	Field acidify, 6 months	16	16	100.00
EPA 200.8	Molybdenum	Field acidify, 6 months	74	74	100.00
EPA 200.8	Selenium	Field acidify, 6 months	35	35	100.00
EPA 200.8	Cadmium (Dissolved)	Field acidify, 6 months	36	36	100.00
EPA 200.8	Copper (Dissolved)	Field acidify, 6 months	108	108	100.00
EPA 200.8	Lead (Dissolved)	Field acidify, 6 months	78	78	100.00
EPA 200.8	Nickel (Dissolved)	Field acidify, 6 months	36	36	100.00
EPA 200.8	Zinc (Dissolved)	Field acidify, 6 months	36	36	100.00
Walkley-Black	Total Organic Carbon (Sediment)	Freeze within 48 hours; unfrozen 28 days	43	43	100.00
ASTM D4464M,ASTM D422	Grain Size	Analyze within 28 days	43	43	100.00
EPA 8270M_NCI	Bifenthrin	Freeze within 48 hours; 12 months	4	4	100.00
EPA 8270M_NCI	Chlorpyrifos	Freeze within 48 hours; 12 months	4	4	100.00
EPA 8270M_NCI	Cyfluthrin	Freeze within 48 hours; 12 months	4	4	100.00
EPA 8270M_NCI	Cyhalothrin, lambda	Freeze within 48 hours; 12 months	4	4	100.00
EPA 8270M_NCI	Cypermethrin	Freeze within 48 hours; 12 months	4	4	100.00
EPA 8270M_NCI	Deltamethrin:Tralomethrin	Freeze within 48 hours; 12 months	4	4	100.00
EPA 8270M_NCI	Esfenvalerate/Fenvalerate	Freeze within 48 hours; 12 months	4	4	100.00
EPA 8270M_NCI	Fenpropathrin	Freeze within 48 hours; 12 months	4	4	100.00
EPA 8270M_NCI	Permethrin	Freeze within 48 hours; 12 months	4	4	100.00
EPA 8270	Piperonyl butoxide	Freeze within 48 hours; 12 months	4	4	100.00
EPA 821/R-02-012	*Ceriodaphnia dubia*	Store at ≤6°C, 36 Hours	80	80	100.00
EPA 821/R-02-012	*Pimephales promelas*	Store at ≤6°C, 36 Hours	70	70	100.00
EPA 821/R-02-013	*Selenastrum capricornutum*	Store at ≤6°C, 36 Hours	119	119	100.00
EPA 600/R-99-064	*Hyalella azteca*	Store at ≤6°C do not freeze, 14 days	36	36	100.00
		TOTAL	**4313**	**4189**	**97.12**

Table 30. ESJWQC summary of toxicity field duplicate sample evaluations.

Samples collected for the 2014 WY; sorted by method and species. Analytes that did not meet 90% acceptability are bolded.

Method	Toxicity Species	Data Quality Objective	Total Field Duplicate Samples	Field Duplicate Samples Within Control Limits (Total)	Samples Within Acceptable Limits (%)
EPA 821/R-02-012	*Ceriodaphnia dubia*	RPD ≤ 25	13	13	100.00
EPA 821/R-02-012	*Pimephales promelas*	RPD ≤ 25	13	13	100.00
EPA 821/R-02-013	*Selenastrum capricornutum*	RPD ≤ 25	13	9	**69.23**
EPA 600/R-99-064	*Hyalella azteca*	RPD ≤ 25	3	3	100.00

Table 31. ESJWQC summary of toxicity laboratory control sample evaluations.

Samples collected for the 2014 WY; sorted by method and species. Analytes that did not meet 90% acceptability are bolded.

Method	Toxicity Species	Data Quality Objective	Lab Control Samples (Total)	Total Lab Controls within Control Limits (Total)	Samples Within Acceptable Limits (%)
EPA 821/R-02-012	*Ceriodaphnia dubia*	Survival in control samples ≥90%	13	13	100.00
EPA 821/R-02-012	*Pimephales promelas*	Survival in control samples ≥80%	13	13	100.00
EPA 821/R-02-013	*Selenastrum capricornutum*	> 200,000 cells/mL, variability of controls <20%	13	13	100.00
EPA 600/R-99-064	*Hyalella azteca*	Survival in control samples >80%	4	4	100.00

Table 32. ESJWQC summary of calculated sediment grain size RPD_{SD} results.

Batch calculations based on the relative percent difference (RPD_{SD}) between the standard deviation of the environmental samples and the standard deviation of their duplicate samples. Analytes that did not meet 90% acceptability are bolded.

Sample Type	Analysis Month	Φ5	Φ16	Φ84	Φ95	SD	RPD_{SD}
Environmental Sample	3/4/2014	1.33	2.92	7.21	8.89	2.22	NA
Field Duplicate	3/4/2014	1.09	2.76	6.99	8.76	2.22	0.075
Lab Duplicate	3/4/2014	0.99	2.73	7.04	8.79	2.26	1.85
Lab Duplicate	3/4/2014	1.16	2.74	6.92	8.68	2.18	1.60
Environmental Sample	3/5/2014	-1.4	-0.76	2.48	4.27	1.67	NA
Field Duplicate	3/5/2014	-1.43	-0.77	2.62	4.31	1.72	2.84
Lab Duplicate	3/5/2014	-1.43	-0.75	2.63	4.29	1.71	0.32
Environmental Sample	9/9/2014	1.80	3.30	7.49	9.21	2.17	NA
Field Duplicate	9/9/2014	2.18	3.50	7.74	9.43	2.16	0.54
Lab Duplicate	9/9/2014	2.37	3.57	7.72	9.42	2.11	2.48
Environmental Sample	9/9/2014	-1.28	-0.67	1.18	2.13	0.979	NA
Lab Duplicate	9/9/2014	-1.26	-0.7	1.12	1.99	0.947	3.30

Φ_5 = phi value of the 5th percentile sediment grain size category.
Φ_{16} = phi value of the 16th percentile sediment grain size category.
Φ_{84} = phi value of the 84th percentile sediment grain size category.
Φ_{95} = phi value of the 95th percentile sediment grain size category.

8. DISCUSSION OF RESULTS

8.A. INTRODUCTION

The next section summarizes all data on exceedances by zone. A list of all WQTLs used to evaluate results is included in Table 33. Tallies of exceedances that occurred during the 2014 WY are listed by site and zone in Appendix III, Tables 2A-D. The sites are tallied by the number of exceedances per constituent and the percent of exceedances compared to the number of samples taken, including dry events. If an exceedance occurred in both the environmental and the associated field duplicate sample, the result was counted only once.

Coalition monitoring during the 2014 WY resulted in exceedances of WQTLs for DO, *E. coli*, pH, SC, ammonia, nitrates, *E. coli*, arsenic, copper, molybdenum, chlorpyrifos, diuron, hexachlorocyclohexane (HCH-gamma), and malathion (Tables 40-42). Water column toxicity to *C. dubia, S. capricornutum, P. promelas,* and sediment toxicity to *H. azteca* also occurred (Tables 43-45).

The Coalition monitored Core sites on February 10, March 3, July 8, and August 12, 2014 to capture storm / high TSS events (including additional samples for organochlorines, Group A pesticides, glyphosate, paraquat, arsenic, cadmium, copper, lead, molybdenum, nickel, and zinc analysis) as outlined in the 2013 MPU.

Table 33. Water Quality Trigger Limits (WQTLs).

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
pH	6.5 - 8.5 units	Numeric		Sacramento/San Joaquin Rivers Basin Plan (Page III.6.00)	1
Electrical Conductivity (maximum)	700 µmhos/cm	Narrative	Agricultural Supply	Water Quality for Agriculture (Ayers & 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 - Sources of Drinking Water (water & fish consumption)	1
	0.056 µg/L	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) / Continuous Concentration 4-day average (total)	1

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

Constituent	Water Quality Trigger Limit (WQTL)	Standard Type	Beneficial Use (BU) with most protective limit	Reference for the Trigger Limit	Category (see footnotes)
Aldrin	0.00013 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	3 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Instantaneous maximum	
Chlordane	0.00057 µg/L	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA), Human Health Protection, 30-Day Average - Sources of Drinking Water (water & fish consumption)	1
	0.0043 µg/L		Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: CTR (USEPA) - Continuous Concentration 4-day average (total)	
Heptachlor	0.00021 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					
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

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

CONSTITUENT	WATER QUALITY TRIGGER LIMIT (WQTL)	STANDARD TYPE	BENEFICIAL USE (BU) WITH MOST PROTECTIVE LIMIT	REFERENCE FOR THE TRIGGER LIMIT	CATEGORY (SEE FOOTNOTES)
Zinc	For aquatic life variable (see Zinc worksheet).	Numeric	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: Freshwater Aquatic Life Protection - Continuous Concentration, 4-Day Average - varies with water hardness	1
Nutrients					
Nitrate as NO3 Nitrate as N	45,000 µg/L as NO3 10,000 µg/L as N	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL	1
Nitrite as Nitrogen	1,000 µg/L as N	Numeric	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Chemical Constituents Objective: California Primary MCL	1
Ammonia	For aquatic life variable (see ammonia worksheet).	Narrative	Freshwater Habitat	Sacramento/San Joaquin Basin Plan Toxicity Objective: USEPA Freshwater Aquatic Life Criteria, Continuous Concentration	3
	1.5 mg/L (regardless of pH and Temperature values)	Narrative	Municipal and Domestic Supply	Sacramento/San Joaquin Basin Plan Toxicity Objective: Taste and Odor Threshold (Ammore and Hautala)	3
Hardness	NA				
Phosphorus, total	NA				
Orthophosphate, soluble	NA				
TKN	NA				

Category 1: Constituents that have numeric water quality objectives in the Sac-SJR Basin Plan or other 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.
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
(*)-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.

8.B. EXCEEDANCE REPORTS

Exceedances of WQTLs were reported to Regional Board staff via email within five business days upon receipt of laboratory results. If any errors occurred in the original Exceedance Report, an amendment report was emailed to the Regional Board. Three Exceedance Reports required amendments. An amendment to the October 18, 2013 Field Exceedance Report was made on October 24, 2013 to include a previously overlooked exceedance of the WQTL for SC at one site and omit a reported exceedance of the WQTL for SC at another site. The April 28, 2014 toxicity Exceedance Report was amended on September 19, 2014 to include toxicity to *S. capricornutum* at a site that was not originally reported in the preliminary results provided by the laboratory. An amendment to the March 12, 2014 Field Exceedance Report was submitted on March 13, 2014 to update an incorrect monitoring type conducted at a site. A list of all WQTLs used to evaluate results is included in Table 33.

8.C. METHODS FOR SOURCING

8.a. Pesticide Use Report Data

Available PUR data are provided to the Coalition from each of the County Agricultural Commissioner's offices. Registered products recorded in the database are evaluated for applications relevant to exceedances of WQTLs. To assess possible sources of toxicity, applications of pesticides known 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 sediment toxicity occurs, pesticides with a relatively high K_{oc} (1600 or greater) are considered potential causes. If water column toxicity occurs, pesticides with a relatively low K_{oc} (below 1900) are evaluated. The PUR database is queried for pesticides applied within 30 days prior to water sampling. When determining if pyrethroid pesticides could be responsible for toxicity, the PUR database is queried for applications within 180 days prior to the date of 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 there were no applications within the specified time period, the PUR database was queried an additional 30 days to determine which pesticides were applied within 60 days of the sample date. Appendix V includes tables and maps of all pesticide applications that are relevant to WQTL exceedances or toxicity. When PUR data for any county are unattainable, the Coalition makes a note in Appendix 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. If exceedances of WQTLs for aldrin, dieldrin, endrin, HCH, DDD, DDE, DDT, or molybdenum occur, these constituents cannot be queried for associated applications since there are no longer any registered products containing these chemicals. One exceedance of the WQTL for HCH-gamma occurred at Dry Creek @ Wellsford Rd in February 2014.

Table 34. Pesticide Use Data collected for reported exceedances.

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

Preliminary 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. In order for the calculations to be made correctly, the proper units be reported for the amount applied and for the area treated; if there are errors in the data these calculations cannot be performed and will result in a blank cell for AI per acre. Zero values 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 applied relative to an acre is very minimal. The original data are not rounded; only the pounds AI per acre derived from calculations are rounded.

Table 35. Obtained PUR data for 2014 WY exceedances.

County	2014 PUR Data Obtained	2014 PUR Data Outstanding for 2015 Report
Madera	October 2013 through October 2014	None
Merced	October 2013 through October 2014	None
Stanislaus	October 2013 through October 2014	None

8.b. Sediment Chemistry Analysis

The Coalition analyzes for pyrethroids and chlorpyrifos in sediment samples when toxicity to *H. azteca* occurs and survival is 80% or less compared to the control. Pyrethroids readily bind to sediment and a small portion of what binds to sediment partitions off into pore water becoming bioavailable to *H. azteca*. The sediment toxicity results can indicate that sediment-bound pyrethroids and chlorpyrifos were bioavailable for *H. azteca* and detected at concentrations that could 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. Table 36 lists the LC50 concentrations for pyrethroids and chlorpyrifos tested by the Coalition (Amweg et al., 2005). Sediment chemistry analysis is discussed in the Summary of Exceedance section below, by zone.

Table 36. Pyrethroid and chlorpyrifos LC50 concentrations.
(Amweg et al., 2005).

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

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

8.c. Toxic Identification Evaluations

A TIE was performed on water samples when survival or growth of the respective target organism was 50% or less compared to the control. Additional sediment chemistry analysis for chlorpyrifos and pyrethroids was performed if survival of the target organism was less than 80% compared to the control. All TIE results were submitted quarterly with all laboratory results. Water column and sediment toxicity results are listed in Table 37, a summary of the water column phase III TIE results are listed in Table 38, and additional sediment chemistry results associated with sediment toxicity can be found in Table 39.

Table 37. Water column and sediment toxicity exceedance summary.

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 station name. **Red bolded** values represent MPM exceedances.

Station Name	Sample Date	Species	Toxicity End Point	Mean	Percent Control	Toxicity Significance	Summary Comments
Lateral 5 1/2 @ South Blaker Rd	10/15/13	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	390545	26	SL	A TIE was conducted on 10/22/13. SPE column and EDTA addition did not remove toxicity, thereby making the source of toxicity unknown.
Prairie Flower Drain @ Crows Landing Rd	10/15/13	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	149564	**10**	SL	A TIE was conducted on 10/22/13. The toxicity in the baseline test was lost; indicating the source of toxicity in initial tests was unknown.
Deadman Creek @ Gurr Rd	11/12/13	*Ceriodaphnia dubia*	Survival (%)	0	**0**	SL	No TIE was conducted due to the high levels of ammonia (47.3 mg/L) measured at the lab being too difficult to remove; it is assumed that ammonia was the cause of toxicity.
Deadman Creek @ Gurr Rd	11/13/13	*Pimephales promelas*	Survival (%)	0	**0**	SL	No TIE was conducted due to the high levels of ammonia (37.0 mg/L) measured at the lab being too difficult to remove; it is assumed that ammonia was the cause of toxicity.
Deadman Creek @ Gurr Rd	12/10/13	*Pimephales promelas*	Survival (%)	0	**0**	SL	No TIE was conducted due to the high levels of ammonia (70.5 mg/L) measured at the lab being too difficult to remove; it is assumed that ammonia was the cause of toxicity.
Lateral 5 1/2 @ South Blaker Rd	12/10/13	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	403571	24	SL	A TIE was conducted on 12/17/13. SPE column and EDTA addition did not remove toxicity, thereby making the source of toxicity unknown.
Lateral 6 and 7 @ Central Ave	12/10/13	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	520805	31	SL	A TIE was conducted on 12/17/2013. The toxicity in the baseline test was lost, indicating the source of toxicity in initial tests was unknown.
Levee Drain @ Carpenter Rd	12/10/13	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	1253518	74	SL	No TIE was conducted.
Lower Stevinson @ Faith Home Rd	12/10/13	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	348211	21	SL	A TIE was conducted on 12/17/13. The toxicity in the baseline test was lost, indicating the source of toxicity in initial tests was unknown.
Prairie Flower Drain @ Crows Landing Rd	12/10/13	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	1276313	**76**	SL	No TIE was conducted.
Prairie Flower Drain @ Crows Landing Rd	3/3/14	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	230977	23	SL	A TIE was conducted on 3/14/14. SPE Column and EDTA addition did not remove toxicity, indicating the source of toxicity is unknown. An exceedance of the WQTL for diuron (2.1 µg/L) coincides with this monitoring event.
Duck Slough @ Gurr Rd	3/3/14	*Ceriodaphnia dubia*	Survival (%)	75	**75**	SL	No TIE was conducted due to the percent effect being less than 50%. Toxicity coincides with a chlorpyrifos exceedance of 0.053 µg/L.
Duck Slough @ Gurr Rd	3/3/14	*Pimephales promelas*	Survival (%)	85	85	SG	No TIE was conducted due to the percent effect being less than 50%. Toxicity coincides with a chlorpyrifos exceedance of 0.053 µg/L.
Mootz Drain downstream of Langworth Pond	3/4/14	*Hyalella azteca*	Survival (%)	88	88	SG	Additional sediment chemistry analysis was not required.
Hatch Drain @ Tuolumne Rd	3/4/14	*Hyalella azteca*	Survival (%)	56	**56**	SL	See Table 38.
Levee Drain @ Carpenter Rd	3/4/14	*Hyalella azteca*	Survival (%)	76	76	SL	See Table 38.
Lateral 5 1/2 @ South Blaker Rd	3/5/14	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	752017	61	SL	No TIE was conducted due to the percent effect being less than 50%. No samples were collected for chemistry analyses during this monitoring event.

Station Name	Sample Date	Species	Toxicity End Point	Mean	Percent Control	Toxicity Significance	Summary Comments
Lower Stevinson @ Faith Home Rd	4/8/2014	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	318902	50	SL	No TIE was conducted due to the percent growth compared to the control based on cell absorbance (direct measurement of algal growth) not justifying conducting a TIE. The laboratory agreed that cells/mL will be used to determine whether or not a TIE should be conducted.
Lateral 5 1/2 @ South Blaker Rd	4/8/2014	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	507779	79	SL	No TIE was conducted due to the percent effect being less than 50%.
Levee Drain @ Carpenter Rd	6/10/2014	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	302620	37	SL	A TIE was conducted on 6/17/14. Toxicity was reduced when samples were run through the SPE Column, indicating non-polar organics were the source of toxicity.
Lower Stevinson @ Faith Home Rd	6/10/2014	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	331928	40	SL	A TIE was conducted on 6/17/14. Toxicity was completely reduced when samples were ran through the SPE column and slightly reduced when EDTA was added to the samples. It was concluded that non-polar organics and cationic metals were the source of toxicity, but non-polar organics were the greater contributor to toxicity over cationic metals.
Highline Canal @ Hwy 99	6/10/2014	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	296107	36	SL	A TIE was conducted on 6/17/14. Toxicity was completely reduced when samples were ran through the SPE column and slightly reduced when EDTA was added to the samples. It was concluded that non-polar organics and cationic metals were the source of toxicity, but non-polar organics were the greater contributor to toxicity over cationic metals.
Hatch Drain @ Tuolumne Rd	7/8/14	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	143051	**15**	SL	A TIE was conducted on 07/09/14. Toxicity occurred in the baseline toxicity test. Ammonia was the cause of toxicity. Ammonia measured at the lab was 66.5 mg/L.
Highline Canal @ Hwy 99	7/8/14	*Selenastrum capricornutum*	Total Cell Count (cells/ml)	377519	40	SL	A TIE was conducted on 07/09/14. Toxicity occurred in the baseline toxicity test. Cationic metals and non-polar organics were the cause of toxicity.
Hatch Drain @ Tuolumne Rd	9/9/14	*Hyalella azteca*	Survival (%)	48	**52**	SL	See Table 38.
Lateral 6 and 7 @ Central Ave	9/9/14	*Hyalella azteca*	Survival (%)	74	80	SG	Additional sediment chemistry analysis was not required.

NM-Normal Monitoring.
SED-Sediment monitoring.
SL-Statistically significantly different from control; less than 80% threshold.
SG-Statistically significantly different from control; Greater than 80% threshold.

Table 38. Summary of water column phase III TIE results and conclusions.

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

Station Name	Sample Date	Species	Baseline Toxicity Result		Phase III TIE Result			Phase III conclusions
			EC_{50}	TU	Chemical	EC_{50} (µg/L)	TU	
Deadman Creek @ Gurr Rd[1]	11/12/13	*C. dubia*	NA	NA	Ammonia, 47.3 mg/L	NA	NA	The concentration of ammonia in the samples is enough to account for all of the observed toxicity.
Deadman Creek @ Gurr Rd[1]	11/13/13	*P. promelas*	NA	NA	Ammonia, 37.0 mg/L	NA	NA	The concentration of ammonia in the samples is enough to account for all of the observed toxicity.
Deadman Creek @ Gurr Rd[1]	12/10/13	*P. promelas*	NA	NA	Ammonia, 70.5 mg/L	NA	NA	The concentration of ammonia in the samples is enough to account for all of the observed toxicity.
Prairie Flower Drain @ Crows Landing Rd	3/3/14	*S. capricornutum*	76.1	1.3	Diuron, 2.1 µg/L	2	1.1	Although the TIE suggested that NPOs were likely not a cause of toxicity, the TUa calculated from the diuron concentration detected in the sample is enough to account for most of the observed toxicity.
Hatch Drain @ Tuolumne Rd[1]	7/8/14	*S. capricornutum*	67.7	1.5	Ammonia, 66.5 mg/L	NA	NA	The concentration of ammonia in the sample is enough to account for all of the observed toxicity.
Highline Canal @ Hwy 99	7/8/14	*S. capricornutum*	43.7	2.3	Dissolved Copper, 0.4 µg/L Nickel, 0.34 µg/L Arsenic, 0.35 µg/L Boron, 6.6 µg/L Molybdenum, 0.28 µg/L	20 9.4 NA NA NA	0.02 0.04 NA NA NA	Based on results from the Phase III analysis, the source of the toxicity is inconclusive. The concentration of metals in the sample is not enough to account for the observed toxicity.

EC_{50} = The effective concentration that inhibits 50% of the test population.
TU- Toxic Unit.
[1]TIE not conducted due to high ammonia levels.
NA- Not Applicable. There is no toxicity data in the USEPA ECOTOX database to calculate the TU.
NPO-Non-polar organic.

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

Station Name	Sample Date	Monitoring Type	*H. azteca* (% Control)	Sediment Pesticides µg/kg dw: Bifenthrin, µg/kg	Chlorpyrifos , µg/kg	Cyfluthrin, µg/kg	Cyhalothrin, Lambda µg/kg	Cypermethrin, µg/kg	Deltamethrin:Tralomethrin, µg/kg	Esfenvalerate/Fenvalerate, µg/kg	Fenpropathrin, µg/kg	Permethrin, µg/kg	Piperonyl Butoxide	TOC (mg/Kg dw)	Percent TOC	Mean GS Description	Median GS (mm)
Hatch Drain @ Tuolumne Rd	3/4/14	MPM	56	32	20	ND	1.3	6.3	ND	J0.28	ND	ND	ND	25800	2.58	Fine sand	0.096
Levee Drain @ Carpenter Rd	3/4/14	NM	76	6.3	26	ND	3.2	ND	ND	ND	ND	0.93	ND	33000	3.28	Silt	0.029
Levee Drain @ Carpenter Rd-GR2	3/4/14	NM	84*	6.4	22	ND	2.7	ND	ND	ND	ND	0.76	ND	32000	3.27	Silt	0.032
Hatch Drain @ Tuolumne Rd	9/9/14	MPM	52	27	4.6	J0.21	2.2	1.4	ND	ND	ND	J0.31	ND	23000	2.30	Fine sand	0.064

*TIE was performed on the duplicate sample from Levee Drain @ Carpenter Rd because the first sample from that site, during the same sampling event, produced a less than 80% survival rate in *H. azteca*.
GS- Grain Size
J-Estimated value
ND- Not Detected
SED-Sediment monitoring
TOC- Total Organic Carbon
[1]Sand (Fine): 0.075 to <0.425 mm
[2]Silt: 0.005 to <0.075 mm

8.D. SUMMARY OF EXCEEDANCES

All exceedances that occurred during the 2014 WY are tabulated by zone in Tables 40-46. The tables are accompanied by a discussion of exceedances and an assessment of agricultural pesticide applications that are potential sources of the exceedances. A tally of all exceedances compared to the total number of samples collected at each site is included in Appendix III. All PUR data relevant to pesticide exceedances and toxicity are discussed based on pounds (lbs) of AI applied upstream of the site where sampling occurs; a complete list is included in Appendix V. Measures taken to address these exceedances are described in the Member Actions Taken to Address Water Quality Exceedances section of this report.

8.a. Zone 1 (Dry Creek @ Wellsford Rd, Mootz Drain downstream of Langworth Pond, and Rodden Creek @ Rodden Rd)

Dry Creek @ Wellsford Rd was monitored monthly as the Core site for Zone 1, including MPM for chlorpyrifos and sediment toxicity to *H. azteca*. Mootz Drain downstream of Langworth Pond is a Represented site and was monitored for sediment toxicity to *H. azteca* in March and September 2014. Rodden Creek @ Rodden Rd was not monitored during the 2014 WY. Table 40 includes all exceedances that occurred during the 2014 WY in Zone 1. Non-contiguous samples were collected from Dry Creek @ Wellsford Rd from January through March 2014.

8.a.i. Field Parameters and E. coli

In Zone 1, exceedances of the WQTLs for DO (13) and *E. coli* (6) occurred during the 2014 WY. All 13 exceedances of the WQTL (less than 7 mg/L) for DO occurred, ranging from 0.39 to 6.85 mg/L; 11 were from Dry Creek @ Wellsford Rd and two from Mootz Drain downstream of Langworth Pond. Exceedances of 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 concentrations of these parameters are the result of processes occurring in the water column and in the sediment. These processes can vary diurnally and seasonally.

Six exceedances above the WQTL (235 MPN/100 mL) for *E. coli* occurred in Zone 1 and ranged from 285.1 to >2419.6 MPN/100 mL; all occurred at Dry Creek @ Wellsford Rd. There are numerous dairies located in Zone 1. 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 could be measured during sampling events. 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. It is also possible that natural populations of *E. coli* in stream sediments become active with increasing air and water temperatures during the spring.

8.a.ii. 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 (K_{oc} of 6070). The concentration at which 50% mortality (LC_{50}) to *C. dubia* occurs is 0.055 µg/L. The WQTL to protect aquatic life is 0.015 µg/L. In Zone 1, a single exceedance of the WQTL for chlorpyrifos occurred in October 2013 in samples collected from Dry Creek @ Wellsford Rd.

Samples collected on October 15, 2013 resulted in an exceedance of the WQTL for chlorpyrifos at Dry Creek @ Wellsford Rd (0.016 µg/L); 0.001 µg/L above the WQTL. Samples collected one month prior also exceeded the WQTL at a concentration of 0.14 µg/L (2014 Annual Report). According to the PUR data, 11 applications from August 24, 2013 through September 10, 2013 could be associated with the exceedances in September and October. Two of the three parcels (corn and walnuts) are farmed by Coalition members; however, these parcels located near the outer boundary of the subwatershed are most likely too far (more than 2 miles) away to have contributed to the exceedance. Parcels next to the waterbody have a higher likelihood of having direct drainage and a higher potential for spray drift to end up in the water column. Chlorpyrifos applications to corn were made on September 2, 2013 to a non-member parcel located within a mile of the creek and along a canal/lateral that drains directly to Dry Creek. In addition to the 11 applications from August 24, 2013 through September 10, 2013, six applications of 630 lbs AI applied to grapes and alfalfa from October 1, 2013 through October 15, 2013 were also associated with the October exceedance (Appendix V). The single application with the highest amount applied (163 lbs AI) is associated with a TRS most likely too far (more than 2 miles) away to have contributed to the exceedance. Three applications to grapes near the waterbody were applied by a non-member from October 11 to October 15, 2013. The remaining applications were associated with member parcels. Members applying chlorpyrifos near the waterbody have participated in outreach and have documented implemented management practices to prevent irrigation runoff or spray drift.

During the 2015 WY, monitoring will occur monthly for chlorpyrifos; MPM for chlorpyrifos is scheduled during October 2014 and July through September 2015 (Appendix VIII).

8.a.iii. Hexachlorocyclohexane

Hexachlorocyclohexane (HCH), or lindane, is an organochlorine insecticide that is not currently registered for agricultural use. Lindane was used in the past as a pesticide and a pharmaceutical treatment for lice and scabies. Isomers of lindane include alpha-HCH, beta-HCH, delta-HCH and gamma-HCH. Lindane is not produced in the US (since 1970), but has been imported from other nations. In 2006 US EPA called for a voluntary withdrawal of all agricultural uses of lindane. Lindane is still used for its pharmaceutical application but has been banned for use on agriculture in the US. All products containing lindane are currently banned in California. Detections of the lindane isomers are a result of past use and cannot be attributed to current agricultural practices. The WQTL for HCH is > 0.0039 µg/L. Samples collected from Dry Creek @ Wellsford Rd during a storm on February 10, 2014 contained gamma-HCH (0.049 µg/L) with the source unknown.

8.a.iv. Toxicity

Sediment samples collected at Mootz Drain downstream of Langworth Pond on March 4, 2014 were toxic to *H. azteca* (88% survival compared to the control). Since survival were greater than 80% compared to the control, no additional sediment chemistry analysis for pyrethroids and chlorpyrifos were required. The PUR data associated with the March sediment toxicity indicate that from December 30, 2013 through March 4, 2014 a total of 32 applications of copper, pyrethroids, and organophosphates, ranging between 0.62 and 420 lbs AI, were applied. A total of 2,017 lbs AI across 1,218 acres of almonds, walnuts, and cherrieswere associated with the toxicity.

Table 40. Zone 1 (Dry Creek @ Wellsford Rd, Mootz Drain downstream of Langworth Pond, and Rodden Creek @ Rodden Rd) exceedances.

The WQTLs are listed below each constituent.

Zone 1 Station Name	Site Type	Monitoring Type	Sample Date	DO,<7 mg/L	*E. coli*, > 235 MPN/100 mL	Chlorpyrifos,> 0.015 µg/L	HCH gamma,> 0.0039 µg/L	*H. azteca*, % Control
Dry Creek @ Wellsford Rd	Core	NM	10/15/2013			0.016		
Dry Creek @ Wellsford Rd	Core	NM	11/12/2013	2.08				
Dry Creek @ Wellsford Rd	Core	NM	11/13/2013	1.22				
Dry Creek @ Wellsford Rd	Core	NM	12/10/2013	0.39	>2419.6			
Dry Creek @ Wellsford Rd	Core	NM, Non-contiguous	1/14/2014	3.98				
Dry Creek @ Wellsford Rd	Core	MPM, NM, Non-contiguous, High TSS 1-P, High TSS 1-M	2/10/2014	3.35			0.049	
Dry Creek @ Wellsford Rd	Core	NM	4/8/2014	2.36	>2419.6			
Dry Creek @ Wellsford Rd	Core	NM	5/13/2014	5.76				
Dry Creek @ Wellsford Rd	Core	NM	6/10/2014	4.20	435.2			
Dry Creek @ Wellsford Rd	Core	MPM, NM, High TSS 1-M	7/8/2014	4.69	770.1			
Dry Creek @ Wellsford Rd	Core	MPM, NM, High TSS 1-P, High TSS 2-M	8/12/2014	5.95	285.1			
Dry Creek @ Wellsford Rd	Core	MPM, NM	9/9/2014	5.27	248.1			
Mootz Drain downstream of Langworth Pond	Represented	NM, SED	3/4/2014	3.97				88
Mootz Drain downstream of Langworth Pond	Represented	NM, SED	9/9/2014	6.85				
			Normal Monitoring Exceedances	13	6	1	1	1
			Non-contiguous Waterbody Exceedances	2	0	0	1	0
			Management Plan Monitoring Exceedances[1]	NA	NA	0	0	0
			Total Exceedances	13	6	1	1	1

[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

NM-Normal Monitoring

SED- Sediment Monitoring

8.b. 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)

Prairie Flower Drain @ Crows Landing Rd was monitored monthly as the Core site for Zone 2, including MPM for dimethoate, molybdenum, *C. dubia*, *P. promelas*, *S. capricornutum* water column toxicity, and *H. azteca* sediment toxicity. Monitoring occurred at nine Represented sites: 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. In addition, MPM was conducted at Hatch Drain @ Tuolumne, Hilmar Drain @ Central Ave, Lateral 2 ½ near Keyes Rd, and Westport Drain @ Vivian Rd. Table 41 includes all exceedances that occurred during the 2014 WY in Zone 2.

In the 2014 WY, Lateral 2 ½ near Keyes Rd was dry during monitoring in December, January, and April. Westport Drain @ Vivian Rd was non-contiguous in February and March and dry during monitoring in April. Non-contiguous samples were collected from Hatch Drain @ Tuolumne Rd (January and July), Hilmar Drain @ Central Ave (January, February, and April), Levee Drain @ Carpenter Rd (January), and Prairie Flower Drain @ Crows Landing Rd (March).

8.b.i. Field Parameters and E. coli

In Zone 2, the field parameters, DO, pH, and SC, were monitored 97 times during the 2014 WY; exceedances of the WQTLs for DO (38), pH (12), and SC (77) occurred (Appendix III, Table III-2A). Concentrations of DO constituting the exceedances of the WQTL in Zone 2 ranged from 0.05 to 5.85 mg/L and occurred at: Hatch Drain @ Tuolumne Rd (7), Hilmar Drain @ Central Ave (3), Lateral 6 and 7 @ Central Ave (2), Levee Drain @ Carpenter Rd (4), Lower Stevinson @ Faith Home Rd (1), Prairie Flower Drain @ Crows Landing Rd (4), Unnamed Drain @ Hogin Rd (6), and Westport Drain @ Vivian Rd (3). Processes affecting DO in waterways include stream flow, fluctuations in temperature, loss of vegetation around streams, as well as excessive nutrients, and algal growth. The majority of exceedances of the WQTL for DO in Zone 2 occurred during the irrigation season when temperatures were elevated (April-September; between 17-35^{o}C/63-95^{o}F) which could have contributed to the lower DO resulting in the exceedances.

Exceedances of the WQTL for pH were all above the upper limit of 8.5 and occurred at Lateral 2 ½ near Keyes Rd (2), Lateral 5 ½ @ South Blaker Rd (2), Lateral 6 and 7 @ Central Ave (1), Levee Drain @ Carpenter Rd (1), Lower Stevinson @ Faith Home Rd (4), and Prairie Flower Drain @ Crows Landing Rd (2).

Elevated levels of SC are common in Zone 2 subwatersheds 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. Exceedance level detections of SC above the 700 µS/cm WQTL occurred at all sites in Zone 2 and ranged from 702 to 2670 µS/cm.

E. coli was monitored monthly at Prairie Flower Drain @ Crows Landing Rd; exceedances of the WQTL occurred twice, in May and July. There are many dairies located in the site subwatershed. These dairies generate solid and liquid waste 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 waste applications and/or possible discharges from dairy lagoons. One exceedance of the WQTL for *E. coli* at Prairie Flower Drain @ Crows Landing Rd also coincided with an exceedance of the WQTL for nitrates (31 mg/L). In discussions of exceedances of the WQTL for *E. coli* in the Prairie Flower Drain watershed, Regional Board staff indicated that they have identified illegal discharges from dairies in the area, and have monitored in that watershed in the past in an attempt to detect the dairy discharges immediately after they occur.

8.b.ii. Ammonia

Ammonium can enter a waterbody from three sources: 1) direct discharge of agricultural fertilizers (anhydrous ammonia), 2) direct discharge of animal waste, and 3) discharge from wastewater treatment plants. In soils, ammonium from fertilizers is typically converted to nitrite and then to nitrate over a short period of time. Therefore, ammonium from fertilizers would require a direct discharge to surface waters to detect ammonia in the receiving waterbody. The method of anhydrous ammonium application to fields is injection into soil which argues against direct discharge to a receiving waterbody. Ammonium can also be formed in the waterbody through the mineralization of organic nitrogen. Previous exceedances of the WQTL for ammonia and associated water column toxicities in Zone 2 were attributed to discharge from dairies.

In Zone 2, there was one exceedance of the WQTL for ammonia in samples collected at Prairie Flower Drain @ Crows Landing Rd in January (4 mg/L); the field duplicate also contained concentrations of ammonia at 4 mg/L. For the January sampling event, both the environmental and field duplicate samples also contained concentrations of nitrates over the WQTL. In the past, dairy wastewater discharge has been responsible for high ammonia results in the Prairie Flower Drain @ Crows Landing Rd site subwatershed. In addition, dairy discharge and/or applications of manure as fertilizer have contributed to other exceedances of the WQTLs by other constituents within the subwatershed including nitrate and *E. coli*.

8.b.iii. Nitrates

Potential sources of nitrate in surface waters include runoff of fertilizer or organic matter from irrigated fields, leaking septic systems, waste-treatment facility effluent, and inputs from animal waste. These sources can move to surface waters through above ground runoff or shallow subsurface flows. Total Kjeldahl nitrogen (TKN) and ammonium in animal waste that enter surface waters can be converted to nitrate by nitrifying bacteria. Possible sources of animal waste in a waterbody include dairies, poultry operations, pasture, and/or wildlife. From years of movement of nitrate into groundwater, there is a significant amount of nitrate in the aquifers beneath the 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. Excessive nutrients can cause eutrophication of surface waters resulting in low DO and an inability to support healthy aquatic communities. Sources of nutrients, organic carbon, and low DO are difficult to identify. Because of their extreme solubility, nitrates in fertilizer could move to surface waters immediately after application although it is unlikely that applications in the spring would result in exceedances of the WQTL throughout the irrigation season. Nitrates may move past the root zone to the shallow subsurface (vadose zone) and move laterally to surface waters although the extent of this potential pathway is not known.

In Zone 2, seven exceedances of the WQTL for nitrate occurred at Prairie Flower Drain @ Crows Landing Rd; five field duplicates also contained concentrations above the WQTL. One exceedance of the WQTL for nitrate was associated with elevated levels of ammonia in January and one was associated with an exceedance of the WQTL for *E. coli* in May (Table 41).

8.b.iv. 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. Molybdenum can be a byproduct in copper and tungsten mining and is used in alloys due to its ability to withstand high temperatures, resistance to corrosion, and its weldability. The west side of the ESJWQC region is naturally elevated in molybdenum (CDWR, 1990) 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.

In Zone 2, eight exceedances of the molybdenum WQTL occurred at Prairie Flower Drain @ Crows Landing Rd from October 2013 through July 2014; seven associated field duplicates also exceeded the WQTL. The first year that molybdenum was monitored at Prairie Flower Drain was 2011 as part of scheduled Assessment Monitoring, and due to exceedances of the WQTL, molybdenum was as placed in a management plan. The 2014 WY was the first year the Coalition conducted MPM for molybdenum; molybdenum was monitored monthly. Molybdenum will continue to be monitored monthly at Prairie Flower Drain @ Crows Landing Rd during the 2015 WY.

8.b.v. Chlorpyrifos

Twenty chlorpyrifos samples were collected in Zone 2 during the 2014 WY (Appendix III, Table III-2B). A single exceedance of the WQTL occurred at Lateral 2 ½ near Keyes Rd on July 8, 2014 (0.16 µg/L). The PUR data associated with the exceedance indicate that 39 applications (products include Drexel, Govern, Lorsban Vulcan and Whirlwind) ranging between 2.3 and 270 lbs AI were applied by ground and aerial spray methods from June 13 through July 3, 2014. A total of 1,666 lbs AI across 885 acres of almonds and walnuts were associated with this exceedance (Appendix V). Fields closest to the sample site reported two ground applications on June 18, 2014 and June 21, 2014 on 150 acres of walnut orchards

(300 lbs AI applied). All parcels associated with the July exceedance are currently members of the Coalition; however, not all were targeted for focused outreach in 2012 and 2013 based on location of the parcels, when the members joined the Coalition, and potential for direct drainage.

During the 2015 WY, MPM will occur for chlorpyrifos from April through August at Lateral 2 ½ near Keyes Rd (Appendix VIII).

8.b.vi. Diuron

Diuron is a broad-spectrum herbicide used for weed control on agriculture, highway rights of way, railroads, industrial sites, and by homeowners. Diuron inhibits photosynthesis and also affects seed germination. Diuron has a half-life (in soil) of about 90 days and is very mobile. Diuron inhibits growth of *S. capricornutum* with an Effective Concentration of 50% of the measured endpoint (EC50) of 2.4 µg/L. The WQTL for diuron is 2 µg/L.

A single exceedance of the WQTL occurred at Prairie Flower Drain @ Crows Landing Rd on March 3, 2014, during a storm. Prairie Flower Drain has been monitored for diuron from 2006 through 2008, monthly in 2011, and monthly during the 2014 WY; 45 samples were collected, 35 were non-detect, and only one exceedance occurred at 0.1 µg/L above the WQTL (2.1 µg/L). The associated field duplicate sample also exceeded of the WQTL for diuron (2.3 µg/L). According to the PUR data, applications of diuron have not occurred in the site subwatershed since December 2012. Therefore, the Coalition cannot determine the source of the exceedance. During the 2015 WY, diuron will be monitored monthly at Prairie Flower Drain @ Crows Landing Rd and at four Represented sites in Zone 2 during times of high use.

8.b.vii. Toxicity

In Zone 2, water column toxicity to *S. capricornutum* was tested 63 times and toxicity occurred 14 times (21%) at six sites: Prairie Flower Drain @ Crows Landing Rd (3), Hatch Drain @ Tuolumne Rd (1), Lateral 5 1/2 @ South Blaker Rd (4), Lateral 6 and 7 @ Central Ave (1), Levee Drain @ Carpenter Rd (2), and Lower Stevinson @ Faith Home Rd (3). Four sediment samples (20% of all samples collected) were toxic to *H. azteca* during March and September at Hatch Drain @ Tuolumne Rd (2), Lateral 6 and 7 @ Central Ave (1), and Levee Drain @ Carpenter Rd (1).

Samples collected during MPM from Prairie Flower Drain @ Crows Landing Rd were toxic to *S. capricornutum* on October 15, 2013 and December 10, 2013, in addition to March 3, 2014 (10%, 76%, and 23% growth compared to the control, respectively). The water sampled in March was non-contiguous and therefore not connected to any upstream or downstream water. Every month the site had no flow and discharge was recorded as zero. When algal growth is 50% or less compared to the control, a TIE is initiated to help determine the cause of the toxicity. The TIE conducted on the October sample was inconclusive; toxicity in the baseline test was lost (Table 37). The PUR data associated with the October *S. capricornutum* toxicity indicate there was one application of 120 lbs AI of glyphosate on September 2, 2013 across 30 acres (Appendix V). No TIE was conducted on the toxic sample from December 2013 (76%) or the field duplicate (69%). The PUR data associated with the December toxicity indicate there were 12 applications of products ranging from 0.13 to 284 lbs AI. A total of 557 lbs AI were applied from November 25, 2013 through December 3, 2013 across 393 acres of almonds, oats, and alfalfa (Appendix V). The TIE conducted on the March sample did not remove toxicity, therefore the TIE was inconclusive. The March samples collected also exceeded the WQTL for diuron at a concentration of 2.1 µg/L and the field duplicate at a concentration of 2.3 µg/L. The laboratory calculated the baseline TUc (1.3) and the diuron TUc (1.1) and determined the diuron concentration found in the sample is enough to account for most of the observed toxicity (Table 38). When reviewing the PUR data associated with the March toxicity, there were 35 applications of products ranging from 0.04 to 76 lbs AI. A total of 311 lbs AI were applied from February 4, 2014 through March 1, 2014 across 1,505 acres of alfalfa and oats (Appendix V). However, no applications of diuron have been recorded since 2012.

Non-contiguous samples collected during MPM on July 8, 2014 from Hatch Drain @ Tuolumne Rd were toxic to *S. capricornutum* (15% growth compared to the control). A TIE was not conducted due to high levels of ammonia detected; the concentration of ammonia in the sample measured at the laboratory (66.5 mg/L) is enough to account of all the observed toxicity (Table 38). It is possible that pesticides were contributing to the algae toxicity in addition to the ammonia. The PUR data associated with the July toxicity indicate there were 25 applications of herbicides ranging from 1.2 to 417 lbs AI applied (1,221 total lbs AI) from June 10 through July 8, 2014 to corn, alfalfa, and almond crops (Appendix V).

2014 WY was the first year of monitoring at Lateral 5 ½ @ South Blaker Rd. Samples collected were toxic to *S. capricornutum* on October 15, 2013, December 10, 2013, March 5, 2014, and April 8, 2014 (26%, 24%, 61%, and 79% growth compared to the control, respectively). TIEs were conducted on the October and December samples; the tests had no effect on the toxicity, and therefore the cause of the toxicity is unknown (Table 37). The PUR data associated with the October *S. capricornutum* toxicity indicate there were 77 applications of products ranging from 0.17 to 689 lbs AI (4,973 lbs AI total) applied from July 24, 2013 through October 15, 2013 across 3,367 acres of almonds, walnuts, alfalfa, and grapes. The PUR data associated with the December toxicity indicate there were 245 applications of products ranging from 0.03 to 1472 lbs AI (17,940 lbs AI total) applied from October 14, 2013 through December 10, 2013 across 12,271 acres of almonds, alfalfa, cherries, grapes, and walnuts (Appendix V). No TIEs were required for the March and April toxic samples. The PUR data associated with the March sample indicate there were 950 applications of potentially toxic products ranging from 0.01 to 1472 lbs AI. A total of 18,540 lbs AI were applied from October 14, 2013 through December 10, 2013 across 13,405 acres of almonds, alfalfa, grapes, cherries, walnuts, and oats. In addition the TID indicated that off bank applications of herbicides occurred at Lateral 5 ½ @ South Blaker Rd from January 3 through January 8, 2014. The PUR data associated with April toxicity sample indicate there were 729 applications of products ranging from 0.02 to 1634 lbs AI. A total of 68,566 lbs AI were applied from January 14 through April 8, 2014 across 41,340 acres of almonds, alfalfa, cherries, grapes, walnuts, and oats (Appendix V). Discharge was not measured during toxicity sampling, however it was measured three times during the 2014 WY, and the average flow for the site was 94.8 cfs. Lateral 5 ½ @ South Blaker Rd is a Represented site and, based on the evaluation provided in the 2013 MPU, toxicity was the only constituent required to be monitored. Therefore, it is unknown if any nutrients or pesticides were in the water column at concentrations that could negatively affect the species. Rainfall events from early December through March could have increased flows in the Coalition region and stormwater runoff transporting applied products to the waterways may have contributed to the toxicity. Toxicity to

S. capricornutum has been added to the management plan at Lateral 5 ½ @ South Blaker Rd following exceedances in the 2014 WY. Monitoring for *S. capricornutum* toxicity is scheduled during October, December, and March in the 2015 WY.

This was the first year of monitoring at Lateral 6 and 7 @ Central Ave; only toxicity monitoring was required in December (2013 MPU). Samples collected from Lateral 6 and 7 @ Central Ave on December 10, 2013 were toxic to *S. capricornutum* (31% growth compared to the control). The TIE conducted on the December sample concluded that the source of toxicity was not persistent and therefore unknown (Table 37). The PUR data associated with the *S. capricornutum* toxicity indicate there were 289 applications of potentially toxic products ranging from 0.03 to 1,472 lbs AI. A total of 18,540 lbs AI were applied from October 14, 2013 through December 10, 2013 across 13,405 acres of almond, alfalfa, grape, cherry, walnut, and oat crops (Appendix V). The second rainfall event, on December 7, 2013, could have increased flows in the Coalition region and storm runoff transporting applied products to the waterway could have contributed to the toxicity. Toxicity to *S. capricornutum* will continue to be monitored at Lateral 6 and 7 @ Central Ave in the 2015 WY.

Samples collected from Levee Drain @ Carpenter Rd were toxic to *S. capricornutum* on December 10, 2013 and June 10, 2014 (74% and 37% growth compared to the control, respectively). Since survival was above 50% compared to the control for the December sample, a TIE was not required. The PUR data associated with the *S. capricornutum* toxicity indicate there were 40 applications of products ranging from 0.08 to 76 lbs AI. A total of 572 lbs AI were applied from November 26, 2013 through December 10, 2013 across 1,569 acres of alfalfa, oats, and wheat (Appendix V). The December rainfall event could have increased flows in the Coalition region and storm runoff transporting applied products to the waterway. Since survival was 50% or less compared to the control for the June sample, a TIE was required. Results from the TIE indicated non-polar organics were the cause of the toxicity. The PUR data associated with the June toxicity indicate there were 87 applications of products ranging from 0.04 to 417 lbs AI. A total of 4,165 lbs AI were applied from March 28, through June 10, 2014 across 3,832 acres of almonds and corn (Appendix V). Toxicity to *S. capricornutum* has been added to the management plan at Levee Drain @ Carpenter Rd. MPM for *S. capricornutum* toxicity will occur at Levee Drain @ Carpenter Rd during the 2015 WY (Appendix VIII).

Three samples collected from Lower Stevinson @ Faith Home Rd were toxic to *S. capricornutum* on December 10, 2013, April 8, 2014, and June 10, 2014 (21%, 50%, and 40% growth compared to the control, respectively). This was the first year of monitoring at Lower Stevinson @ Faith Home Rd and only toxicity monitoring was required in December, April, and June. The TIE conducted on the December sample was inconclusive; toxicity in the baseline test was lost indicating the source of toxicity was not persistent (Table 37). The PUR data associated with the December toxicity indicate there were 436 applications of products ranging from 0.01 to 148 lbs AI. A total of 732 lbs AI were applied from October 14, 2013 through December 10, 2013 across 30,287 acres of alfalfa, almonds, walnuts, oats, and grapes (Appendix V). No TIE was conducted on the April toxic sample due to a laboratory error. The PUR data associated with the April toxicity indicate there were 1,124 applications of products ranging from 0.003 to 6,085 lbs AI. A total of 130,597 lbs AI were applied from January 14 through April 8, 2014 across 62,946 acres of almonds, walnuts, peaches, grapes, corn, and oats (Appendix V). Rainfall events from early December through March could have contributed to the toxicity at Lower Stevinson @ Faith Home Rd. The TIE conducted on the June toxic sample indicated that non-polar organics and cationic metals were the most likely source of the toxicity. The PUR data associated with the June toxicity indicate there were 1,259 applications of products ranging from 0.004 to 3,756 lbs AI. A total of 115,347 lbs AI were applied from March 18 through June 10, 2014 across 48,309 acres of alfalfa, almonds, beans, walnuts, grapes, and corn (Appendix V). Toxicity to *S. capricornutum* was added to the management plan at Lower Stevinson @ Faith Home Rd following exceedances in the 2014 WY. Monitoring for toxicity to *S. capricornutum* will continue during the 2015 WY, December through August.

Sediment samples collected during MPM on March 4, 2014 and September 9, 2014 from Hatch Drain @ Tuolumne Rd were toxic to *H. azteca* (56% and 52% survival compared to the control, respectively). Since the March and September survival were less than 80% compared to the control, additional sediment chemistry analysis for pyrethroids and chlorpyrifos were required. Table 42 includes additional chemistry results for the March sample where bifenthrin (32 µg/kg dw), chlorpyrifos (20 µg/kg dw), cyhalothrin lambda (1.3 µg/kg dw), cypermethrin (6.3µg/kg dw), and esfenvalerate/fenvalerate (J0.28 µg/kg dw) were detected. Total organic carbon concentration was 25,800 mg/kg for this sample with a median grain size of 0.096 mm (fine sand). The amount of pyrethroids contributing to sediment toxicity can be evaluated using the TUa calculation based on the LC50s for pyrethroids determined to cause acute toxicity and growth impairment to *H. azteca*. Based on the chemistry results, there were sufficient TUs of pyrethroids (3.333 TUa) in the March sediment sample to account for the Hatch Drain @ Tuolumne Rd sediment toxicity (Table 42). In addition, the PUR data associated with the March sediment toxicity indicate that from February 3, 2014 through February 27, 2014 a total of 28 applications (chlorpyrifos, cyhalothrin lambda, pyraclostrobin, buprofezine, copper hydroxide, paraquat, and trifloxystrobin) ranging from 0.25 to 119 lbs AI were applied. In the month prior to the exceedance, 523 lbs AI across 836 acres of almonds and alfalfa were associated with this toxicity (Appendix V).

Additional chemistry analysis for pyrethroids and chlorpyrifos for the September sediment toxicity at Hatch Drain @ Tuolumne Rd resulted in detections of bifenthrin (27 µg/kg dw), chlorpyrifos (4.6 µg/kg dw), cyhalothrin lambda (2.2 µg/kg dw), cypermethrin (1.4 µg/kg dw), cyfluthrin (J0.21 µg/kg dw) and permethrin (J0.31 µg/kg dw; Table 42). Based on the chemistry results, there were sufficient TUa of pyrethroids (2.74 TUa) in the sediment sample to account for the sediment toxicity (Table 42). In addition, the PUR data associated with the September sediment toxicity indicate that from March 26 through August 9, 2014 a total of 69 applications (pyrethroids and chlorpyrifos) ranging between 0.21 and 79 lbs AI were applied. A total of 701 lbs AI across 2,739 acres of alfalfa, almonds, and corn were associated with this toxicity (Appendix V). During the 2015 WY, MPM for sediment toxicity will continue during March and September at Hatch Drain @ Tuolumne Rd (Appendix VIII).

Sediment samples collected on September 9, 2014 from Lateral 6 and 7 @ Central Ave were toxic to *H. azteca* (80% survival compared to the control). Since the September toxicity was 80% survival compared to the control, additional sediment chemistry analysis for pyrethroids and chlorpyrifos was not required. The PUR data associated with the sediment toxicity indicate that from April 3 through September 9, 2014 a total of 2442 applications (chlorpyrifos, copper hydroxide, paraquat, and pyrethroids) ranging from 0.0001 to 7924 lbs AI were applied. In the three months prior to the exceedance, 19,925 lbs AI across 80,322 acres of alfalfa, almonds, and fruit crops were associated with this toxicity (Appendix V).

Sediment samples and the associated field duplicate collected on March 4, 2014 from Levee Drain @ Carpenter Rd were toxic to *H. azteca* (76% and 84% survival compared to the control, respectively). Since survival were less than 80% compared to the control for the environmental sample, additional sediment chemistry analysis for pyrethroids and chlorpyrifos was required. The additional chemistry results for the March environmental sample were: bifenthrin (6.3 µg/kg dw), chlorpyrifos (26 µg/kg dw), cyhalothrin lambda (3.2 µg/kg dw), and permethrin (0.93 µg/kg dw) detections. Total organic carbon concentration was 33000 mg/kg for this sample with a median grain size of 0.029 mm (silt). The amount of pyrethroids contributing to sediment toxicity can be evaluated using the TUa calculation. The total TUa for pyrethroids in the March sediment sample and field duplicate was less than 1 TUa (0.799 and 0.740 TUa); therefore there were not enough pyrethroids in the sample to cause 50% mortality of *H. azteca* (Table 42). The PUR data associated with the March sediment toxicity indicate that from December 10, 2013 through February 27, 2014 a total of 33 applications (chlorpyrifos, cyhalothrin lambda, pyraclostrobin, buprofezine, copper hydroxide, paraquat, and trifloxystrobin) ranging from 0.25 to 119 lbs AI were applied. In the three months prior to the exceedance, 715 lbs AI across 1,330 acres of alfalfa and almonds were associated with this toxicity (Appendix V). Due to the toxicity in the 2014 WY, Levee Drain @ Carpenter Rd is now in a management plan for sediment toxicity. During the 2015 WY, MPM for sediment toxicity is scheduled during March and September (Appendix VIII).

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.

Zone 2 Station 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/100mL	Ammonia, variable[1] or >1.5 mg/L	Nitrates, >10 mg/L	Molybdenum, total, 10 G/L	Chlorpyrifos, > 0.015 µg/L	Diuron , > 2 µg/L	*S. capricornutum*, % Control	*H. azteca*, % Control
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	10/15/2013			2136			26	**14**			**10**	
Prairie Flower Drain @ Crows Landing Rd (FD)	Core	MPM, NM	10/15/2013						25	**14**			**15**	
Prairie Flower Drain @ Crows Landing Rd	Core	NM	10/21/2013	5.83		2245								
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	11/12/2013			2129			41	**18**				
Prairie Flower Drain @ Crows Landing Rd (FD)	Core	MPM, NM	11/12/2013						39	**16**				
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	11/13/2013			2135								
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	12/10/2013			2006			46	**15**			**76**	
Prairie Flower Drain @ Crows Landing Rd (FD)	Core	MPM, NM	12/10/2013						47	**15**			**69**	
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	1/14/2014			1555		4.00	35	**13**				
Prairie Flower Drain @ Crows Landing Rd (FD)	Core	MPM, NM	1/14/2014					4.00	33	**12**				
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM, Non-contiguous, High TSS 1-P, High TSS 1-M	2/10/2014		8.67	1520								
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM, Non-contiguous, High TSS 2-M	3/3/2014	2.85		2061			23	**15**		2.1	23	
Prairie Flower Drain @ Crows Landing Rd (FD)	Core	MPM, NM, Non-contiguous, High TSS 2-M	3/3/2014						23	**16**		2.3	22	
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM, SED, Non-contiguous	3/4/2014	3.39		2199								
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	4/8/2014			2670			33	**17**				
Prairie Flower Drain @ Crows Landing Rd (FD)	Core	MPM, NM	4/8/2014							**18**				
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	5/13/2014			2160	648.8		31	**13**				
Prairie Flower Drain @ Crows Landing Rd (FD)	Core	MPM, NM	5/13/2014							**13**				
Prairie Flower Drain @ Crows Landing Rd	Core	MPM	6/10/2014		8.58	999								
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM, High TSS 1-M	7/8/2014			1821	648.8			**14**				
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM, High TSS 1-P, High TSS 2-M	8/12/2014	1.38		1745								
Prairie Flower Drain @ Crows Landing Rd	Core	MPM, NM	9/9/2014	5.15		1199								
Hatch Drain @ Tuolumne Rd	Represented	MPM, Non-contiguous	1/14/2014	5.05		1071								
Hatch Drain @ Tuolumne Rd	Represented	MPM	2/10/2014	5.25		1081								
Hatch Drain @ Tuolumne Rd	Represented	MPM, SED	3/4/2014	3.47		2047								**56**
Hatch Drain @ Tuolumne Rd	Represented	MPM	4/8/2014	4.85		715								

Zone 2 Station 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	Nitrates, >10 mg/L	Molybdenum, total, 10 g/L	Chlorpyrifos, > 0.015 µg/L	Diuron , > 2 µg/L	*S. capricornutum*, % Control	*H. azteca*, % Control
Hatch Drain @ Tuolumne Rd	Represented	MPM	5/13/2014	0.80		1071								
Hatch Drain @ Tuolumne Rd	Represented	NM	6/10/2014	3.77		1202								
Hatch Drain @ Tuolumne Rd	Represented	NM, MPM, Non-contiguous	7/8/2014	2.23		1303							**15**	
Hatch Drain @ Tuolumne Rd	Represented	MPM	8/12/2014	6.08		1175								
Hatch Drain @ Tuolumne Rd	Represented	MPM	9/9/2014	0.47		966								**52**
Hilmar Drain @ Central Ave	Represented	MPM	12/10/2013			801								
Hilmar Drain @ Central Ave	Represented	MPM, Non-contiguous	1/14/2014			1122								
Hilmar Drain @ Central Ave	Represented	MPM, Non-contiguous	2/10/2014			764								
Hilmar Drain @ Central Ave	Represented	MPM	3/5/2014			972								
Hilmar Drain @ Central Ave	Represented	MPM, Non-contiguous	4/8/2014			1125								
Hilmar Drain @ Central Ave	Represented	MPM	6/10/2014	4.72		1616								
Hilmar Drain @ Central Ave	Represented	MPM, NM	7/8/2014	4.45										
Hilmar Drain @ Central Ave	Represented	NM	8/12/2014	5.08		854								
Hilmar Drain @ Central Ave	Represented	MPM	9/9/2014	5.85		1119								
Lateral 2 1/2 near Keyes Rd	Represented	NM	10/15/2013			752								
Lateral 2 1/2 near Keyes Rd	Represented	NM	2/10/2014		8.58									
Lateral 2 1/2 near Keyes Rd	Represented	NM	3/4/2014		8.75									
Lateral 2 1/2 near Keyes Rd	Represented	MPM	7/8/2014								**0.16**			
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	10/15/2013			1418							26	
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	12/10/2013		8.54	897							24	
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	1/14/2014			1025								
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	3/5/2014		8.84	707							61	
Lateral 5 1/2 @ South Blaker Rd (FD)	Represented	NM	3/5/2014										56	
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	4/8/2014			1102							79	
Lateral 5 1/2 @ South Blaker Rd	Represented	MPM	5/13/2014			880								
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	6/10/2014			1035								
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	7/8/2014			702								
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	8/12/2014			1436								
Lateral 5 1/2 @ South Blaker Rd	Represented	NM	9/9/2014			2127								
Lateral 6 and 7 @ Central Ave	Represented	NM	10/15/2013			1129								
Lateral 6 and 7 @ Central Ave	Represented	NM	12/10/2013			778							31	
Lateral 6 and 7 @ Central Ave	Represented	NM	1/14/2014	4.54		1138								
Lateral 6 and 7 @ Central Ave	Represented	NM	2/10/2014			1317								
Lateral 6 and 7 @ Central Ave	Represented	NM	3/5/2014			1213								

Zone 2 Station 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/100mL	Ammonia, variable[1] or >1.5 mg/L	Nitrates, >10 mg/L	Molybdenum, total, 10 g/L	Chlorpyrifos, >0.015 µg/L	Diuron, >2 µg/L	*S. capricornutum*, % Control	*H. azteca*, % Control
Lateral 6 and 7 @ Central Ave	Represented	NM	4/8/2014		8.57	1037								
Lateral 6 and 7 @ Central Ave	Represented	NM	5/13/2014			963								
Lateral 6 and 7 @ Central Ave	Represented	NM	6/10/2014			827								
Lateral 6 and 7 @ Central Ave	Represented	NM	8/12/2014	2.92		895								
Lateral 6 and 7 @ Central Ave	Represented	NM	9/9/2014	1.83		791								80
Levee Drain @ Carpenter Rd	Represented	NM	10/15/2013	4.72										
Levee Drain @ Carpenter Rd	Represented	NM	12/10/2013										74	
Levee Drain @ Carpenter Rd	Represented	NM, Non-contiguous	1/14/2014		8.94	1545								
Levee Drain @ Carpenter Rd	Represented	NM	2/10/2014			1614								
Levee Drain @ Carpenter Rd	Represented	NM, SED	3/4/2014			1599								76
Levee Drain @ Carpenter Rd (FD)	Represented	NM, SED	3/4/2014											84
Levee Drain @ Carpenter Rd	Represented	NM	6/10/2014	5.62		2631							37	
Levee Drain @ Carpenter Rd	Represented	NM	7/8/2014	1.84		1898								
Levee Drain @ Carpenter Rd	Represented	NM	9/9/2014	3.12		1285								
Lower Stevinson @ Faith Home Rd	Represented	NM	10/15/2013		8.97									
Lower Stevinson @ Faith Home Rd	Represented	NM	12/10/2013			967							21	
Lower Stevinson @ Faith Home Rd	Represented	NM	1/14/2014			943								
Lower Stevinson @ Faith Home Rd	Represented	NM	2/10/2014		8.61	963								
Lower Stevinson @ Faith Home Rd	Represented	NM	3/5/2014	5.60										
Lower Stevinson @ Faith Home Rd	Represented	NM	4/8/2014			1047							50	
Lower Stevinson @ Faith Home Rd	Represented	NM	5/13/2014			719								
Lower Stevinson @ Faith Home Rd	Represented	NM	6/10/2014			1150							40	
Lower Stevinson @ Faith Home Rd	Represented	NM	7/8/2014		8.58									
Lower Stevinson @ Faith Home Rd	Represented	NM	8/12/2014			914								
Lower Stevinson @ Faith Home Rd	Represented	NM	9/9/2014		8.52									
Unnamed Drain @ Hogin Rd	Represented	NM	10/15/2013	4.15		942								
Unnamed Drain @ Hogin Rd	Represented	NM	12/10/2013			1080								
Unnamed Drain @ Hogin Rd	Represented	NM	2/10/2014	5.06		1417								
Unnamed Drain @ Hogin Rd	Represented	NM	3/4/2014	1.85		1978								
Unnamed Drain @ Hogin Rd	Represented	NM	6/10/2014	1.32		1632								
Unnamed Drain @ Hogin Rd	Represented	NM	7/8/2014	4.17		984								
Unnamed Drain @ Hogin Rd	Represented	NM	8/12/2014	5.15		2226								
Unnamed Drain @ Hogin Rd	Represented	NM	9/9/2014	1.74		1233								
Westport Drain @ Vivian Rd	Represented	MPM, Non-contiguous	2/10/2014	2.77		800								
Westport Drain @ Vivian Rd	Represented	MPM, Non-contiguous	3/5/2014	0.05										

Zone 2 Station 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	Nitrates, >10 mg/L	Molybdenum, total, 10 G/L	Chlorpyrifos, > 0.015 µg/L	Diuron , > 2 µg/L	*S. capricornutum*, % Control	*H. azteca*, % Control
Westport Drain @ Vivian Rd	Represented	MPM	5/13/2014	1.25		837								
Westport Drain @ Vivian Rd	Represented	MPM	7/8/2014	4.55										
Westport Drain @ Vivian Rd	Represented	MPM	8/12/2014	4.91										
Westport Drain @ Vivian Rd	Represented	MPM, NM	9/9/2014			872								
Normal Monitoring Exceedances				38	12	77	2	1	7	0	0	1	10	2
Non-contiguous Waterbody Exceedances				6	2	10	0	0	1	1	0	1	2	0
Management Plan Monitoring Exceedances[2]				NA	NA	NA	NA	NA	NA	8	1	0	4	2
Total Exceedances[3]				38	12	77	2	1	7	8	1	1	14	4

FD- Field Duplicate

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

[2]Management Plan Monitoring 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.

[3] Field duplicates not included in total count, unless the associated environmental sample did not exceed the WQTL.

MPM-Management Plan Monitoring

NM-Normal Monitoring

SED- Sediment monitoring

Table 42. Hatch Drain @ Tuolumne Rd and Levee Drain @ Carpenter Rd total TUa of sediment pyrethroids collected during the 2014 WY.

Calculated TUs rounded to the nearest 1000th and LC50 µg/g converted to µg/kg for calculating the TUa. The Percent TOC is converted to a numerical value for calculation. TUa formula: pesticide concentration/%TOC/LC50 OC.

Station Name	Sample Date	*H. azteca*, % Control	Sediment Pesticide	Concentration (µg/kg dw)	LC50[1] (µg/kg oc)	Sample TOC (mg/kg dw)	TOC (%)	Calculated TUa
Hatch Drain @ Tuolumne Rd	3/4/14	56	Bifenthrin	32	520	25800	2.58	2.385
			Chlorpyrifos	20	4160			0.186
			Cyhalothrin, lambda	1.3	450			0.112
			Cypermethrin	6.3	380			0.642
			Esfenvalerate/Fenvalerate	J0.28	1540			0.007
							Total TUa of Pyrethroids	**3.333**
Hatch Drain @ Tuolumne Rd	9/9/14	52	Bifenthrin	27	520	23000	2.30	2.258
			Chlorpyrifos	4.6	4160			0.048
			Cyhalothrin, lambda	2.2	450			0.213
			Cypermethrin	1.4	380			0.161
			Cyfluthrin	J0.21	154			0.059
			Permethrin	J0.31	10830			0.001
							Total TUa of Pyrethroids	**2.740**
Levee Drain @ Carpenter Rd	3/4/14	76	Bifenthrin	6.3	520	32000	3.20	0.379
			Chlorpyrifos	26	4160			0.195
			Cyhalothrin, lambda	3.2	450			0.222
			Permethrin	0.93	10830			0.003
							Total TUa of Pyrethroids	**0.799**
Levee Drain @ Carpenter Rd (FD)	3/4/14	84	Bifenthrin	6.4	520	32000	3.20	0.385
			Chlorpyrifos	22	4160			0.165
			Cyhalothrin, lambda	2.7	450			0.188
			Permethrin	0.76	10830			0.002
							Total TUa of Pyrethroids	**0.740**

[1]Normalized to TOC measurements in sediments collected for research (Amweg, et al., 2005 and Weston, et al., 2013).
DW-Dry Weight
J-Estimated value
TOC-Total Organic Carbon
TUa-Toxic Unit for the acute endpoint.

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

Highline Canal @ Hwy 99 was monitored monthly as the Core site for Zone 3, including MPM for copper, lead, *C. dubia* and *S. capricornutum* toxicity, and sediment toxicity to *H. azteca*. Highline Canal @ Hwy 99 was dry in November and December 2013, and January, February, and April 2014.

Highline Canal @ Lombardy Rd is a Represented site in Zone 3; however no monitoring was required for the 2014 WY based on the evaluation provided in the 2013 MPU. MPM was conducted at Highline Canal @ Lombardy Rd for chlorpyrifos, copper, lead, *C. dubia* and *S. capricornutum* toxicity, and sediment toxicity to *H. azteca*. Chlorpyrifos and toxicity to *C. dubia* were approved for removal from the site's management plan on October, 15, 2013. Non-contiguous samples were collected from Highline Canal @ Lombardy Rd in April.

Mustang Creek @ East Ave is also a Represented site in Zone 3. Monitoring occurred for sediment toxicity in March and September. In addition, MPM occurred for copper from October 2013 through April 2014. Mustang Creek @ East Ave was dry in October, November, January, February, and September. Non-contiguous samples were collected from Mustang Creek in December and April. Table 43 includes all exceedances that occurred during the 2014 WY in Zone 3.

8.c.i. Field Parameters and E. coli

In Zone 3, exceedances of the WQTLs for DO (5), pH (5) and *E. coli* (2) occurred during the 2014 WY. The five exceedances of the WQTL for DO ranged from 2.93 to 6.92 mg/L; two were from Highline Canal @ Hwy 99, one from Highline Canal @ Lombardy Rd, and two from Mustang Creek @ East Ave. Exceedances of WQOs for field parameters, such as DO, are difficult to track and source. For example, DO is non-conserved meaning that it can increase or decrease as water moves downstream. The concentrations of these parameters are the result of processes occurring in the water column and in the sediment. These processes can vary diurnally and seasonally. Four of the five exceedances occurred during the irrigation season when temperatures were elevated (April-August; between 20-25^{o}C/68-77^{o}F) which could have contributed to the lower DO, resulting in the exceedances.

Five exceedances of the upper level WQTL for pH (8.5) occurred during sampling, ranging from 8.55 to 9.26; two occurred at Highline Canal @ Hwy 99 during October 2013 and September 2014, and three at Highline Canal @ Lombardy Rd during February, March, and September 2014.

The May and June 2014 monitoring events resulted in two exceedances of the WQTL for *E. coli* at Highline Canal @ Hwy 99. These were the only exceedances of the WQTL for *E. coli* to occur in Zone 3 during the 2014 WY. The subwatershed has numerous dairies and/or lands managed by dairies located directly upstream of the sample location.

8.c.ii. 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. A definitive source for copper exceedances has not been clearly identified in the Coalition region; however, there are four potential sources including 1) recent agricultural applications moving to surface waters either through storm/irrigation runoff or spray drift, 2) dairy uses of copper sulfate in footbaths discharged to surface waters, 3) resuspension of historic copper from upstream mining, brake pads and other anthropogenic uses, and 4) copper used for algae and aquatic weed control in irrigation supply ditches. However, throughout most of the Coalition region, irrigation districts no longer use copper to clean their canal systems (see below).

Dissolved copper concentrations are adjusted for the hardness of the water to determine if the bioavailable amount of copper could be toxic to aquatic life. Therefore, the WQTL for dissolved copper potentially is different for each sample. In Zone 3, there were four exceedances of the hardness based WQTL for dissolved copper out of a total of eight samples collected; one in December 2013 and three in March 2014.

Samples collected for MPM during the second storm on March 3, 2014 at Highline Canal @ Hwy 99 contained 7.1 µg/L dissolved copper (hardness based WQTL 6.76 µg/L). Upstream samples were collected two days later at Highline Canal @ Lombardy Rd and samples also exceeded the hardness based WQTL for dissolved copper at 14 µg/L (hardness based WQTL 8.34 µg/L). Water column toxicity samples were collected for *C. dubia* at both Highline Canal sites during MPM in March, no toxicity occurred. The PUR data associated with the March exceedance at Highline Canal @ Hwy 99 indicate there were 210 applications of copper ranging from 2 to 2,048 lbs AI (36,753 total lbs AI) across 12,097 acres of almonds, cherries, and peach orchards from December 12, 2013 through March 3, 2014. The PUR data associated with the March exceedance at Highline Canal @ Hwy 99 indicate there were 131 applications of copper ranging from 6 to 2,048 lbs AI (27,619 total lbs AI) across 10,883 acres of almonds, cherries, and peach orchards from December 16, 2013 through March 4, 2014 (Appendix V). 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. The TID indicated that herbicide (endothall) applications occurred weekly during the irrigation season to the canal. During the 2015 WY, MPM for copper will continue at Highline Canal @ Hwy 99 (January through April) and at Highline Canal @ Lombardy Rd (January through March, May, and August; Appendix VIII).

Samples collected during MPM from Mustang Creek @ East Ave on December 10, 2013 contained 42 µg/L dissolved copper (hardness based WQTL 10.47 µg/L) and on March 5, 2014 contained 14 µg/L dissolved copper (hardness based WQTL 9.72 µg/L; Table 43). No samples were collected for water column toxicity; the only toxicity in a management plan for Mustang Creek @ East Ave is sediment toxicity. The PUR data associated with the December exceedance indicate there were eight applications of copper ranging from 345 to 1,811 lbs AI (8,465 total lbs AI) across 2,245 acres of almonds from October 23, 2013 through November 27, 2013. The PUR data associated with the March exceedance indicate there were 29 applications of copper ranging from 14 to 1,848 lbs AI (12,288 total lbs AI) across 7,867 acres of almonds from December 11, 2013 through February 28, 2014 (Appendix V).

There were two measureable storms within the Coalition region that occurred before the December sampling event. The first storm occurred November 19 through November 21, 2013 and resulted in 0.80 inches. The second storm occurred on December 7, 2013 and produced 0.23 inches. In addition, rainfall occurring from February 6 through March 6, 2014 resulted in 1.66 inches (Modesto). Rainfall increased flows in Mustang Creek enough for samples to be collected in December (non-contiguous) and in March (flow rate of 0.14 cfs); Mustang Creek was dry for all other monitoring events. During the 2015 WY, MPM for copper will continue Mustang Creek @ East Ave in October through December and January through March (Appendix VIII).

8.c.iii. Toxicity

Samples collected in June and July 2014 at Highline Canal @ Hwy 99 were toxic to *S. capricornutum* (36% and 40% growth compared to the control, respectively). Highline Canal @ Hwy 99 was monitored for *C. dubia* toxicity monthly and for sediment toxicity in March and September; no toxicity occurred during the 2014 WY.

Algae growth was less than 50% compared to the control, and therefore a TIE was initiated for both June and July 2014 samples. The TIE conducted on the June toxic sample indicated both non-polar organics and metals were the cause of toxicity. There were no exceedances of WQTLs or detections of any non-polar organics or metals that coincided with this toxicity. The PUR data associated with the June toxicity indicate there were 505 applications of pesticides ranging between 0.0037 and 2,737 lbs AI (55,751 total lbs AI) across 24,366 acres of alfalfa, almonds, grapes, peaches, walnuts, and corn from March 18 through June 10, 2014 (Appendix V). The TIE conducted on the July toxic sample indicated both non-polar organics and metals were the cause of toxicity. There were no exceedances of WQTLs or detections of any non-polar organics or metals that coincided with this toxicity. Based on results from the phase III analysis, the source of toxicity is inconclusive; the concentration of metals in the sample is not enough to account for the observed toxicity (Table 38). The PUR data associated with the July toxicity indicate there were 450 applications ranging between 0.0267 and 12,669 lbs AI (129,509 total lbs AI) across 30,282 acres of alfalfa, almonds, grapes, peaches, plums, walnuts, and corn from April 17 through July 8, 2014 (Appendix V). Applications were made by aerial and ground methods indicating a potential for spray drift from parcels being treated adjacent to Highline Canal. In addition, TID indicated that herbicide (endothall) applications occurred weekly during the irrigation season to the canal. During the irrigation season, flow increased at this location; during the June sampling event, discharge was recorded as 37.03 cfs, and July was recorded as 91.67 cfs, compared to November, December, January, February, and April when the site was dry. During the 2015 WY, MPM for *S. capricornutum* toxicity will continue in February and July, in addition to monthly monitoring at Highline Canal @ Hwy 99 (Appendix VIII).

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.

Zone 3 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	pH, <6.5 and >8.5 units	*E. coli*, > 235 MPN/100 mL	Copper Dissolved, µg/L (hardness based trigger limit)	*S. capricornutum*, % Control
Highline Canal @ Hwy 99	Core	NM	10/15/2013		9.26			
Highline Canal @ Hwy 99	Core	MPM, NM, High TSS 2-M	3/3/2014				**7.1 (6.76)**	
Highline Canal @ Hwy 99	Core	MPM, NM	5/13/2014			686.7		
Highline Canal @ Hwy 99 (FD)	Core	MPM, NM	5/13/2014			648.8		
Highline Canal @ Hwy 99	Core	MPM, NM	6/10/2014	5.98		248.1		36
Highline Canal @ Hwy 99 (FD)	Core	MPM, NM	6/10/2014			307.6		51
Highline Canal @ Hwy 99	Core	MPM, NM, High TSS 1-M	7/8/2014					40
Highline Canal @ Hwy 99 (FD)	Core	MPM, NM, High TSS 1-M	7/8/2014					55
Highline Canal @ Hwy 99	Core	MPM, NM, High TSS 1-P, High TSS 2-M	8/12/2014	6.92				
Highline Canal @ Hwy 99	Core	MPM, NM	9/9/2014		8.86			
Highline Canal @ Lombardy Rd	Represented	MPM	2/10/2014		9.07			
Highline Canal @ Lombardy Rd	Represented	MPM	3/5/2014		8.55		**14 (8.34)**	
Highline Canal @ Lombardy Rd	Represented	MPM, Non-contiguous	4/8/2014	4.13				
Highline Canal @ Lombardy Rd	Represented	MPM	9/9/2014		8.70			
Mustang Creek @ East Ave	Represented	MPM	12/10/2013	4.66			**42 (10.47)**	
Mustang Creek @ East Ave (FD)	Represented	MPM	12/10/2013				**42 (10.47)**	
Mustang Creek @ East Ave	Represented	NM, MPM	3/5/2014				**14 (9.72)**	
Mustang Creek @ East Ave	Represented	MPM, Non-contiguous	4/8/2014	2.93				
Normal Monitoring Exceedances				5	5	2	0	2
Non-contiguous Waterbody Exceedances				2	0	0	0	0
Management Plan Monitoring Exceedances[1]				NA	NA	NA	4	0
Total Exceedances[2]				5	5	2	4	2

FD- Field Duplicate

[1]Management Plan Monitoring 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.

MPM-Management Plan Monitoring

NM-Normal Monitoring

8.d. Zone 4 (Bear Creek @ Kibby Rd, 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)

Merced River @ Santa Fe was monitored monthly as the Core site for Zone 4, including MPM for chlorpyrifos, lead, and toxicity to *C. dubia*. MPM occurred at three Represented sites within this zone (Bear Creek @ Kibby Rd, Black Rascal Creek @ Yosemite Rd, Livingston Drain @ Robin Ave). Copper was approved for removal from the Bear Creek @ Kibby Rd management plan on October 15, 2013. However, the site was sampled for copper MPM in January and March 2014; no exceedances of the WQTL for copper occurred. Monitoring occurred at three Represented sites, Canal Creek @ West Bellevue Rd, Howard Lateral @ Hwy 140, and Unnamed Drain @ Hwy 140, based on past exceedances at the Core site. Table 44 includes all exceedances that occurred during the 2014 WY in Zone 4.

Three sites in Zone 4 were dry during monitoring: Black Rascal Creek @ Yosemite Rd (May and September 2014), Livingston Drain @ Robin Ave (December 2013, January, February, April-June, and September 2014), and Howard Lateral @ Hwy 140 (November 2013 and January 2014). Non-contiguous samples were collected from Bear Creek @ Kibby Rd during January, March, and April 2014, and from Canal Creek @ West Bellevue Rd during November 2013.

8.d.i. Field Parameters and E. coli

In Zone 4, exceedances of the WQTLs for DO (4), pH (1), SC (1), and *E. coli* (1) occurred during the 2014 WY. Four exceedances of the WQTL for DO occurred, ranging from 2.84 to 6.86 mg/L; one from Canal Creek @ West Bellevue Rd in November 2013 when non-contiguous samples were collected, one from Unnamed Drain @ Hwy 140 in November 2013 (no measureable flow during collection), and two were from Black Rascal Creek @ Yosemite Rd in July and August 2014 (no measureable flow during collection). A detection of pH greater than the 8.5 WQTL (9.16) occurred at Livingston Drain @ Robin Ave. A detection of SC above the WQTL occurred at Unnamed Drain @ Hwy 140.

Twelve *E. coli* samples were collected at Merced River @ Santa Fe; one exceedance of the WQTL occurred in August. No other exceedances of the WQTL for *E. coli* occurred in Zone 4. Merced River @ Santa Fe site subwatershed has dairies and/or lands managed by dairies located directly upstream and adjacent to the sample location that receive manure.

Table 44. Zone 4 (Bear Creek @ Kibby Rd, 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) exceedances.

The WQTLs are listed with each constituent.

Zone 4 Station 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
Merced River @ Santa Fe	Core	MPM, NM, High TSS 1-P, High TSS 2-M	8/12/2014				816.4
Canal Creek @ West Bellevue Rd	Represented	NM, Non-contiguous	11/12/2013	6.84			
Black Rascal Creek @ Yosemite Rd	Represented	MPM	7/8/2014	4.07			
Black Rascal Creek @ Yosemite Rd	Represented	MPM	8/12/2014	2.84			
Livingston Drain @ Robin Ave	Represented	MPM	8/12/2014		9.16		
Unnamed Drain @ Hwy 140	Represented	NM	11/12/2013	6.86			
Unnamed Drain @ Hwy 140	Represented	NM	1/14/2014			1686	
			Normal Monitoring Exceedances	4	1	1	1
			Non-contiguous Waterbody Exceedances	1	0	0	0
			Total Exceedances	4	1	1	1

MPM-Management Plan Monitoring
NM-Normal Monitoring

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

Duck Slough @ Gurr Rd was monitored monthly as the Core site for Zone 5, including MPM for copper, lead, toxicity to *C. dubia*, and sediment toxicity to *H. azteca*. MPM occurred at all Represented sites within this zone (Deadman Creek @ Gurr Rd, Deadman Creek @ Hwy 59, and Miles Creek @ Reilly Rd). Toxicity to *S. capricornutum* was approved for removal from the Deadman Creek @ Hwy 59 management plan on October 15, 2013. However, the site was sampled for MPM in January and April 2014 due to a sampling error; no toxicity occurred. Table 45 includes all exceedances that occurred during the 2014 WY in Zone 5.

In Zone 5, sites were dry during five monitoring events at Deadman Creek @ Gurr Rd (November), Deadman Creek @ Hwy 59 (January, August, and September) and Duck Slough @ Gurr Rd (January). Non-contiguous samples were collected at Deadman Creek @ Gurr Rd during November, December, and January and at Duck Slough @ Gurr Rd during December, February, two March events, April, and July.

8.e.i. Field Parameters and E. coli

In Zone 5, exceedances of the WQTLs for DO (14), pH (8), SC (4), and *E. coli* (1) occurred during the 2014 WY. Fourteen exceedances of the WQTL of 7 mg/L for DO occurred, ranging from 2.42 to 6.83 mg/L. Three exceedances of the WQTL for DO occurred at Duck Slough @ Gurr Rd in December (non-contiguous), June (no measurable flow), and July (non-contiguous), eight occurred at Deadman Creek @ Gurr Rd in November (non-contiguous), December (non-contiguous), and May through September, and three at Miles Creek @ Reilly Rd in June through August (all three events had no measureable flow).

A total of 11 samples of *E. coli* were collected at Duck Slough @ Gurr Rd and one exceedance of the WQTL of 235 MPN/100 mL occurred (>2419 mL). Samples from Duck Slough @ Gurr Rd were the only samples analyzed for *E. coli* in Zone 5. The site subwatershed contains numerous dairies and/or lands managed by dairies located upstream of the sample locations that receive applications of manure.

8.e.ii. Arsenic

The registrations of many products with arsenic as an active ingredient have been cancelled. 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. In addition, arsenic is a naturally occurring metal in the Coalition area; high concentrations of arsenic have been detected in the groundwater supply. Consequently, exceedances of the arsenic WQTL may be due to these non-agricultural uses or natural occurrence. In Zone 5, one exceedance of the WQTL for arsenic occurred in March 2014.

Arsenic was monitored in Zone 5 during two storm and two irrigation events at the Core site, Duck Slough @ Gurr Rd. Samples collected during March 3, 2014 storm monitoring exceeded the arsenic WQTL of 10 µg/L (16 µg/L). Elevated levels of arsenic appear to be common in Zone 5 and exceedances of the WQTL for arsenic have occurred 18 times from 2007 through 2014, and therefore may be due to naturally occurring arsenic. Since there are no registered products containing arsenic for use in agriculture, no PUR data were queried for this exceedance. It is possible that the heavy rainfall during January through early March could have suspended the metal and transported it to the creek.

8.e.iii. Chlorpyrifos

The non-contiguous sample collected during the storm from Duck Slough @ Gurr Rd on March 3, 2014 resulted in an exceedance of the 0.015 µg/L WQTL for chlorpyrifos (0.053 µg/L); all chlorpyrifos results with the exception of March were non-detect. This is the first exceedance of the WQTL for chlorpyrifos to occur in the site subwatershed since 2004; chlorpyrifos was approved for removal from the site's active management plan on May 30, 2012. Due to the 2014 exceedance, the chlorpyrifos management plan for Duck Slough @ Gurr Rd will be reinstated. During the 2015 WY, chlorpyrifos will be monitored monthly and MPM will occur in March and July.

Toxicity to *C. dubia* (75% survival compared to the control) and *P. promelas* (85% survival compared to the control) were associated with this sample. A substantial amount of rainfall occurred in the ESJWQC region from late January through March 6, 2014 (2.48 inches). The storm trigger limit was reached during a storm from February 26 through March 6, 2014, where 1.72 inches (Merced) of rainfall occurred in the Coalition region. Duck Slough @ Gurr Rd was non-contiguous during December and February through March sampling events; the site was dry in January. Therefore, water was stagnant the site from October through April (discharge was recorded as zero). The last month Duck Slough @ Gurr had flowing water above 1 cfs was in January 2013.

The PUR data associated with the March exceedance indicate that from February 8 through February 20, 2014 a total of 10 applications (products include Cobalt, Lorsban, Nufos, and Whirlwind) ranging between 20 and 90 lbs AI were applied. A total of 473 lbs AI across 561 acres of alfalfa was associated with this exceedance. In addition, eight of the 10 applications were made by aerial spray methods where it is possible for chlorpyrifos to enter the waterway via spray drift (Appendix V). The 10 applications associated with the exceedance were applied by both members (4, including two targeted members during focused outreach) and five non-members. The member associated with the TRSs adjacent to the site participates in Coalition outreach and, according to their 2013 Farm Evaluations, currently implement management practices to prevent runoff such as: construct berms to capture runoff and trap sediment, sediment basins/holding ponds are used, stormwater is captured using field borders, laser leveling, drip irrigation, tailwater return systems, shorter irrigation runs with checks to manage and capture flow, and drift control agents.

8.e.iv. 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. In Zone 5, one detection of malathion occurred in the 2014 WY at Duck Slough @ Gurr Rd. Malathion is known to be toxic to *C. dubia* (LC_{50} = 3.35 µg/L); however no toxicity occurred at the time of the malathion exceedance.

Malathion was monitored monthly at Duck Slough @ Gurr Rd. Non-contiguous samples collected during the April 8, 2014 irrigation event resulted in an exceedance of the WQTL for malathion at a concentration of 0.12 µg/L. All malathion results with the exception of samples collected in April were non-detect. The PUR data associated with the April exceedance indicate there were 14 applications of malathion, ranging from 40 to 170 lbs AI (1,073 lbs AI) across 862 acres of alfalfa, barley, and corn from March 12 through April 6, 2014 (Appendix V). The 14 applications were associated with both members (targeted and not targeted during focused outreach) and non-members. Thirteen applications were made by aerial methods indicating a potential for spray drift from parcels being treated with malathion near the waterway; 40 lbs of AI were applied over 40 acres by aerial methods. The site has been non-contiguous or dry, and with no water flowing since October 2013. Therefore, the exceedance most likely occurred from spray drift or stormwater runoff mobilizing malathion into Duck Slough. A storm (March 26-April 2, 2014) resulted in a total rainfall of 1.00 inch in Merced.

The 2014 exceedance was the first to occur at Duck Slough @ Gurr Rd, and therefore no management plan was in effect during the Coalition's focused outreach from 2010 through 2012. 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 2015 WY, malathion will continue to be monitored monthly.

8.e.v. Toxicity

In Zone 5, water column toxicity was monitored monthly at Duck Slough @ Gurr Rd and during MPM at Deadman Creek @ Gurr Rd, Deadman Creek @ Hwy 59, and Miles Creek @ Reilly Rd. Toxicity occurred five times, twice to *C. dubia* and three times to *P. promelas*.

Non-contiguous samples collected in November during MPM from Deadman Creek @ Gurr Rd were toxic to *C. dubia* (0% survival compared to the control). No TIE was conducted on the November sample due to high levels of ammonia (47.3 mg/L) measured at the laboratory. The concentration of ammonia the samples is enough to account for all of the observed toxicity (Table 38). Samples were not collected for any other constituent except for toxicity during November MPM. During the 2015 WY, MPM for *C. dubia* toxicity will continue at Deadman Creek @ Gurr Rd in November, February, and March (Appendix VIII).

Non-contiguous samples collected in March during MPM from Duck Slough @ Gurr Rd were toxic to *C. dubia* (75% survival compared to the control). The toxicity coincided with an exceedance of the WQTL for chlorpyrifos (0.053 µg/L). The PUR data indicate there were 10 applications of chlorpyrifos for a total of 423 lbs of AI applied from February 8, 2014 through February 20, 2014 across 561 acres of alfalfa. In addition, 205 applications of pesticides ranging from 0.4 to 980 lbs AI (6,450 lbs AI total) applied from September 16, 2013 through March 3, 2014 across 11,680 acres of alfalfa, almonds, nectarines, peaches, pistachios, prunes, tomatoes, and walnuts (Appendix V). Rainfall from late January through March 6, 2014 occurred and increased flows in the Coalition region (1.72in in Merced). Rainfall could have increased storm runoff transporting applied products to the waterways contributing to the March toxicity. During the 2015 WY, MPM for *C. dubia* toxicity will continue at Duck Slough @ Gurr Rd during February and March, in addition to monthly monitoring (Appendix VIII).

Non-contiguous samples collected in November and December during MPM from Deadman Creek @ Gurr Rd were toxic to *P. promelas* (0% survival compared to the control for both samples). No TIE was conducted on November toxic sample due to the high levels of ammonia (37.0 mg/L) measured at the laboratory; ammonia concentrations accounted for all of the observed toxicity (Table 38). Samples were not collected for any other constituent except toxicity during November MPM. No TIE was conducted on December toxic sample due to the high levels of ammonia (70.5 mg/L) measured at the laboratory; ammonia concentrations accounted for all of the observed toxicity (Table 38). Samples were not collected for any other constituent except toxicity during December MPM.

Non-contiguous samples collected in March from Duck Slough @ Gurr Rd were toxic to *P. promelas* (85% survival compared to the control). The toxicity coincided with an exceedance of the WQTL for chlorpyrifos (0.053 µg/L). The PUR data indicate there were 10 applications of chlorpyrifos associated with the *P. promelas* toxicity, a total of 473 lbs of AI applied from February 8, 2014 through February 20, 2014 across 561 acres of alfalfa. In addition, 313 applications of pesticides ranging from 0.21 to 229 lbs AI (4,437 lbs AI total) applied from September 16, 2013 through March 3, 2014 across 15,128 acres of alfalfa, almonds, nectarines, peaches, pistachios, prunes, tomatoes, and walnuts (Appendix V). Toxicity to *P. promelas* has been added to the management plan at Duck Slough @ Gurr Rd following exceedances in the 2014 WY; MPM for *P. promelas* toxicity will occur at Duck Slough @ Gurr Rd in October and March based on past toxicity and PUR data.

Table 45. Zone 5 (Deadman Creek @ Gurr Rd, Deadman Creek @ Hwy 59, Duck Slough @ Gurr Rd and Miles Creek @ Reilly Rd) exceedances.
The WQTLs are listed with each constituent.

Zone 5 Station 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	Arsenic, Total 10 µg/L	Chlorpyrifos, µ> 0.015 µg/L	Malathion, >0 µg/L	*C. dubia*, % Control	*P. promelas*, % Control
Duck Slough @ Gurr Rd	Core	NM	10/21/2013		8.73							
Duck Slough @ Gurr Rd	Core	MPM, NM, Non-contiguous	12/10/2013	6.83								
Duck Slough @ Gurr Rd	Core	MPM, NM, High TSS 1-P, High TSS 1-M	2/10/2014		8.66							
Duck Slough @ Gurr Rd	Core	MPM, NM, Non-contiguous, High TSS 2-M	3/3/2014		8.79			16	0.053		**75**	85
Duck Slough @ Gurr Rd	Core	NM, Non-contiguous	3/5/2014		9.38							
Duck Slough @ Gurr Rd	Core	MPM, NM, Non-contiguous	4/8/2014			726				0.12		
Duck Slough @ Gurr Rd	Core	MPM, NM	5/13/2014		8.55							
Duck Slough @ Gurr Rd	Core	MPM, NM	6/10/2014	6.82			>2419.6					
Duck Slough @ Gurr Rd	Core	MPM, NM, Non-contiguous, High TSS 1-M	7/8/2014	5.37								
Deadman Creek @ Gurr Rd	Represented	MPM, NM, Non-contiguous	11/12/2013	2.42		1073					**0**	
Deadman Creek @ Gurr Rd	Represented	MPM, NM, Non-contiguous	11/13/2013	2.67		1109						**0**
Deadman Creek @ Gurr Rd	Represented	MPM, Non-contiguous	12/10/2013	5.98		1308						**0**
Deadman Creek @ Gurr Rd	Represented	MPM, Non-contiguous	1/14/2014		9.61							
Deadman Creek @ Gurr Rd	Represented	MPM	2/10/2014		9.31							
Deadman Creek @ Gurr Rd	Represented	MPM	5/13/2014	6.71								
Deadman Creek @ Gurr Rd	Represented	MPM	6/10/2014	6.38								
Deadman Creek @ Gurr Rd	Represented	MPM	7/8/2014	4.88								
Deadman Creek @ Gurr Rd	Represented	MPM	8/12/2014	4.30								
Deadman Creek @ Gurr Rd	Represented	MPM	9/9/2014	6.09								
Miles Creek @ Reilly Rd	Represented	MPM	3/5/2014		9.38							
Miles Creek @ Reilly Rd	Represented	MPM	6/10/2014	3.55								
Miles Creek @ Reilly Rd	Represented	MPM	7/8/2014	4.05								
Miles Creek @ Reilly Rd	Represented	MPM	8/12/2014	5.57								
			Normal Monitoring Exceedances	14	8	4	1	1	1	1	0	1
			Non-contiguous Waterbody Exceedances	5	3	4	0	1	1	1	2	3
			Management Plan Monitoring Exceedances[1]	NA	NA	NA	NA	0	0	0	2	2
			Total Exceedances	14	8	4	1	1	1	1	2	3

[1]Management Plan Monitoring 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

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

Cottonwood Creek @ Rd 20 was monitored monthly as the Core site for Zone 6, including MPM for copper and lead. Chlorpyrifos was approved for removal from the management plan on October 15, 2013. MPM occurred at Ash Slough @ Ave 21 and Dry Creek @ Rd 18. Table 46 includes all exceedances that occurred during the 2014 WY in Zone 6.

In Zone 6, Cottonwood Creek @ Rd 20 was dry during every month, Ash Slough was dry during all eight MPM events (January, February, April through September), and Dry Creek @ Rd 18 was dry during five MPM events (December, January, April, July, August). Non-contiguous samples were collected at Dry Creek @ Rd 18 in February and March 2014.

8.f.i. Field Parameters

In Zone 6, exceedances of the WQTLs for DO (1) and pH (2) occurred during the 2014 WY. The single exceedance of the WQTL for DO occurred at Dry Creek @ Rd 18 during MPM in September (6.57 mg/L). Two detections of pH were greater than the WQTL of pH 8.5 at Dry Creek @ Rd 18 during MPM in February and September (non-contiguous).

8.f.ii. Copper

In Zone 6, there was a single exceedance of the hardness WQTL for dissolved copper during the 2014 WY from samples collected from Dry Creek @ Rd 18. It is possible that geologic conditions and the transport of copper from closed mines upstream could be contributing to the elevated copper concentrations found in water column samples in Zone 6.

Samples collected in February 2014 during the first storm monitoring event at Dry Creek @ Rd 18 contained 12 µg/L dissolved copper (hardness based WQTL 11.21 µg/L). Toxicity to *S. capricornutum* was also monitored in February; no toxicity occurred. The PUR data associated with the February exceedance at Dry Creek @ Rd 18 indicate there were 12 ground applications of copper ranging from 23 to 405 lbs AI (2,612 lbs AI total) from November 19, 2013 through January 26, 2014 across 735 acres of almonds, oranges, tangerines, and cherries (Appendix V). Rainfall from January 30 through Feb 10, 2014 occurred and precipitation was reported at 1.40 inches (Madera) in Zone 6 of the Coalition region. This substantial amount of rainfall could result in storm runoff that transported copper from urban and agricultural land uses to the waterways, contributing to the exceedances. During the 2015 WY, MPM for copper will continue at Dry Creek @ Rd 18 (January, February, and April through September; Appendix VIII).

Table 46. Zone 6 (Ash Slough @ Ave 21, Berenda Slough along Ave 18 1/2, Cottonwood Creek @ Rd 20, and Dry Creek @ Rd 18) exceedances.

The WQTLs are listed below each constituent.

Zone 6 Station Name	Site Type	Monitoring Type	Sample Date	DO, <7 mg/L	pH, <6.5 and > 8.5 units	Copper Dissolved, µg/L (hardness based trigger limit)
Dry Creek @ Rd 18	Represented	MPM	2/10/2014		8.98	**12 (11.2)**
Dry Creek @ Rd 18	Represented	MPM, Non-contiguous	3/5/2014		9.16	
Dry Creek @ Rd 18	Represented	MPM	9/9/2014	6.57		
Normal Monitoring Exceedances				1	2	0
Non-contiguous Waterbody Exceedances				0	1	0
Management Plan Monitoring Exceedances[1]				NA	NA	1
Total Exceedances				1	2	1

[1]Management Plan Monitoring not conducted for field parameters, 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

9. 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 notified the Regional Board of all exceedances with electronically submitted Exceedance Reports. Any discrepancies or omissions have been described in the Discussion of Results section.

The Coalition also notifies members of exceedances and works with growers to address water quality impairments. Monitoring results are disseminated to Coalition members via grower mailings, at grower outreach meetings, and by 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. Grower notification, management practice outreach and education, and management practice implementation and tracking are all additional actions taken by the Coalition to ensure that growers are aware of and take actions to address downstream water and sediment quality concerns.

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

Outreach and education activities are an important component of the Coalition 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 2014 WY, the Coalition presented information to members concerning the Coalition's progress in achieving water quality goals, site subwatershed specific monitoring results, and Best Management Practices (BMPs) proven to be effective to reduce 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 serves as a clearing house for Coalition activities and outreach on management practices. Information provided through the website can be utilized as a supplement to regular grower contacts and meetings. The website offers growers the ability to view a recording of the annual meetings, download the Nitrogen Management

Plan Worksheet, and calculate the pounds of nitrogen in irrigation water. The website also provides access to water quality monitoring results and provides and updates on Coalition news and activities.

9.a. Member Mailings

During the 2014 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.

Newsletters:

The Coalition Newsletters inform members of monitoring results, upcoming events, and updates to the monitoring program (see Appendix VI). The October 2013 newsletter was mailed to 2,649 members and emailed to 1,743 members on October 25, 2013. The February 2014 newsletter was mailed to 1,677 members and emailed to 1,349 members on February 14, 2014.

Annual Grower's Summary Report:

The Annual Grower's Summary Report informs growers of monitoring results/exceedances, Coalition actions, and related news.

Focused Outreach Notifications:

Targeted growers in the fifth priority site subwatersheds were notified to schedule meetings with Coalition representatives to discuss on-farm management practices. There were nine members who did not respond. These members were mailed a letter on October 1, 2013 indicating the Coalition would drop any members who did not respond to schedule focused outreach meetings. Members within the fifth priority site subwatersheds that met with Coalition representatives in 2013 were mailed follow-up surveys on January 2, 2014 and June 24, 2014 to confirm the implementation of recommended management practices.

9.b. Member Meetings

Coalition representatives conducted or participated in meetings during the 2104 WY to discuss topics including WDR requirements, irrigation and stormwater quality, sediment runoff, management practices, and groundwater.

Individual Focused Outreach Meetings:

Coalition representatives held 26 individual meetings with targeted growers in the sixth priority site subwatersheds as part of individual focused outreach and education.

Farm Evaluation Meetings:

The Coalition hosted member meetings on January 8, 10, 15 in Modesto, Madera, and Merced Counties, respectively, to discuss Farm Evaluation Surveys and survey instructions. Two meetings were held on each date. Over 1,800 growers attended the meetings.

On January 23, 2014, 1,919 members were mailed letters for Farm Evaluation Plan (FEP) survey options. Members were given the option of selecting their FEP survey preference, a mail-in survey or an online survey.

Between February 7 and February 24, 2014, all members were mailed and emailed FEP surveys to complete and return to the Coalition. On March 27, 2014, FEP reminder notices were mailed to 1,944 members with outstanding FEP surveys. On May 9, 2014, 1,170 members were mailed FEP survey late notices and informed of the requirements to return their completed surveys. On June 15, 2014, 669 members were mailed FEP requirement warning letters.

Sediment and Erosion Control Meetings:

On November 11, 2013 meeting announcements were mailed to 440 members and emailed to 187 members notifying growers of a Sediment and Erosion Control meeting. On November 22, 2014 the Sediment and Erosion Control meeting was held where 127 members were represented by 120 attendees.

Annual Grower's Meetings:

The Coalition hosted member meetings on May 15, 16, and 20, 2014 in Madera, Merced, and Modesto, respectively, to discuss water quality issues that occurred in 2013, overall ILRP regulations, and groundwater vulnerability areas. Two meetings were held on each date; on May 15, 123 members attended, on May 16, 136 members attended, and on May 20, 368 members attended.

9.c. Collaboration

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 2014, 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 2014 WY.

Outreach categories include Management Practice Tracking, Best Management Practice (BMP) Outreach and Education, Grower Notification, and Collaboration.

Area	Date	Category	Details	Who
Coalition Region	10/1/2013	Grower Notification	Final attempt letters: mailed to nine members to schedule their meetings in fifth priority site subwatersheds (Merced River @ Santa Fe, Miles Creek @ Reilly Rd, and Highline Canal @ Lombardy).	Parry Klassen and Wayne Zipser
Coalition Region	10/25/2013	Grower Notification	October Newsletter: mailed to 2649 and emailed to 1743 members.	Parry Klassen
Foothill area east of Oakdale/Waterford	11/11/2013	Grower Notification	Sediment and Erosion Control Meeting Announcement: mailed to 440 members and supplemental email to 187 members.	Parry Klassen and Wayne Zipser
Foothill area east of Oakdale/Waterford	11/22/2013	BMP Outreach and Education	Sediment and Erosion Control Meeting: 120 attendees. Attendees represented 127 members.	Parry Klassen and Wayne Zipser
Coalition Region	1/2/2014	Management Practice Tracking	Follow-Up Surveys: mailed to two members one year after recommendations were made.	Parry Klassen and Wayne Zipser
Modesto Area	1/8/2014	BMP Outreach and Education	Member Meeting: 637 members attended. Topics included ILRP overview, and Farm Evaluation Survey overview and instructions.	Parry Klassen and Wayne Zipser
Madera Area	1/10/2014	BMP Outreach and Education	Member Meeting: 171 members attended. Topics included ILRP overview, and Farm Evaluation Survey overview and instructions.	Parry Klassen and Wayne Zipser
Merced Area	1/15/2014	BMP Outreach and Education	Member Meeting: 402 members attended. Topics included ILRP overview, and Farm Evaluation Survey overview and instructions.	Parry Klassen and Wayne Zipser
Coalition Region	1/17/2014	Grower Notification	Annual Grower's Summary Report: mailed to 2,840 members.	Parry Klassen, Wayne Zipser
Coalition Region	1/23/2014	Grower Notification	Farm Evaluation Preference Request: mailed to 1,919 members. Online or mail survey preferences.	Parry Klassen, Wayne Zipser
Coalition Region	2/7/2014 through 2/24/2014	Grower Notification	Farm Evaluation Survey: mailed and emailed to all members.	Parry Klassen, Wayne Zipser
Coalition Region	2/14/2014	Grower Notification	February Newsletter: mailed to 1,677 members and emailed to 1,349 members.	Parry Klassen
Coalition Region	3/27/2014	Grower Notification	Farm Evaluation Reminder Notice: mailed to 1,944 members with outstanding surveys.	Parry Klassen, Wayne Zipser
Coalition Region	4/18/2014	Grower Notification	May Member Meeting Announcement: mailed to 2,329 members and emailed to 462 members.	Parry Klassen, Wayne Zipser
Coalition Region	5/9/2014	Grower Notification	Farm Evaluation Late Notice: mailed to 1,170 members with outstanding surveys.	Parry Klassen, Wayne Zipser
Madera Area	5/15/2014	BMP Outreach and Education	May Madera Member Meeting: 125 members attended. Topics included ILRP overview and groundwater vulnerability designations.	Parry Klassen, Wayne Zipser
Merced Area	5/16/2014	BMP Outreach and Education	May Merced Member Meeting: 136 members attended. Topics included ILRP overview and groundwater vulnerability designations.	Parry Klassen, Wayne Zipser
Modesto Area	5/20/2014	BMP Outreach and Education	May Modesto Member Meeting: 387 members attended. Topics included ILRP overview and groundwater vulnerability designations.	Parry Klassen, Wayne Zipser
Coalition Region	6/15/2014	Grower Notification	Farm Evaluation Requirement Warning: mailed to 669 members.	Parry Klassen, Wayne Zipser
Coalition Region	6/24/2014	Management Practice Tracking	Follow-Up Survey: mailed to one member one year after recommendations were made.	Parry Klassen, Wayne Zipser

9.B. MANAGEMENT PLAN ACTIVITIES

9.a. Management Plan Performance Goals and Schedules

The Coalition Strategic Plan is outlined in the original Management Plan (approved on November 25, 2008) in Table 18, Pages 77-79, and is designed 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."

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

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

Performance Goals were approved for each group of priority site subwatersheds by the Regional Board as amendments to the ESJWQC Management Plan on June 16, 2009 (first priority), June 8, 2010 (second priority), November 17, 2010 (third priority), November 14, 2011 (fourth priority), November 1, 2012 (fifth priority), January 28, 2013 (sixth priority), and January 5, 2015 (seventh priority). Performance Goals 1-5 are complete and each goal was discussed in detail for the first priority (2012 MPUR, Pages 30-34), second priority (2012 MPUR, Pages 35-37), third priority (2013 MPUR, Pages 34-36), and fourth priority (2014 Annual Report, Pages 160-170). The following sections describe Coalition actions to meet the approved Performance Goals and the status of each of the Performance Goals along with associated measures/outputs for the fifth, sixth, and seventh high priority site subwatersheds. A site subwatershed analysis has been included in Appendix I and II for all high priority site subwatersheds.

9.a.i. Fifth Priority Subwatersheds (2013 – 2015)

The fifth priority subwatersheds include Hatch Drain @ Tuolumne Rd, Highline Canal @ Lombardy Rd, Merced River @ Santa Fe, and Miles Creek @ Reilly Rd. Performance Goals for the fifth priority subwatersheds are similar to those formulated for the fourth 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 fifth priority subwatersheds (Table 48). The Coalition sent mailings to targeted growers in the fifth priority subwatersheds. Growers were encouraged to initiate the scheduling of individual contact meetings with the Coalition. All initial contacts were complete before March 30, 2013 (Table 48).

A total of 42 growers were contacted farming 9,947 acres or 33% of the acreage with the potential for direct drainage in the fifth priority subwatersheds (Table 48). Of the four site subwatersheds, Highline Canal @ Lombardy Rd had the highest percentage of acreage with direct drainage represented by contacted growers (46%), followed by Merced River @ Santa Fe (34%), Miles Creek @ Reilly Rd (18%), and Hatch Drain @ Tuolumne Rd (13%).

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

Coalition representatives met with and documented current management practices for 100% of growers within the fifth priority subwatersheds (Table 48). As detailed in the Management Practice Evaluation section of this report, documented management practices include practices focused on irrigation management, stormwater runoff, erosion and sediment management, pest management, and dormant spray management (when applicable). One hundred percent of the management practices documented on the surveys filled out by growers were recorded in an Access database. A complete review of current and recommended management practices is included in the Fifth Priority Subwatersheds Summary of Management Practices section of this report.

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

The Coalition conducts follow-up contacts with growers between February 1 and April 30 to record newly implemented practices (Table 48). The Coalition followed-up with 21 growers who had recommendations to implement additional practices in 2014. A summary of recommended and implemented management practices is included in the Fifth Priority Subwatersheds Summary of Management Practices section of this report.

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

The Coalition conducted Year 2 of MPM at fifth priority sites during the 2014 WY; MPM will continue through the 2015 WY to assess changes in water quality and to evaluate the effectiveness of newly implemented management practices. The Evaluation of Management Practice Effectiveness section includes the water quality results from the 2014 WY in the fifth priority 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.

The Coalition met with the Regional Board staff on January 22, 2014 and May 8, 2014 to discuss Coalition Management Plan activities and water quality improvements.

Table 48. High Priority Performance Goals status for 2013 - 2015 high priority site subwatersheds (Hatch Drain @ Tuolumne Rd, Highline Canal @ Lombardy Rd, Merced River @ Santa Fe, and Miles Creek @ Reilly Rd) approved on November 1, 2012 (revised and approved on June 3, 2013 and September 23, 2013).

Performance Goal/Performance Measure	Outputs	Who	Status as of May 1, 2014[1]			
			Hatch Drain @ Tuolumne Rd	Highline Canal @ Lombardy Rd	Merced River @ Santa Fe	Miles Creek @ Reilly 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	**1 of 1** (100%) March 30, 2013	**20 of 20** (100%) March 30, 2013	**12 of 12** (100%) March 30, 2013	**9 of 9** (100%) March 30, 2013
Performance Measure 1.2 – Contact owners/operators in the site subwatershed with direct drainage membership acreage.	Report ratio of acreage represented by individual contacts versus subwatershed acreage determined to have direct drainage.	MLJ-LLC	**36 of 275** (13%)	**4226 of 9228** (46%)	**4152 of 12,172** (34%)	**1533 of 8603** (18%)
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	**1 of 1** (100%)	**20 of 20** (100%)	**12 of 12** (100%)	**9 of 9** (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.	MLJ-LLC	**Complete**	**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**	**Complete**
	Summary of management practices implemented as a result of individual contacts.	MLJ-LLC	**Complete**	**Complete**	**Complete**	**Complete**
Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.						
Performance Measure 4.1 Update – Assess water quality results from Coalition monitoring location within the priority site subwatershed.	Summary of water quality data from Management Plan Monitoring.	MLJ-LLC	**Complete** May 1, 2015	**Complete** May 1, 2015	**Complete** May 1, 2015	**Complete** May 1, 2015
Performance Goal 5: Consult with CVRWQCB at least once to discuss Management Plan activities and consider if changes need to be made in Management Plan strategy for High Priority waterbodies.						

[1]Overall irrigated direct drainage acreage for fifth priority subwatersheds comes from 2010/2011 parcel data layers.

*Contacts with growers to determine implemented practices will occur between February 1 and April 30; all information obtained by February 28th will be entered into an Access database and included in the following May 1 Annual Report; any additional information will be reported on during the quarterly meetings.

9.a.ii. 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 49).

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 49).

A total of 26 growers were contacted farming 9,838 acres or 60% of the acreage with the potential for direct drainage in the sixth priority subwatersheds (Table 49). 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.

The Coalition met and documented current management practices for 100% of growers within the sixth priority subwatersheds (Table 49). 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 this 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. All newly implemented management practices will be reported on in the May 1, 2016 Annual Report (Table 49). If the Coalition is aware of structural management practices that will take longer than two years to implement, this information will be included in the annual updates and may result in an extension to the final evaluation of management practice effectiveness.

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 WY; MPM will continue through the 2015 and 2016 WYs to assess changes in water quality.

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.

The Coalition met with the Regional Board staff on January 22, 2014 and May 8, 2014 to discuss Coalition Management Plan activities (Table 49).

Table 49. High Priority Performance Goals status for 2014–2016 high 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	**5915 of 10,730** (55%) Quarterly	**3472 of 4218** (82%) Quarterly	**451 of 1359** (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	**In Progress:** Feb. 28, 2015*	**In Progress:** Feb. 28, 2015*	**In Progress:** Feb. 28, 2015*
	Summary of management practices implemented as a result of individual contacts.	MLJ-LLC	**In Progress:** May 1, 2015/2016	**In Progress:** May 1, 2015/2016	**In Progress:** May 1, 2015/2016
Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.					
Performance Measure 4.1 – Assess water quality results from Coalition monitoring location within the priority site subwatershed.	Summary of water quality data from Management Plan Monitoring.	MLJ-LLC	**In Progress:** May 1, 2015/2016	**In Progress:** May 1, 2015/2016	**In Progress:** May 1, 2015/2016
Performance Goal 5: Consult with CVRWQCB at least once to discuss Management Plan activities and consider if changes need to be made in Management Plan strategy for High Priority waterbodies.					

*Contacts with growers to determine implemented practices will occur between February 1 and April 30; all information obtained by February 28th will be entered into an Access database and included in the following May 1 Management Plan Update Report; any additional information will be reported on during the quarterly meetings.

9.a.iii. Seventh Priority Subwatersheds (2015 – 2017)

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 50). A revised set of Performance Goals/Measures and associated schedule were proposed in the 2014 in the revised Surface Water Quality Management Plan (SQMP; submitted May 1, 2014; approval pending). The Coalition requested to modify the Performance Goals and Measures schedule for the seventh priority site subwatersheds to allow for the use of information obtained from Farm Evaluation Plan (FEP) surveys. The Coalition will identify members with the potential to discharge to surface waters and review the FEP responses to determine current practices. The Coalition will use this information for determine if individual visits/outreach will occur with specific members.

The updated Performance Goals are built on the following actions essential to the Coalition's revised SQMP strategy:

7. Identify members with the potential to discharge to surface waters causing exceedances of WQTLs of management plan constituents.
8. Review the member's FEP 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.
9. Hold meetings as necessary to inform members of water quality problems and recommend additional practices.
10. Review the member's Farm Evaluation Plan from the year following initiation of Management Plan activities to document number/type of new management practices implemented.
11. Evaluate effectiveness of new management practices.

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 (13 growers), Levee Drain @ Carpenter Rd (4 growers), and Mootz Drain downstream of Langworth Pond (6 growers) were mailed initial contact letters (Table 50). 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 FEP 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 FEP surveys prior to contacting individuals. The FEP surveys were used to determine current management practices. Based on the FEP results for current management practices, members were targeted for additional 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 their implemented and recommended management practices (Table 50). 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 3: Hold meetings as necessary to inform members of water quality problems and recommend additional practices.

During individual meetings with growers, Coalition representatives discuss local water quality concerns, and may recommend additional management practices effective at reducing water quality impairments (Table 50).

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

Management practices will be recorded in an Access database from the FEP surveys reporting on practices implemented in 2015 and 2016. During individual visits some members may be encouraged to adopt additional management practices. The Coalition will utilize the FEP survey responses from 2015 and 2016 to determine if those practices were implemented. If the Coalition is aware of structural management practices that will take longer than two years to implement, this information will be included in the annual updates and may result in an extension to the final evaluation of management practice effectiveness.

Performance Goal 5: Evaluate effectiveness of new management practices.

The Coalition will conduct MPM in the seventh high priority sites from 2015 through 2017 to assess changes in water quality.

Table 50. High Priority Performance Goals status for 2015–2017 high 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 Goal	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	X		
	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	X		
2: Performance Goal	Performance Measure 2.1 – Review FEP (or NMP or SECP as appropriate) from 100% of targeted members.	Received management practices recorded in Access database.	MLJ-LLC	X		
	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	X		
	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 Goal	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 Goal	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 Goal	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

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

10. MEMBER ACTIONS TAKEN TO ADDRESS EXCEEDANCES OF THE WATER QUALITY OBJECTIVES

10.A. 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 and that could transport to receiving waters. In 2014, the Coalition also presented to members information regarding nutrient management and well management practices to protect groundwater quality.

The Coalition has conducted focused outreach within high priority subwatersheds since 2008. The purpose of focused outreach is to review local water quality concerns, document practices implemented prior to focused outreach (current practices), recommend additional practices if applicable (recommended practices), and document practices implemented following focused outreach (newly implemented practices).

The Coalition completed focused outreach in the first, second, third, and fourth set of priority subwatersheds: Dry Creek @ Wellsford Rd, Duck Slough @ Hwy 99, and Prairie Flower Drain @ Crows Landing Rd (2008-2010); Bear Creek @ Kibby Rd, Cottonwood Creek @ Rd 20, Duck Slough @ Gurr Rd, and Highline Canal @ Hwy 99 (2010-2012); Berenda Slough along Ave 18 ½, Dry Creek @ Rd 18, Lateral 2 ½ near Keyes Rd and Livingston Drain @ Robin Ave (2011-2013); and Black Rascal Creek @ Yosemite Rd, Deadman Creek @ Hwy 59, Deadman Creek @ Gurr Rd, Hilmar Drain @ Central Ave (2012-2014). Initial and follow up meetings are complete for 100% of targeted growers in all 15 subwatersheds. The Coalition reported final results of current and recommended management practices for first priority site subwatersheds in the 2011 MPUR (Pages 50-54, 57-65), and newly implemented practices were reported in the 2012 MPUR (Pages 54-65). The Coalition reported the final results of current, recommended, and newly implemented management practices for the second priority subwatersheds in the 2012 MPUR Management Practices section (Pages 67-99). The 2013 MPUR Management Practices section provides a complete analysis of implemented management practices in the third priority site subwatersheds (Pages 54-69). The 2014 Annual Report provides a complete analysis of implemented management practices in the fourth priority site subwatersheds (Pages 160-170).

The Coalition continued with its management plan tracking process during 2014 in the fifth set of high priority subwatersheds (2013-2015): Hatch Drain @ Tuolumne Rd, Highline Canal @ Lombardy Rd, Merced River @ Santa Fe, and Miles Creek @ Reilly Rd. The Coalition completed individual meetings with 100% of targeted growers by January 15, 2014. Results were reported in the 2014 Annual Report Management Practices section (Pages 171-192). The Coalition conducted follow-up contacts with growers who received recommendations for additional management practices between January 14, 2014 and March 30, 2015 to record newly implemented practices. The Coalition has received and recorded 100% of the follow-up surveys. A final analysis of implemented management practices is reported in the following management practice sections.

Management plan tracking continues in the sixth set of high priority subwatersheds (2014-2016): Ash Slough @ Ave 21, Mustang Creek @ East Ave, and Westport Drain @ Vivian Rd. The Coalition notified targeted growers of the management plan tracking process and the requirement to schedule an individual meeting with Coalition representatives to review their operations via mailings sent on November 27, 2013. The Coalition has since completed 100% of initial contact meetings with all targeted growers. The Coalition is in the process of sending follow-up surveys to targeted growers; the survey included instructions for growers to indicate any newly implemented management practices. All newly implemented management practices will be reported in the 2016 Annual Report.

In late 2014, the Coalition began the management plan tracking process for the seventh set of high priority subwatersheds (2014-2016): Howard Lateral @ Hwy 140, Levee Drain @ Carpenter Rd, and Mootz Drain downstream of Langworth Pond. Based on the revised set of Performance Goals/Measures, the Coalition developed the targeted grower list and will evaluate current management practices using information obtained from the 2014 FEP surveys. A summary of currently implemented and recommended management practices will be included in the 2016 Annual Report.

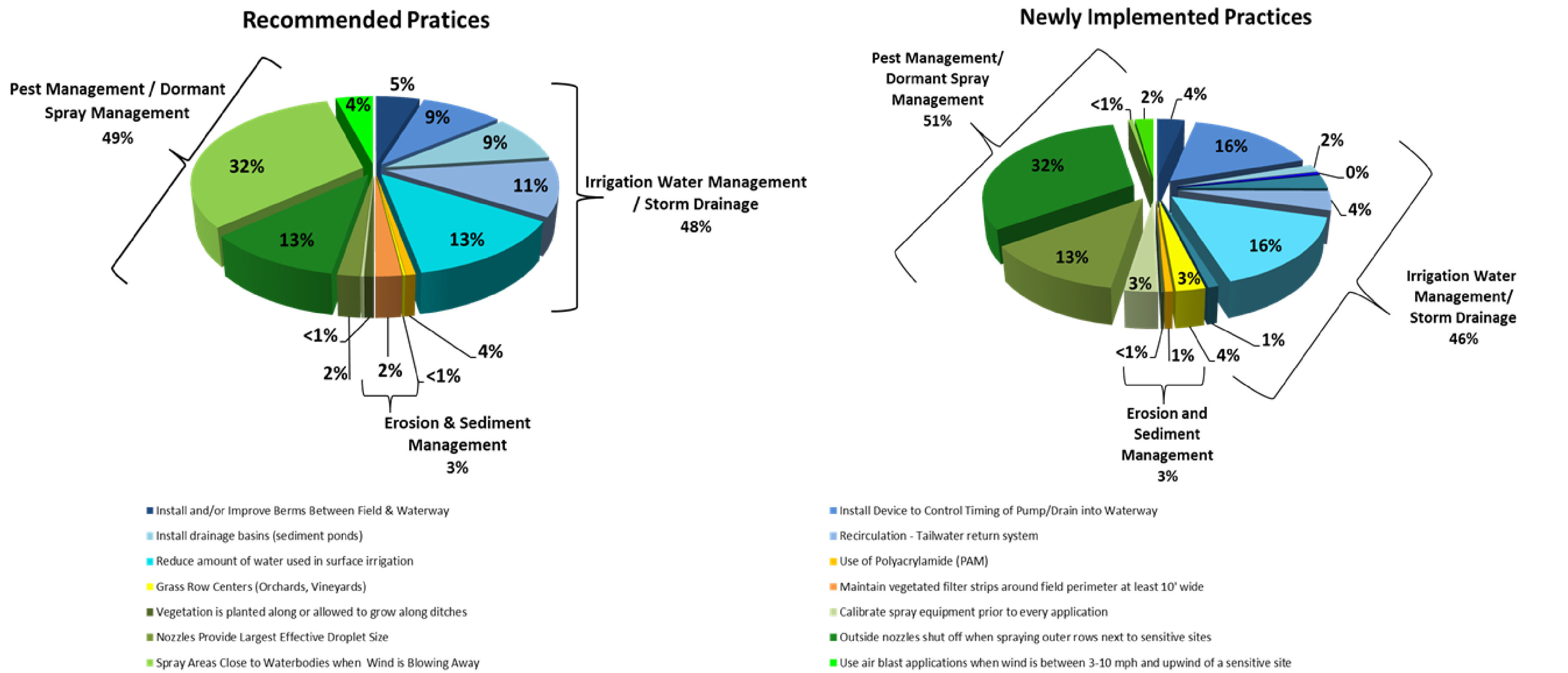
10.B. SUMMARY OF NEWLY IMPLEMENTED MANAGEMENT PRACTICES

The Coalition completed its focused outreach strategy in the first through fifth priority site subwatersheds, which included recommending management practices to improve water quality and documenting newly implemented practices. Figure 14 illustrates the management practices recommended by Coalition representatives to growers and the newly implemented management practices within first through fifth priority site subwatersheds. These practices are color coded in the figure by management practice category: Irrigation Water Management/Storm Drainage (blue shades), Erosion and Sediment Management (yellow/orange shades) and Pest Management/Dormant Spray Management (green shades). Of the acres with recommended practices, Irrigation Water Management /Storm Drainage practices accounted for 49% of the acres, Erosion & Sediment Management practices accounted for 3% of the acres, and Pest Management / Dormant Spray Management practices accounted for 48% of the acres (Figure 14). Several practices are designed to address multiple aspects of agricultural operations (i.e. filter strips aid in irrigation tailwater management and reducing erosion).

Overall, growers implemented most of the recommended management practices in addition to practices not recommended based on the Coalition's focused outreach. Of the acres with newly implemented practices, growers implemented Irrigation Water Management / Storm Drainage Management practices the most frequently (51% of acres, 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 sediment erosion caused by offsite movement of irrigation tailwater. Practices more specifically designed to address Erosion and Sediment Management, such as grass row centers or vegetation filter strips, account for 3% of the acres with newly implemented management practices. Pest Management /Dormant Spray Management practices accounted for 46% of the acres with newly implemented practices (Figure 14). In addition to recommended management practices, growers implemented practices not recommended by the Coalition such as adjusting spray nozzles to match crop canopy profile and Reducing the amount of water used in surface irrigation.

During follow-up contacts, Coalition representatives noted 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 will continue to provide members with information regarding funding opportunities for management practice implementation including the following programs: Agricultural Water Enhancement Program (AWEP), and Environmental Quality Incentives Program (EQIP). Growers that indicated on their follow-up surveys that they were interested in additional information about funding will be contacted directly by a Coalition representative to assist with their individual operation's needs. More information regarding financial resources for management practice implementation can be found in the Coalition Wide Evaluation section.

Figure 14. Percentage of acreage associated with each recommended and newly implemented management practice in the first through fifth 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.



10.C. FIFTH PRIORITY SUBWATERSHEDS SUMMARY OF MANAGEMENT PRACTICES (2013-2015)

The Coalition began focused outreach in the fifth priority site subwatersheds in January 2013. The Coalition completed individual meetings and documented current management practices in 2013 for 42 targeted growers (Table 48). The Coalition reported current management practices implemented by members within fifth priority site subwatersheds in the 2014 Annual Report (Pages 171-192). Follow-up contacts were conducted in 2014 to document any additional practices implemented in 2013 and/or 2014. Follow-up mailings included a survey with instructions for growers to record any newly implemented management practices; surveys were identical to those used for follow-up in the second priority subwatersheds, which are recorded in the amendment to the 2011 MPUR, Table 1. The Coalition recommended practices to one grower in the Hatch Drain @ Tuolumne Rd site subwatershed, eight growers in the Highline Canal @ Lombardy Rd site subwatershed, seven growers in the Merced River @ Santa Fe site subwatershed, and five growers in the Miles Creek @ Reilly Rd site subwatershed (Table 51). The Coalition completed follow-up contacts with 100% of growers by March 31, 2015; all recommended and newly implemented management practices are discussed below.

Table 51. Tally of growers who participated in focused outreach in the fifth set of high priority site subwatersheds (2013-2015).

	HATCH DRAIN @ TUOLUMNE RD	HIGHLINE CANAL @ LOMBARDY RD	MERCED RIVER @ SANTA FE	MILES CREEK @ REILLY RD
Targeted Growers	1	20	12	9
Completed Individual Meeting	1	20	12	9
Growers with Recommended Practices	1	8	7	5
Completed Follow-up Contact	1	8	7	5
PERCENT COMPLETE (INITIAL CONTACT)	**100%**	**100%**	**100%**	**100%**
PERCENT COMPLETE (FOLLOW-UP CONTACT)	**100%**	**100%**	**100%**	**100%**

10.a. Hatch Drain @ Tuolumne Rd

The Coalition contacted the single targeted grower who farms on 36 acres within the Hatch Drain @ Tuolumne Rd site subwatershed (Table 51). Management practices were documented for 13% of the acreage identified as direct drainage (Figure 15). The grower reported no irrigation runoff from his 36 acre orchard; however, the Coalition representative discussed with the grower local water quality concerns, the importance of preventing the offsite movement of all agricultural constituents, and recommended implementing one additional management practice. The grower indicated on the follow-up survey he implemented the recommended practice (Table 52).

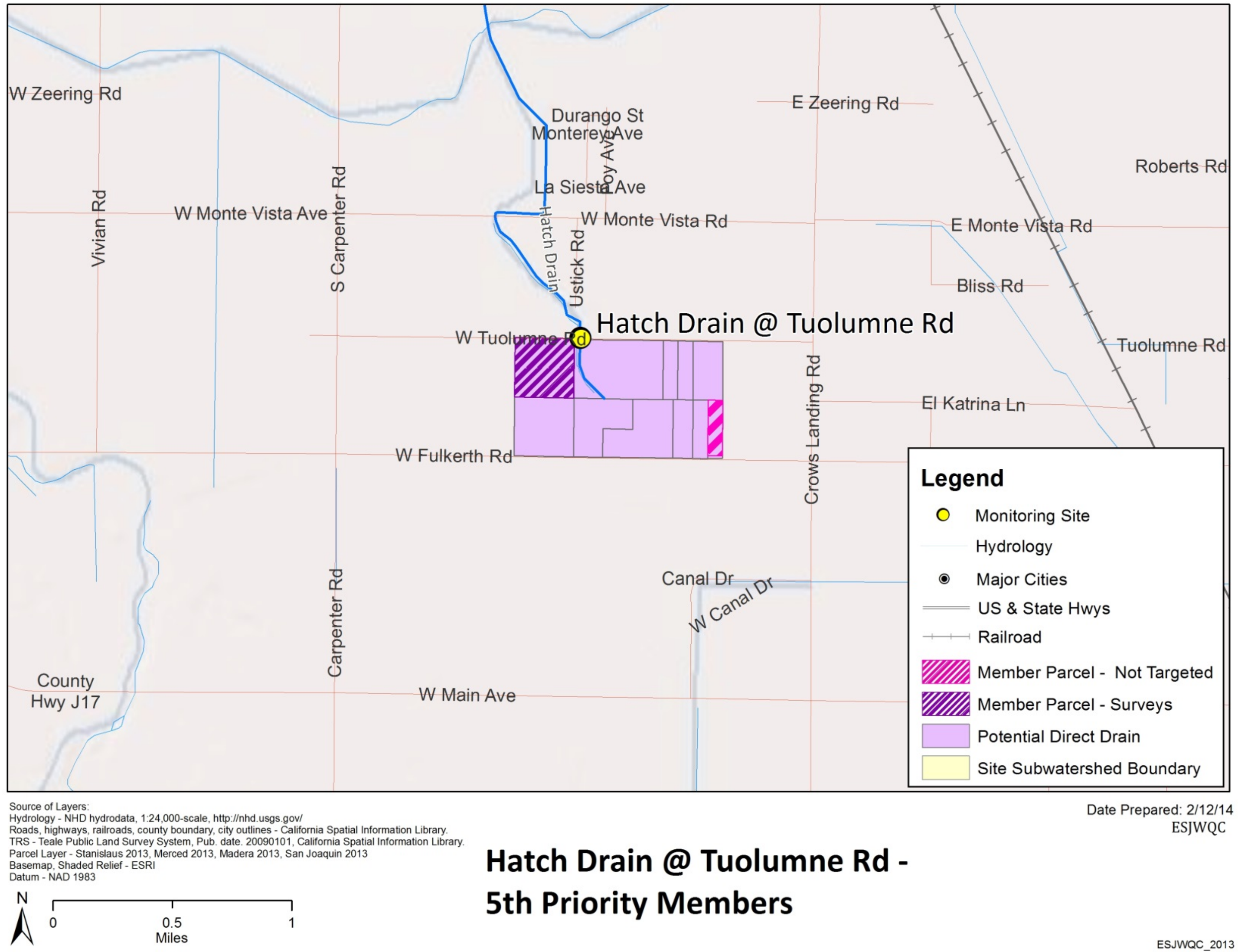
10.a.i. Summary of Implemented Management Practices (2013/2014)

As indicated in the initial survey, the grower already implements several management practices to prevent irrigation and sediment runoff from his orchard (2014 Annual Report, Table 61). In addition, the grower implemented the recommended management practice to spray areas close to waterbodies when the wind is blowing away from them (Table 52).

Table 52. Comparison of recommended and implemented management practices in the Hatch Drain @ Tuolumne 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	36	1	36	100%

Figure 15. Hatch Drain @ Tuolumne Rd member parcels with direct drainage potential.



10.b. Highline Canal @ Lombardy Rd

The Coalition sent follow-up surveys to eight targeted growers who farm on 1,153 acres within the Highline Canal @ Lombardy Rd site subwatershed (Table 51). Management practices were documented for 46% of the acreage identified as direct drainage (Figure 16). Coalition representatives discussed local water quality concerns, the importance of preventing the offsite movement of all agricultural constituents and recommended additional management practices be implemented. All eight growers indicated on their follow-up surveys they implemented the recommended management practices.

10.b.i. Summary of Implemented Management Practices (2013/2014)

Table 53 is a comparison of recommended management practices and newly implemented practices for the Highline Canal @ Lombardy Rd site subwatershed. Eight growers implemented additional practices recommended by Coalition representatives. Seven growers indicated they spray areas close to waterbodies when the wind is blowing away from them, two indicated they use air blast applications when wind is between 3-10 mph and upwind of a sensitive site, and one grower installed a device to control timing of pump/drain into waterway (Table 53). Figure 17 compares the percent of acreages for each newly implemented management practice.

Table 53. Comparison of recommended and implemented management practices in the Highline Canal @ Lombardy Rd site subwatershed.

Management Practice	Recommended Practices		Implemented Practices		% Recommended Acreage with Implemented Practices
	# Growers	Acres	# Growers	Acres	
No irrigation drainage from property					
Pump/Drain into waterway & able to control timing.	1	574	1	574	100%
Spray areas close to waterbodies when the wind is blowing away from them.	7	507	7	507	100%
Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site.	2	72	2	72	100%

Figure 16. Highline Canal @ Lombardy Rd member parcels with direct drainage potential.

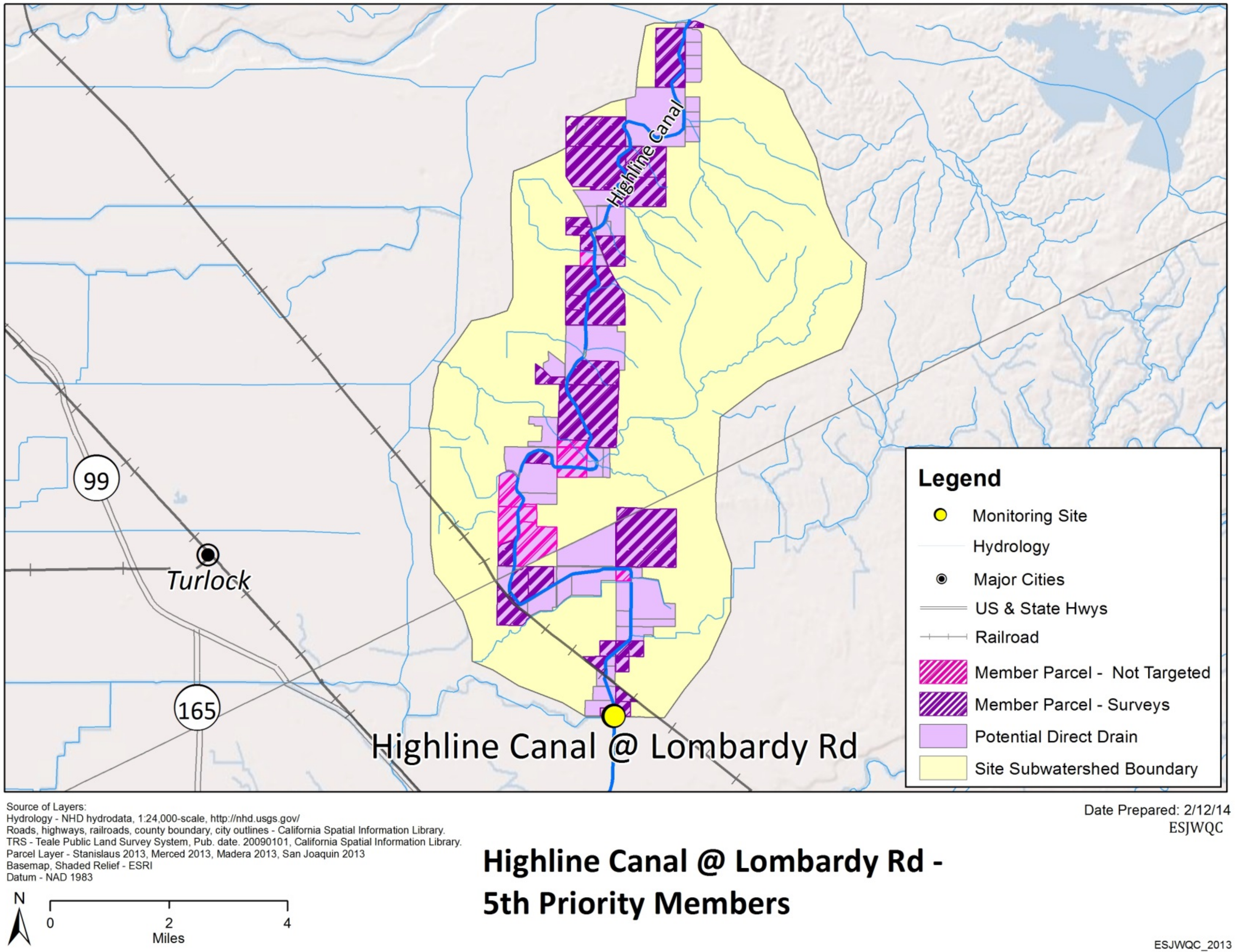
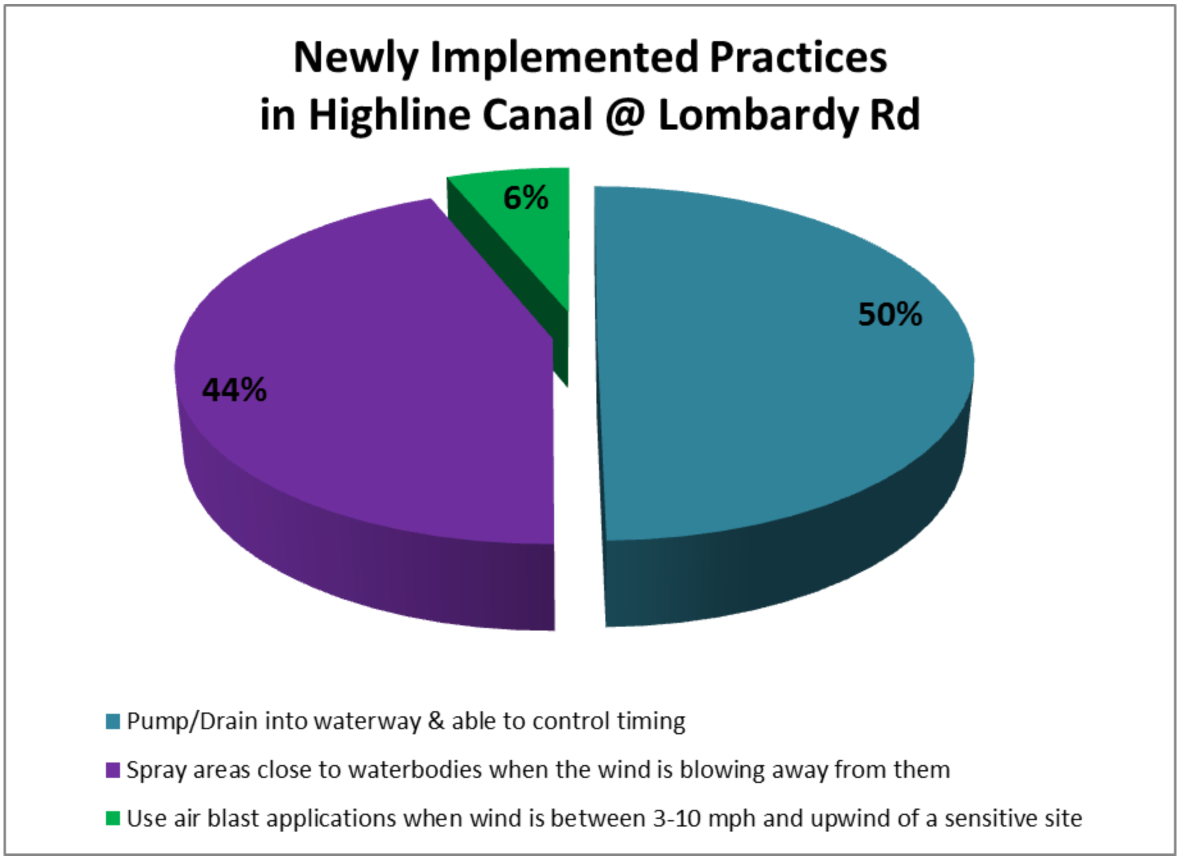


Figure 17. Percentage of acreage represented by newly implemented management practices in the Highline Canal @ Lombardy Rd site subwatershed.



10.c. Merced River @ Santa Fe

The Coalition sent follow-up surveys to seven targeted growers who farm on 1,949 acres within the Merced River @ Santa Fe site subwatershed (Table 51). Management practices were documented for 34% of the acreage identified as having direct drainage (Figure 18). The Coalition met with growers to discuss water quality concerns, document current management practices, and recommend additional practices. Six growers indicated they implemented the recommended management practices for 99% of the targeted acreage (Table 54).

10.c.i. Summary of Implemented Management Practices (2013/2014)

Table 54 is a comparison of recommended management practices and newly implemented practices for the site subwatershed. Five out of six growers that reported no irrigation drainage implemented management practices recommended by the Coalition. One targeted grower representing 19 acres indicated that the management practice to spray areas close to the waterbodies when the wind is blowing away from them is not applicable; the grower uses a commercial applicator because their orchard is still young and not in production yet. The Coalition discussed with the grower concerns about spray drift. One grower reported irrigation drainage from 1,045 acres (54% total acres) and implemented the recommended management practice to spray areas close to the waterbodies when the wind is blowing away (Figure 19).

Table 54. Comparison of recommended and implemented management practices in the Merced River @ Santa Fe 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.	6	904	5	885	83%
Irrigation drainage from property					
Spray areas close to waterbodies when the wind is blowing away from them.	1	1045	1	1045	100%
Total	**7**	**1949**	**6**	**1930**	**99%**

Figure 18. Merced River @ Santa Fe member parcels with direct drainage potential.

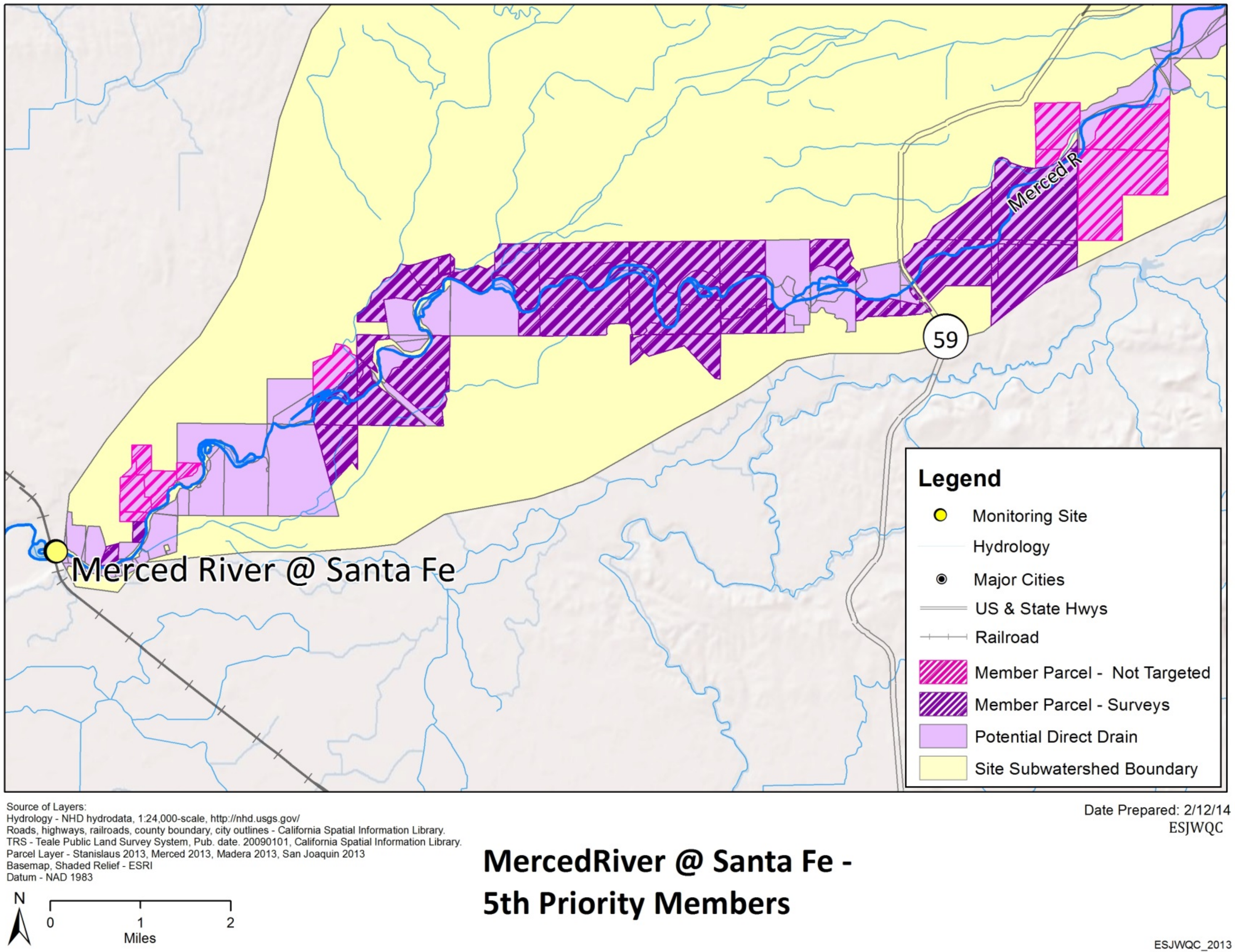
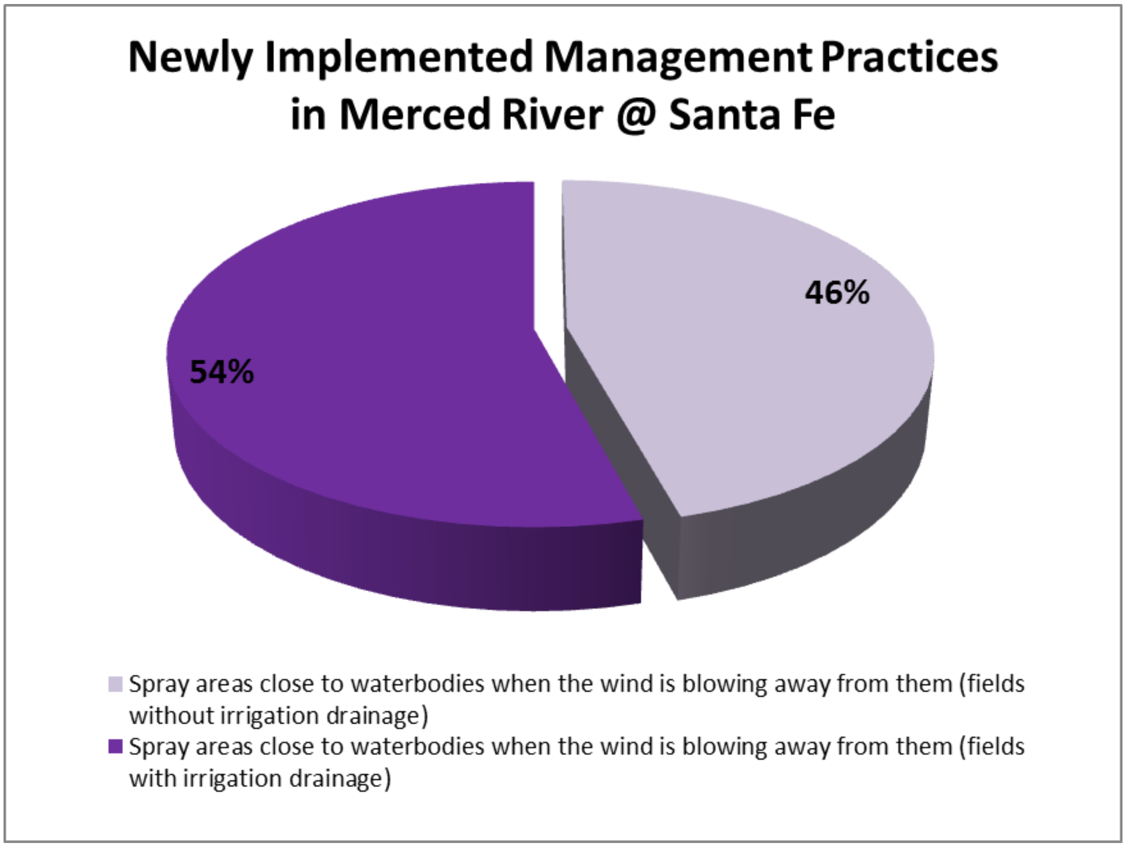


Figure 19. Percentage of acreage represented by newly implemented management practices in the Merced River @ Santa Fe site subwatershed.



10.d. Miles Creek @ Reilly Rd

The Coalition sent follow-up surveys to five targeted growers who farm on 1,195 acres within the Miles Creek @ Reilly Rd site subwatershed (Table 51). Management practices were documented for 18% of the acreage identified as direct drainage (Figure 20). The Coalition met individually with growers to discuss water quality concerns, document current management practices, and recommend additional practices. One hundred percent of targeted growers completed the follow-up surveys in 2015 (Table 51). All five growers implemented all the Coalition's recommended management practice for 100% of the targeted acreage (Table 55).

10.d.i. Summary of Implemented Management Practices (2013/2014)

Table 55 is a comparison of recommended management practices and newly implemented practices for the site subwatershed. One hundred percent of growers who reported no irrigation drainage implemented management practices recommended by the Coalition. One hundred percent of growers with irrigation drainage from their property implemented management practices recommended by the Coalition. Figure 21 compares the percentage of acreages with irrigation drainage and non irrigation drainage with newly implemented management practices.

Table 55. Comparison of recommended and implemented management practices in the Miles Creek @ Reilly 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.	2	179	2	179	100%
Yes, irrigation drainage from property					
Spray areas close to waterbodies when the wind is blowing away from them.	3	1016	3	1016	100%
Total	**5**	**1195**	**5**	**1195**	**100%**

Figure 20. Miles Creek @ Reilly Rd member parcels with direct drainage potential.

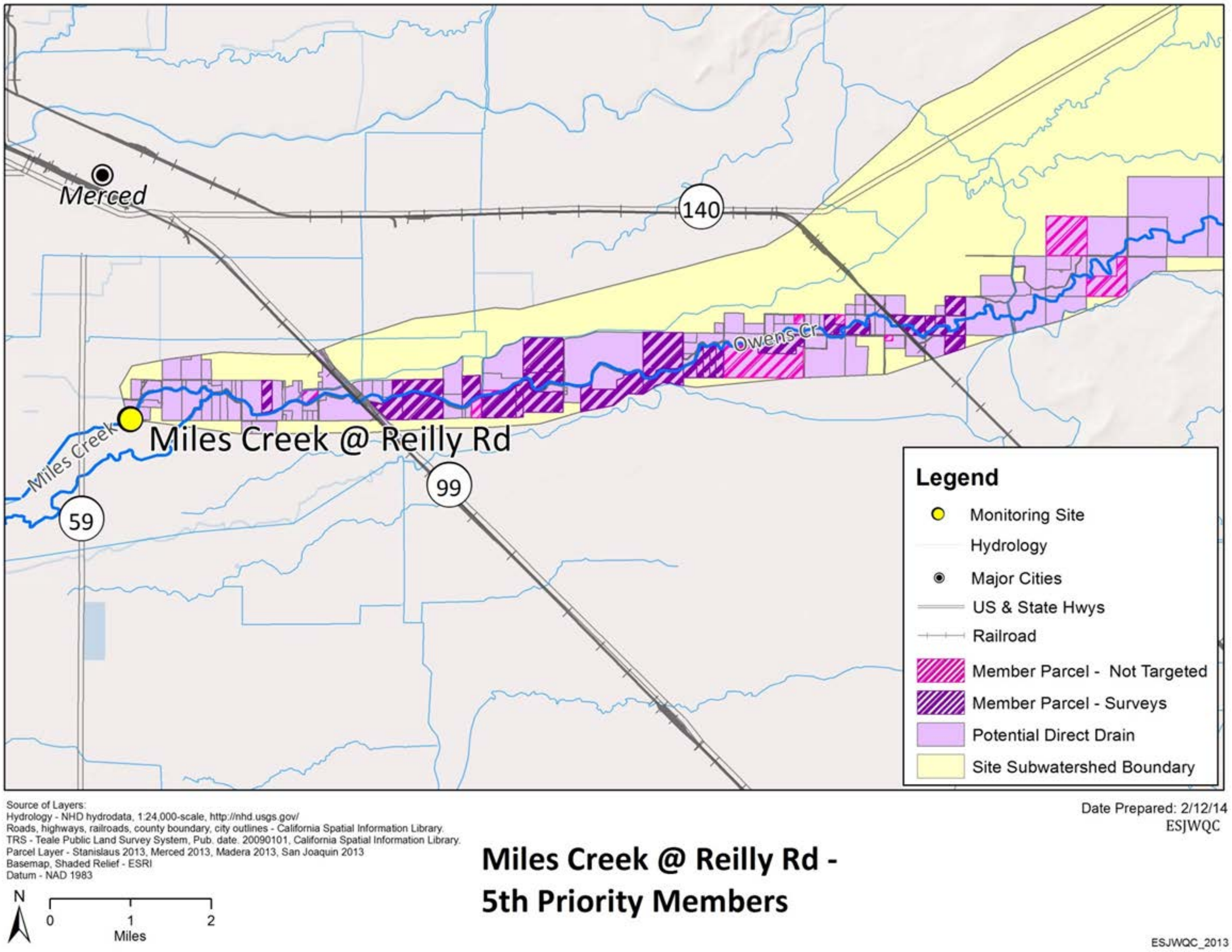
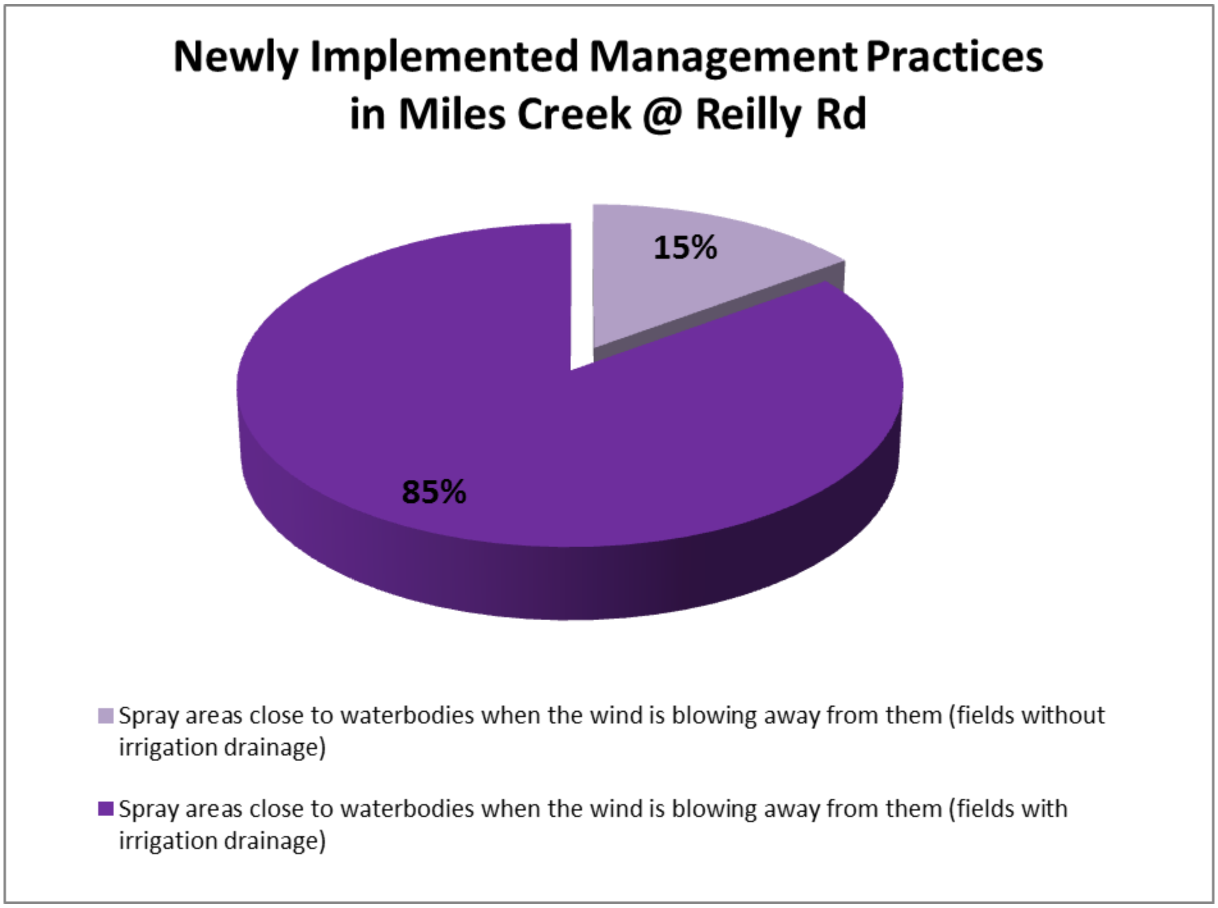


Figure 21. Percentage of acreage represented by newly implemented management practices in the Miles Creek @ Reilly Rd site subwatershed.



10.D. SIXTH PRIORITY SUBWATERSHEDS SUMMARY OF MANAGEMENT PRACTICES (2014-2016)

The Coalition began focused outreach in sixth priority site subwatersheds in January 2014. The Coalition mailed initial contact letters November 27, 2013 informing growers of the high priority site subwatershed Management Plan process, including growers' responsibilities, and requested that members contact the Coalition to schedule an individual grower meeting. The Coalition completed individual meetings with the 26 targeted growers in 2014. During the meetings, Coalition representatives discussed water quality concerns, documented currently implemented management practices, and recommended additional management practices designed to address the water quality concerns (Table 56). The Coalition is in the process of following up with sixth priority targeted growers regarding any newly implemented management practices. Six growers received recommendations to implement management practices and follow-up surveys were mailed April 1, 2015. The results from follow-up contacts will be reported during meetings with Regional Board staff, and a final analysis of newly implemented management practices will be presented in the 2016 Annual Report.

Table 56. Tally of growers who participated in focused outreach in the sixth set of high priority site subwatersheds (2014-2016).

	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	4	1	1
Follow-up Contact by April 30, 2015	0	1	1
Percent Complete (Initial Contact)	**100%**	**100%**	**100%**
Percent Complete (Follow-up Contact)	**0%**	**100%**	**100%**

NA-The Coalition did not recommend any management practices during individual meetings.

10.a. Ash Slough @ Ave 21

The Ash Slough @ Ave 21 site subwatershed contains vineyards, field crops, pasture, and deciduous nuts. The site subwatershed consists of 10,730 irrigated acres with direct drainage (members and non-members); targeted growers farm a total of 5,915 irrigated acres (Table 49). The Coalition completed the initial contacts with 17 targeted growers within the site subwatershed (Table 56). Management practices were documented for 55% of the acreage identified as direct drainage (Figure 22). The Coalition representative discussed with growers local water quality concerns and the importance of preventing the offsite movement of all agricultural constituents. Four growers were recommended to implement new management practices.

10.a.i. Summary of Current Management Practices (2014)

The 17 parcels surveyed in the site subwatershed are vineyards and orchards. Sixteen growers reported no irrigation runoff and one grower, farming 52 acres, reported irrigation runoff (Figure 23). Table 57 lists all the management practices recorded as currently implemented in the Ash Slough @ Ave 21 site subwatershed.

Irrigation Water Management

Growers in the site subwatershed employ a mixture of irrigation systems; six growers use microirrigation on 3,655 acres, nine growers specified using drip irrigation on 3,134 acres, and two growers reported using surface irrigation on 293 acres. Twelve growers reported they implement irrigation management practices to manage any irrigation runoff: eleven (65%) have laser leveled their property, five (29%) have a drainage basin (sediment pond) to capture and retain runoff, and six (35%) indicated they utilize recirculation/ tailwater return systems.

Storm Drainage

Fourteen growers (82%) indicated no stormwater runoff. Five growers (29%) have a settling pond that captures stormwater. Six growers (35%) utilize recirculation/ tailwater return systems to manage stormwater runoff and four growers (24%) implemented berms between the field and waterway.

Erosion & Sediment Management

One grower with 52 acres indicated that they do not apply herbicides during winter months. The remaining growers apply glyphosate to 5,828 acres, Goal (oxyflurofen) to 5,412 acres, paraquat to 241 acres, and Surflan (oryzalin) to 35 acres during the winter to control weeds. To prevent erosion and sediment movement into the waterway, growers constructed wetlands (6%), implemented grass row centers in the orchards and vineyards (94%), planted vegetation along ditches (82%), and maintained vegetated filter strips around field perimeters (71%).

Pest Management

All 17 growers implement several spray management practices to prevent spray drift, including calibrating spray equipment regularly, adjusting spray nozzles to match crop canopy profiles, shutting off outside nozzles when spraying outer rows next to sensitive sites, using air blast applications when wind is between 3-10 mph and upwind of a sensitive site, and using nozzles that provide the largest effective droplet size to minimize drift. In addition, 14 growers have also considered alternative strategies to using diazinon or chlorpyrifos and ten growers indicated on their surveys that they no longer apply Lorsban (chlorpyrifos).

Dormant Spray Management

Six growers farming 2,593 acres, implement several management practices during dormant sprays including checking weather conditions and maintaining setback zones. Four out of the six growers reported using copper, oil, and esfenvalerate only during dormant sprays and five growers do not apply when soil moisture is at field capacity.

Figure 22. Ash Slough @ Ave 21 member parcels with direct drainage potential.

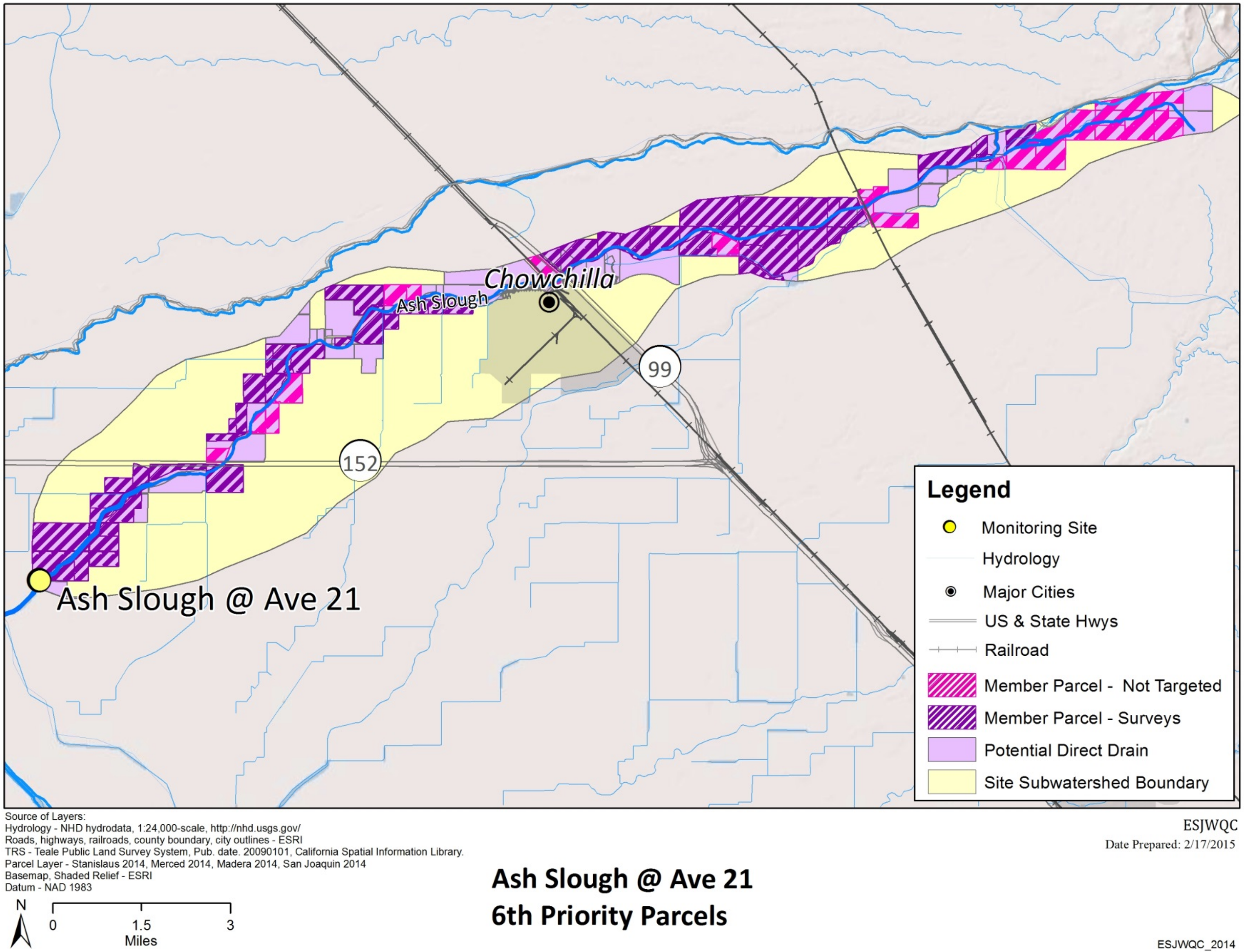
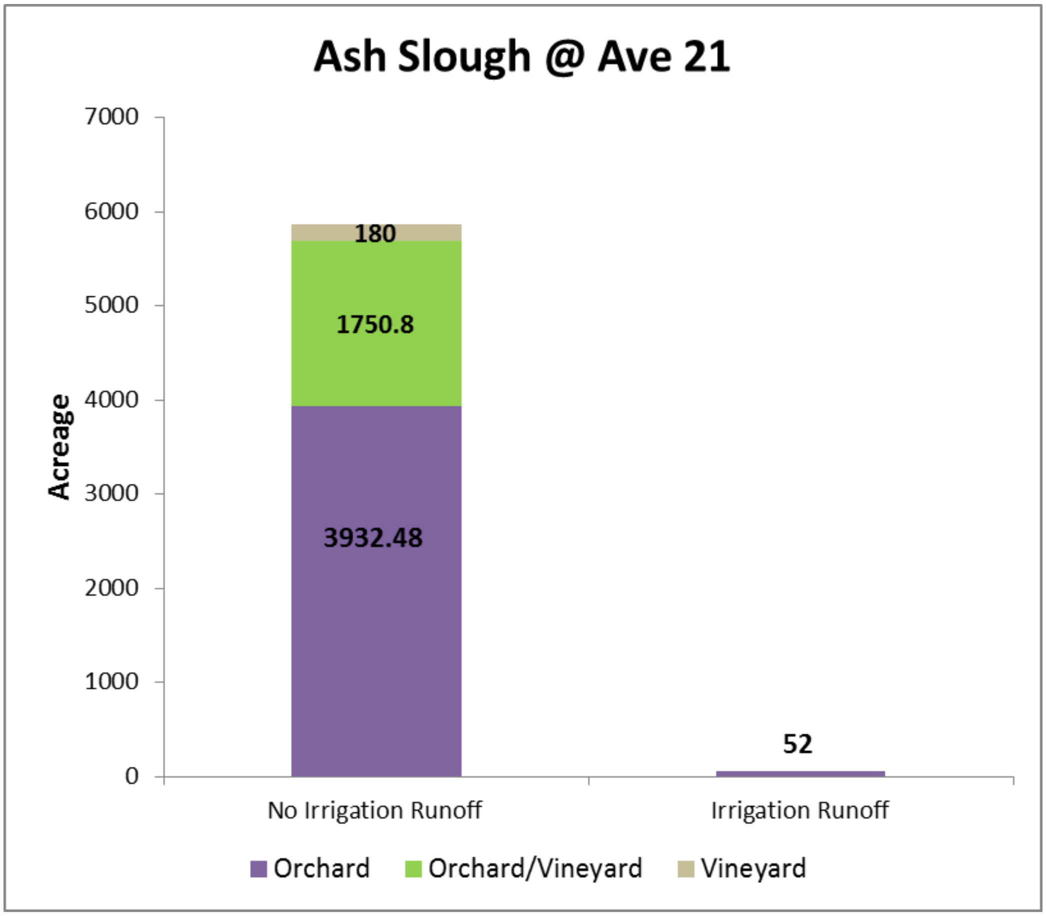


Table 57. Ash Slough @ Ave 21 site subwatershed current management practices (2014).

Checklist	Question	Answer	Count of Answers	Pct of Respondents	Sum of Associated Acreage
Section 1: Irrigation Water Management	Irrigation System	Drip	9	53%	3,134
		Microirrigation	6	35%	3,655
		Surface	2	12%	293
	Irrigation management practices:	Laser leveled fields	11	65%	3,236
		Recirculation - Tailwater return system	6	35%	2,539
		Use drainage basins (sediment ponds) to capture and retain runoff	5	29%	2,193
	Which do you base your irrigation schedule on:	Actual Moisture Levels in soil/crop needs	17	100%	5,915
Section 2: Storm Drainage	When do you have stormwater draining from your field?	No Storm Drainage	14	82%	5,563
		Only in heavy (100 year) storms	1	6%	35
		After soil is saturated-late winter	1	6%	315
	How are you able to manage storm drainage?	Berms Between Field & Waterway (Install and/or Improve)	4	24%	1,777
		Recirculation - Tailwater return system	6	35%	2,539
		Settling Pond	5	29%	3,530
Section 3: Erosion & Sediment Management	Do you apply herbicides during winter months?	Does Not Apply	1	29%	3,530
		Glyphosate (Round-Up)	15	6%	52
		Goal	13	88%	5,828
		Other: Surflan	1	76%	5,412
		Paraquat (Gramaxone)	1	6%	35
	Sediment management practices:	Constructed wetlands	1	6%	276
		Grass Row Centers (Orchards, Vineyards)	16	94%	5,735
		Maintain vegetated filter strips around field perimeter at least 10' wide	12	71%	5,251
		Vegetation is planted along or allowed to grow along ditches	14	82%	5,587
Section 4: Pest Management	Have you considered alternative strategies to using diazinon or chlorpyrifos either during the dormant or growing season?	Yes	14	82%	5,656
		N/A	3	18%	259

Checklist	Question	Answer	Count of Answers	Pct of Respondents	Sum of Associated Acreage
	How often is spray equipment calibrated?	Prior to each application	14	82%	1,168
		Once per year	2	12%	1,794
		Once per month	1	6%	172
	Spray management practices:	Adjust spray nozzles to match crop canopy profile	17	100%	5,915
		Outside nozzles shut off when spraying outer rows next to sensitive sites	17	100%	5,915
		Spray areas close to waterbodies when the wind is blowing away from them	11	65%	3,597
		Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site	3	18%	262
		Uses of nozzles that provide largest effective droplet size to minimize drift	17	100%	5,915
Section 5: Dormant Spray Management	Dormant spray management practices:	No Dormant Sprays	10	59%	1,813
		Check weather conditions prior to spraying (i.e. storm status)	6	35%	2,592
		Maintain setback zones	6	35%	2,592
Section 6: Irrigated Pasture	If waterway crosses or borders pasture, how is livestock managed?	N/A - Not Pasture	11	100%	5,915

Figure 23. Ash Slough @ Ave 21 crop acreage information from member surveys (2014).



10.b. Mustang Creek @ East Ave

The Mustang Creek @ East Ave site subwatershed contains citrus and deciduous nut crops, with smaller amounts of field crops and vineyards as the main agriculture. The site subwatershed consists of 4,218 irrigated acres with direct drainage (members and non-members; Table 49). The Coalition completed initial contacts with six targeted growers farming 3,472 acres within the Mustang Creek @ East Ave site subwatershed (Table 56). Management practices were documented for 82% of the acreage identified as direct drainage (Figure 24). Coalition representatives discussed local water quality concerns, the importance of preventing the offsite movement of all agricultural constituents, and recommended additional management practices be implemented to one grower.

10.b.i. Summary of Current Management Practices (2014)

All six parcels surveyed in the site subwatershed are orchards and vineyards (Figure 25); 100% of the parcels reported no irrigation runoff. Table 58 lists all the management practices recorded as currently implemented in the Mustang Creek @ East Ave site subwatershed.

Irrigation Water Management

Growers in the site subwatershed employ a mixture of irrigation systems; four growers use microirrigation on 2,262 acres, one grower specified using drip irrigation on 403 acres, and one grower reported using surface irrigation on 806 acres. Five growers reported they implement irrigation management practices to manage any irrigation runoff: two growers installed a drainage basin (sediment pond) to capture and retain runoff, two growers indicated they utilize recirculation/ tailwater return systems to prevent irrigation runoff, and one grower indicated they laser leveled their fields. In addition, five growers reported they base their irrigation schedule on actual moisture levels in the soil/crop needs.

Storm Drainage

Four growers (67%) indicated no stormwater runoff. All six growers implement management practices to prevent stormwater runoff. One grower utilizes recirculation/ tailwater return systems, three growers (50%) have a settling pond that captures stormwater, and four growers implemented or improved berms between the field and waterway.

Erosion & Sediment Management

All six growers apply glyphosate, Goal (oxyflurofen), and/or other herbicides during the winter to control weeds. However, to prevent erosion and sediment movement into the waterway, 17% of growers constructed wetlands, 83% implemented grass row centers in the orchards and vineyards, and 100% planted vegetation along ditches and maintained vegetated filter strips around field perimeters.

Pest Management

All six growers reported that they implement several spray management practices including: calibrating spray equipment prior to each use, adjusting spray nozzles to match crop canopy profiles, shutting off outside nozzles when spraying outer rows next to sensitive sites, spraying areas close to waterbodies when the wind is blowing away from the waterbody, using air blast applications when the wind is between 3-10 mph and spraying takes place upwind of sensitive sites, and using nozzles that provide the largest effective droplet size to minimize drift. In addition, five growers have considered alternative strategies to using diazinon or chlorpyrifos; two indicated they no longer use Lorsban (chlorpyrifos) and one indicated they use Movento-Myer instead of chlorpyrifos. The Coalition recommended to one grower they spray areas close to waterbodies when the wind is blowing away from them.

Dormant Spray Management

Out of the six targeted growers, three reported applying dormant spray pesticides to 2,815 acres of orchards. Two growers check weather conditions prior to spraying and maintain setback zones. Additionally, three out of the six fields have vegetative cover/vegetative cover with sprayed berms or some vegetation prior to applications.

Figure 24. Mustang Creek @ East Ave member parcels with direct drainage potential.

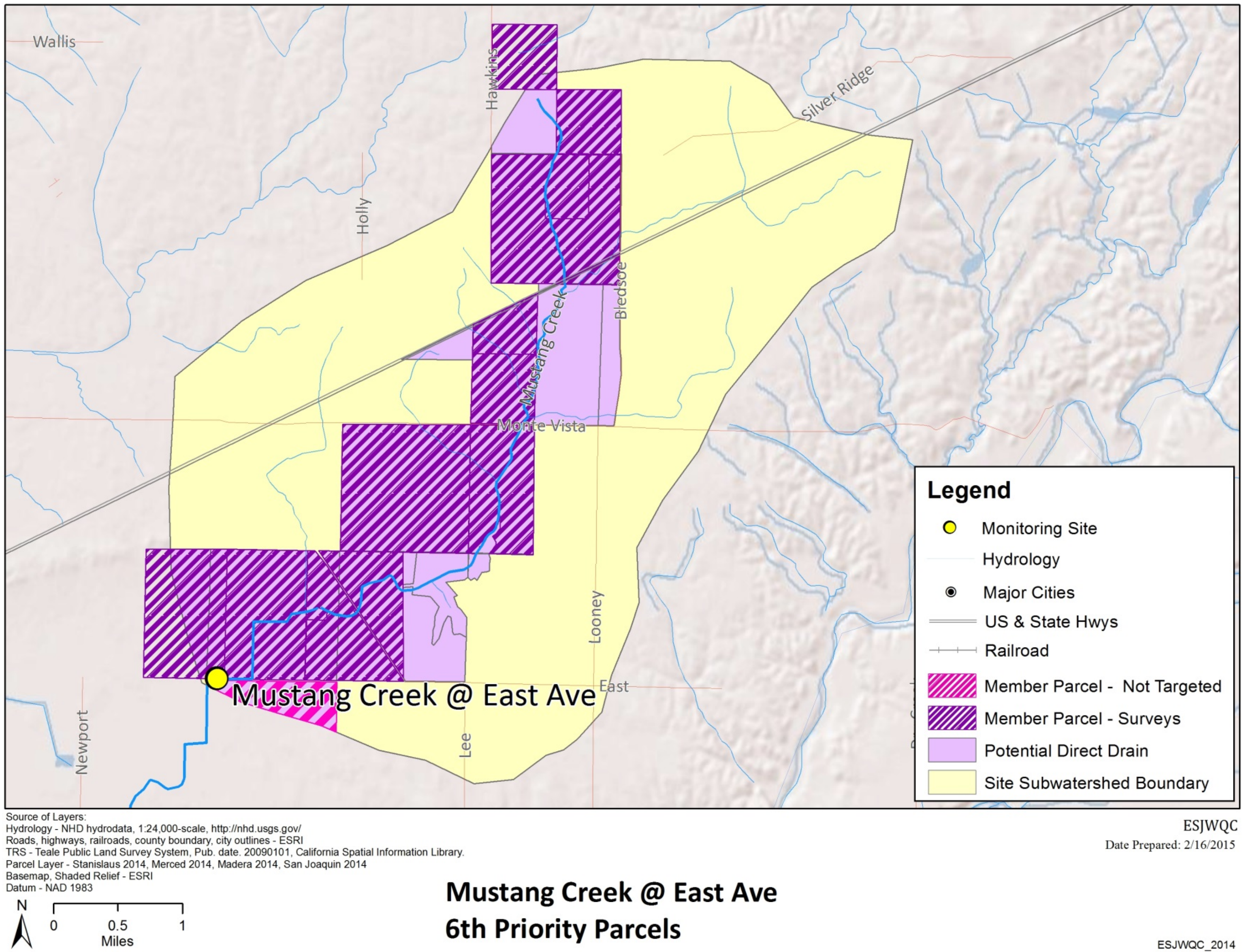
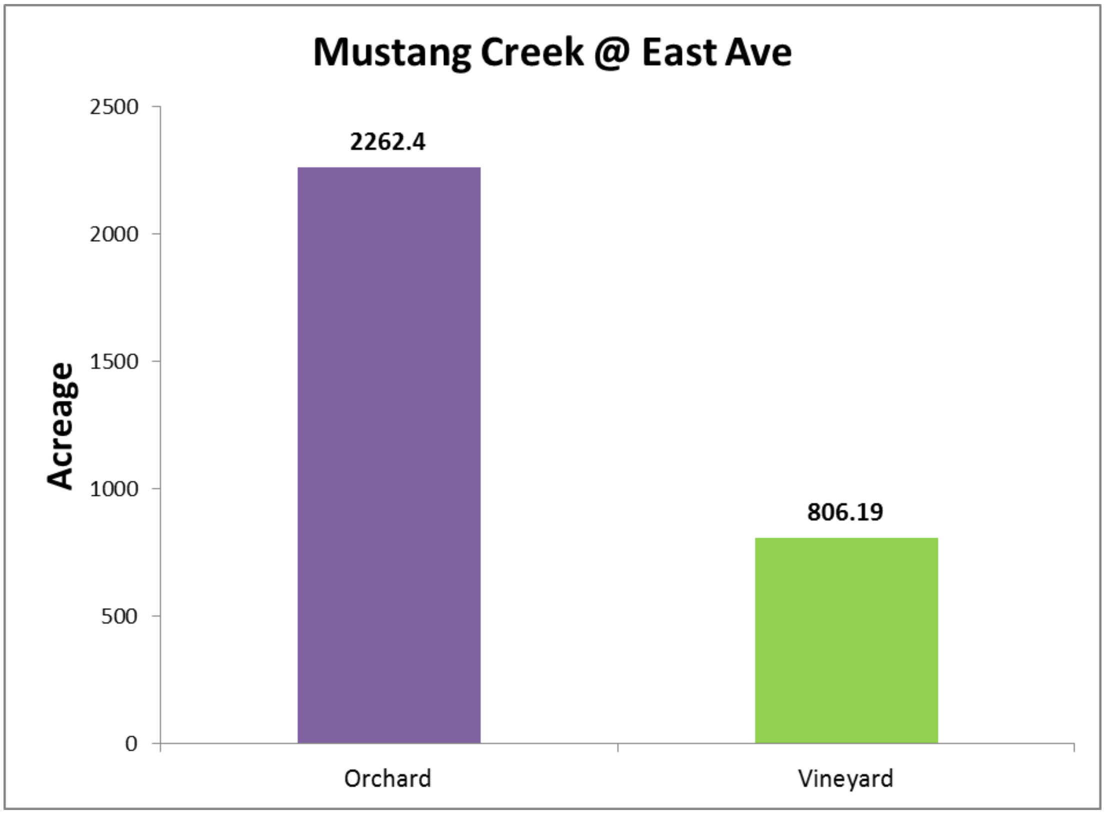


Table 58. Mustang Creek @ East Ave site subwatershed current management practices (2014).

Checklist	Question	Answer	Count of Answers	Pct of Respondents	Sum of Associated Acreage
Section 1: Irrigation Water Management	Irrigation System	Microirrigation	4	67%	2,262
		Surface	1	17%	806
		Other: Drip	1	17%	403
	Which do you base your irrigation schedule on:	Actual Moisture Levels in soil/crop needs	5	83%	3,188
		Not Recorded	1	17%	284
	Irrigation management practices:	Laser leveled fields	1	17%	403
		Recirculation - Tailwater return system	2	33%	687
		Use drainage basins (sediment ponds) to capture and retain runoff	2	33%	564
Section 2: Storm Drainage	When do you have stormwater draining from your field?	On most rain events	1	17%	1,611
		Only in heavy (100 year) storms	2	33%	490
		After soil is saturated-late winter	2	33%	564
	How are you able to manage storm drainage?	Berms Between Field & Waterway (Install and/or Improve)	4	67%	2,504
		No Storm Drainage	4	67%	3,026
		Recirculation - Tailwater return system	1	17%	403
		Settling Pond	3	50%	770
Section 3: Erosion & Sediment Management	Do you apply herbicides during winter months?	Glyphosate (Round-Up)	5	83%	2,665
		Goal	4	67%	2,262
		Other	1	17%	806
	Sediment management practices:	Constructed wetlands	1	17%	806
		Grass Row Centers (Orchards, Vineyards)	5	83%	3,069
		Maintain vegetated filter strips around field perimeter at least 10' wide	6	100%	1,861
		Vegetation is planted along or allowed to grow along ditches	6	100%	3,472
Section 4: Pest Management	Have you considered alternative strategies to using diazinon or chlorpyrifos either during the dormant or growing season?	Yes	5	83%	3,188
		NA	1	17%	284
	How often is spray equipment calibrated?	Prior to each application	6	100%	3,472

Checklist	Question	Answer	Count of Answers	Pct of Respondents	Sum of Associated Acreage
	Spray management practices:	Adjust spray nozzles to match crop canopy profile	6	100%	3,472
		Outside nozzles shut off when spraying outer rows next to sensitive sites	6	100%	3,472
		Spray areas close to waterbodies when the wind is blowing away from them	5	83%	1,861
		Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site	2	33%	1,012
		Use electronic controlled sprayer nozzles	2	33%	445
		Uses of nozzles that provide largest effective droplet size to minimize drift	6	100%	3,472
Section 5: Dormant Spray Management	How many acres are sprayed with dormant pesticides?	No Dormant Sprays	3	50%	1,415
		1,620 Acres	1	17%	1,611
		911 Acres	1	17%	161
		284 Acres	1	17%	284
	Dormant spray management practices:	Check weather conditions prior to spraying (i.e. storm status)	2	33%	445
		Maintain setback zones	2	33%	445
		Vegetated Cover or Vegetated Cover w/Sprayed Berms	3	50%	2,056
Section 6: Irrigated Pasture	If waterway crosses or borders pasture, how is livestock managed?	N/A - Not Pasture	4	67%	2,785

Figure 25. Mustang Creek @ East Ave crop acreage information from member surveys (2014).



10.c. Westport Drain @ Vivian Rd

The Westport Drain @ Vivian Rd site subwatershed is a small subwatershed with vineyards and orchards, with smaller amounts of field crops as the main agriculture. The site subwatershed consists of 1,360 irrigated acres with direct drainage (members and non-members; Table 49). The Coalition completed initial contacts with three targeted growers farming 451 acres within the Westport Drain @ Vivian Rd site subwatershed (Table 56). Management practices were documented for 33% of the acreage identified as direct drainage (Figure 26). Coalition representatives discussed local water quality concerns, the importance of preventing the offsite movement of all agricultural constituents, and recommended additional management practices be implemented to one grower.

10.c.i. Summary of Current Management Practices (2014)

The majority of the targeted acreage in the site subwatershed contains vineyards and orchards (Figure 27); 100% of the parcels reported no irrigation runoff. Table 59 lists all the management practices recorded as currently implemented in the site subwatershed.

Irrigation Water Management

The three growers in the site subwatershed employ either sprinkler, surface, or flood irrigation. All three growers have laser leveled fields and one grower utilizes recirculation/ tailwater return systems to prevent irrigation runoff.

Storm Drainage and Erosion & Sediment Management

Two growers indicated no stormwater runoff and one grower indicated stormwater runoff occurs only in heavy storms. One grower with 368 acres implements berms between the field and waterway, and one grower with 70 acres implements a recirculation/ tailwater return system to manage any stormwater runoff.

One grower with 13 acres indicated that they do not apply herbicides during winter months. The remaining growers apply glyphosate, Goal (oxyflurofen), and Buctril (bromoxynil) during the winter to control weeds. However, to prevent erosion and sediment movement into the waterway, growers implemented grass row centers in the orchards and vineyards.

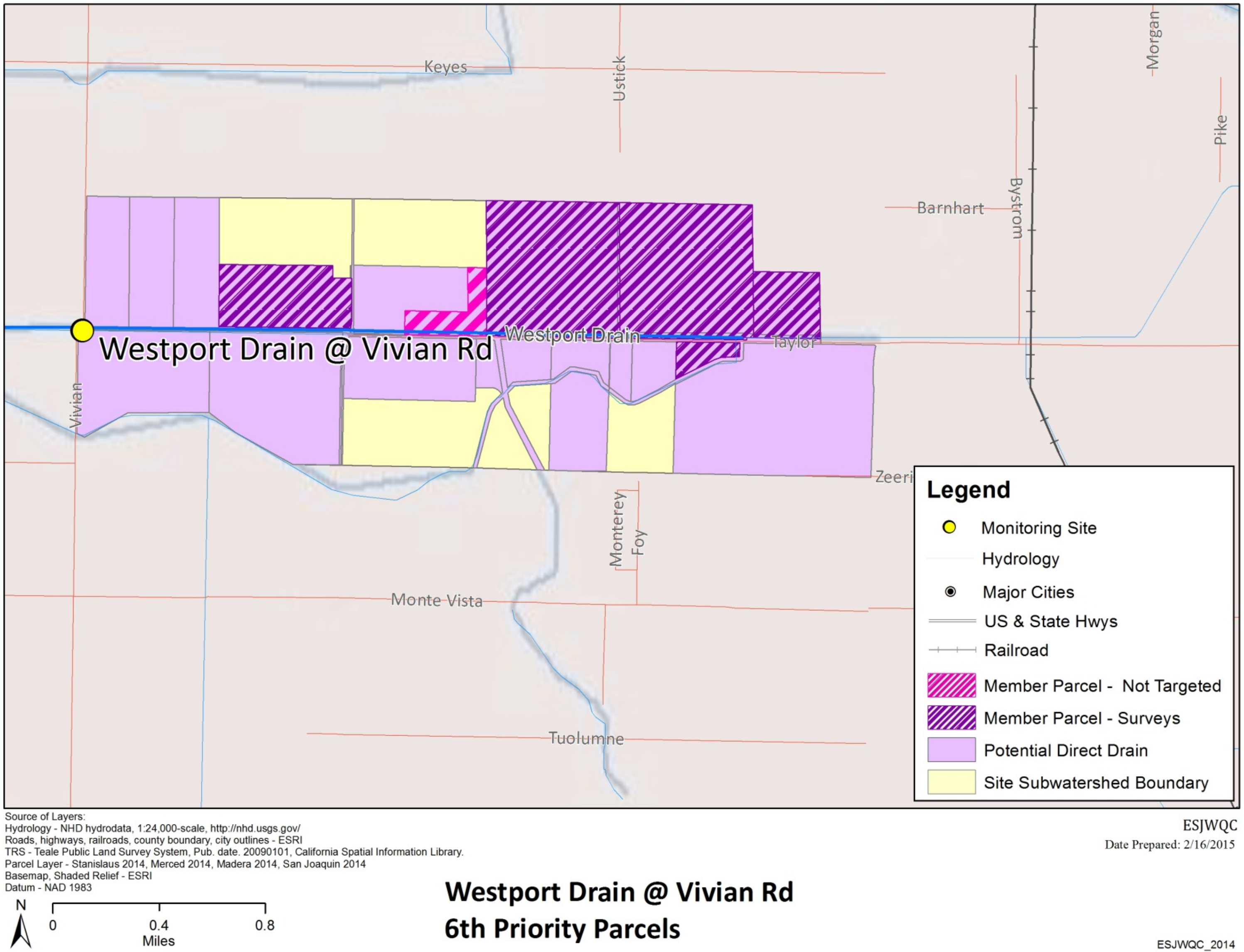
Pest Management

Targeted growers implement several spray management practices including: calibrating spray equipment prior to each application, adjusting spray nozzles to match the canopy profile, shutting off outside nozzles when spraying outer rows next to sensitive sites, using nozzles that provide the largest effective droplet size to minimize drift, using air blast applications when wind is between 3-10 mph and upwind of a sensitive site, and spraying areas close to waterbodies when the wind is blowing away from them. Two growers have considered alternative strategies to applying chlorpyrifos and diazinon. The Coalition recommended for one grower to spray areas close to waterbodies when the wind is blowing away from them.

Dormant Spray Management

All three targeted growers do not apply pesticides to dormant orchards.

Figure 26. Westport Drain @ Vivian Rd member parcels with direct drainage potential.



Source of Layers:
Hydrology - NHD hydrodata, 1:24,000-scale, http://nhd.usgs.gov/
Roads, highways, railroads, county boundary, city outlines - ESRI
TRS - Teale Public Land Survey System, Pub. date. 20090101, California Spatial Information Library.
Parcel Layer - Stanislaus 2014, Merced 2014, Madera 2014, San Joaquin 2014
Basemap, Shaded Relief - ESRI
Datum - NAD 1983

ESJWQC
Date Prepared: 2/16/2015

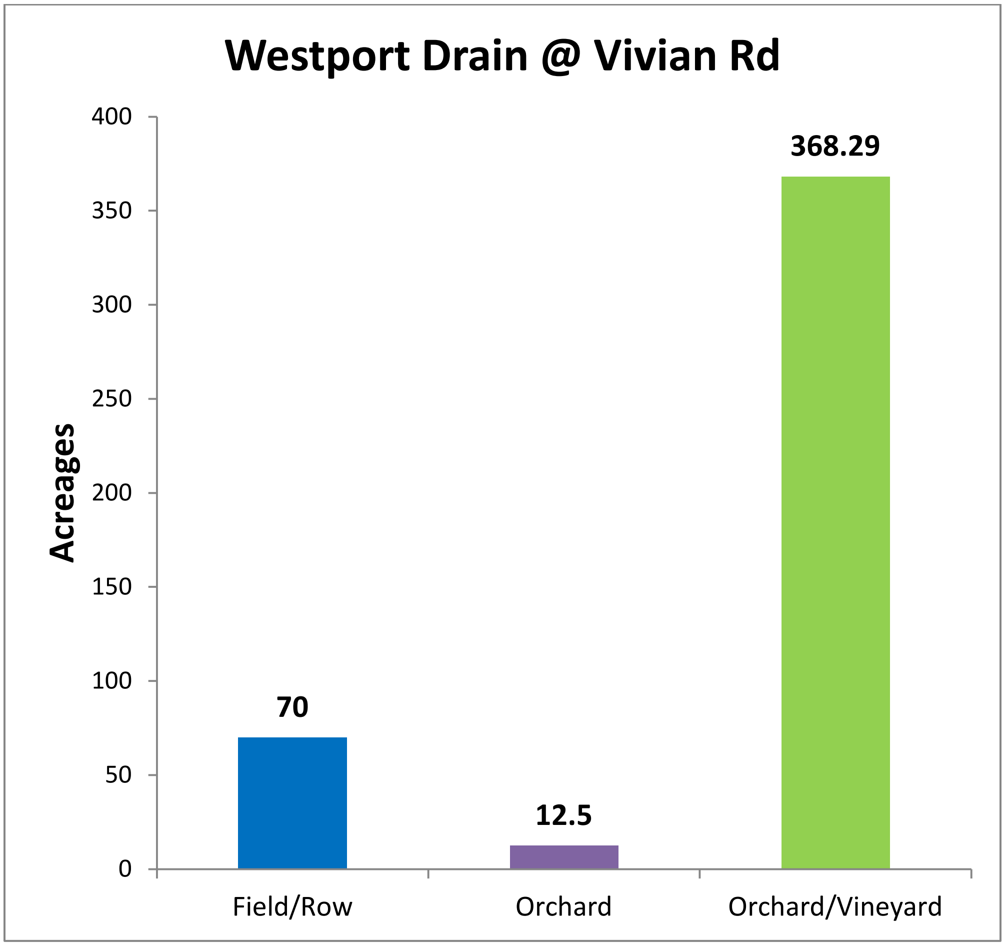
Westport Drain @ Vivian Rd
6th Priority Parcels

ESJWQC_2014

Table 59. Westport Drain @ Vivian Rd site subwatershed current management practices (2014).

Checklist	Question	Answer	Count of Answers	Pct of Respondents	Sum of Associated Acreage
Section 1: Irrigation Water Management	Irrigation System	Sprinkler	1	33%	13
		Surface	2	67%	438
		Other: Sprinkler & Flood	1	33%	13
	Irrigation management practices:	Laser leveled fields	3	100%	451
		Recirculation - Tailwater return system	1	33%	70
	Which do you base your irrigation schedule on:	Actual Moisture Levels in soil/crop needs	3	100%	451
Section 2: Storm Drainage	When do you have stormwater draining from your field?	No Storm Drainage	2	67%	83
		Only in heavy (100 year) storms	1	33%	368
	How are you able to manage storm drainage?	Berms Between Field & Waterway (Install and/or Improve)	1	33%	368
		Recirculation - Tailwater return system	1	33%	70
Section 3: Erosion & Sediment Management	Do you apply herbicides during winter months?	Do not apply	1	33%	13
		Glyphosate (Round-Up)	1	33%	368
		Goal	1	33%	368
		Other: Buctril	1	33%	70
	Sediment management practices:	Grass Row Centers (Orchards, Vineyards)	2	67%	381
Section 4: Pest Management	Have you considered alternative strategies to using diazinon or chlorpyrifos either during the dormant or growing season?	No	1	33%	368
		Yes	2	67%	83
	How often is spray equipment calibrated?	Prior to each application	3	100%	451
	Spray management practices:	Adjust spray nozzles to match crop canopy profile	3	100%	451
		Outside nozzles shut off when spraying outer rows next to sensitive sites	3	100%	451
		Spray areas close to waterbodies when the wind is blowing away from them	2	67%	381
		Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site	1	33%	368
		Uses of nozzles that provide largest effective droplet size to minimize drift	3	100%	451
		Have you considered alternative strategies to using diazinon or chlorpyrifos either during the dormant or growing season?	2	67%	83
Section 5: Dormant Spray Management	How many acres are sprayed with dormant pesticides?	No Dormant Sprays	3	100%	451
Section 6: Irrigated Pasture	If waterway crosses or borders pasture, how is livestock managed?	N/A - Not Pasture	3	100%	451

Figure 27. Westport Drain @ Vivian Rd crop acreage information from member surveys (2014).



10.E. SEVENTH PRIORITY SUBWATERSHEDS SUMMARY OF MANAGEMENT PRACTICES (2015-2017)

The Coalition began focused outreach for the seventh priority site subwatersheds in November and December of 2014. The Coalition compiled a list of targeted growers, based on the revised Performance Goals and Measures (Pages 139-146) in the Howard Lateral @ Hwy 140 (13), 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 grower contact the Coalition to schedule a required meeting with a Coalition representative. The Coalition began contacting individual grower in 2015 and will report the results and document currently implemented management practices in the 2016 Annual Report. Follow-up contacts will occur in 2016.

11. STATUS OF SPECIAL PROJECTS

Special projects in the ESJWQC region include MPM and TMDL compliance monitoring. During the 2014 WY, monitoring occurred in accordance with the ESJWQC Monitoring Plan Update (MPU; approved on December 10, 2013). The MPU includes a monitoring schedule based on TMDL monitoring requirements for chlorpyrifos and diazinon, requirements outlined in the WDR, and the ESJWQC Management Plan strategy.

The Basin Plan includes TMDL monitoring and reporting requirements, and states that dischargers must comply with the monitoring and management criteria specified for each TMDL. If a single exceedance of the WQTL for a constituent under an EPA approved TMDL occurs (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.

11.A. MANAGEMENT PLAN STATUS

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, and 5) encouraging and evaluating implementation of management practices. A narrative concerning each monitoring constituent was provided in the Coalition's Management Plan approved on November 25, 2008 (Pages 24-37) as well as an explanation of how the Coalition prioritizes exceedances to meet the TMDL requirements (Pages 39-44).

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 to remove the constituent from the site's management plan and consider the management plan "complete". Three years of monitoring with no exceedances indicates improved water quality due to grower reduction/elimination of the offsite movement of agricultural constituents and/or newly implemented management practices.

Table 60 includes the number of management plans petitioned for removal/approved for completion as well as petition and approval dates. The Coalition received approval to remove specific site/constituent pairs from active management plans on May 30, 2012 and October 15, 2013 (Table 60). Table 61 lists all of the management plans per site as well as the specific site/constituent pairs approved for management plan completion.

Table 60. 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 61.

Petition Date	Number Management Plans Petitioned for Completion	Number 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	NA	Approval Pending

Table 61. 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 (DO)*	pH*	Specific Conductance (SC)*	Total Dissolved Solids (TDS)	Ammonia	Nitrate/Nitrite	*E. coli*	Arsenic	Copper (Total & Dissolved)	Lead (Total & Dissolved)	Molybdenum	Chlorpyrifos	DDE	Diazinon	Dimethoate	Diuron	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			X		X						X				0
Cottonwood Creek @ Rd 20	2014	X						X		X	X												3
Deadman Creek @ Gurr Rd	2010	X	X	X	X	X		X	X				X						X	X	X		1
Deadman Creek @ Hwy 59	2012	X						X	X				X										1
Dry Creek @ Rd 18	2013	X	X					X		X	X		X				X				X	X	1
Dry Creek @ Wellsford Rd	2014	X	X		X			X					X						X			X	4
Duck Slough @ Gurr Rd**	2014	X	X	X				X		X	X		X						X	X		X	2
Hatch Drain @ Tuolumne Rd	2008†	X		X	X		X	X	X												X	X	0
Highline Canal @ Hwy 99	2014	X	X					X		X	X								X		X	X	5
Highline Canal @ Lombardy Rd	2011		X					X		X	X										X	X	3
Hilmar Drain @ Central Ave	2008†	X	X	X	X	X	X	X		X							X				X	X	1
Howard Lateral @ Hwy 140	2010		X	X	X			X		X			X										0
Lateral 2 ½ near Keyes Rd	2010		X	X									X										1
Lateral 5 ½ @ South Blaker Rd	NA		X	X																	X		0
Lateral 6 and 7 @ Central Ave	NA	X		X																			0
Levee Drain @ Carpenter Rd	2013	X		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		0
McCoy Lateral @ Hwy 140	2012		X							X													0
Merced River @ Santa Fe	2014	X						X			X		X						X				0
Miles Creek @ Reilly Rd	2013	X	X					X		X	X		X		X				X		X	X	0
Mootz Drain downstream of Langworth Pond	2013	X				X		X					X				X						0
Mustang Creek @ East Ave	2013	X		X	X		X	X		X				X									2
Prairie Flower Drain @ Crows Landing Rd	2014	X	X	X	X	X	X	X				X				X			X	X	X	X	1
Rodden Creek @ Rodden Rd	2012							X															0
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								X		0
Total Approved Management Plan Completion (Grey Cells)		**1**	**0**	**3**	**2**	**1**	**0**	**2**	**0**	**3**	**2**	**0**	**8**	**0**	**2**	**0**	**3**	**1**	**2**	**0**	**4**	**0**	**34**
Total Reinstated Management Plans (Light Grey Cells)		**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
Total Management Plan Constituents Remaining (X)		**21**	**18**	**15**	**9**	**5**	**6**	**24**	**3**	**13**	**8**	**1**	**14**	**1**	**1**	**1**	**3**	**0**	**9**	**3**	**13**	**10**	**178**

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

**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. Management plans approved for removal from Duck Slough @ Hwy 99 are not reflected in counts in table above but are included in counts in Table 60.

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

NA-Represented site, monitoring for full suite of constituents not scheduled.

Based on the prioritization of constituents with exceedances of WQTLs, MPM was conducted for copper, lead, molybdenum, chlorpyrifos, diazinon, dimethoate, diuron, water column toxicity (*Ceriodaphnia dubia, Pimephales promelas,* and *Selenastrum capricornutum*), and sediment toxicity (*Hyalella azteca*), as outlined in the 2013 MPU. Tables 5 and 6 list the sampling locations and type of monitoring conducted during the 2014 WY.

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

11.a. Management Plans Implemented Since 2004

Based on water quality improvements, the Coalition has received approval to remove 38 constituents from 16 site subwatershed management plans (approvals May 30, 2012 and October 15, 2013; Tables 61-62). Of those 38 constituents approved for management plan completion, three management plans have been reinstated due to exceedances of WQTLs during recent monitoring (Table 62).

A reevaluation of the WQTL for DO was submitted in the Coalition's May 1, 2014 Revised SQMP (approval pending) based on criteria outlined in the Fourth Edition of the Basin Plan for the Sacramento River and San Joaquin River Basins (Page III-5). The Basin Plan indicates the lower DO trigger limit of 5 mg/L should be utilized for waterways that are 'warm' and/or not considered a resource for fisheries. Information on the past reported exceedances and justification for reevaluation based on the Basin Plan criteria can be referenced in the May 1, 2014 Revised SQMP (Pages 10-14). Since the Revised SQMP has not been approved yet, the ESJWQC continues to use the DO trigger limit of 7 mg/L to determine if a management plan is required.

Monitoring for TDS is no longer required under the WDR. Sites within the Coalition region have management plans for both TDS and SC although 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 Revised 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 (approval pending).

Table 62 is a tally of exceedances of WQTLs for 2004 through the 2014 WY. Sites removed from the ESJWQC MRPP (approved June 3, 2010) and sites monitored for upstream MPM in 2008 are not included in Table 62. These upstream sites and associated exceedances were included in the MPUR submitted on April 1, 2009 and are referenced in Appendix I. Table 63 is a tally of exceedances that occurred during the 2014 WY. In both Tables 62 and 63, cells with blue highlights indicate constituents that are currently in management plans. In Table 62, dark grey cells indicate sites/constituents that have been removed from active management plans and light grey cells indicate sites/ constituents previously removed from management plans but were reinstated due to recent exceedances. In Table 63, green highlights indicate new sites/constituents that have been added to a management plans and light green highlights indicate sites/constituents previously removed from management plans but were reinstated due to exceedances in the 2014 WY.

Table 62. ESJWQC exceedance tally based on results from 2014 WY.

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

	F		I						B	M						P																			T			
Site Name	Oxygen, Dissolved	pH	Specific Conductivity	Dissolved Solids	Ammonia	Nitrate as N	Nitrite as N	Nitrate + Nitrite as N	*E. coli*	Arsenic	Copper Dissolved†	Copper Total†	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	Methyl Parathion	Thiobencarb	Simazine	*C. dubia*	*P. promelas*	*S. capricornutum*	*H. azteca*
Ash Slough @ Ave 21	1								3		2	5	2						4																		1	
Bear Creek @ Kibby Rd	2	5							7	1		4							2				1												3		2	2
Berenda Slough along Ave 18 ½	12	1							7		13								4								1								1		3	
Black Rascal Creek @ Yosemite Rd	23	3							11			1	2						4																5		1	1
Canal Creek @ West Bellevue Rd	1																																					
Cottonwood Creek @ Rd 20	21	1							22		10	12	3						3	1				1			2							1		1	2	1
Deadman Creek @ Gurr Rd	36	7	9	6	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	1
Dry Creek @ Rd 18	6	9							6		13	21	5		1				3					2			3								1		5	3
Dry Creek @ Wellsford Rd	53	7	1	1					53			3	1						10								2	1					1		2		4[1]	3
Duck Slough @ Gurr Rd	10	13	5	3	1			1	28	1	1	8	4					1	2										1				2		5	2	2	8
Duck Slough @ Hwy 99	2	3							12			11	11						4																1		3	2*
Hatch Drain @ Tuolumne Rd	39		38	12	1	13	1		12	12													1			1					1						11	10
Highline Canal @ Hwy 99	3	22	1	2	2				14		4	7	7						5				1				2								4		7	6
Highline Canal @ Lombardy Rd	2*	11	1		1				6		6	5	8		1				6								1		1			1		1	6	2*	6	7
Hilmar Drain @ Central Ave	10	3	52	26	2	12			20			2							1		1	1					3								1		6	4
Howard Lateral @ Hwy 140	1	6	1	1				1	3		5								1																		1	
Lateral 2 ½ near Keyes Rd		9	1		1			1	2										4									1									1	1
Lateral 5 ½ @ South Blaker Rd		2	10																																		4	
Lateral 6 and 7 @ Central Ave	3	1	10																																		1	1
Levee Drain @ Carpenter Rd	15	1	26	21	4			18	13																										2	1	3	2
Livingston Drain @ Robin Ave	1	18				1			2		3	9	2						4																		4	
Lower Stevinson @ Faith Home Rd	1	4	7																																		3	
McCoy Lateral @ Hwy 140		7							1		7																											
Merced River @ Santa Fe	8	1		1					6			1	2						3				1					1							5		1	
Miles Creek @ Reilly Rd	14	2		1					12			7	5			1			4					1					1	1					3		4	3
Mootz Drain downstream of Langworth Pond	17	1			1[2]				16																		1[2]											1
Mustang Creek @ East Ave	14		9	6	1			2	10		7								2			3												2	2*		1	1
Prairie Flower Drain @ Crows Landing Rd	27	8	112	80	15	18	1	53	60	1				13			1		4				1			3	1		1						4	3[3]	16	6
Rodden Creek @ Rodden Rd	1								6														1				1											
Unnamed Drain @ Hogin Rd	7		8																																			
Unnamed Drain @ Hwy 140	3	2	1						3		1																											
Westport Drain @ Vivian Rd	12		22	13		13			7										2																		4	1
Grand Total	375	154	314	173	35	57	2	76	4078	32	72	100	52	13	2	1	1	1	81	1	2	4	8	4	1	4	19	3	5	1	1	1	3	5	50	18	103	64

*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]The total toxic samples to *S. capricornutum* at Dry Creek @ Wellsford Rd was updated from 5 to 4, the previous total counted a sample that was not considered statistically different and therefore was not toxic from March 7, 2007.

[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, as approved on November 18, 2009).

[3]Two of the *P. promelas* toxic samples at Prairie Flower Drain @ Crows Landing Rd were from the same sampling event (sample and resample to test for persistence).

11.b. Management Plans Implemented in 2014 WY

New sites requiring a focused management plan approach are added to the priority list (Table 63). Source identification, outreach, and evaluation of management practices will be addressed at all new site subwatersheds that have been added to the focused management plan list during their years of high priority status as specified in Table 63.

As a result of monitoring during the 2014 WY, several new site/constituent specific management plans are required or have been reinstated (see dark and light green highlights in Table 63). Below is a list of sites/constituents with exceedances of WQTLs that triggered a new management plan or required previously removed management plans to be reinstated.

- DO
  - Highline Canal @ Hwy 99
  - Lateral 6 and 7 @ Central Ave
  - Unnamed Drain @ Hogin Rd
- pH
  - Lateral 5 ½ @ South Blaker Rd
  - Lower Stevinson @ Faith Home Rd
  - Miles Creek @ Reilly Rd
  - Prairie Flower Drain @ Crows Landing Rd (reinstated)
- SC
  - Duck Sough @ Gurr Rd (reinstated)
  - Lateral 2 ½ near Keyes Rd
  - Lateral 5 ½ @ South Blaker Rd
  - Lateral 6 and 7 @ Central Ave
  - Lower Stevinson @ Faith Home Rd
  - Unnamed Drain @ Hogin Rd
  - Unnamed Drain @ Hwy 140
- Chlorpyrifos
  - Duck Slough @ Gurr Rd (reinstated)
- Water column toxicity to *P. promelas*
  - Duck Slough @ Gurr Rd
- Water column toxicity to *S. capricornutum*
  - Lateral 5 ½ @ South Blaker Rd
  - Levee Drain @ Carpenter Rd
  - Lower Stevinson @ Faith Home Rd
- Sediment toxicity to *H. azteca*
  - Levee Drain @ Carpenter Rd

Table 63. ESJWQC exceedance tally based on monitoring during the 2014 WY.

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

		F			I		B	M			P				T			
Zones	Site Name	Oxygen, Dissolved	pH	Specific Conductivity	Ammonia	Nitrate + Nitrite as N	*E. coli*	Arsenic, Total	Copper, Dissolved[1]	Molybdenum, Total	Chlorpyrifos	Diuron	HCH, gamma	Malathion	*C. dubia*	*P. promelas*	*S. capricornutum*	*H. azteca*
4	Black Rascal Creek @ Yosemite Rd	2																
2	Canal Creek @ West Bellevue Rd	1																
5	Deadman Creek @ Gurr Rd	8	2	3											1	2		
6	Dry Creek @ Rd 18	1	2						1									
1	Dry Creek @ Wellsford Rd	11					6				1		1					
5	Duck Slough @ Gurr Rd	3	5	1			1	1			1			1	1	1		
2	Hatch Drain @ Tuolumne Rd	9		9													1	2
3	Highline Canal @ Hwy 99	2	2				2		1								2	
3	Highline Canal @ Lombardy Rd	1	3						1									
2	Hilmar Drain @ Central Ave	4		8														
2	Lateral 2 ½ near Keyes Rd		2	1							1							
2	Lateral 5 ½ @ South Blaker Rd		2	10													4	
2	Lateral 6 and 7 @ Central Ave	3	1	10													1	1
2	Levee Drain @ Carpenter Rd	4	1	6													2	1
4	Livingston Drain @ Robin Ave		1															
2	Lower Stevinson @ Faith Home Rd	1	4	7													3	
4	Merced River @ Santa Fe						1											
5	Miles Creek @ Reilly Rd	3	1															
1	Mootz Drain downstream of Langworth Pond	2																1
3	Mustang Creek @ East Ave	2							2									
2	Prairie Flower Drain @ Crows Landing Rd	5	2	15	1	7	2			8		1					3	
2	Unnamed Drain @ Hogin Rd	7		8														
4	Unnamed Drain @ Hwy 140	1		1														
2	Westport Drain @ Vivian Rd	5		3														
	Grand Total	**75**	**28**	**82**	**1**	**7**	**12**	**1**	**5**	**8**	**3**	**1**	**1**	**1**	**2**	**3**	**16**	**5**

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

11.c. Evaluation of Management Practice Effectiveness

The Coalition implemented its management plan process in first through fifth priority site subwatersheds from 2009 through March 2015 (Table 64). Since focused outreach was initiated, there have been two or more years for growers to implement new or recommended management practices in these 19 site subwatersheds. In addition, water quality results have been collected for two or more years during MPM at each site. The Coalition uses the results of all monitoring to evaluate the effectiveness of current and newly implemented management practices. The following evaluation of management practice effectiveness includes these 19 site subwatersheds. An evaluation of management practice effectiveness for the sixth priority site subwatersheds will be included in the 2016 Annual Report.

Table 64. Years of MPM and current and newly implemented management practices in high priority site subwatersheds with two or more years of focused outreach.

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

[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.

11.c.i. Summary of Management Practices

During initial focused outreach meetings, the Coalition documented numerous management practices currently implemented by members. 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. The Coalition reports each currently implemented management practice within each site subwatershed in the Management Practice sections of 2011 through 2013 MPURs (first priority in the 2011 MPUR, Pages 50-80; second, third priority in 2012 MPUR, Pages 67-124; fourth priority in the 2014 Annual Report, Pages 160-170). The Coalition then summarizes currently implemented practices by category.

Figure 28 compares the acreage associated with currently implemented practices (before outreach) to newly implemented practices (after outreach) for the subwatersheds listed in Table 63. 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 before and after outreach (Figure 28).

As a result of focused outreach, 47% of targeted growers in 19 subwatersheds implemented new management practices. Seventy growers implemented 95 additional management practices from 2009 through March 2015 due to the Coalition's focused outreach (Table 65). The number and type of practices implemented by members varies among site subwatersheds because each is unique in both water quality impairments and causes of the impairments. Table 66 lists the number of acres associated with each newly implemented management practice. Figure 29 compares the percentage of acreages with newly implemented practices in each category. 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 the timing of spraying areas close to waterbodies (Table 66, Figure 29).

Figure 28. Targeted acreage of categories of current and newly implemented management practices in the first through fifth 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.

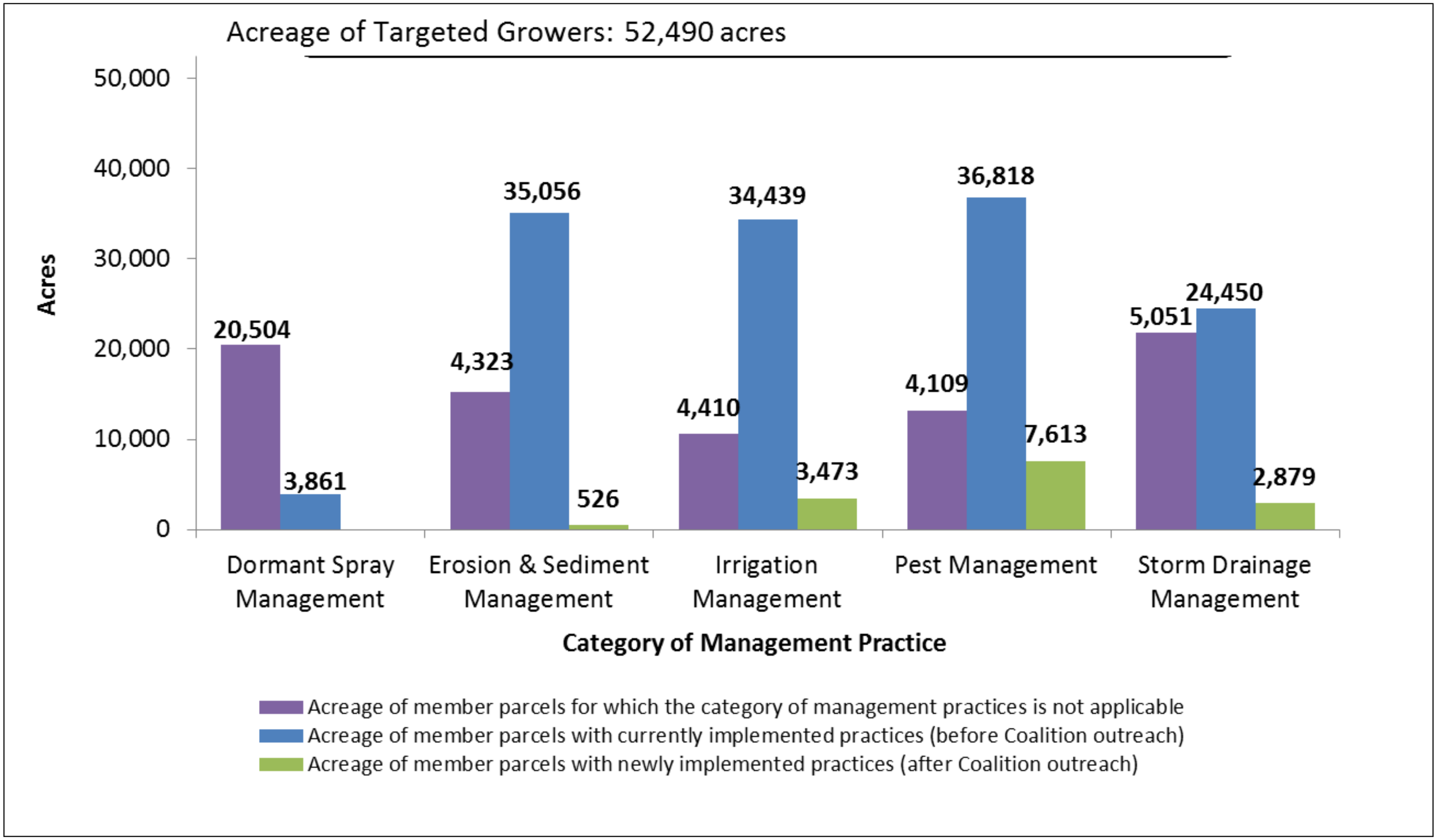


Table 65. Count of targeted growers implementing new management practices in first through fifth priority site subwatersheds.

Priority Group	Site Name	Number of Growers Implementing:			Number of Growers:		% Targeted Growers Implementing New MPs	Count of New MPs Implemented
		1 New MP	2 New MPs	3 New MPs	Implementing new MPs	Targeted (Follow-up)		
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
	4the 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
	5the Priority Total	**19**	**2**	**0**	**20**	**21**	**90%**	**21**
	1st-5th Priority Total	**54**	**17**	**4**	**71**	**151**	**47%**	**95**

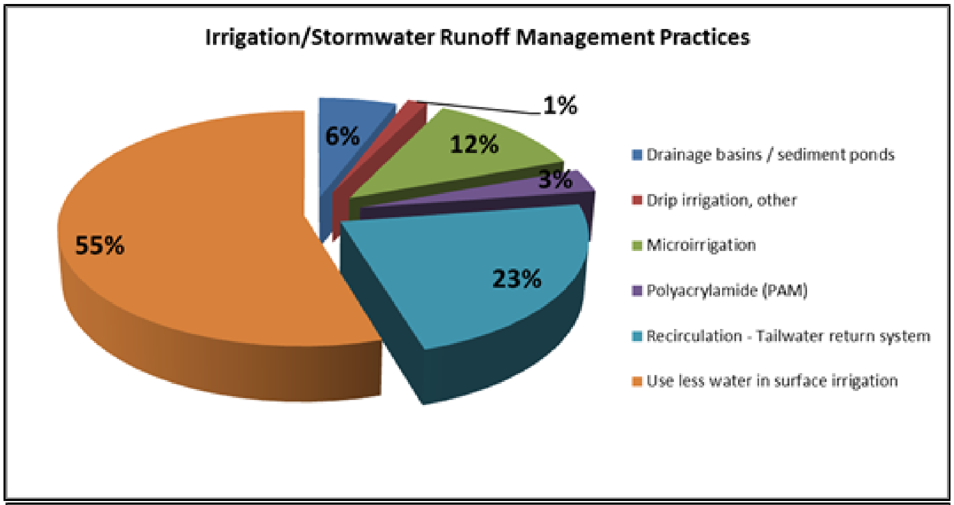
MP – Management Practice.

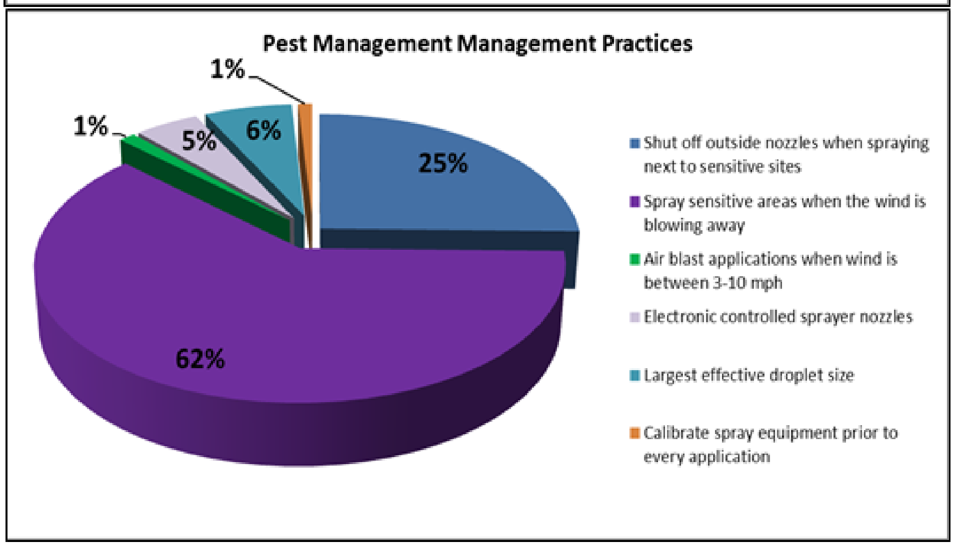
Table 66. Summary of first through fifth priority subwatershed targeted acreage with newly implemented management practices.
First through fifth subwatersheds have been reported on in previous MPURs and the 2015 Annual Report, and summarized in this table.

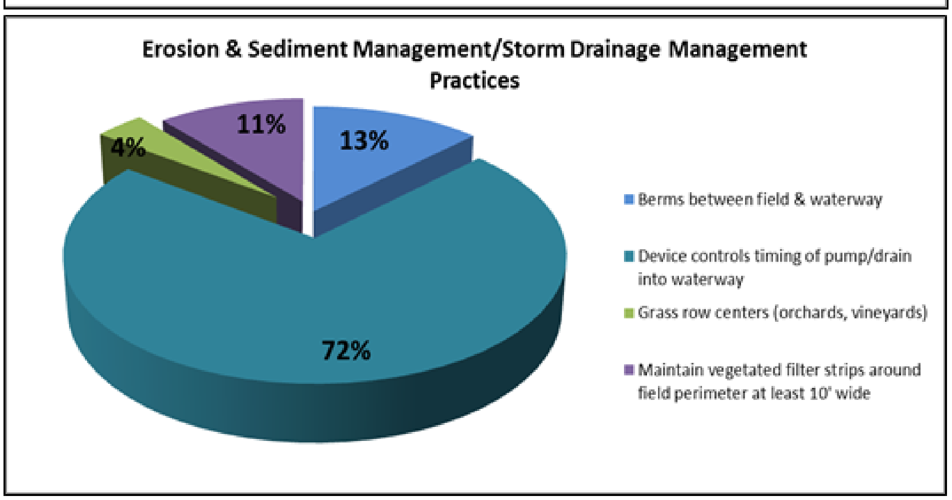
Practice Category		1st Priority Subwatersheds	2nd Priority Subwatersheds	3rd Priority Subwatersheds	4th Priority Subwatersheds	5th Priority Subwatersheds				Sum of Acreage	% of Targeted Acres with New Practices Implemented
						Hatch Drain @ Tuolumne Rd	Highline Canal @ Lombardy Rd	Merced River @ Santa Fe	Miles Creek @ Reilly Rd		
	Targeted Acreage:	11,273	10,084	10,974	4,410	36	4,226	4,152	1,533	46,688	NA
	Management Practices										
Irrigation, Storm Runoff	Berms between field & waterway			402	80					482	1%
	Drainage Basins (Sediment Ponds)	271								271	<1%
	Install device to control amount/timing of discharge to waterway	1,660		402	80		574			2,716	6%
	Microirrigation system	279	207	71						557	1%
	Recirculation - Tailwater return system	443			609					1,052	2%
	Reduce amount of water used in surface irrigation	1,197	1,028	308						2,533	5%
	Use Polyacrylamide (PAM)	150								150	<1%
Sed. and Erosion	Filter strips at least 10' wide around field perimeter	28	8							419	<1%
	Grass row centers	107								143	<1%
Pest, Dormant Spray	Calibrate spray equipment prior to every application			44						80	<1%
	Shut off outside nozzles when spraying outer rows next to sensitive sites	1,170	622	251						2,079	4%
	Spray areas close to waterbodies when the wind is blowing away from them		1,223	528		36	507	1,930	1,016	5,071	11%
	Use air blast applications when wind is 3-10 mph and upwind of sensitive sites		25				72			97	<1%
	Use electronic controlled sprayer nozzles		375							375	<1%
	Use nozzles that provide largest effective droplet size to minimize drift		121	215	139					511	1%
Other[1]	Other (Not specified)	4,102			303					4,405	13%
	Total Acres of Implemented Management Practices	**9,407**	**3,609**	**2,221**	**1,594**	**36**	**1,153**	**1,930**	**1,016**	**20,966**	**45%**

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

Figure 29. Percentage of acreage represented by newly implemented management practices in the 1-5th Priority site subwatershed.







11.c.ii. Evaluation of Water Quality (2014 WY Results)

Starting in 2009, the Coalition has conducted MPM to evaluate the effectiveness of newly implemented management practices. High priority management plan constituents 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 high priority constituents has decreased significantly (Table 67 and 68). The improved water quality in the first through fifth priority site subwatersheds, where focused outreach is complete, demonstrates the effectiveness of management practices. Due to the implementation of management practices by growers aimed at reducing the offsite movement of high priority constituents, the Coalition has removed 29 constituents from 14 management plans in the first through fifth priority site subwatersheds (Table 61). During the 2014 WY monitoring, three exceedances triggered reinstated management plans: pH at Prairie Flower Drain @ Crows Landing Rd and SC and chlorpyrifos at Duck Slough @ Gurr Rd.

Tables 67 and 68 include the number of exceedances per year (from 2006 through the 2014 WY) and the ratio of the number of exceedances relative to the number of samples collected (as a percentage) for the first through fifth high priority site subwatersheds; the percentage is graphed in Figure 30 and 31. 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 high priority constituents is provided below for the first through fifth priority site subwatersheds.

Table 67. Count of exceedances and samples collected for high priority pesticides in first through fifth priority subwatersheds.

The 2013 data are from January through September.

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	14	96	15%	114066	13	62	21%	463737	0	95	0%	4653	0	75	0%	14345
2007	16	137	12%	98482	46	124	37%	311219	1	132	1%	4927	7	128	5%	20756
2008	19	163	12%	57505	36	185	19%	238541	2	152	1%	2517	7	150	5%	11629
2009	4	54	9%	113217	1	102	1%	206858	0	37	0%	1953	0	27	0%	11354
2010	8	45	21%	66199	4	131	3%	334601	0	27	0%	1149	0	30	0%	15786
2011	3	121	3%	51248	26	253	10%	432311	0	108	0%	1109	0	109	0%	23104
2012	0	41	0%	45628	7	97	7%	337130	0	32	0%	414	0	36	0%	18137
2013	1	58	2%	79541	8	121	7%	367174	1	28	4%	415	1	30	3%	6868
2014 WY	3	116	4%	33456	3	121	2%	228702	0	76	0%	511	1	80	1%	7470

[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 2012.

Table 68. Count of toxicity and samples collected for high priority toxic analysis in first through fifth 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	109	13%	3	97	3%	3	98	3%	5	27	19%
2007	10	139	7%	1	130	1%	13	140	9%	7	35	20%
2008	6	162	4%	3	152	2%	45	174	26%	29	59	49%
2009	2	29	7%	3	33	9%	3	43	7%	1	13	8%
2010	2	34	6%	2	34	6%	1	50	2%	1	15	7%
2011	1	109	1%	2	107	2%	4	115	3%	0	26	0%
2012	0	38	0%	0	34	0%	1	41	2%	0	15	0%
2013	2	49	4%	0	35	0%	4	60	7%	4	26	15%
2014 WY	2	83	2%	3	80	4%	6	106	6%	2	40	5%

[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 30. Percentage of exceedances of WQTLs for high priority constituents in first through fifth priority site subwatersheds.

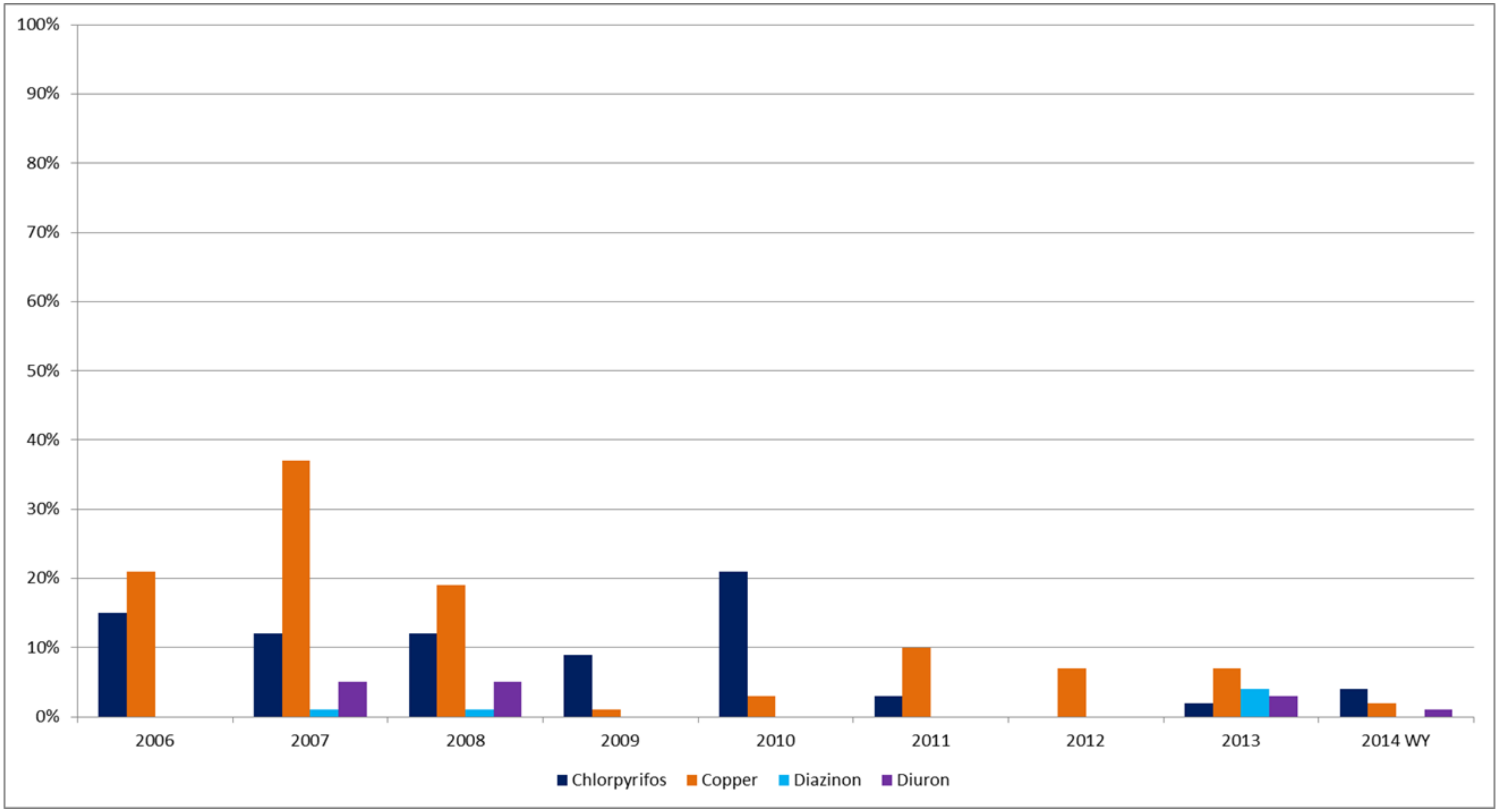
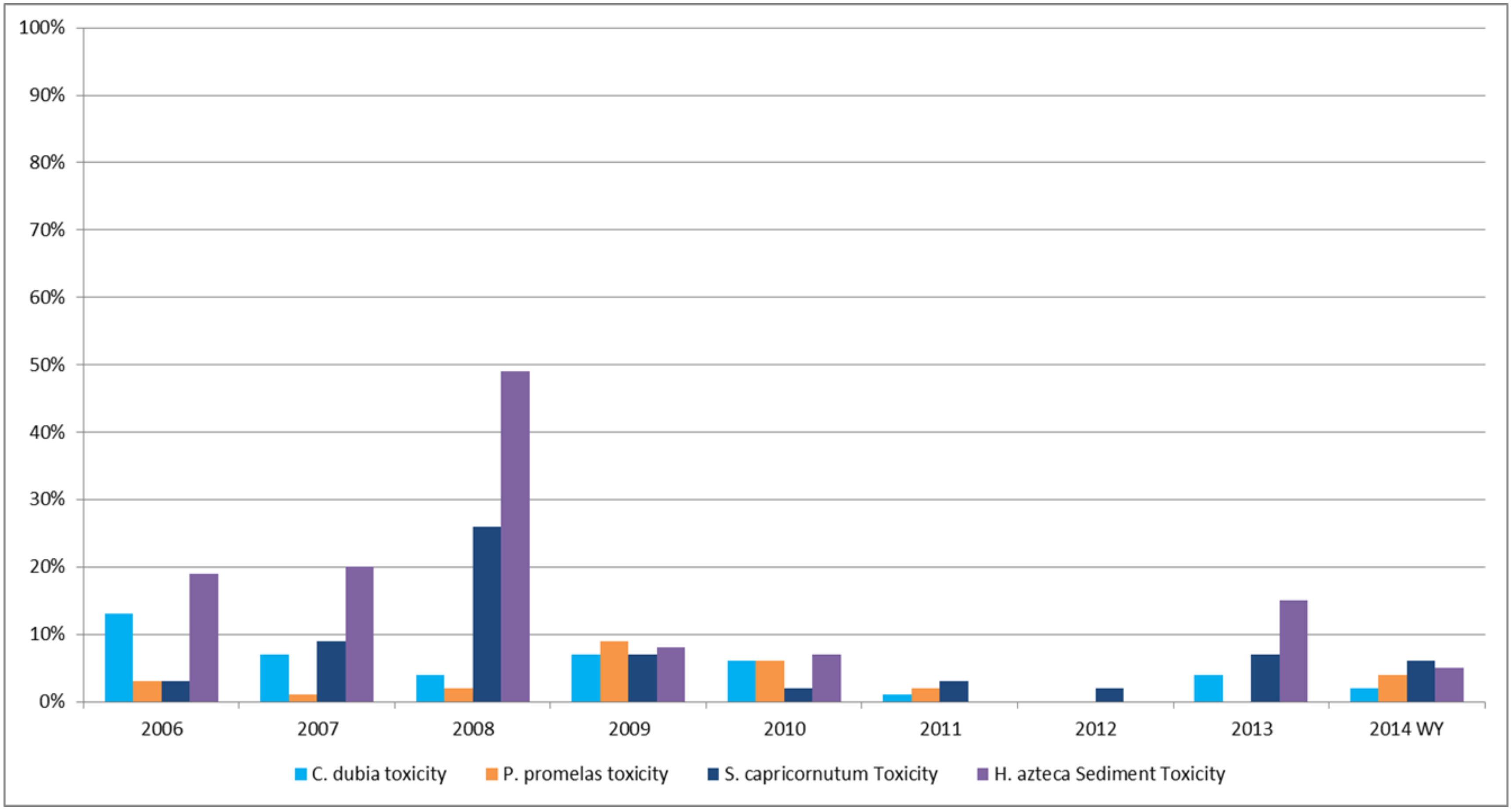


Figure 31. Percentage of toxic samples first through fifth priority site subwatersheds.



Chlorpyrifos

Chlorpyrifos has been removed from Bear Creek @ Kibby Rd, Cottonwood Creek @ Rd 20, Highline Canal @ Lombardy Rd, Highline Canal @ Hwy 99, Hilmar Drain @ Central Ave, and Prairie Flower Drain @ Crows Landing Rd management plans. Eleven site subwatersheds remain in a management plan for chlorpyrifos (Table 61). The Coalition petitioned the Regional Board to remove chlorpyrifos from the Dry Creek @ Rd 18 and Merced River @ Santa Fe management plans on June 5, 2014 (approval pending). Chlorpyrifos was petitioned to be removed from the Dry Creek @ Wellsford Rd management plan on June 5, 2014; however, due to exceedances of the WQTL that occurred in September and October 2013, it will remain in a management plan. Thirty-four percent of targeted growers implemented new management practices based on the Coalition's focused outreach in first through fifth site subwatersheds. As a result, the amount of chlorpyrifos entering the waterways has decreased and exceedances of the WQTL for chlorpyrifos have gone from 13 exceedances (12%) in 2008 to three exceedance (3%) during the 2014 WY (Table 67).

Three samples exceeded the WQTL for chlorpyrifos at Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, and Lateral 2 ½ near Keyes Rd during the 2014 WY (4% of samples collected; Table 67). The PUR data associated with the three exceedances indicate applications of chlorpyrifos occurred prior to each of the sampling events. The Coalition completed focused outreach in each of the site subwatersheds: Dry Creek @ Wellsford Rd (2008-2010), Duck Slough @ Gurr Rd (2010-2012), and Lateral 2 ½ near Keyes Rd (2011-2013). Chlorpyrifos use in the first through fifth priority site subwatershed has decreased significantly since outreach began; 113,217 lbs AI applied in 2009 comparted to 33,456 lbs AI in 2014. The applications associated with the exceedance in October at Dry Creek @ Wellsford Rd were from both members and non-members. Samples collected from Duck Slough @ Gurr Rd in March 2014 were from a non-contiguous waterbody where water had been stagnant since October 2013. Eight of the 10 applications were made by aerial spray methods where it is possible for chlorpyrifos to enter the waterway via spray drift (Appendix V). The 10 applications associated with the exceedance were applied by both members (4, including two targeted members during focused outreach) and five non-members. The member associated with the fields adjacent to the site participates in Coalition outreach and documented management practices implemented from 2011 through the 2014 WY. Samples collected from Lateral 2 ½ near Keyes Rd in July exceeded the WQTL for chlorpyrifos. All parcels associated with the July exceedance are currently members of the Coalition; however, not all were targeted for focused outreach in 2012 and 2013 based on location of parcels, when they became a member, and potential for direct drainage.

The Coalition will continue to conduct outreach in all site subwatersheds and inform growers of the water quality concerns in the ESJWQC region. Overall, the Coalition has demonstrated that outreach has been effective in improving water quality; of the 116 samples analyzed, only three exceedances occurred. Because exceedances of the WQTL for chlorpyrifos still occurred, and outreach is an ongoing process, the Coalition will work to keep growers informed of the status of the water quality in their region, remind growers during meetings to continue to implement management practices, and document any new management practices as necessary.

Copper

Copper has been removed from Bear Creek @ Kibby Rd, Deadman Creek @ Gurr Rd, and Dry Creek @ Wellsford Rd management plans. Copper remains a high priority constituent for nine sites in the first through fifth priority site subwatersheds. The Coalition petitioned to remove copper from the Duck Slough @ Gurr Rd management plan on June 5, 2014 (approval pending). Copper is included in management plans for Berenda Slough along Ave 18 ½, Cottonwood Creek @ Rd 20, Dry Creek @ Rd 18, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99, Highline Canal @ Lombardy, Hilmar Drain @ Central Ave, Livingston Drain @ Robin Ave, and Miles Creek @ Reilly Rd.

The PUR data indicate that applications of copper have slightly decreased from 2011 through 2014, within the first through fifth priority site subwatersheds. Exceedances of the WQTL for copper have decreased significantly in the site subwatersheds; 36 exceedances of both the dissolved and total fraction of copper (23%) occurred in 2008 compared to three exceedances (2%) of the hardness based WQTL for dissolved copper in the 2014 WY (Table 67). Exceedances of the hardness based WQTL for dissolved copper occurred at Dry Creek @ Rd 18, Highline Canal @ Hwy 99, and Highline Canal @ Lombardy Rd during the 2014 WY.

During the 2014 WY, 121 samples were analyzed for copper and only three exceedances occurred. A definitive source for copper exceedances has not been clearly identified in the Coalition region; however, potential sources include recent agricultural applications moving to surface waters either through storm/irrigation runoff or spray drift, dairy uses of copper sulfate, stormwater runoff from brake pads and other anthropogenic uses, and copper used for algae and aquatic weed control in irrigation supply ditches. The Coalition will continue to conduct general outreach within the first through fifth priority site subwatersheds and monitor for copper to assess water quality improvements.

Diazinon

Diazinon has been removed from the Cottonwood Creek @ Rd 20 and Dry Creek @ Rd 18 management plans (Table 61). The Miles Creek @ Reilly Rd site subwatershed is the only site in a management plan for diazinon; if no exceedances occur during the 2015 WY MPM, the Coalition will petition the Regional Board to remove it from a management plan. Management practices implemented by growers have been effective in improving water quality and preventing diazinon from entering the waterways. Additionally, the applications of diazinon have reduced significantly; in 2006, 4,653 lbs of diazinon were applied to crops within the first through fifth priority site subwatersheds, compared to only 511 lbs in 2014. No exceedances of the WQTL for diazinon occurred during the 2014 WY.

Diuron

Diuron has been removed from three site subwatershed management plans: Cottonwood Creek @ Rd 20, Dry Creek @ Wellsford Rd, and Highline Canal @ Hwy 99. Dry Creek @ Rd 18 (third priority) and Hilmar Drain @ Central Ave (fourth priority) remain in management plans for diuron. Overall, implemented management practices designed to address stormwater runoff and dormant spray applications, such as maintaining filter strips at least 10 feet wide and monitoring wind conditions prior to application, have proven effective in reducing the offsite movement of diuron; no exceedance occurred from 2009 through 2012. Only one exceedance of the WQTL for diuron occurred during 2013 (Dry Creek @ Rd 18). A single exceedance of the WQTL for diuron occurred during the second storm sampling event on March 3, 2014 at Prairie Flower Drain @ Crows Landing. Prairie Flower Drain has been monitored for diuron from 2006 through 2008, monthly in 2011, and monthly during the 2014 WY; 45 samples were collected, 35 were non-detect, and only one exceedance occurred at 0.1 µg/L above the WQTL. The PUR data indicate no applications of diuron had occurred since

December 2012. It is possible that diuron was applied but not reported and mobilized during the storm into Prairie Flower Drain.

C. dubia toxicity

Water column toxicity to *C. dubia* has been removed from Bear Creek @ Kibby Rd and Highline Canal @ Lombardy Rd management plans. In addition, due to three years with no toxicity, the Coalition sent a petition on June 5, 2014 to remove *C. dubia* toxicity from Dry Creek @ Rd 18, Highline Canal @ Hwy 99, and Merced River @ Santa Fe management plans (approval pending). Toxicity to *C. dubia* remains in management plans for Black Rascal Creek @ Yosemite Rd, Deadman Creek @ Gurr Rd, Duck Slough @ Gurr Rd, Miles Creek @ Reilly Rd, and Prairie Flower Drain @ Crows Landing Rd. However, due to the effectiveness of management practices to prevent pesticides from mobilizing in the waterways, toxicity to *C. dubia* occurs less frequently. Prior to focused outreach, 30 toxic samples were collected from 2006 through 2008, compared to 10 toxic samples collected from 2009 through the 2014 WY (Table 68).

During the 2014 WY, toxicity to *C. dubia* occurred twice within the first through fifth priority site subwatersheds. Samples collected from a non-contiguous waterbody on November 12, 2013 at Deadman Creek @ Gurr Rd were toxic to *C. dubia* (0% survival compared to the control). Toxicity was attributed to the high levels of ammonia (47.3 mg/L). Samples collected for storm sampling on March 3, 2014 from Duck Slough @ Gurr Rd were toxic to *C. dubia* (75% survival); Duck Slough was non-contiguous at the time. Since survival was greater than 50%, no TIE was performed. Samples collected at the same time from Duck Slough also exceeded the WQTL for chlorpyrifos (0.053 µg/L) and were toxic to *P. promelas*.

P. promelas toxicity

Eighty samples were collected to test for toxicity to *P. promelas* during the 2014 WY in the first through fifth site subwatersheds; three samples were toxic (4%; Table 68). Toxicity to *P. promelas* was added to the Duck Slough @ Gurr Rd management plan after samples were toxic during the storm sampling event in March 2014; no TIE was performed. Samples collected at the same time also exceeded the WQTL for chlorpyrifos and were toxic to *C. dubia*.

Toxicity to *P. promelas* is also in a management plan for Prairie Flower Drain @ Crows Landing Rd and Deadman Creek @ Gurr Rd. Prairie Flower Drain @ Crows Landing Rd was tested monthly during the 2014 WY; no toxicity occurred. Toxicity occurred twice during the 2014 WY at Deadman Creek @ Gurr Rd due to high levels of ammonia. Exceedances of the WQTL for ammonia coincided with toxicity five out of nine times toxicity occurred from 2006 through the 2014 WY; TIE results indicated ammonia was the cause of toxicity during those sampling events. Previous exceedances of the WQTL for ammonia and associated water column toxicities were attributed to discharge from dairies; exceedances were also associated with very high *E. coli* counts, high total dissolved solids, and low DO.

S. capricornutum toxicity

The Coalition received approval to remove *S. capricornutum* toxicity from the Dry Creek @ Wellsford Rd, Deadman Creek @ Hwy 59, Duck Slough @ Gurr Rd, and Berenda Slough along Ave 18 ½ site subwatershed management plans. Nine site subwatersheds remain in management plans for *S. capricornutum* toxicity in the first through fifth priority site subwatersheds: Deadman Creek @ Gurr Rd, Dry Creek @ Rd 18, Highline Canal @ Hwy 99, Hatch Drain @ Tuolumne Rd, Highline Canal @ Lombardy, Hilmar Drain @ Central Ave, Livingston

Drain @ Robin Ave, Miles Creek @ Reilly Rd, and Prairie Flower Drain @ Crows Landing Rd. However, due to the effectiveness of management practices, the number of samples toxic to *S. capricornutum* has decreased significantly in the site subwatersheds; in 2008, 45 toxic samples (27%) were collected from first through fifth priority sites, compared to six samples (6%) collected during the 2014 WY.

During the 2014 WY, toxicity to *S. capricornutum* occurred three times at Prairie Flower Drain @ Crows Landing Rd, twice at Highline Canal @ Hwy 99, and once at Hatch Drain @ Tuolumne Rd. Toxicity to *S. capricornutum* occurred at Prairie Flower Drain @ Crows Landing Rd in October, December, and March. A TIE was initiated on the October sample however the toxicity was not persistent and the TIE treatments could not identify the cause of the toxicity. On March 3, 2014 samples collected from Prairie Flower Drain were toxic to algae (23% growth compared to the control). The TIE performed on the March sample was ran through a SPE column and treated with EDTA; neither procedures had any effect on the toxicity. Samples collected at the same time at Prairie Flower Drain exceeded the WQTL for diuron, which is known to be toxic to *S. capricornutum*.

Samples collected in June and July from Highline Canal @ Hwy 99 were toxic to algae. Results from the TIEs concluded that non-polar organics and metals were the cause of the toxicity in both months. No exceedances of WQTLs or detections of any non-polar organics or metals that coincided with this toxicity; however, TID reported applying endothall weekly to the canals in June. Samples collected in July from Hatch Drain @ Tuolumne Rd were toxic to algae. TIE results indicate that toxicity was caused by high levels of ammonia (66.5 mg/L).

H. azteca toxicity

The Coalition requested the removal of sediment toxicity to *H. azteca* on June 5, 2014 from the following management plans: Prairie Flower Drain @ Crows Landing Rd, Highline Canal @ Lombardy Rd, and Highline Canal @ Hwy 99, due to three years with no sediment toxicity (approval pending). The remaining site subwatersheds with management plans for *H. azteca* toxicity are Dry Creek @ Rd 18, Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, Hatch Drain @ Tuolumne Rd, and Miles Creek @ Reilly Rd. Due to the effectiveness of management practices, toxicity to *H. azteca* has decreased significantly in the site subwatersheds; in 2008, 29 toxic samples (59%) were collected at first through fifth priority sites, compared to two samples (9%) collected during the 2014 WY.

During the 2014 WY, toxicity to *H. azteca* occurred twice at Hatch Drain @ Tuolumne Rd, in March and September (56% and 48% survival compared to the control). Since both samples resulted in less than 80% survival compared to the control, additional sediment chemistry analysis for pyrethroids and chlorpyrifos were required. Chemistry results from the March and September samples found detections of pyrethroids. Based on the chemistry results, there were sufficient TUa of pyrethroids in the March and September sediment samples to account for the Hatch Drain @ Tuolumne Rd sediment toxicity.

11.B. TMDL CONSTITUENTS

Monitoring to evaluate compliance with approved TMDLs occurred in the Coalition region during the 2014 WY. If an exceedance of the WQTL occurs for a TMDL constituent, a management plan is required for that constituent in that site subwatershed. A management plan for a TMDL constituent results in additional focused monitoring, source identification, and outreach within the site subwatershed. Coalition efforts include but are not limited to: 1) MPM, 2) conducting site subwatershed grower meetings, 3) encouraging the implementation of and evaluating the efficacy of management practices, and 4) addressing the seven surveillance and monitoring objectives described in the Basin Plan. Intensive outreach and documentation of implemented management practices occur throughout the Coalition every year. Furthermore, the Coalition conducts annual meetings to provide growers with information on management practices designed to improve water quality. These actions enable growers within the Coalition region to address the agricultural sources of TMDL constituents.

11.a. Chlorpyrifos and Diazinon TMDL

During the 2014 WY the ESJWQC assessed compliance with seven monitoring objectives established in the Basin Plan Amendment: 1) determine load capacity compliance, 2) determine load allocation compliance, 3) determine degree of implemented management practices, 4) determine effectiveness of implemented management practices, 5) determine if alternative pesticides are impairing water quality, 6) determine if additive or synergistic effects of multiple pollutants are causing toxicity, and 7) demonstrate 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 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 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 reviewed results from the SJR monitoring and outreach conducted within their respective Coalition regions as a part of the ILRP.

Chlorpyrifos and diazinon were not detected in any samples collected from the San Joaquin River during the 2014 WY. There were three exceedances of WQTLs for chlorpyrifos during ESJWQC tributary monitoring at Dry Creek @ Wellsford Rd (0.016 µg/L; October 15, 2013), Duck Slough @ Gurr Rd (0.053 µg/L; March 03, 2014), and Lateral 2 ½ near Keyes Rd (0.16 µg/L; July 08, 2014). Complete monitoring results from the 2014 WY (October 2014 through September 2014) as well as a detailed assessment of each Coalition's compliance with Monitoring Objectives 1- 7 are reported in the San Joaquin River Chlorpyrifos and Diazinon TMDL AMR (submitted May 1, 2015).

12. SUMMARY OF REQUIRED GROWER SUBMITTALS

Table 69 includes a list of all ESJWQC submittals, approvals, and upcoming due dates related to the WDR. The Farm Evaluation Plan template was resubmitted on December 6, 2013 and approved on December 9, 2013. The Groundwater Assessment Report (GAR) was submitted on January 13, 2014 (conditionally approved on June 4, 2014), revised and resubmitted on November 7, 2014 (approved December 24, 2014). The GAR includes designations for high and low vulnerability areas. The Nitrogen Management Plan Template was resubmitted on December 18, 2014 and was approved on December 23, 2014. The ESJWQC is working with the other Coalition's and Regional Board staff to revise the Sediment Discharge and Erosion Control Plan template to address comments on the original template (submitted April 11, 2013). The Sediment Discharge and Erosion Assessment Report was submitted on January 13, 2014. The Coalition has been working with Regional Board staff to address their comments and requests for revisions and will be resubmitting this report in 2015. The Coalition's 2015 WY MPU was submitted on August 1, 2014 and resubmitted on September 23, 2014 (approved January 5, 2015).

Table 69. ESJWQC WDR related submittals and approvals.

The ESJWQC WDR (R5-2012-0116-R2) was approved December 7, 2012 and revised on October 3, 2013 and March 27, 2014.

Document Description	Submittal/ Due Date[1]	Approval Date
Notice of Applicability-third party application	December 14, 2012	January 11, 2013
Regional Board letter to non-members	January 16, 2013	NA
Member List	July 31, 2014	NA
Monitoring Plan Update (MPU)	August 1, 2014 and September 23, 2014	January 5, 2015
Farm Evaluation Plan Template	April 11, 2013 and December 6, 2013	December 9, 2013
FEP Addendum to 2014 Annual Report	July 1, 2014	Approval Pending
FEP (High Vuln Areas >60 ac)	March 1, 2015	NA
FEP (Small Farm High Vuln Area <60 ac)	March 1, 2015	NA
FEP (Low Vuln Area >60 ac)	March 1, 2015	NA
FEP (Small Farm Low Vuln <60 ac)	March 1, 2017	NS
Groundwater Quality Assessment Report Outline	April 11, 2013	May 6, 2013
GAR	January 13, 2014 and November 7, 2014	June 4, 2014 (conditional) December 24, 2014 (official)
MPEP- Group Agreement	January 14, 2014	March 13, 2014 (conditional approval)
MPEP- Identify Technical Experts	September 23, 2014	NA
MPEP-Identify Program Administrator	November 1, 2014	NA
MPEP- Conceptual Design Meeting	February 4, 2015	NA
MPEP- Conceptual Study Design submitted for discussion	June 4, 2015	NS
Groundwater Quality Trend Monitoring Workplan	June 4, 2015	NS
Groundwater QAPP for Trend Monitoring Workplan	June 4, 2015	NS
MPEP- Draft Workplan	March 1, 2016	NS
MPEP- Final Workplan	June 4, 2016	NS
Nitrogen Management Plan Template (All Coalitions)	April 11, 2013 and December 18, 2014	December 23, 2014
NMP (High Vuln >60 ac)	March 1, 2015[2]	NA
NMP Summary Report (High Vuln >60 ac)	March 1, 2016	NS
NMP (Small Farm High Vuln <60 ac)	March 1, 2017	NS
NMP Summary Report (Small Farm High Vuln <60 ac)	March 1, 2018	NS

DOCUMENT DESCRIPTION	SUBMITTAL/ DUE DATE[1]	APPROVAL DATE
NMP (Low Vuln)	March 1, 2017	NS
NMP Summary Report (Low Vuln)	March 1, 2018	NS
Sediment and Erosion Control Plan Template (All Coalitions)	April 11, 2013	Resubmittal Pending
Sediment and Erosion Control Assessment Report	January 13, 2014 and December 12, 2014	Approval Pending
Inform members required to prepare Sediment Plans	30 days from approval	NS
Sediment Discharge and Erosion Control Plan (High Vuln)	180 days from approval	NS

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).

12.A. FARM EVALUATIONS

The ESJWQC WDR requires that all Coalition members complete a Farm Evaluation. The Farm Evaluation is intended to gather information on general site conditions and management practices that members currently have in place to protect surface and groundwater quality (Farm Evaluation Template for all Coalitions was approved December 9, 2013).

The Farm Evaluations are designed to collect the following information:

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

Farm Evaluations are designed to describe how each member is implementing management practices to protect water quality while trend data are collected through monitoring. Management practices that are designed to protect the quality of groundwater should be implemented, where applicable, by members in high or low vulnerability areas. Data from the Farm Evaluations can be used to evaluate improvements in surface water quality relative to changes in management practices.

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

Members are required to complete their Farm Evaluation as prioritized by farm size and whether they are in a high or low vulnerability area. Table 69 includes the Farm Evaluation official submittal deadlines for high and low vulnerability areas. The focus on high vulnerability areas is to determine where surface and/or groundwater quality are most impacted. High vulnerability areas are the geographic regions within the Coalition area where management plans are required due to surface water or groundwater quality impairments or where the area has been determined to be highly vulnerable for groundwater in the GAR.

All members are mailed Farm Evaluation surveys to report on the practices implemented in 2014. The surveys are pre-populated with the member's enrolled parcels and whether or not the parcel is within a high vulnerability area for either surface or groundwater. Farm Evaluations are returned from growers to the Coalition by March 1 annually. A list of active members created in December 2014 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.

If the member submitted a 2013 Farm Evaluation, 2014 surveys were pre-populated with parcel information and responses provided by the members on the 2013 surveys. If the membership was created in 2014, parcel information was pre-populated from their membership forms. Members were asked to correct crop information, update acreage, and change responses as needed to accurately reflect the farming practices used in 2014. Survey responses were recorded in an Access database and linked to an Assessor Parcel Number (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:

- 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 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.

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

- Some parcels were not included on returned surveys or groups of parcels were unclear. Data entry personnel cannot accurately assume 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 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, the Site ID/Field IDs were unfamiliar to the grower, 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.

Domestic wells are sometimes reported in the irrigation well section. In the instances where a note or name indicated the well was domestic, it was recorded accordingly. In some cases, well names or notes were too vague to make an accurate designation. Members were contacted to resolve these issues when possible.

12.a. Farm Evaluation Summary

Surface water vulnerability (high or low) was assigned to each member parcel based on current ESJWQC surface water quality management plans. Groundwater vulnerability (high or low) was assigned to each parcel based on the ESJWQC GAR (approved December 23, 2014). 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 high vulnerability area or a groundwater high vulnerability area. By March 1, 2015 all members in both high and low vulnerability areas were required to complete and return a Farm Evaluation survey with the exception of members with small farming operations (<60 acres enrolled). We expected surveys back from 3,925 members representing 728,472 acres of land. Table 71 and Figure 31 illustrate the acreage and membership totals for all surveys sent in 2014 divided by vulnerability categories and farming operation sizes. Of the surveys that were required to be returned 72% were returned by members representing 77% of the acreage (Table 70). Members failing to return a 2014 Farm Evaluation were sent two reminder notices in an effort to reach 100% compliance. For three percent of members who were sent a survey, completion for 2014 was not necessary for one of three possible reasons: 1) the member had no irrigated acreage with the Coalition during 2014 (a member may do this if the ground will be temporarily fallowed), 2) they did not farm in 2014 (new members who recently acquired the land), or 3) they are no longer a member (Table 72, Figure 32).

Figure 33 illustrates the parcels for which surveys were returned and the groundwater vulnerability designations, as proposed in the GAR. Some memberships included parcels falling into multiple vulnerability categories. Of the parcel numbers provided on the returned Farm Evaluations, 255 parcels could not be mapped. 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.

Members reported parcel specific crop information on their Farm Evaluation for 2014. 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, etc. Figure 34 illustrates the percentage of total reported acreage for each primary crop listed by members on returned Farm Evaluations. Almost half of the crop acreage is occupied by almonds. Grapes were listed as the second most common crop with a percentage of just over half that of the almonds. Pistachios, corn, and alfalfa ranked third, fourth, and fifth. This is consistent with the crop trend demonstrated in 2013 Farm Evaluation data.

Table 70. Sum of acreage and count of members that were required to complete 2014 Farm Evaluations.

Required 2014 Farm Evaluations	Sum of Acreage	Count of Members
Received	546,298	2,601
Not Received	166,884	989
Total	**713,182**	**3,590**
% Received of Total	**76.60%**	**72.45%**

Table 71. Sum of acreage and count of members represented by 2014 farm evaluations.

Survey Status	SW Vulnerability	GW Vulnerability	Farm Size	Overall Vulnerability	Sum of Acreage	Count of Members
Received	SW High	GW Low	All	High	52,467	207
		GW High	All	High	327,541	996
	SW Low	GW High	All	High	145,690	1,309
		GW Low	Large	Low	20,601	89
			Small		2,607	134
				Received Total	***548,906***	***2,735***
Not Received	SW High	GW Low	All	High	11,236	74
		GW High	All	High	104,444	375
	SW Low	GW High	All	High	46,847	516
		GW Low	Large	Low	4,357	24
			Small		1,407	78
				Not Received Total	***168,291***	***1,067***
				Grand Total	**717,197**	**3,802**
				% High Vulnerability of Total	**95.96%**	**91.45%**
				% Low Vulnerability of Total	**4.04%**	**8.55%**

GW-Groundwater
SW-Surface water

Table 72. Sum of acreage and count of members sent a survey, but did not need to complete one.

Reason for No Survey	SW Vulnerability	GW Vulnerability	Overall Vulnerability	Farm Size	Sum of Acreage	Count of Members
Zero Irrigated Acres	SW High	GW Low	Low	All	0	0
		GW High	High	All	12	3
	SW Low	GW High	High	All	357	5
		GW Low	Low	Large	0	0
		GW Low	Low	Small	0	2
				Zero Irrigated Acres Total	***369***	***8***
Did Not Farm in 2014	SW High	GW Low	Low	All	25	5
		GW High	High	All	0	0
	SW Low	GW High	High	All	1	7
		GW Low	Low	Large	0	0
		GW Low	Low	Small	29	8
				Did Not Farm in 2014 Total	***55***	***20***

Reason for No Survey	SW Vulnerability	GW Vulnerability	Overall Vulnerability	Farm Size	Sum of Acreage	Count of Members
Past Member	SW High	GW Low	Low	All	349	13
		GW High	High	All	3,880	30
	SW Low	GW High	High	All	6,570	58
		GW Low	Low	Large	2,943	8
		GW Low	Low	Small	52	8
				Past Member Total	***13,794***	***117***
				Grand Total	**11,275**	**123**
				% High Vulnerability of Total	**96.68%**	**86.18%**
				% Low Vulnerability of Total	**3.32%**	**13.82%**

GW-Groundwater
SW-Surface water

Figure 32. Percentages of sent status for 2014 Farm Evaluations.

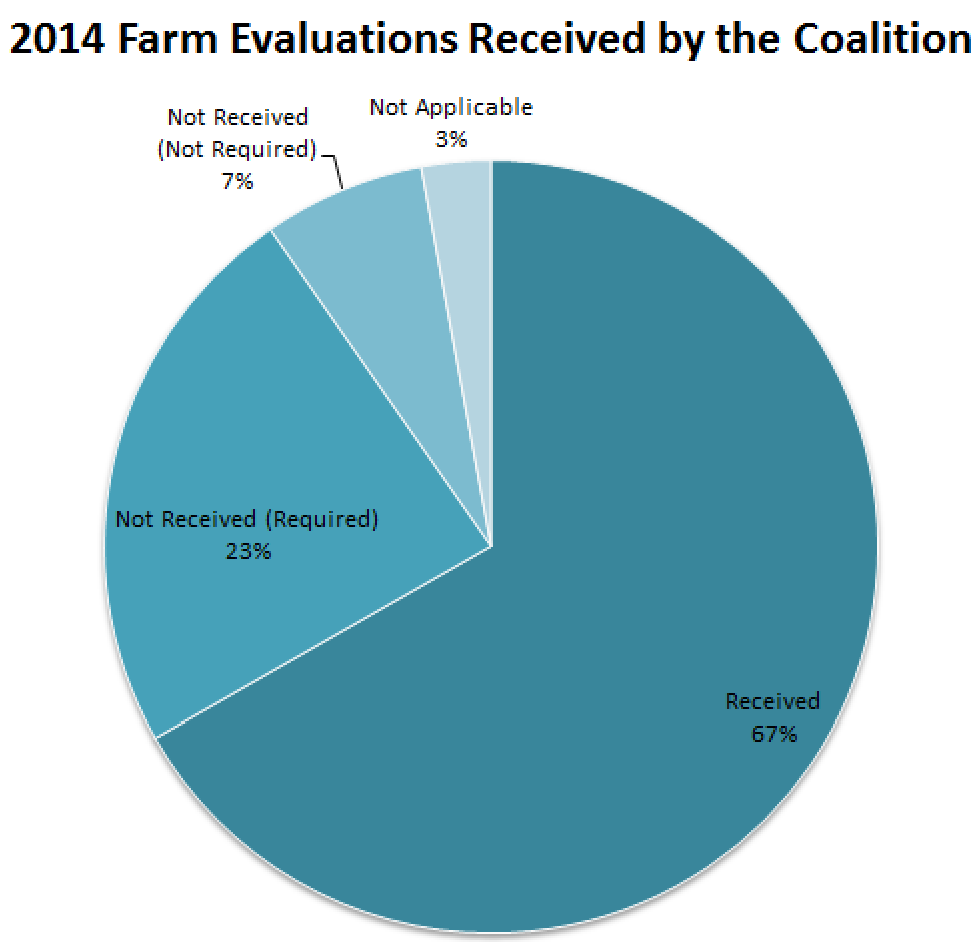


Figure 33. ESJWQC member parcels associated with one or more farm evaluation and groundwater high vulnerability areas.

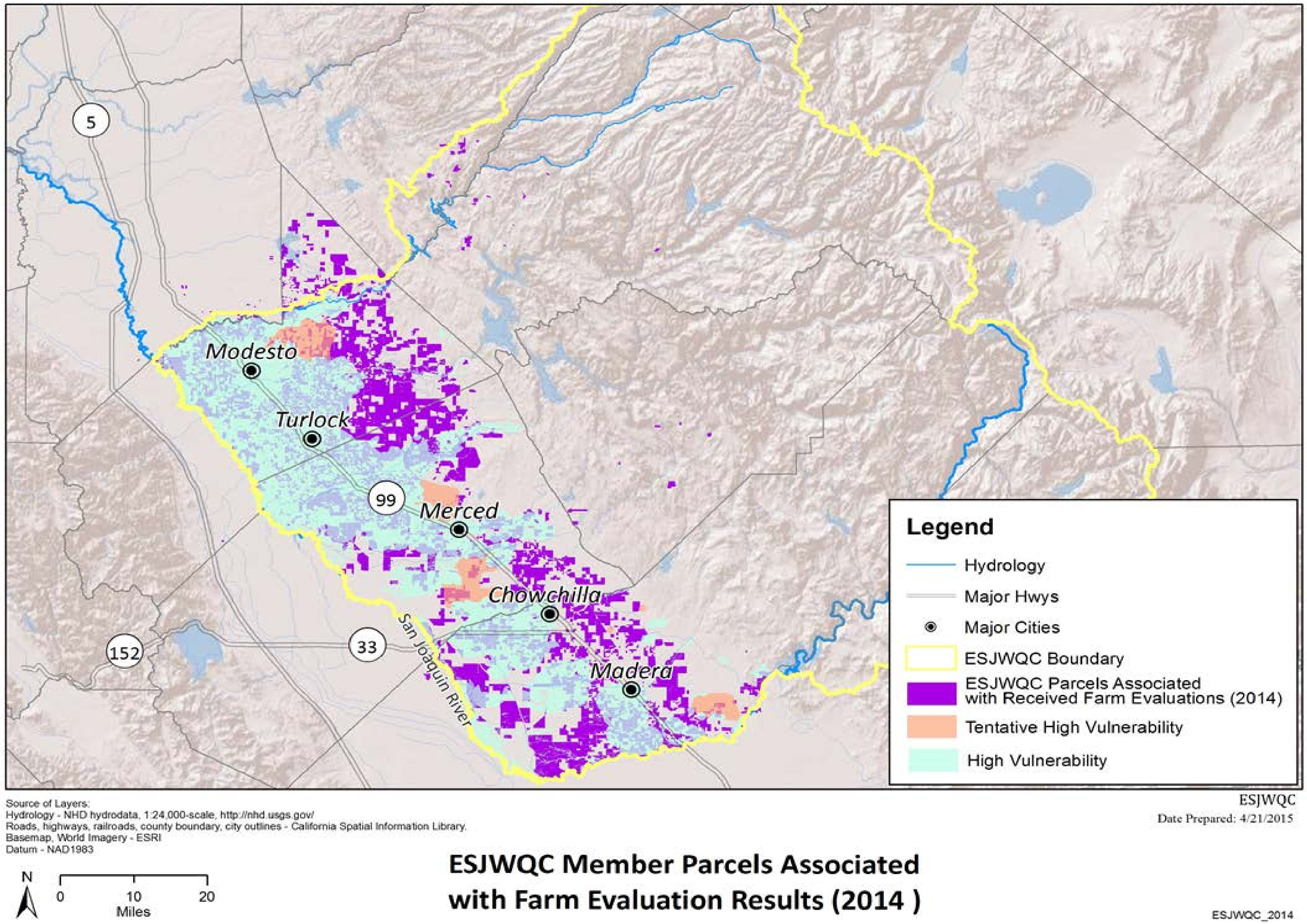
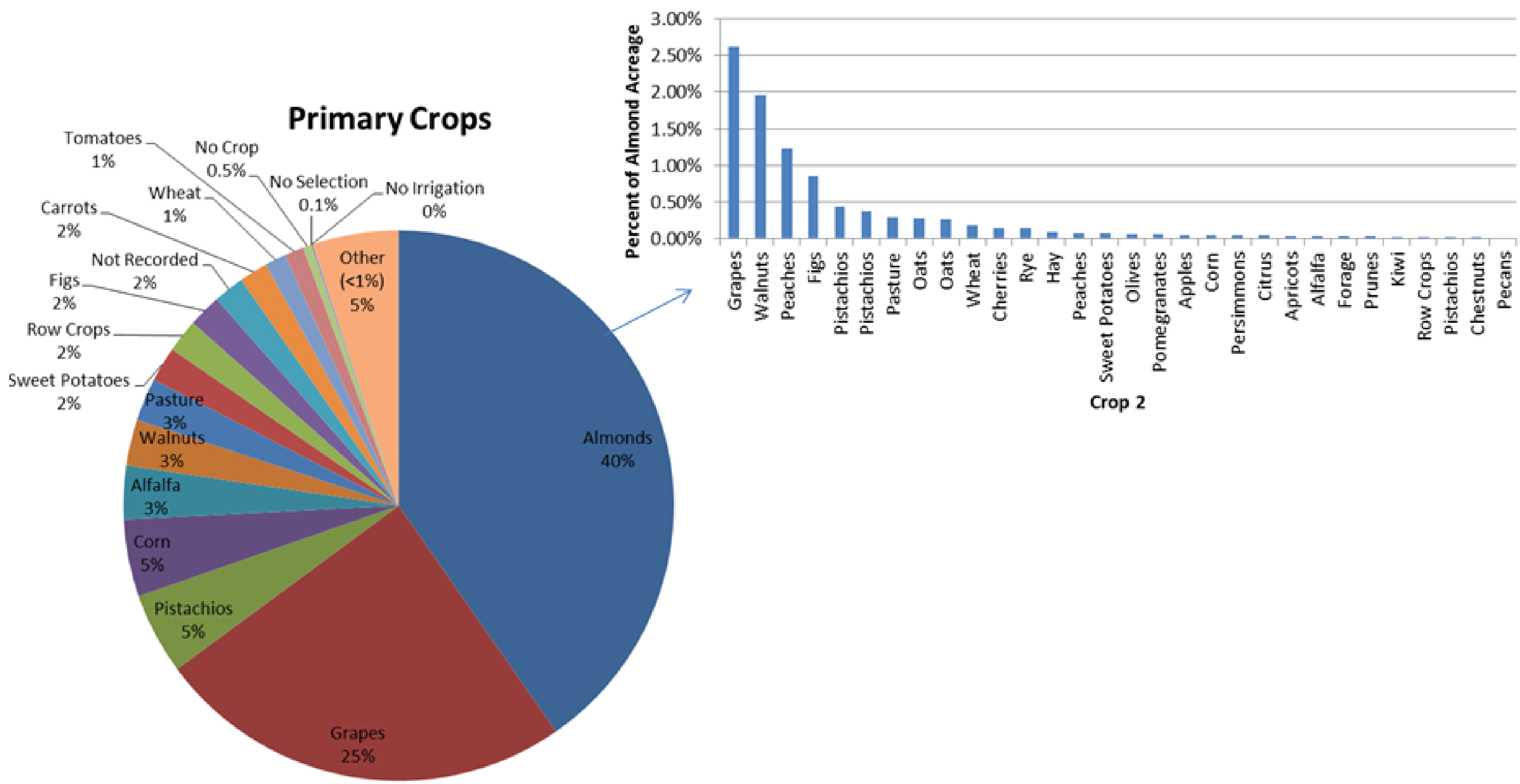


Figure 34. Percent of acreage by primary crop (first crop listed) associated with returned 2014 Farm Evaluations.
In many cases there is more than one crop associated with a survey and management practices for a field.



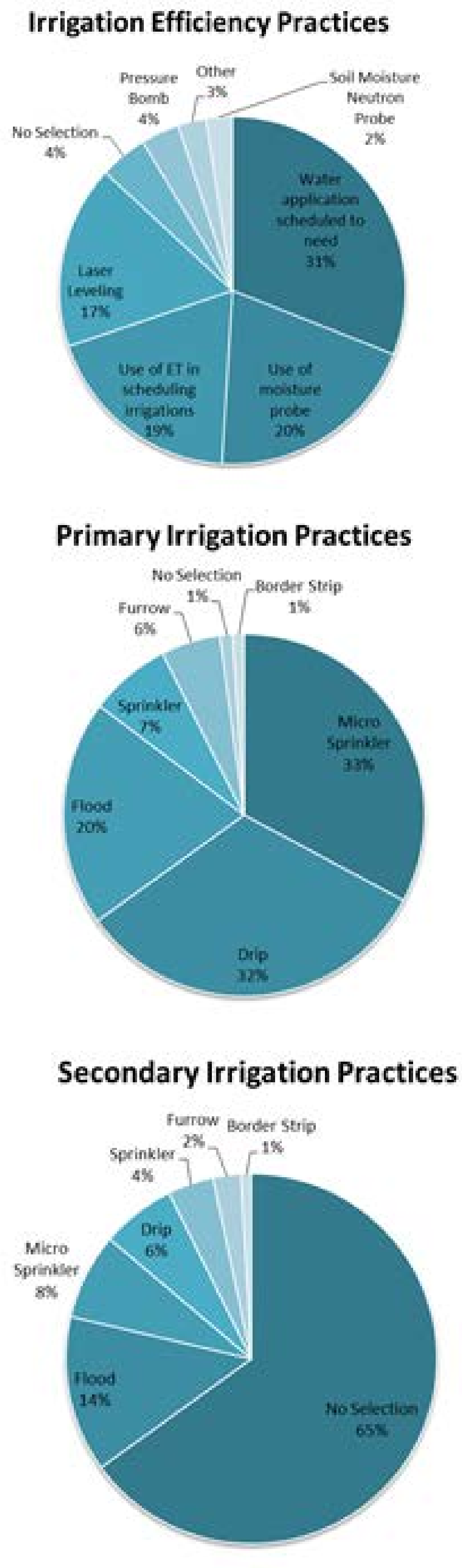
12.a.i. Irrigation Management Practices

Practices to efficiently manage irrigation were utilized on a large portion of the Coalition region. More growers reported using irrigation efficiency practices in 2014 as compared to 2013. This is shown by the increase in almost all efficiency practices and the 12% decrease in "no selection". There was a three percent increase alone in members scheduling their water application to the needs of their crop. The largest acreages were associated with pressurized irrigation, including drip and micro-sprinkler. Border strip, flood, furrow, and sprinkler irrigation combined were used on 58% fewer acres than pressurized irrigation systems. Most members utilize only a primary irrigation method, as shown by the large acreage reported with "no selection" for secondary irrigation practices. Flood and micro-sprinkler are the most common forms of secondary irrigation utilized by members for 2014 (Table 73, Figure 35). This is a change from 2013, where flood and drip irrigation were the top two secondary irrigation choices.

Table 73. Acreage associated with 2014 irrigation management questions and responses.

Survey Section	Question	Response	Acreage
B	**Irrigation Efficiency Practices**		
		Water application scheduled to need	332,854
		Use of moisture probe	214,475
		Use of ET in scheduling irrigations	201,958
		Laser Leveling	183,407
		Pressure Bomb	38,423
		Other	28,049
		No Selection	47,791
		Soil Moisture Neutron Probe	26,563
B	**Primary Irrigation Practices**		
		Border Strip	5,349
		Drip	173,939
		Flood	109,223
		Furrow	28,684
		Micro Sprinkler	177,201
		No Selection	6,191
		Sprinkler	39,199
B	**Secondary Irrigation Practices**		
		Border Strip	3,869
		Drip	28,071
		Flood	59,048
		Furrow	10,580
		Micro Sprinkler	32,588
		No Selection	281,931
		Sprinkler	17,379
		Total Acreage	**2,046,775**

Figure 35. Percent of acreage for irrigation management practices.



12.a.ii. Sediment Management Practices

Almost all Coalition members use management practices to control the movement of sediment; members typically employ more than one method on a parcel, as shown by the total acreage reported within sediment management practices greatly exceeding the total enrolled acres in the Coalition (Table 74, Figures 36 and 37). The most common methods to reduce erosion include implementing amendments to increase soil water penetration, minimizing tillage, and utilizing pressurized irrigation systems. In 2013 the same sediment and erosion practices were most commonly used. Overall, the percent acreages represented by each management practice have been fairly consistent from 2013 to 2014. More members chose to report on their potential to discharge sediment in 2014, primarily indicating that sediment does not have the potential to leave their property.

Table 74. Acreage associated with 2014 sediment management practice questions and responses.

Survey Section	Question	Response	Acreage
A	**Does your farm have the potential to discharge sediment to off-farm surface waters?**		
		No	246,261
		No Selection	70,739
		Yes	100,222
D	**Cultural Practices to Manage Sediment and Erosion**		
		Soil water penetration.	308,618
		Minimum tillage incorporated to minimize erosion.	259,437
		Cover crops or native vegetation.	243,213
		Crop rows are graded, directed and at a length.	175,252
		No storm drainage due to field or soil conditions.	157,759
		Storm water is captured using field borders.	123,707
		Berms.	118,602
		Field is lower than surrounding terrain.	78,533
		Vegetative filter strips and buffer.	73,408
		Sediment basins / holding ponds.	69,906
		Subsurface pipelines.	68,464
		Hedgerows or trees.	67,389
		Vegetated ditches.	66,300
		Creek banks and stream banks have been stabilized.	45,451
		No Selection for D3	19,975
D	**Irrigation Practices for Managing Sediment and Erosion**		
		Use drip or micro-irrigation to eliminate irrigation drainage.	306,226
		Lengthen time between pesticide applications and irrigation.	268,669
		No irrigation drainage due to field or soil conditions.	205,018
		Shorter irrigation runs are used with checks.	119,118
		Tailwater Return System.	78,749
		Catchment Basin.	65,092
		Use of flow dissipaters.	44,254
		In-furrow dams.	37,885
		No Selection.	14,750
		PAM (polyacrylamide) used in furrow and flood fields.	3960
		Total Acreage	**3,436,961**

Figure 36. Acreage of 2014 cultural practices implemented to manage sediment and erosion.

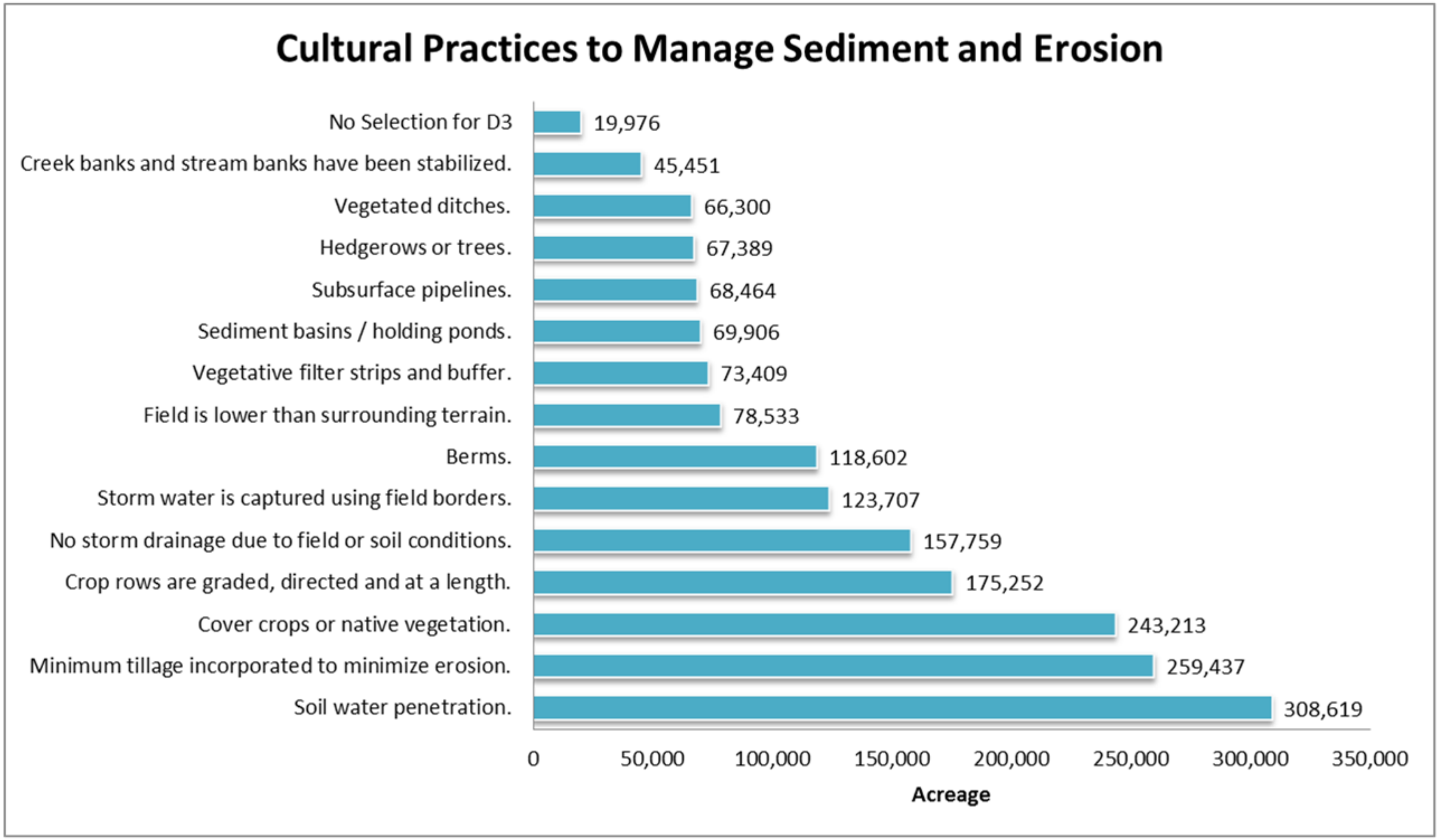
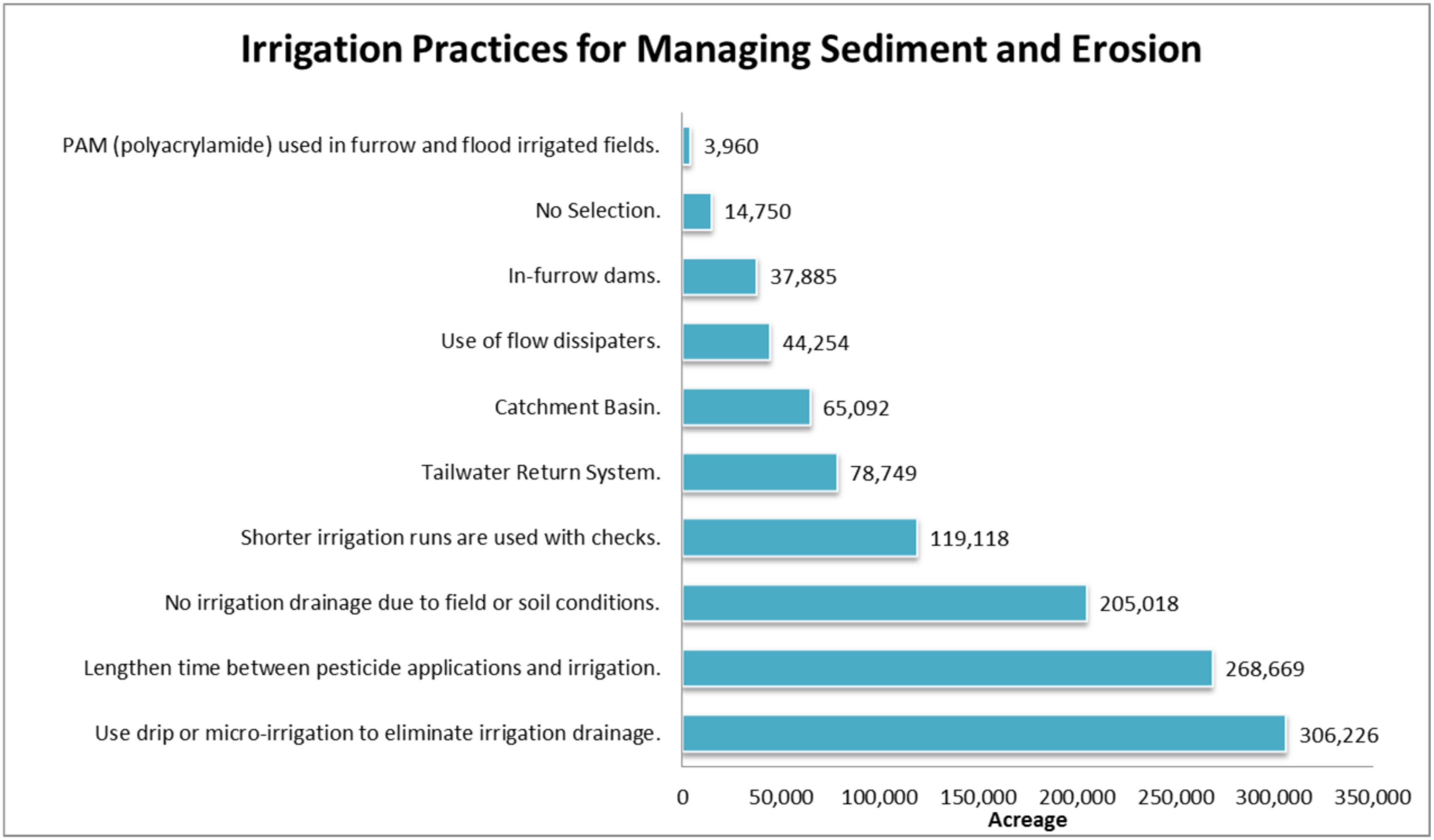


Figure 37. Acreage of 2014 practices implemented to manage sediment and erosion.



12.a.iii. Pesticide & Nutrient Management

Out of all management practices included in this Farm Evaluation, the largest number of reported practices are associated with pesticide and nutrient management. This indicates that members employ several practices to reduce the movement of pesticides and nutrients to surface waters (Table 75, Figures 38 through 40). No single pesticide management practice was used more than others; the relative consistency among practices with respect to the acreage on which they are used indicates that members may employ as many as eight to 10 practices to manage pesticide applications. The majority of members engage a professional in nutrient management to prepare their fertility plan, most often with a CCA or PCA certification. The top two reported nitrogen management practices were splitting fertilizer applications throughout the growing season and conducting soil and tissue testing. Foliar application of nitrogen was also commonly used.

Table 75. Acreage associated with 2014 pesticide application practices question and answers.

Survey Section	Question	Response	Acreage
A	**Pesticide Application Practices**		
		County Permit Followed	410,537
		Follow Label Restrictions	408,883
		Monitor Wind Conditions	402,073
		Use PCA Recommendations	397,448
		End of Row Shutoff When Spraying	391,210
		Avoid Surface Water When Spraying	390,842
		Monitor Rain Forecasts	381,204
		Attend Trainings	380,730
		Use Appropriate Buffer Zones	349,096
		Use Drift Control Agents	318,673
		Reapply Rinsate to Treated Field	236,582
		Sensitive Areas Mapped	234,565
		Chemigation	196,823
		Use Vegetated Drain Ditches	103,517
		Target Sensing Sprayer used	88,213
		Other1	37,669
		No Pesticides Applied	9,894
		No Selection	1,484
A	**Who do you have help develop your crop fertility plan?**		
		Pest Control Advisor (PCA)	382,665
		Certified Crop Advisor (CCA)	207,831
		Professional Agronomist	124,607
		Professional Soil Scientist	111,213
		UC Farm Advisor	83,258
		Independently Prepared by Member	67,430
		Certified Technical Service Providers by NRCS	20,644
		None of the above	8,650
		No Selection	1,959
B	**Nitrogen Management Methods to Minimize Leaching Past The Root Zone**		
		Soil Testing	336,484

Survey Section	Question	Response	Acreage
		Split Fertilizer Applications	318,649
		Tissue/Petiole Testing	310,550
		Foliar N Application	255,008
		Fertigation	238,767
		Irrigation Water N Testing	198,052
		Cover Crops	144,164
		No Selection	41,636
		Variable Rate Applications using GPS	39,909
		Other	22,790
		Total Acreage	**7,653,708**

Figure 38. Percent acreage associated with professionals qualified to develop crop fertility plans.

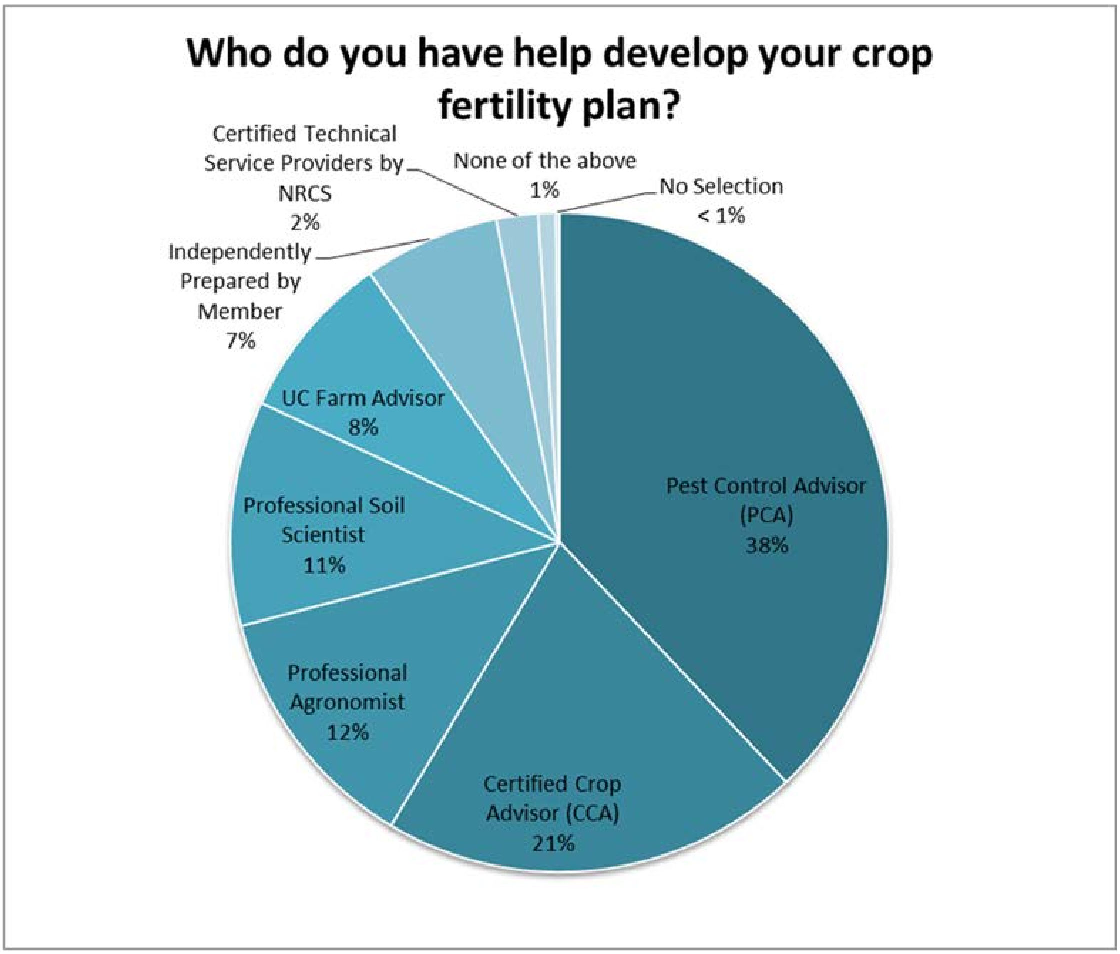


Figure 39. Acreage associated with 2014 pesticide application practices.

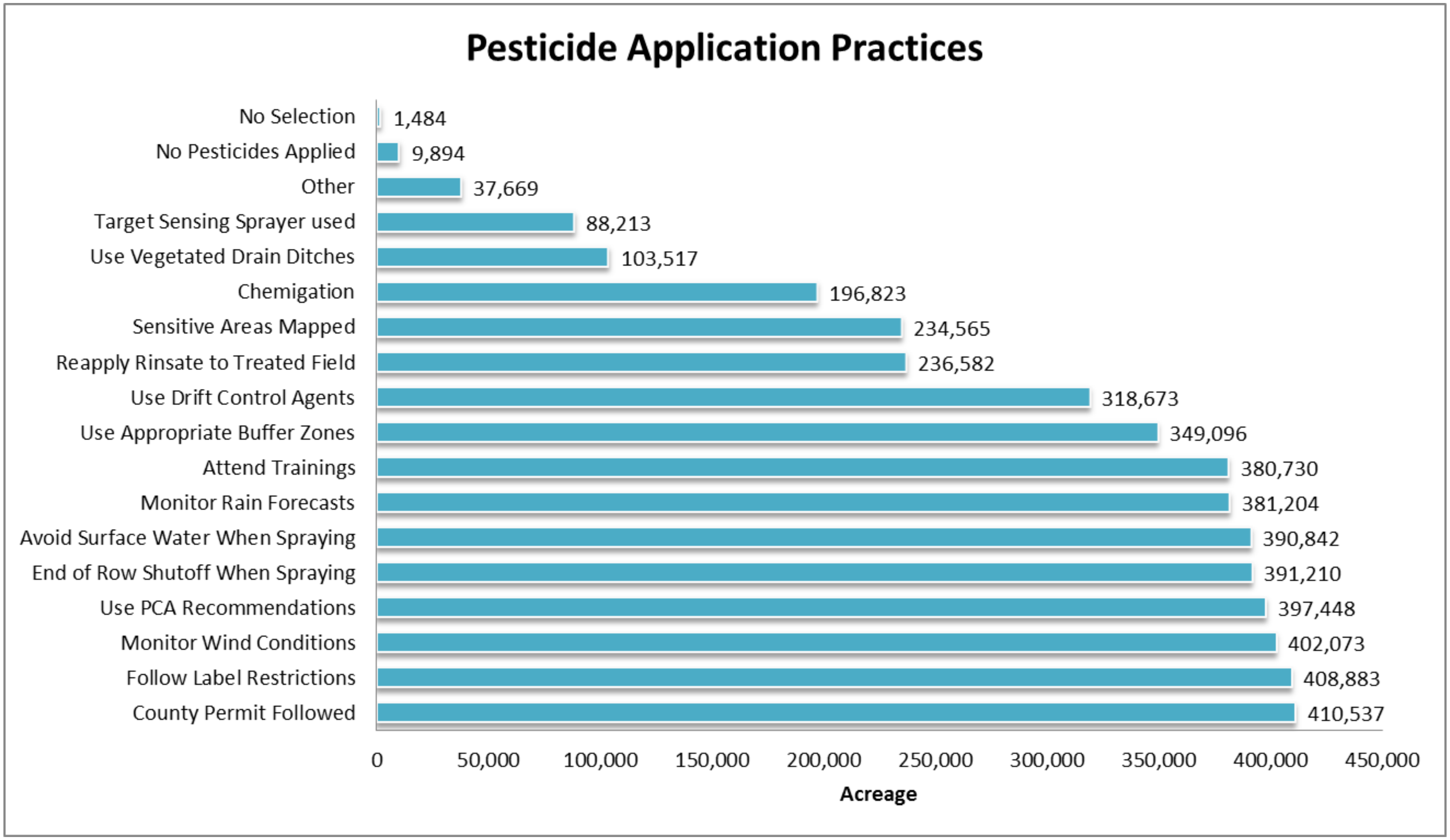
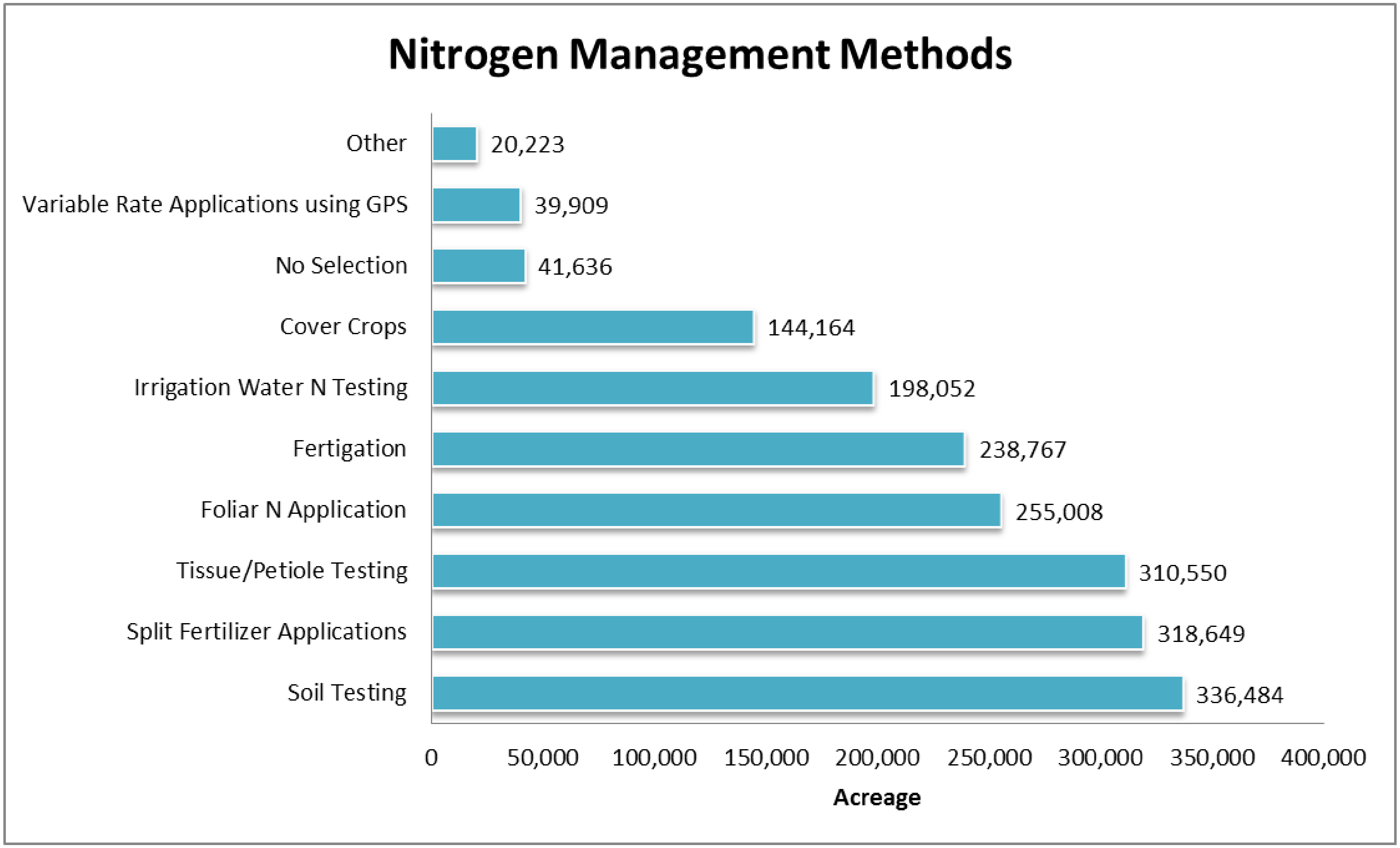


Figure 40. Acreage associated with 2014 nitrogen management methods.



12.b. Well Management Practices

12.b.i. Irrigation Wells

The majority of the parcels had at least one irrigation well with three to four wellhead protection practices in place (Table 76, Figure 41). The Coalition region contains many abandoned wells, with a large portion of these abandoned wells having been properly destroyed (Table 77, Figure 42). Fifteen percent more members completed the abandoned well questions in 2014, all of which indicated that they did not have any abandoned wells on their parcels. The number of wells abandoned over the years has fluctuated and appears to bear no relationship to any environmental variable although a thorough analysis was not conducted (Table 78).

Table 76. Acreage associated with 2014 wellhead protection practices.

Survey Section	Question	Response	Acreage
C	**Do you have any irrigation wells on parcels associated with this Farm Evaluation?**		
		No	32,950
		No Selection	16,416
		Yes	370,884
C	**Wellhead Protection Practices**		
		Air Gap (for non-pressurized systems	2,306,829
		Backflow Preventive / Check Valve	4,326,272
		Good "Housekeeping" Practices	4,983,036
		Ground Sloped Away from Wellhead	4,736,509
		N/A (Has No Irrigation Wells)	35,523
		No Data Entered	29,710
		Standing water avoided around wellhead	4,855,366
		Total Acreage	**21,693,496**

Figure 41. Percent acreage associated with members who have irrigation wells and members implementing wellhead protection practices.

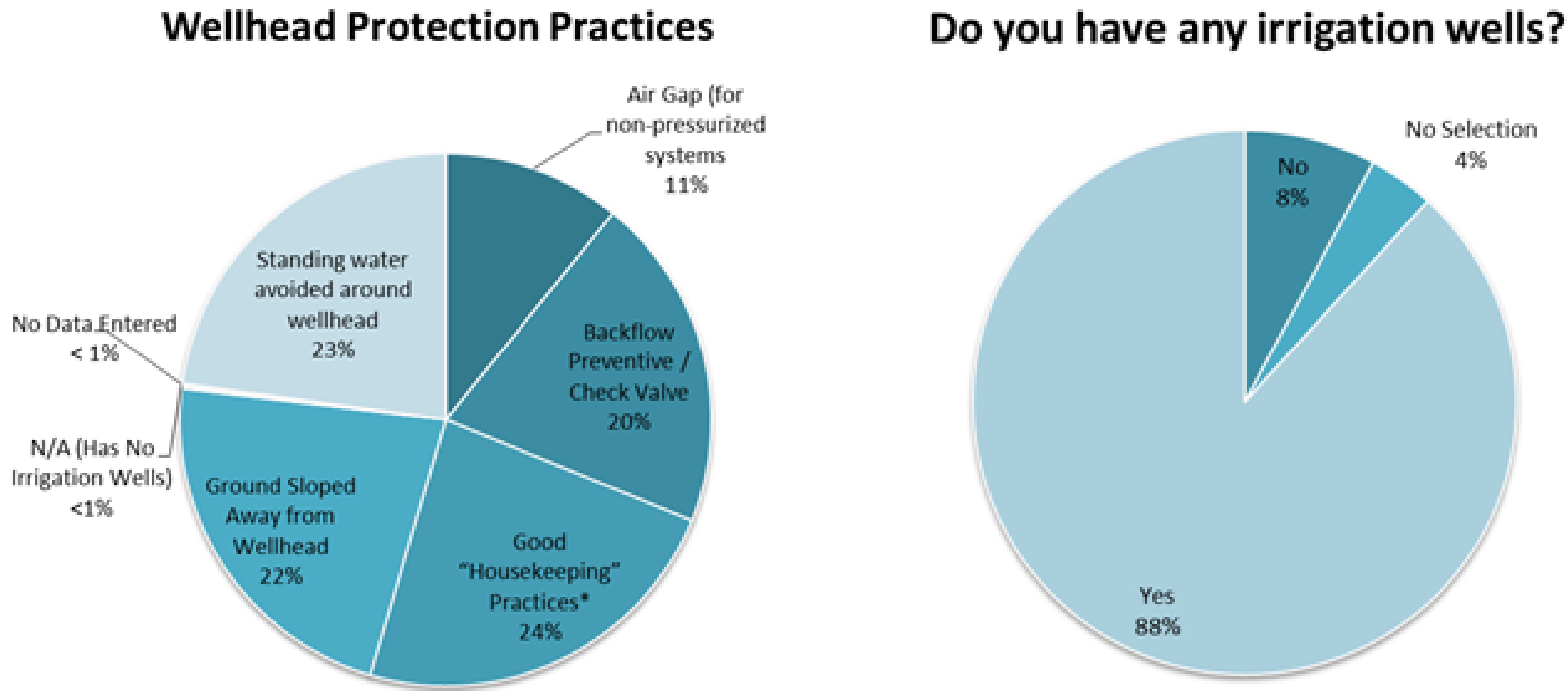


Table 77. Acreage associated with abandoned well practices.

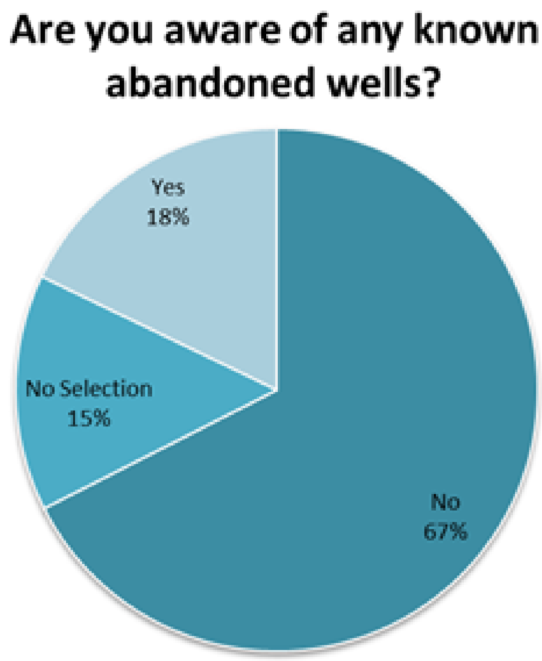
SURVEY SECTION	QUESTION	RESPONSE	ACREAGE
C	**Are you aware of any known abandoned wells associated with this Farm Evaluation?**		
		No	283,371
		No Selection	61,560
		Yes	74,923
C	**Abandoned Well Practices**		
		Destroyed – certified by county	25,175
		Destroyed - Unknown method	48,552
		Destroyed by licensed professional	85,570
		N/A (Has No Abandoned Wells)	284,356
		No Data Entered	125,317
		TOTAL ACREAGE	**988,825**

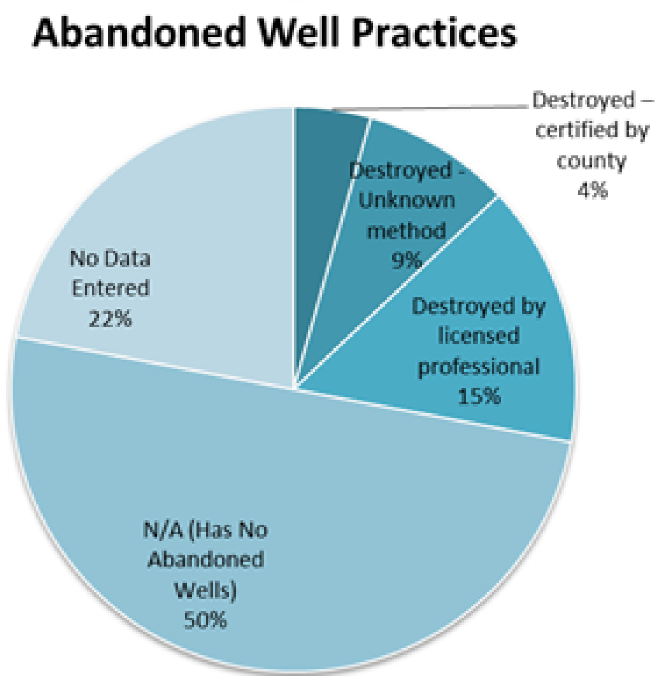
Table 78. Count of wells abandoned in specific years.

SURVEY SECTION	QUESTION	RESPONSE	COUNT OF WELLS
C	**Well Abandoned Year**	1960	1
		1962	1
		1967	1
		1968	1
		1970	4
		1971	1
		1975	2
		1977	2
		1978	1
		1986	2
		1988	1
		1990	8
		1991	2
		1994	2
		1995	2
		1996	2
		1998	4
		2000	6
		2001	1
		2002	2
		2003	3
		2004	4
		2005	2
		2006	3
		2007	1
		2008	4
		2009	7
		2010	9
		2011	6

SURVEY SECTION	QUESTION	RESPONSE	COUNT OF WELLS
		2012	6
		2013	6
		2014	8
		2015	2
		Year Unknown	30
		Unanswered	9
		TOTAL COUNT OF WELLS	**146**

Figure 42. Percentage of acreage with abandoned wells and practices associated with those wells.





12.B. NITROGEN MANAGEMENT PLAN

Coalition members are required to prepare and implement a Nitrogen Management Plan (NMP) and submit a Nitrogen Management Plan Summary Report for the previous crop year (template submitted on April 11, 2013, resubmitted on December 18, 2014; approved December 23, 2015). The NMP template was developed with all of the Central Valley coalitions. On January 20, 2015, the Coalition submitted a request for deadline extension of when growers in High Vulnerability areas are to have their NMPs certified from March 1, 2015 to March 1, 2016 (approved April 16-17, 2015). The template for the NMP Summary Report has not yet been approved.

The Coalition began mailing NMP surveys to all members on January 28, 2015; a total of 3,877 NMP surveys were mailed (NMP instructions and worksheet Figures 43 and 44). All members within groundwater high vulnerability areas must complete and maintain their NMP at their farming operation headquarters or primary place of business by March 1, 2015. On February 19, 2015 the Regional Board sent a memo requesting that the Coalitions submit several documents related to finalizing the NMP Summary Report template that members must submit to the Coalition by March 2016. On March 12, 2015, the Coalition in collaboration with the other Central Valley coalitions submitted a description of a NMP Technical Advisory Work Group (NMP TAWG) to the Regional Board that will develop a series of reference guidance documents and a Crop Nitrogen Knowledge Gap Study Plan. The NMP TAWG will meet during 2015 to determine what nitrogen removal guidance documents are available for crops grown within the Central Valley and identify data gaps that will affect the ability of growers to report on nitrogen use. The Regional Board has requested that a document or timeline related to the reference guidance documents used by growers and certifiers for the NMPs be submitted by December 18, 2015. A Crop Nitrogen Knowledge Gap Study Plan with workplan and milestone schedules is also due by December 18, 2015. All submittal/approval dates associated with the NMP are included in Table 69.

The ESJWQC is responsible for identifying members with high vulnerability parcels (for either surface water or groundwater). Groundwater high vulnerability areas are identified as:

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

Figure 43. Nitrogen Management Plan worksheet instructions.

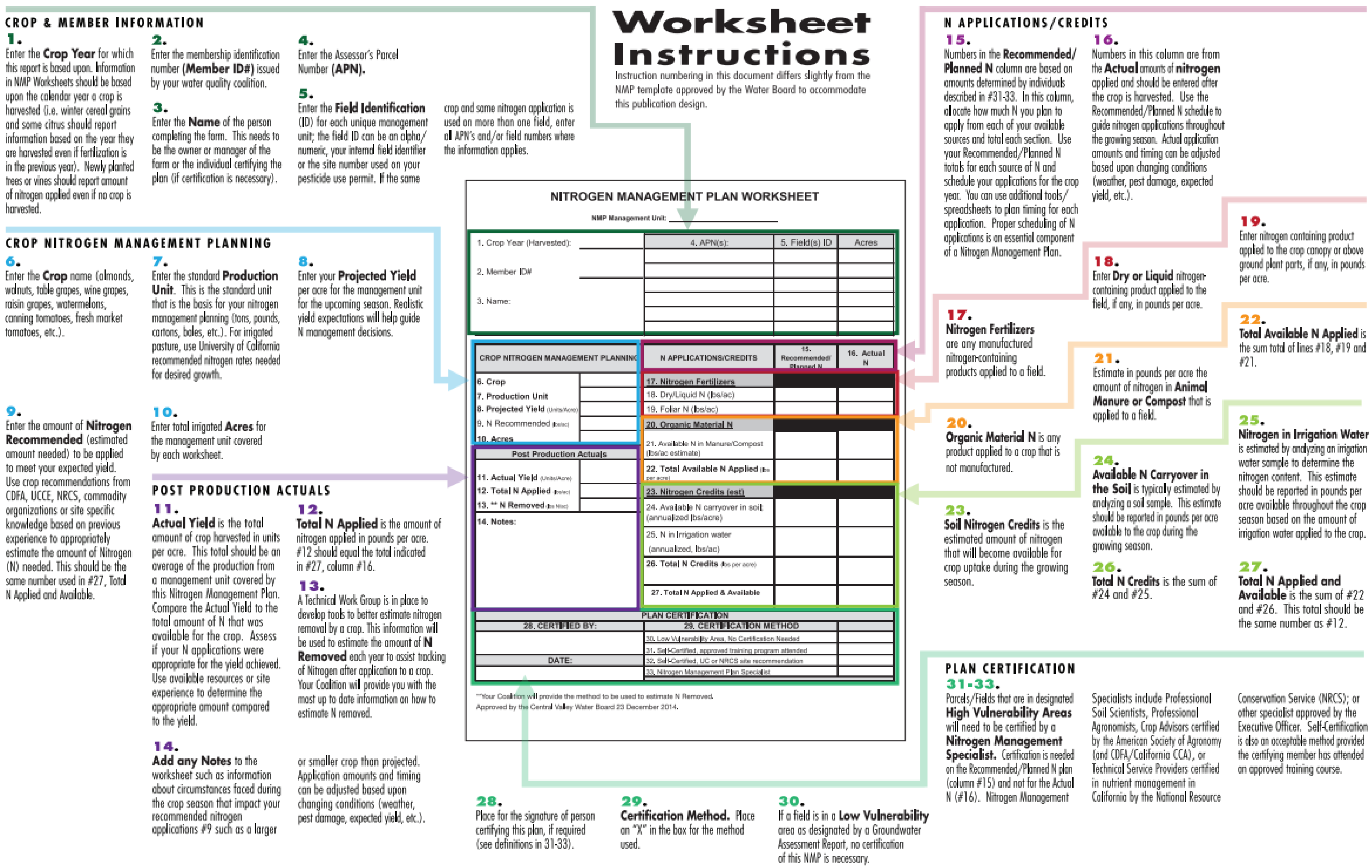


Figure 44. Nitrogen Management Plan Worksheet.

NITROGEN MANAGEMENT PLAN WORKSHEET

NMP Management Unit: ____________________________

		4. APN(s):	5. Field(s) ID	Acres
1. Crop Year (Harvested):				
2. Member ID#				
3. Name:				

CROP NITROGEN MANAGEMENT PLANNING			15. Recommended/ Planned N	16. Actual N
6. Crop		**17. Nitrogen Fertilizers**		
7. Production Unit		18. Dry/Liquid N (lbs/ac)		
8. Projected Yield (Units/Acre)		19. Foliar N (lbs/ac)		
9. N Recommended (lbs/ac)		**20. Organic Material N**		
10. Acres		21. Available N in Manure/Compost (lbs/ac estimate)		
Post Production Actuals				
11. Actual Yield (Units/Acre)		**22. Total Available N Applied** (lbs per acre)		
12. Total N Applied (lbs/ac)		**23. Nitrogen Credits (est)**		
13. ** **N Removed** (lbs N/ac)		24. Available N carryover in soil; (annualized lbs/acre)		
14. Notes:		25. N in Irrigation water (annualized, lbs/ac)		
		26. Total N Credits (lbs per acre)		

PLAN CERTIFICATION		
28. CERTIFIED BY:	**29. CERTIFICATION METHOD**	
	30. Low Vulnerability Area, No Certification Needed	
	31. Self-Certified, approved training program attended	
DATE:	32. Self-Certified, UC or NRCS site recommendation	
	33. Nitrogen Management Plan Specialist	

** Your Coalition will provide the method to be used to estimate N Removed.
Approved by the Central Valley Water Board 23 December 2014.

12.C. SEDIMENT DISCHARGE AND EROSION CONTROL PLAN

All Coalition members are required to implement effective sediment discharge and erosion prevention practices. The Coalition submitted the Sediment and Erosion Control Plan Template to the Regional Board on April 11, 2013. All submittal/approval dates associated with the Sediment and Erosion Control Plan are included in Table 69. The Regional Board compiled comments regarding the template from stakeholders and Regional Board staff. The Central Valley coalitions are working together with Regional Board staff to revise the template to ensure that the template is adequate for documenting practices that are protective of water quality. The template will be used by all Coalitions.

The Coalition was required to provide an assessment report to identify areas susceptible to erosion and discharge of sediment that could impact receiving water (submitted January 13, 2014 and resubmitted December 12, 2014; approval pending). The Sediment Discharge and Erosion Assessment Report (SDEAR) identifies the areas within the ESJWQC region where growers will be required to complete Sediment and Erosion Control Plans (SECPs). In addition, the Farm Evaluations include questions which address erosion potential and allow members to self-identify as potential dischargers of sediment to surface waters. Members identified as having potential to discharge sediment are required to prepare a SECP in one of the ways identified in the WDR (Page 25). Therefore, with the approval of the SDEAR, the Coalition will contact members located in areas identified as having a high potential for erosion and request that those members complete the SECP. A qualified Sediment and Erosion Control Plan developer must certify the member's SECP (WDR, Attachment A, Page 23). Those plans will be maintained at the member's farming operation and updated as conditions change. The document must be onsite and accessible by the Regional Board staff if requested during inspections.

Members located in areas with high potential for erosion are required to complete and implement a SECP within 180 days (farm operations greater than 60 irrigated acres) and within one year (small farm operations less than 60 irrigated acres) of the approval of the SDEAR (Table 69).

12.D. 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 the impacts where feasible or implement identified mitigation measures, if any, to reduce the potential impacts. Where avoidance or implementation of identified mitigation is not feasible, use of the WDR is prohibited and individual WDRs would be required. The MRP Order, Attachment B, includes a Mitigation Monitoring and Reporting Program for tracking the implementation of mitigation measures. Any California Environmental Quality Act (CEQA) mitigation measures implemented and reported by 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 mitigation measures implemented during the reporting period.

12.E. GROUNDWATER QUALITY ASSESSMENT REPORT AND EVALUATION/MONITORING WORKPLANS

For groundwater protection, the WDR requires 1) a GAR, 2) a Management Practices Evaluation Program (MPEP), 3) a Groundwater Quality Trend Monitoring Program, and 4) a Groundwater Quality Management Plan (GQMP). Table 69 includes all deadlines associated with the Groundwater Quality Assessment Report and Evaluation/Monitoring Workplans.

12.a. Groundwater Quality Assessment Report

The ESJWQC GAR was approved on December 24, 2014 (Table 69). With the approval of the GAR, the deadline for the GQMP was established and the Coalition submitted its GQMP on February 23, 2015.

The GAR contains details on the approach and methods applied to determine high and low vulnerability areas in the ESJWQC region. The GAR is designed to provide information necessary for the design of the Management Practices Evaluation Program, the Groundwater Quality Trend Monitoring Program, and the GQMP. Therefore, the GAR includes the following:

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

The GAR compares the designated East San Joaquin High Vulnerability Area (ESJHVA) to each area designated by the State Water Board Resources Control Board's (SWRCB) Hydrogeologically Vulnerable Areas and California Department of Pesticide Regulation's (DPR) Groundwater Protection Area, and to these areas combined. The GAR's content develops the scientific quantification of vulnerable areas as related to the delineation of areas of higher and lower groundwater vulnerability. A model for assessing groundwater vulnerability for the ESJWQC area was developed through statistical approaches based on observed groundwater quality and hydrogeologic characteristics. High vulnerability areas are identified and prioritized in the GAR. Six areas identified as Tentative High Vulnerability Areas have been identified and further examination of these areas is required to determine whether they should remain in the high groundwater vulnerability category. High vulnerability areas are required to have a management plan and are assessed in the ESJWQC GQMP that was submitted in January 2015. The purpose of the GQMP is to develop a strategy for managing groundwater contamination due to agricultural practices. The ESJWQC strategy is informed by the Management Practices Evaluation Program (MPEP), the Nitrogen Management Plan Technical Advisory Work Group (NMP TAWG) efforts, grower management practice documentation and groundwater monitoring.

12.b. Management Practices Evaluation Program

As a coordinated effort with the Westside Water Quality Coalition, Westlands Coalition, Sacramento Valley Water Quality Coalition and the San Joaquin County and Delta Water Quality Coalition, the ESJWQC has developed a MPEP Coordinating Committee which will oversee the development of the MPEP Workplan. The overall goal of the MPEP is to determine whether various management practices used by irrigated agriculture are protective of groundwater. The MPEP must address the conditions relevant to high vulnerability groundwater areas. Associated submittals/approvals and upcoming due dates are included in Table 69.

12.c. Groundwater Quality Trend Monitoring Workplan

The Coalition is required to develop a Groundwater Quality Trend Monitoring Workplan and QAPP for Trend Monitoring one year after the conditional approval of the GAR (conditional approval June 4, 2014; Table 69). Both documents will be submitted June 4, 2015.

The overall objectives of groundwater trend monitoring are to 1) determine the current water quality conditions of groundwater relevant to irrigated agriculture, and 2) develop long-term groundwater quality information for evaluation of the regional effects of irrigated agricultural practices. During the development of the GAR, numerous existing wells were identified to satisfy future requirements to develop a Groundwater Quality Trend Monitoring network to track groundwater quality and its response to agricultural practices.

13. PROGRAMMATIC QUESTIONS

The following sections provide responses to the six key programmatic questions outlined in the WDR using water quality information obtained during monitoring in the 2014 WY. The Coalition utilizes monitoring data as well as management practice information to make the following conclusions. Water quality within the Coalition region has been determined using monitoring data from the 2014 WY collected from Core and Represented sites and during MPM events, as outlined in the 2014 MPU. These data indicate water quality improvements are continuing across the Coalition region.

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

The CVRWQB has determined that waters of the State receiving discharge from irrigated lands must support all beneficial uses (BUs) including Agricultural Supply (AG), Aquatic Life (AQ; including cold freshwater habitat spawning, warm freshwater habitat, and freshwater habitat), Water Contact Recreation (REC 1), and Municipal and Domestic Supply (MUN or Municipal). In 2008, the Regional Board developed a list of WQTLs based on numeric water quality objective and standards from the Basin Plan including interpretive narrative water quality objectives (Table 33). The Coalition uses this list of WQTLs to determine exceedances and impairments of BUs. In the WDR, a table of WQOs is included in Attachment B. The Order states that additional trigger limits may be developed by the Executive Officer utilizing water quality criteria to interpret narrative water quality objectives. In lieu of receiving this finalized list, the Coalition continues to utilize the previous WQTLs included in Table 33.

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 for Coalition monitoring sites are applied based on the BU assigned to the most immediate downstream waterbody listed in the Basin Plan. 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 for the Waters of the State may be difficult to achieve. Waters of the State are protected if no exceedances of WQTLs occur during monitoring events. Multiple exceedances of WQTLs impairing BUs have occurred during the 2014 WY (Table 79); therefore receiving waters to which irrigated lands discharge are not meeting applicable WQOs and Basin Plan provisions.

Not all constituents have a WQTL associated with a BU including pH, orthophosphate (soluble), phosphorus (total), TKN, TOC, TSS, carbofuran, demeton-s, dicofol, malathion, molinate, parathion, methyl, and thiobencarb. These constituents are not included in the assessment of BU protection (Tables 79–80, Figure 45) and are addressed separately.

13.a. Protection of Beneficial Uses

Table 79 lists constituents that were detected above their respective WQTLs during the 2014 WY monitoring and the BUs impaired by the exceedances. Figure 45 includes percentages of exceedances of constituent specific WQTLs that impaired BUs based on the 2014 WY monitoring results in the Coalition region. Table 80 lists sites in the Coalition region monitored from 2008 through September 2014 and summarizes when water quality was protective of BUs.

The most common exceedances of the WQTLs were 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 (Figure 45). Impairment of the Municipal BU resulted from elevated concentrations of arsenic, diuron, nitrate/nitrite, and ammonia. There were numerous exceedances of the WQTL for *E. coli* which resulted in an impaired Recreational BU. *E. coli* is the only constituent monitored by the Coalition that can cause impairment to Recreational BU (Table 79). Even though improvements are evident from the 2014 WY monitoring results, water quality is still not entirely protective of all BUs across the Coalition region.

Table 79. Number of times beneficial uses were impaired in the 2014 WY.

Beneficial Use	DO	SC	TDS	Ammonia[1]	*E. coli*	Nitrate	Dissolved Metals (Copper)	Total Arsenic	Total Molybdenum	Herbicides (Diuron)	Pesticides[2,3] (Chlorpyrifos)
AQ Life	75			1			5				3
AG		82	NA*						8		
MUN				1		7		1		1	
REC 1					12						

[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 beneficial uses; different pesticides affect different beneficial uses; see Table 33.

[3] Exceedance of malathion at Duck Slough @ Gurr Rd is not included because there is no WQTL associated with a beneficial use for the constituent. Discharge of malathion is prohibited except for land covered under the Rice Coalition Management Plan.

*Monitoring for TDS is no longer required; the Coalition will continue to monitor for SC to measure salinity.

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

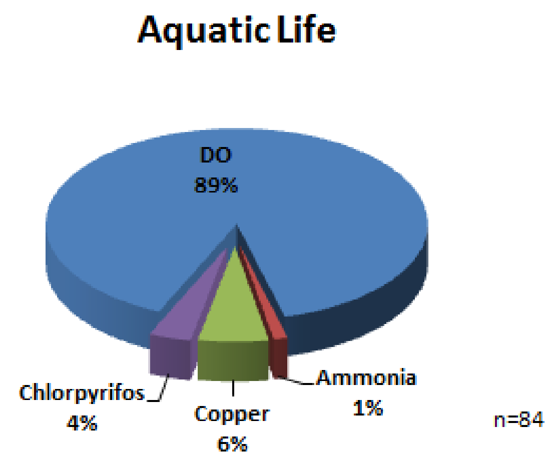
AG-Agricultural

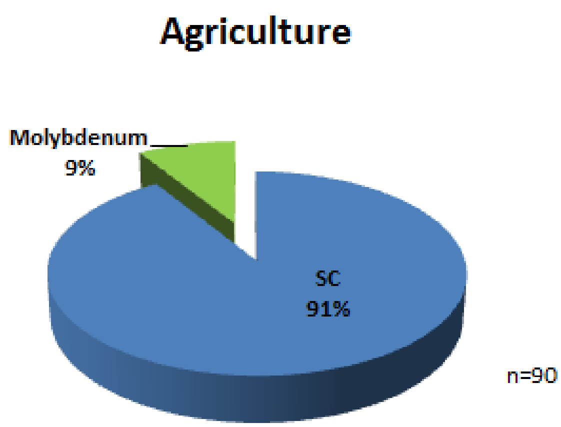
MUN-Municipal and Domestic Supply

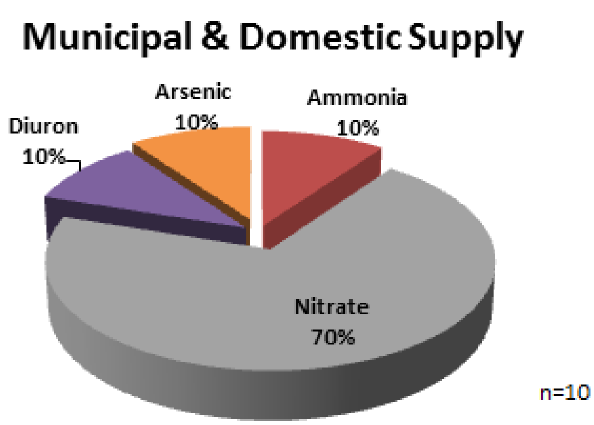
REC 1-Water Contact Recreation

Figure 45. Percentages of impairments of BUs due to exceedances of constituent specific WQTLs from the 2014 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.







13.a.i. Agricultural BU

The Agricultural BU has been impaired due to salts (measured as SC) and total molybdenum in agricultural drains monitored in the ESJWQC region (Figure 45), specifically within Zone 2. Zone 2 includes the western portion of the Coalition region where there is shallow salty groundwater. This area of the Coalition region has inadequate subsurface drainage resulting in low crop productivity if the water is not drained from the root zone. Tile drains were installed to intercept rising groundwater and infiltrating surface water. This water is then drained off the fields so the land can be used for agriculture.

Seventy-seven of the 82 exceedances of the WQTL for SC occurred in sites located in Zone 2 (Appendix III, Table 2A). 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 total molybdenum only occurred in Zone 2. There are no registered products containing this constituent currently in use in the Coalition area. The west side 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.

13.a.ii. Aquatic Life BU

Monitoring results indicate that exceedances of the WQTLs for DO (81%), dissolved copper (6%), chlorpyrifos (4%), and ammonia (1%) resulted in impairments to the Aquatic Life BU (Figure 45).

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 receive recommendations to implement management practices designed to prevent the offsite movement of constituents (including high priority constituents and sediment) into the waterway by reducing irrigation tailwater and storm runoff. As growers implement management practices to reduce discharge of high priority constituents, the amount of water flowing into tributaries is also reduced. When growers reduce the amount of water entering tributaries, water flows and potentially DO concentrations can be lowered. Of the DO exceedances, 17 occurred in in non-contiguous waterbodies.

Copper is one of the two pesticides applied by agriculture and found in concentrations above WQTLs that impaired the Aquatic Life BU; the other was chlorpyrifos (Table 79, Figure 45). A total of five exceedances of the hardness based dissolved copper WQTL occurred in the environmental samples collected at sites in the ESJWQC. Exceedances of the WQTL for copper occurred in samples collected from locations in Zones 3 and 6 (Appendix III, Table 2A). All five exceedances were from sites in a management plan for copper.

Chlorpyrifos detected in samples at concentrations above the WQTL from three sites resulted in Aquatic Life BU impairments (Table 79, Figure 45). 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.

13.a.iii. Municipal and Domestic Supply BU

Exceedances of the WQTL for nitrate (70%), ammonia (10%), diuron (10%), and arsenic (10%) caused impairments to Municipal BU (Figure 45). During the 2014 WY, a total of 7 exceedances of the WQTL for nitrates occurred in samples collected from Prairie Flower Drain @ Crows Landing Rd in Zone 2 (Appendix III, Table 2A). The site is 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 may now be intercepted by the field and surface drains resulting in exceedances of the WQTL for nitrate.

One sample collected from Prairie Flower Drain @ Crows Landing Rd contained concentrations of ammonia above the WQTL of 1.5 mg/L. Previous exceedances of the WQTL for ammonia and associated water column toxicities in Zone 2 were attributed to discharge from dairies; five of the nine samples with ammonia concentrations above the WQTL also coincided with water column toxicity (once to *C. dubia*, twice to *P. promelas*, and twice to *S. capricornutum*).

A single exceedance of the diuron WQTL occurred at Prairie Flower Drain @ Crows Landing Rd during a storm in March. This was the first exceedance of the WQTL for diuron to occur at the site. No applications of diuron have been recorded in the site subwatershed since 2012.

A single exceedance of the total arsenic WQTL occurred at Duck Slough @ Gurr Rd during a storm in March (16 µg/L). This was the first exceedance of the WQTL to occur at the site. The registrations of many products with arsenic as an active ingredient have been cancelled. In addition, arsenic is a naturally occurring metal in the Coalition area.

13.b. Overall Frequency of Exceedances

Trends of improving water quality in the Coalition region are evident from 2008 through the 2014 WY, where monitoring results indicate declines in the frequency of exceedances of WQTLs of applied pesticides (Table 80). The Coalition began focused outreach at first priority site subwatersheds and recommended management practices to targeted growers in 2008 and continued through fifth priority sites in 2014. 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, whether or not each of the BU categories has been protected or not. There are currently 31 site subwatersheds in a management plan in the Coalition region. Sixteen of the 31 site subwatersheds have had at least one constituent removed from a management plan due to improved water quality. Improvements in water quality are noticeable in high priority subwatersheds where the Coalition has conducted focused outreach and education, including Ash Slough @ Ave 21, Bear Creek @ Kibby Rd, Berenda Slough along Ave 18 ½, Cottonwood Creek @ Rd 20, Deadman Creek @

Hwy 59, Dry Creek @ Rd 18, Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99, Highline Canal @ Lombardy Rd, Hilmar Drain @ Central Ave, Howard Lateral @ Hwy 140, Lateral 2 ½ near Keyes Rd, Merced River @ Santa Fe, and Miles Creek @ Reilly Rd (Table 80).

Of the 32 waterbodies sampled in the 2014 WY, 20 waterbodies had one or more BUs category protected; 15 were impaired for that BU one or more previous years (blue highlights, Table 80). Monitoring results at sites where high priority focused outreach is complete indicate a higher frequency of meeting Municipal and Agricultural BUs compared to before focused outreach. Twelve sites where focused outreach is complete have meet BUs at least three recent years and five sites met all BUs during monitoring in the 2014 WY.

Waste discharged from irrigated lands is but 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. Water quality protective of BUs within Coalition boundaries may not depend exclusively on the Coalition efforts alone; other dischargers may need to improve the quality of their discharge. The difference in geology and geography between Coalition zones influences monitoring results for constituents such as SC and dissolved copper. Monitoring sites in Zone 2 are geographically located in an area where high salinity is common, resulting in exceedances of the WQTLs for SC. Due to high salinity, sites in Zone 2 rarely meet Agricultural beneficial uses, although agriculture clearly exists in Zone 2 (Table 80). Growers in Zone 2 farm commodities such as forage crops, which have a relatively high tolerance to salinity. It is possible that certain geologic conditions could be contributing to the elevated copper levels found in water column samples in these zones. As a result, sites in these zones commonly do not meet Aquatic Life BU. The number of exceedances of other constituents applied by agriculture has declined significantly while exceedances of the WQTL for copper continue. Growers have implemented management practices that reduce the discharge of pesticides such as chlorpyrifos. If managing applications eliminates exceedances of the chlorpyrifos WQTL, it is expected that these practices would eliminate the discharge of copper. However copper exceedances often do not coincide with high applications of copper. 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.

13.b.i. Exceedances of WQTLs of Constituents Not Associated with Beneficial Use

pH

There were 28 exceedances of the WQTL for pH during the 2014 WY; all were exceedances of the upper WQTL (8.5). The pH exceedances occurred in every zone in the Coalition region with the exception of Zone 1 and the majority (12) occurred in Zone 2.

Malathion

In addition, samples collected from Duck Slough @ Gurr Rd during April irrigation event resulted in an exceedance level detection of the organophosphate malathion. There is a prohibition of discharge for the pesticide malathion except under the Rice Coalition Management Plan; therefore any detection of the constituent is considered an exceedance. Since there is a prohibition of discharge of this constituent, it is not assigned a most restrictive BU; however, malathion is known to be toxic to aquatic life. For this reason, addressing malathion during education and outreach as well as recommending management practices for growers to implement is still relevant to maintain the integrity of Waters of the State. The Coalition discusses all constituents with growers during high priority focused outreach.

Table 80. Evaluation of beneficial uses applied to 2008-2014 WY monitoring locations (alphabetical by Zone).

'X' indicates no sampling occurred during the years specified. Blue highlights indicate a protected BU in the 2014 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?
1	Dry Creek @ Wellsford Rd (2008-2013)	Tuolumne River (New Don Pedro Dam to SJ River)	MUN	No	No	Yes	Yes	Yes	No	Yes
			AG	Yes	Yes	Yes	No	Yes	Yes	Yes
			REC 1	No	No	No	No	Yes	No	No
			AQ Life	No	No	No	No	No	No	No
1	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
			AG	X	Yes	Yes	X	X	Yes	Yes
			REC 1	X	No	No	X	X	No	X
			AQ Life	X	No	No	X	X	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
			AG	X	X	X	X	X	No	No
			REC 1	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	No	No
2	Hilmar Drain @ Central Ave (2012-2014)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	No	Yes	X	X	Yes	Yes	Yes
			AG	No	No	X	X	No	No	No
			REC 1	No	Yes	X	X	X	X	X
			AQ Life	No	Yes	X	X	Yes	Yes	No
2	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
			AG	Yes	No	Yes	Yes	X	No	No
			REC 1	No	No	Yes	Yes	X	X	X
			AQ Life	No	No	No	Yes	X	Yes	No
2	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
			AG	X	X	X	X	X	X	No
			REC 1	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	Yes
2	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
			AG	X	X	X	X	X	X	No
			REC 1	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	No
2	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
			AG	X	X	X	X	No	No	No
			REC 1	X	X	X	X	No	No	X
			AQ Life	X	X	X	X	No	No	No
2	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
			AG	X	X	X	X	X	X	No
			REC 1	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	No
2	Prairie Flower Drain @ Crows Landing Rd	San Joaquin River (mouth of Merced River to	MUN	No	No	No	No	No	No	No
			AG	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?
	(2008-2010)	Vernalis)	REC 1	No	No	No	No	No	No	No
			AQ Life	No	No	No	No	No	No	No
2	Unnamed Drain @ Hogin Rd (2017-2019)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	No
			REC 1	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	No
2	Westport Drain @ Vivian Rd (2014-2016)	San Joaquin River (mouth of Merced River to Vernalis)	MUN	No	X	X	X	X	X	X
			AG	No	X	X	X	X	X	No
			REC 1	No	X	X	X	X	X	X
			AQ Life	No	X	X	X	X	X	No
3	Highline Canal @ Hwy 99 (2010-2012)	San Joaquin River (mouth of Merced River to Vernalis) / Merced River (McSwain Reservoir to SJR)	MUN	No	No	Yes	No	Yes	Yes	Yes
			AG	No	No	Yes	Yes	Yes	Yes	Yes
			REC 1	No	No	No	No	Yes	No	No
			AQ Life	No	No	Yes	Yes	No	No	No
3	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
			AG	No	Yes	Yes	Yes	Yes	Yes	Yes
			REC 1	No	X	Yes	No	Yes	X	X
			AQ Life	No	Yes	No	No	No	No	No
3	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
			AG	No	No	No	X	X	Yes	Yes
			REC 1	No	No	No	X	X	Yes	X
			AQ Life	No	No	No	X	X	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
			AG	Yes	X	Yes	Yes	Yes	Yes	Yes
			REC 1	No	X	X	X	X	X	X
			AQ Life	No	X	Yes	Yes	Yes	Yes	Yes
4	Black Rascal Creek @ Yosemite Rd (2012-2014)	Merced River (McSwain Reservoir to SJ River)	MUN	No	X	X	X	X	Yes	X
			AG	Yes	X	X	X	X	Yes	Yes
			REC 1	No	X	X	X	X	X	X
			AQ Life	No	X	X	X	X	No	No
4	Canal Creek @ West Bellevue Rd	Merced River (McSwain Reservoir to SJ River)	MUN	X	X	X	X	X	X	X
			AG	X	X	X	X	X	X	Yes
			REC 1	X	X	X	X	X	X	X
			AQ Life	X	X	X	X	X	X	No
4	Howard Lateral @ Hwy 140 (2015-2017)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	X	No	Yes	Yes	X	Yes	X
			AG	X	No	Yes	Yes	X	Yes	Yes
			REC 1	X	No	No	X	X	X	X
			AQ Life	X	No	No	No	X	No	Yes

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?
4	Livingston Drain @ Robin Ave (2011-2013)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	X	X	Yes	Yes	Yes	X
			AG	Yes	X	X	Yes	Yes	Yes	Yes
			REC 1	No	X	X	X	X	X	X
			AQ Life	No	X	X	No	No	Yes	Yes
4	McCoy Lateral @ Hwy 140 (2016-2018)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	X	X	X	Yes	Yes	Yes	X
			AG	X	X	X	Yes	Yes	Yes	X
			REC 1	X	X	X	Yes	No	X	X
			AQ Life	X	X	X	No	No	No	X
4	Merced River @ Santa Fe Rd (2013-2015)	Merced River (McSwain Reservoir to SJ River)	MUN	Yes	Yes	Yes	No	Yes	Yes	Yes
			AG	Yes	Yes	Yes	Yes	Yes	No	Yes
			REC 1	Yes	Yes	No	No	Yes	No	No
			AQ Life	No	No	Yes	Yes	Yes	No	Yes
4	Unnamed Drain @ Hwy 140 (2016-2018)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	X	X	X	X	X	Yes	X
			AG	X	X	X	X	X	Yes	No
			REC 1	X	X	X	X	X	No	X
			AQ Life	X	X	X	X	X	No	No
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
			AG	Yes	No	No	X	Yes	Yes	No
			REC 1	No	No	No	X	X	X	X
			AQ Life	No	No	No	X	Yes	No	No
5	Deadman Creek @ Hwy 59 (2012-2014)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	X	X	Yes	No	Yes	X
			AG	Yes	X	X	Yes	Yes	Yes	Yes
			REC 1	No	X	X	No	No	X	X
			AQ Life	No	X	X	No	No	Yes	Yes
5	Duck Slough @ Gurr Rd (2010-2012)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	Yes	No	Yes	Yes	Yes	No	Yes
			AG	Yes	No	Yes	Yes	Yes	No	No
			REC 1	Yes	No	No	No	No	No	No
			AQ Life	No*	No	No*	No	Yes	No	No
5	Duck Slough @ Hwy 99 (2008-2010)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	Yes	Yes	Yes	Yes	X	X
			AG	No	Yes	Yes	Yes	Yes	X	X
			REC 1	No	X	X	X	X	X	X
			AQ Life	No	No	Yes	Yes	Yes	X	X
5	Miles Creek @ Reilly Rd (2013-2015)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	X	X	X	X	X	Yes	X
			AG	X	X	X	X	X	No	Yes
			REC 1	X	X	X	X	X	No	X
			AQ Life	X	X	X	X	X	No	No
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
			AG	Yes	Yes	Yes	X	X	X	Yes
			REC 1	Yes	Yes	Yes	X	X	X	X
			AQ Life	Yes	No	No	X	X	X	Yes
6	Berenda Slough along Ave 18 ½ (2011-2013)	San Joaquin River (Sack Dam to mouth of Merced	MUN	X	X	X	Yes	Yes	Yes	X
			AG	X	X	X	Yes	Yes	Yes	Yes

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?
		River)	REC 1	X	X	X	No	Yes	X	X
			AQ Life	No	X	X	No	No	No	Yes
6	Cottonwood Creek @ Rd 20 (2010-2012)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	Yes	Yes	Yes	Yes	Yes+	Yes	Yes+
			AG	Yes	Yes	Yes	Yes	Yes+	Yes	Yes+
			REC 1	Yes	No	No	No	Yes+	No	Yes+
			AQ Life	No	Yes	No	No	Yes+	No	Yes+
6	Dry Creek @ Rd 18 (2011-2013)	San Joaquin River (Sack Dam to mouth of Merced River)	MUN	No	X	X	Yes	Yes	Yes	No
			AG	Yes	X	X	Yes	Yes	Yes	Yes
			REC 1	No	X	X	X	X	No	X
			AQ Life	No	X	X	No	Yes	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.

13.B. QUESTION 2: ARE IRRIGATED AGRICULTURAL OPERATIONS CAUSING OR CONTRIBUTING TO IDENTIFIED WATER QUALITY PROBLEMS? IF SO, WHAT ARE THE SPECIFIC FACTORS OR PRACTICES CAUSING OR CONTRIBUTING TO THE IDENTIFIED PROBLEMS?

Irrigated agricultural operations are contributing to identified water quality impairments. However, for many parameters, it is not clear to what extent exceedances of WQTLs are from agricultural activities resulting in offsite movement of farm inputs and sediment into waterways. Most exceedances are for parameters not applied by irrigated agriculture or which may originate with numerous sources in addition to irrigated agriculture. Source identification is difficult, especially for non-conserved constituents and constituents with numerous potential sources. There are numerous non-conserved constituents that cannot be traced upstream, e.g. DO and pH. Even in pristine watersheds, exceedances of WQTLs for these constituents may occur as a result of normal diurnal stream processes. During sampling from the 2014 WY, locations in the western portion of the Coalition region (Zone 2) had 77 exceedances of the WQTL for SC (76% of samples measured in Zone 2; Appendix III, Table III-2A). The construction of drains such as Prairie Flower Drain and Levee Drain occurred in the late 1800s as a means of lowering 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 exceedance level detections of SC. Retention basins would fill from shallow groundwater almost as soon as construction was completed.

Exceedances of nutrient (e.g. ammonia and nitrates) WQTLs are a major cause of impairment of the Municipal BU and may or may not be a result of fertilizer runoff into waterways. Elevated concentrations of nitrates tend to occur in subwatersheds such as Prairie Flower Drain and Levee Drain where surface drains intercept shallow groundwater with high concentrations of nitrates derived from decades of discharge from dairy operations. During the 2014 WY, all water samples resulting in exceedances of the WQTL for nitrates were collected from Prairie Flower Drain @ Crows Landing Rd (58% of samples collected at the site; Appendix III-Table III-2A). Unless sophisticated isotopic analytical analyses are performed, it is not possible to distinguish nitrates originating from inorganic fertilizers applied to crops from cows in dairy and feedlot operations.

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. During the 2014 WY, there were three exceedances of the WQTL for chlorpyrifos (2% of all samples collected and analyzed for chlorpyrifos; Appendix IIII, Table 2B), and one exceedance each of the WQTLs for diuron and malathion (1% of all samples collected; Appendix III, Table III-2B, 2C) in the Coalition region. 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. The Coalition submitted a revised

Management Plan on May 1, 2014, proposing additional strategies for sourcing constituents such as implementing workplans and additional studies. 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 difficult to determine if non-member practices contributed to the pesticide exceedances that occurred during the 2014 WY.

During the 2014 WY, exceedances of the hardness-based WQTL for dissolved copper occurred five times across four subwatersheds (4% of all samples collected; Appendix III, Table III-2A). Copper is applied by agriculture in a variety of forms, mostly as a fungicide. All five exceedances were associated with ground copper applications occurring during the winter months to almond, cherry, orange, and peach orchards. 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 the copper concentrations measured in samples collected from these sites are the result of other sources including dairies and irrigation district applications to control weeds/algae.

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

Monitoring from the 2014 WY resulted in exceedances of applied pesticide WQTLs; three exceedances of chlorpyrifos and one exceedance of diuron WQTLs occurred. This is still a significant decline in exceedances of applied pesticide WQTLs compared to results from 2008. In 2009, the Coalition's Management Plan strategy was implemented including focused outreach regarding water quality impairments and management practices that could be implemented to reduce offsite movement of pesticides and other constituents. The Coalition believes that the decline in pesticide exceedances is a direct result of its education and outreach with growers in high priority site subwatersheds. Management practices implemented by members since 2009 have resulted in improved water quality reducing the percent of applied pesticide exceedances from 1.3% in 2008 to 0.2% for samples collected during the 2014 WY (Table 81).

Figure 46 includes 1) a figure of the percentages of all exceedances that occurred from 2008 through the 2014 WY by constituent category, and 2) bar graphs of the percent of exceedances of applied metals and applied pesticides from 2008 through the 2014 WY. Toxicity resampling events and exceedances from 2008 upstream MPM conducted as part of source evaluation are not included. The majority of exceedances of WQTLs occurred for nutrients, physical parameters, and *E. coli* (37%), and field parameters (44%). The percentages of exceedances of metals (1%), toxicity (10%), and pesticides (8%) were relatively small in comparison (Figure 46).

13.a. Applied Metals: 2008 – 2014 WY

Figure 46 (bar graph) includes the percent of applied metals exceedances from 2008 through the 2014 WY; metals applied by agriculture are copper and zinc. However, the graph only includes copper exceedances because copper was the only applied metal to be detected above the hardness based WQTL between January 1, 2008 and September 30, 2014. The decline in metals exceedances from 2008 through 2009 can be attributed to the Coalition analyzing for both the total and hardness based 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 overall have decreased in frequency. During the 2014 WY monitoring, there were five exceedances of the hardness based WQTL for dissolved copper across the Coalition region (2.8% of the samples analyzed or copper; Table 81).

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 or an anthropogenic source that is restricted geographically; copper exceedances are typical at sites located in Madera and Merced County (Zones 3-6 only). Coalition representatives discuss management practices with growers that re designe4d to reduce the amount of agricultural discharge of pesticides. The implementation of these management practices has successfully lead to the removal of many pesticides from management plans at sites in the ESJWQC. Management practices designed to reduce the amount of pesticides from entering the waterway should also reduce the amount of copper in waterways. However, the concentration of naturally occurring copper inputs from upstream waterways is not known. Therefore, growers implementing management practices to reduce runoff could be successfully decreasing the amount of copper from leaving their fields and entering the waterway yet exceedances could still occur due to 1) naturally occurring copper levels in the waterway are elevated enough to exceed the WQTL, and/or 2) small amounts of agricultural discharge of copper that would not necessarily cause an exceedance but when combined with naturally occurring copper in the waterway results in an exceedance.

Of the site subwatersheds within a management plan for copper, 10 have undergone focused outreach and management practices have been recorded for targeted members. Since 2009, growers in site subwatersheds with copper management plans have implemented management practices to address spray drift, irrigation water management, storm runoff and sediment discharge. Due to improved water quality and additional management practices implemented by Coalition members, three site subwatersheds have had copper removed from management plans.

13.b. Applied Pesticides: 2008 – 2014 WY

The most significant decline in exceedances of applied pesticides occurred directly after focused education and outreach began between 2008 and 2009 (Figure 46 and Table 81). The percent of samples that exceeded the WQTLs with applied pesticides has remained less than 1% since 2009. In

2008 where 1.3% of samples collected resulted in exceedances of pesticide WQTLs compared to January through September 2013 with 0.6%. From 2009 through the 2014 WY, the percent of applied pesticides exceedances is <1% (29 out of 8,261 samples, Table 81).

Monitoring within the Coalition region occurred monthly to assess changes in overall water quality (all applied pesticides were monitored at Core sites monthly) regardless of past water quality impairments. Exceedances occurred in October 2013 at Dry Creek @ Wellsford Rd, March 2014 at Duck Slough @ Gurr Rd, and in July 2014 at Lateral 2 ½ near Keyes Rd for chlorpyrifos. Samples collected from Prairie Flower Drain @ Crows Landing Rd in March 2014 exceeded the WQTL for diuron.

The sources of exceedances of the chlorpyrifos WQTL in samples collected from Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, and Lateral 2 ½ near Keyes Rd are described in the Discussion of Results section of this report. Chlorpyrifos applications occurred prior to sampling in the three site subwatersheds, but it is unknown if the exceedances were caused by members or non-members. There was no reported use of diuron to associate with the sample collected from Prairie Flower Drain @ Crows Landing Rd. The Coalition will continue to review PUR data to assess potential sources.

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. As of 2014, the Coalition demonstrated that implemented practices have reduced the off-site movement of chlorpyrifos into downstream waterbodies and removed eight site subwatersheds from chlorpyrifos management plans. In the 2014 WY, MPM conducted at 13 sites resulted in no exceedances of the chlorpyrifos WQTL, which can be attributed to additional practices implemented by members in these site subwatersheds from 2009 and 2014.

One factor influencing water quality results could be that some growers have changed products without changing management practices. Coalition representatives emphasize that regardless of the product applied, appropriate management practices must be used to protect water quality. Overall, monitoring results from 2008 through the 2014 WY indicate that individual visits and the implementation of management practices (not just switching products) are resulting in improved water quality; hence fewer exceedances of pesticides occurred compared to previous years.

Figure 46. Percentages of exceedances of WQTLs from 2008-2014 WY in the ESJWQC.

Pie chart includes percentages of all exceedances from 2008 through September 2013 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.

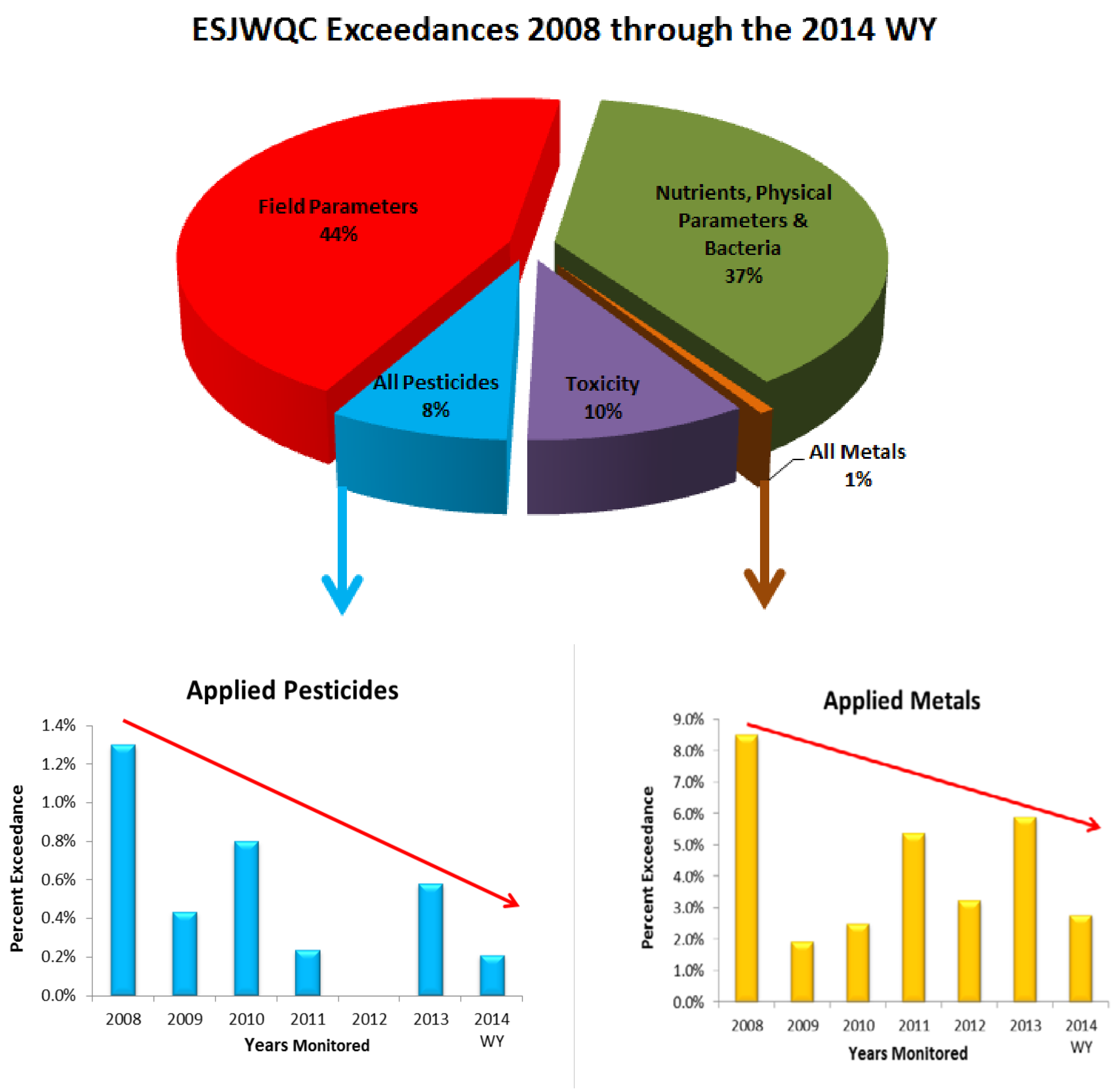


Table 81. Percentages of exceedances of WQTLs for applied metals and applied pesticides from 2008-2014 WY.

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	3460	1.3%	39	459	8.5%
2009	6	1380	0.4%	6	310	1.9%
2010	10	1249	0.8%	8	318	2.5%
2011	5	2101	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	1893	0.2%	5	179	2.8%

13.c. Spatial Trends

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 2014 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, but for which there are no application records (ammonia and nitrates), 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 2014 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 2014 WY reflect water quality six years after focused outreach began. The Coalition analyzed these data for two types of trends, 1) spatial trends (consistent water quality impairments in a specific area), and 2) temporal trends (consistent water quality impairments across time, i.e. same months and/or seasons). The temporal trend analysis (2009 vs. 2014 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.

In recent years, drought conditions have persisted in the ESJWQC region. Growers throughout the Central Valley have been advised to reduce water used for irrigation for conservation purposes. Drought conditions reduce soil permeability which limits water from infiltrating into soil and increases runoff potential. Therefore, irrigation or stormwater runoff can occur more frequently as drought conditions persist, even if water for irrigation is conserved.

13.c.i. Constituents Applied by Agriculture

Pesticides may be found in the water column or in sediment as a result of applications to fields that are irrigated, have runoff after rainfall events, and/or experience drift to surface waters. Irrigation return flows from fields or stormwater runoff can move sediment and chemicals to surface waters. Heavily applied pesticides may be discharged to surface waters at levels that cause water quality impairments.

This analysis is utilized to gain an understanding of trends in water quality concerning the three top applied constituents sampled in 2009 and the 2014 WY. These data are used to 1) determine if there is a trend in the occurrence of detections (spatially or temporally), 2) evaluate differences in the magnitude of detections, and 3) assess monitoring and PUR data for changes that could contribute to the observed trends (discharge measurements, crop type, acreages, applications).

The Coalition uses monitoring data to calculate the frequency and magnitude of exceedances to determine changes in the concentrations of chlorpyrifos, diuron, and copper. The frequency of exceedances is calculated by dividing the number of exceedances per constituent by the total samples collected for that constituent during the monitoring year (Table 83). By calculating the frequency of exceedances, the Coalition can evaluate the overall water quality associated with the top applied constituents in the ESJWQC region. An analysis of the magnitude of chlorpyrifos, diuron, and copper is used to evaluate the degree of the concentrations detected compared to the WQTLs. Magnitude is calculated by dividing the concentration/detection of the constituent by the WQTL of that constituent (Tables 84). 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/detection 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 ESJWQC agriculturally applied constituents 2009 through September 2014 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 WQTL		
	Jan 2009-Sept 2014	2009	2014 WY	Jan 2009-Sept 2014	2009	2014 WY
Glyphosate	8,498,046.69	1,020,453.04	1,581,157.02	0	0	0
Copper	**2,938,837.98**	**363, 018.85**	**385,326.03**	**71**	**6**	**5**
Paraquat	920,272.27	124,816.80	105,639.95	0	0	0
Chlorpyrifos	**674,262.97**	**145,935.65**	**100,968.18**	**21**	**5**	**3**
Zinc	394,181.40	57,379.95	33,528.20	0	0	0
Simazine	304,429.86	68, 076.68	27,341.10	0	0	0
Diuron	**161,718.28**	**26, 524.65**	**14,003.55**	**4**	**1**	**1**
Trifluralin	153,724.42	35939.61	24,578.85	0	0	0
Malathion	141,123.38	0	22,998.67	2	0	1
Dimethoate	80,041.07	13,239.00	27,073.79	2	0	0
Carbaryl	29,411.34	4972.40	0	1	0	0
Diazinon	25,980.85	6,126.45	2,389.03	1	0	0
Methomyl	25,647.76	7,612.31	6,544.11	0	0	0
Aldicarb	11,930.97	2,865.54	0	0	0	0
Methidathion	10,748.24	6,404.37	0	0	0	0
Dicofol	8,309.38	150.01	0	0	0	0
Linuron	8,287.37	471.96	2,748.18	0	0	0
Thiobencarb	6,545.36	1,214.90	852.78	0	0	0
Methyl parathion	5,676.05	1,227.27	0	0	0	0
Oxamyl	4,692.87	789.01	248.96	0	0	0
Methamidophos	1,117.13	565.65	0	0	0	0
Azinphos-methyl	1,078.53	904.53	0	0	0	0
Methiocarb	328.82	0	79.59	0	0	0
Atrazine	68.89	32.45	0	0	0	0
Carbofuran	26.96	25.66	0	0	0	0
Cyanazine	0.54	0	0	0	0	0
Lindane	0.37	0	0	0	0	0

Table 83. Frequency of exceedances of WQTLs for the top applied constituents in the ESJWQC region in 2009 and 2014 WY.

The total number of samples collected includes dry sites that were scheduled to monitor for the constituent listed.

ANALYTE	YEAR	TOTAL EXCEEDANCES OF WQTL	TOTAL SAMPLES COLLECTED	FREQUENCY (% EXCEEDANCE)
Chlorpyrifos	2009	5	99	5.05%
Chlorpyrifos	2014 WY	3	127	2.36%
Diuron	2009	1	71	1.43%
Diuron	2014 WY	1	79	1.27%
Dissolved Copper	2009	6	95	6.32%
Dissolved Copper	2014 WY	4	104	3.85%

Chlorpyrifos

Overall, the water quality impairments related to chlorpyrifos have declined throughout the ESJWQC region. The number of exceedances of the WQTL was five in 2009 and three during the 2014 WY (Table 82). Since the adoption of the WDR, monitoring for chlorpyrifos at Coalition sites occurs more frequently. Since 2009, the Coalition has conducted focused outreach in 19 site subwatersheds in the ESJWQC region. Of the six sites in which samples detected chlorpyrifos, the magnitudes of those detections have declined at three of the sites (Dry Creek @ Wellsford Rd, Highline Canal @ Hwy 99, Miles Creek @ Reilly Rd). The decline in the overall quality impairments for chlorpyrifos in the 2014 WY compared to 2009 could be due to management practices implemented by Coalition members, trends in pesticide use, and changes in the landscape/environment surrounding the monitoring sites (e.g. crop types).

The spatial trends analysis focused on results from samples collected from Dry Creek @ Wellsford Rd, Duck Slough @ Gurr Rd, and Lateral 2 ½ near Keyes Rd because detections of chlorpyrifos occurred in samples collected from these sites during both 2009 and the 2014 WY (Figures 49 and 50). Highline Canal @ Hwy 99 and Miles Creek @ Reilly Rd were monitored for chlorpyrifos in both years; however, detections only occurred in 2009 (non-detect results in 2014 WY). Therefore, monitoring data from these five sites are being analyzed to compare 2009 and the 2014 WY to assess spatial and temporal trends in water quality.

The greatest chlorpyrifos use occurred from March through September in both 2009 and 2014 (Figure 47). Overall, chlorpyrifos use decreased during the 2014 WY compared to 2009 within the Coalition region (Figure 47). However, use appears to be increasing within Zone 5 (Figure 48). Despite overall decreases in use, applications have increased considerably in each of the site subwatersheds where chlorpyrifos was detected in samples (Table 85).

In 2009, in site subwatersheds where annual applications of chlorpyrifos were the greatest, concentrations of chlorpyrifos detected in samples collected from those locations were also the highest. 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) subwatersheds in 2009, and the chlorpyrifos concentrations detected in samples collected from those sites were the highest for that year (Table 84). During the 2014 WY, the correlation between high annual use and chlorpyrifos concentrations detected in samples became less clear. During the 2014 WY, the largest quantity of chlorpyrifos use occurred again in the

Highline Canal @ Hwy 99 (9,439 lbs AI) and Lateral 2 ½ near Keyes Rd (8,577 lbs AI) subwatersheds, but only chlorpyrifos was detected in a sample collected from Lateral 2 ½ near Keyes Rd; that concentration was the highest for the year. Chlorpyrifos was not detected in any samples collected from Highline Canal @ Hwy 99, despite a greater quantity of chlorpyrifos applied compared to the rest of sites that detected chlorpyrifos in samples. The decline in overall frequency of exceedances between 2009 and the 2014 WY demonstrates that the implementation of effective management practices is improving water quality within the Coalition region, despite continued use. The spatial trends evaluation for chlorpyrifos suggests that any trends in use do not necessarily reflect trends in water quality associated with chlorpyrifos.

Despite exceedances of the WQTLs in the ESJWQC region, the frequency of exceedances is decreasing (Table 83). Even in site subwatersheds where management plans for chlorpyrifos were reinstated, the number of exceedances of the WQTL for chlorpyrifos occurring in those subwatersheds is decreasing (Appendix I). Currently 14 site subwatersheds are in management plans for chlorpyrifos. The Coalition has received approval to remove chlorpyrifos from management plans in eight site subwatersheds and petitioned to remove it from three site subwatershed management plans based on water quality improvements.

Table 84. Magnitude of detections of chlorpyrifos in 2009 and the 2014 WY.

Field duplicates are not included unless the exceedance occurred in the duplicate only. Exceedances of the WQTLs are in **red bold**. Highline Canal @ Hwy 99 and Miles Creek @ Reilly Rd were monitored during the 2014 WY, but the all chlorpyrifos results were non-detect.

Zone	Site Subwatershed	Year	Sample Date	Chlorpyrifos Result	Chlorpyrifos WQTL (µg/L)	Magnitude
1	Dry Creek @ Wellsford Rd	2009	7/21/2009	0.013	0.015	0.87
			8/18/2009	0.027	0.015	**1.80**
		2014 WY	10/15/2013	0.016	0.015	**1.07**
	Mootz Drain[1]	2009	6/16/2009	0.033	0.015	**2.20**
2	Lateral 2 1/2 near Keyes Rd	2009	7/21/2009	0.049	0.015	**3.27**
		2014 WY	7/8/2014	0.16	0.015	**10.67**
3	Highline Canal @ Hwy 99[2]	2009	7/21/2009	0.093	0.015	**6.20**
5	Duck Slough @ Gurr Rd	2009	1/20/2009	0.012	0.015	0.80
		2014 WY	3/3/2014	0.053	0.015	**3.53**
	Miles Creek @ Reilly Rd[2]	2009	7/21/2009	0.028	0.015	**1.87**

[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.

[2]Sites were monitored for chlorpyrifos is the 2014 WY, but are not included in the table because the all results were non-detect.

Table 85. Applications of chlorpyrifos in total lbs and lbs per acre to crops in 2009 and the 2014 WY.

Table includes site subwatersheds with samples that resulted in detections of chlorpyrifos in either 2009 or 2014 WY. Table only includes top applications to crops that occurred in both years. There was no reported chlorpyrifos use at Mootz Drain for both years.

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
1	Dry Creek @ Wellsford Rd	Almond	2009	May	385	15.43	745.46	14%	-67%
				June	125	4.04	252.51	5%	
				July	269	21.77	509.15	9%	
				August	97	2.01	97.82	2%	
				September	8	1.25	10.00	0%	
			2014 WY	April	179	10.10	362.08	7%	
				May	53	5.78	100.99	2%	
				June	119	0.40	48.08	1%	
				July	10	2.02	20.20	0%	
		Grapes	2009	March	203	7.51	381.20	7%	49%
				November	260	5.63	487.38	9%	
			2014 WY	October	690	22.54	1,295.98	27%	
		Walnuts	2009	April	84	6.77	284.14	5%	25%
				May	281	25.20	548.31	10%	
				June	206	14.97	329.10	6%	
				July	272	20.43	515.92	10%	
				August	148	12.18	281.83	5%	
				September	71	7.03	122.51	2%	
			2014 WY	April	35	3.75	65.67	1%	
				May	59	220.30	1,599.66	33%	
				June	84	7.78	165.92	3%	
				July	109	9.17	210.91	4%	
				August	302	30.32	563.20	12%	
2	Lateral 2 1/2 near Keyes Rd	Alfalfa	2009	March	328	5.58	166.29	1%	472%
				July	119	1.76	79.22	1%	
				August	136	1.50	68.10	1%	
				September	92	0.19	5.76	0%	
			2014 WY	January	172	3.99	136.89	2%	
				February	872	36.31	784.38	9%	
				March	613	10.68	347.95	4%	
				July	390	3.00	195.45	2%	
				August	467	9.03	237.51	3%	
				November	34	1.15	19.56	0%	
				October	111	5.25	105.27	1%	
		Almond	2009	January	191	13.11	357.66	3%	-20%
				April	34	0.01	0.23	0%	
				May	428	38.52	888.63	8%	

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
				July	816	82.90	1,345.72	11%	
				August	93	4.290	158.55	1%	
				September	19	0.53	10.01	0%	
			2014 WY	April	55	1.88	103.34	1%	
				May	329	25.80	593.48	7%	
				June	244	17.39	354.77	4%	
				July	205	21.48	364.63	4%	
				August	383	8.02	767.67	9%	
				October	33	1.14	37.58	0%	
		Walnuts	2009	April	52	2.39	124.06	1%	-31%
				May	1037	93.64	2071.47	18%	
				June	192	19.85	375.09	3%	
				July	1461	121.39	2,887.86	24%	
				August	527	42.41	916.86	8%	
				September	10	2.03	20.34	0%	
			2014 WY	May	587	55.01	1,118.65	13%	
				June	560	42.79	1057.66	12%	
				July	473	46.90	898.93	10%	
				August	661	65.10	1,322.98	15%	
3	Highline Canal @ Hwy 99	Alfalfa	2009	March	275	1.95	143.05	1%	1123%
				June	5	0.50	2.50	0%	
				August	135	0.50	67.60	1%	
			2014 WY	February	1496	21.20	1,115.02	12%	
				March	542	3.04	275.13	3%	
				April	24	2.00	24.01	0%	
				June	24	1.00	12.02	0%	
				July	909	6.09	692.21	7%	
				August	248	3.01	236.51	3%	
				September	724	1.51	251.01	3%	
		Almond	2009	January	2040	11.27	3,831.12	36%	-38%
				May	39	4.00	78.04	1%	
				June	35	2.34	40.19	0%	
				July	74	2.03	150.48	1%	
				August	649	2.46	1274.57	12%	
			2014 WY	June	321	30.69	597.90	6%	
				July	1374	39.83	2,634.34	28%	
				August	46	3.76	86.43	1%	
		Corn	2009	March	25	1.27	31.83	0%	-46%
				May	129	3.00	129.06	1%	
				June	164	0.75	122.62	1%	
				July	1218	9.66	1030.42	10%	

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
				August	11	0.10	1.05	0%	
				September	65	1.78	59.63	1%	
			2014 WY	May	450	2.60	585.00	6%	
				June	160	2.94	96.31	1%	
				July	80	1.39	55.68	1%	
		Walnuts	2009	May	164	13.79	322.58	3%	77%
				June	50	2.03	101.68	1%	
				July	284	15.86	557.91	5%	
				August	163	19.88	321.17	3%	
			2014 WY	May	310	16.13	624.46	7%	
				June	94	10.13	108.46	1%	
				July	399	31.21	787.71	8%	
				August	394	22.27	731.30	8%	
				September	60	2.00	59.99	1%	
5	Duck Slough @ Gurr Rd	Alfalfa	2009	March	890	5.96	356.15	55%	169%
				July	140	1.00	70.10	11%	
				September	227	1.00	57.16	9%	
			2014 WY	February	561	8.78	472.68	25%	
				March	588	6.47	187.60	10%	
				July	156	1.00	78.12	4%	
				August	1164	8.56	497.68	26%	
				September	124	1.00	62.21	3%	
5	Miles Creek @ Reilly Rd	Alfalfa	2009	March	760	5.11	301.15	27%	106%
				July	92	0.50	46.07	4%	
				September	68	0.25	17.01	2%	
			2014 WY	February	180	1.52	136.65	5%	
				March	348	10.03	174.70	7%	
				July	180	1.00	90.13	4%	
				August	694	6.01	347.51	14%	
		Almond	2009	July	11	1.82	20.01	2%	8829%
			2014 WY	May	320	3.75	600.43	24%	
				June	670	40.00	1186.33	47%	

Figure 47. Sum of pounds of chlorpyrifos applied in 2009 and the 2014 WY.
The PUR data are available through September 2014.

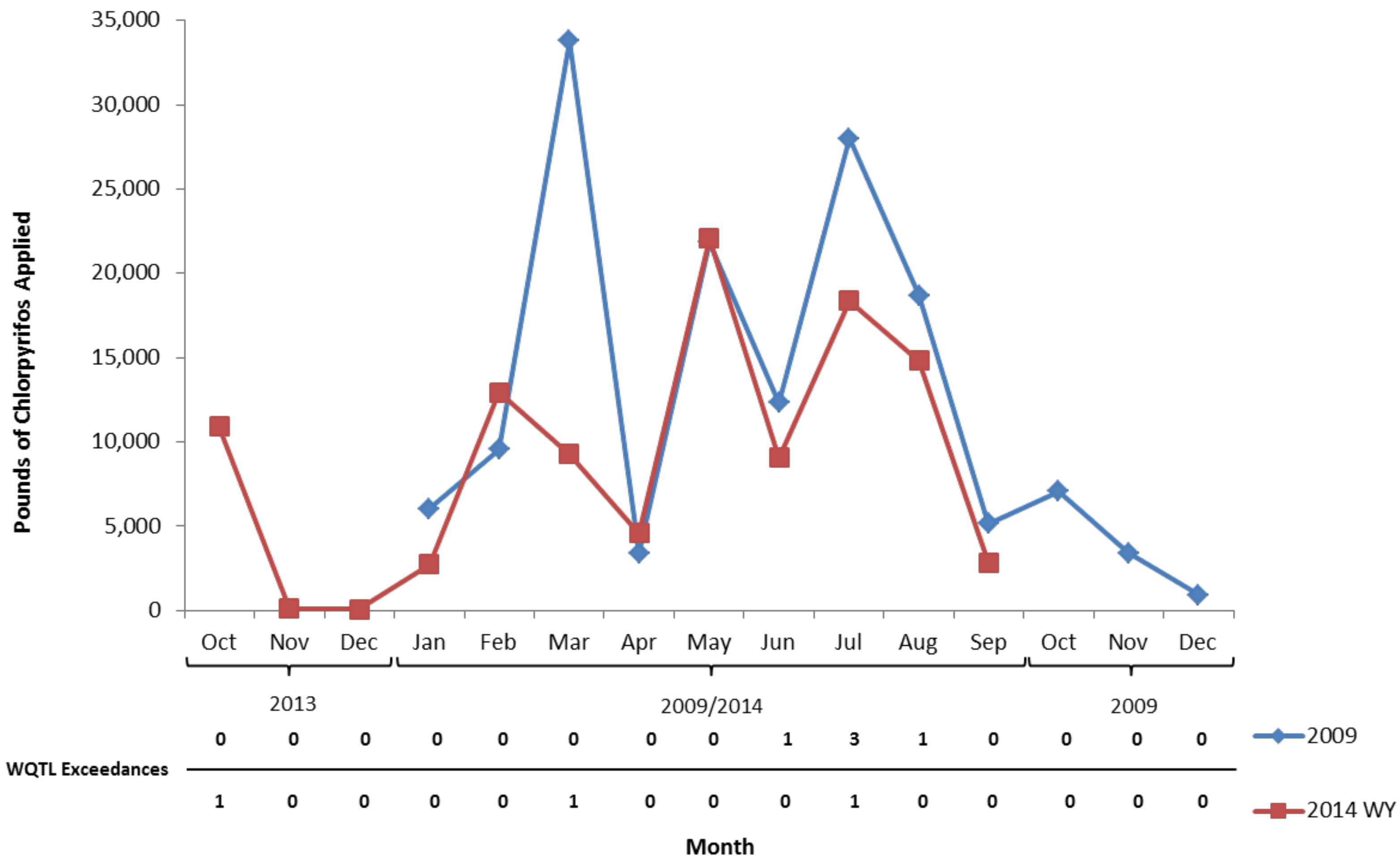


Figure 48. Change in total annual chlorpyrifos use in 2009 and 2014 WY.

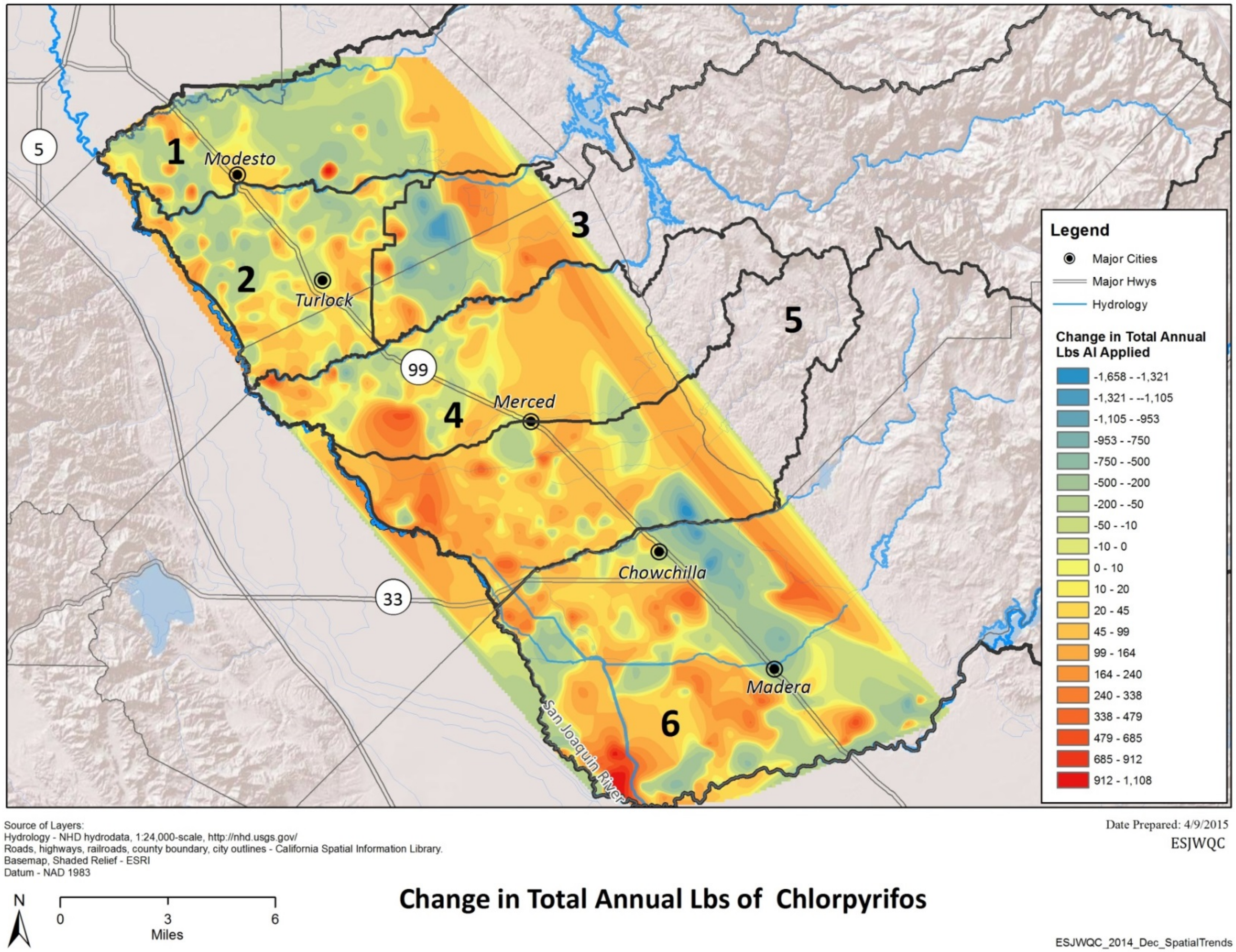


Figure 49. Frequency of detections and total number of exceedances of the WQTL for chlorpyrifos at sites in the ESJWQC region during 2009.
The frequencies of detections are represented by the circle circumference and the number of exceedances of the WQTL for chlorpyrifos corresponds to the color scale in the legend. Detections in the environmental samples are included only. The underlying layer reflects the annual total lbs of chlorpyrifos applied in the ESJWQC region.

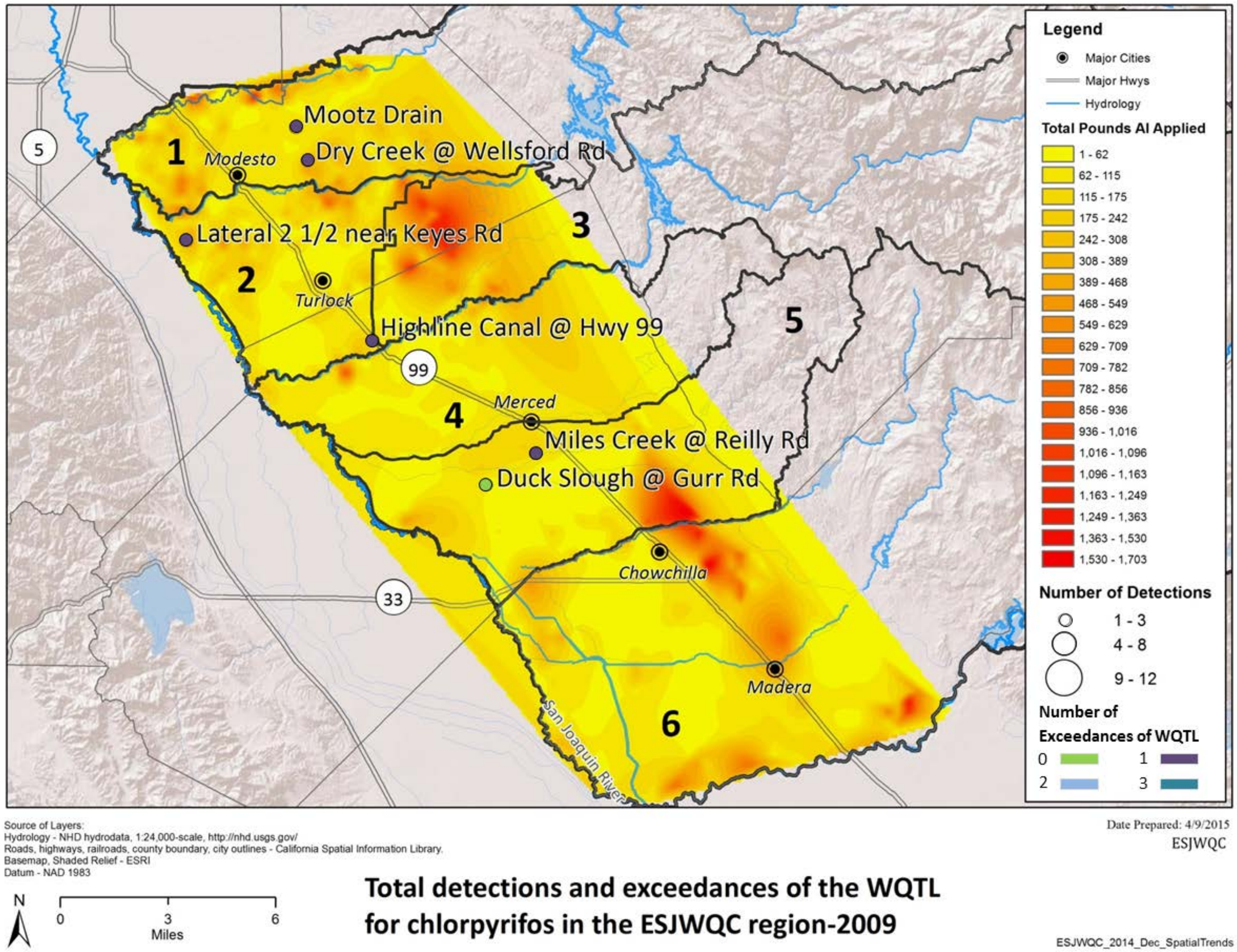
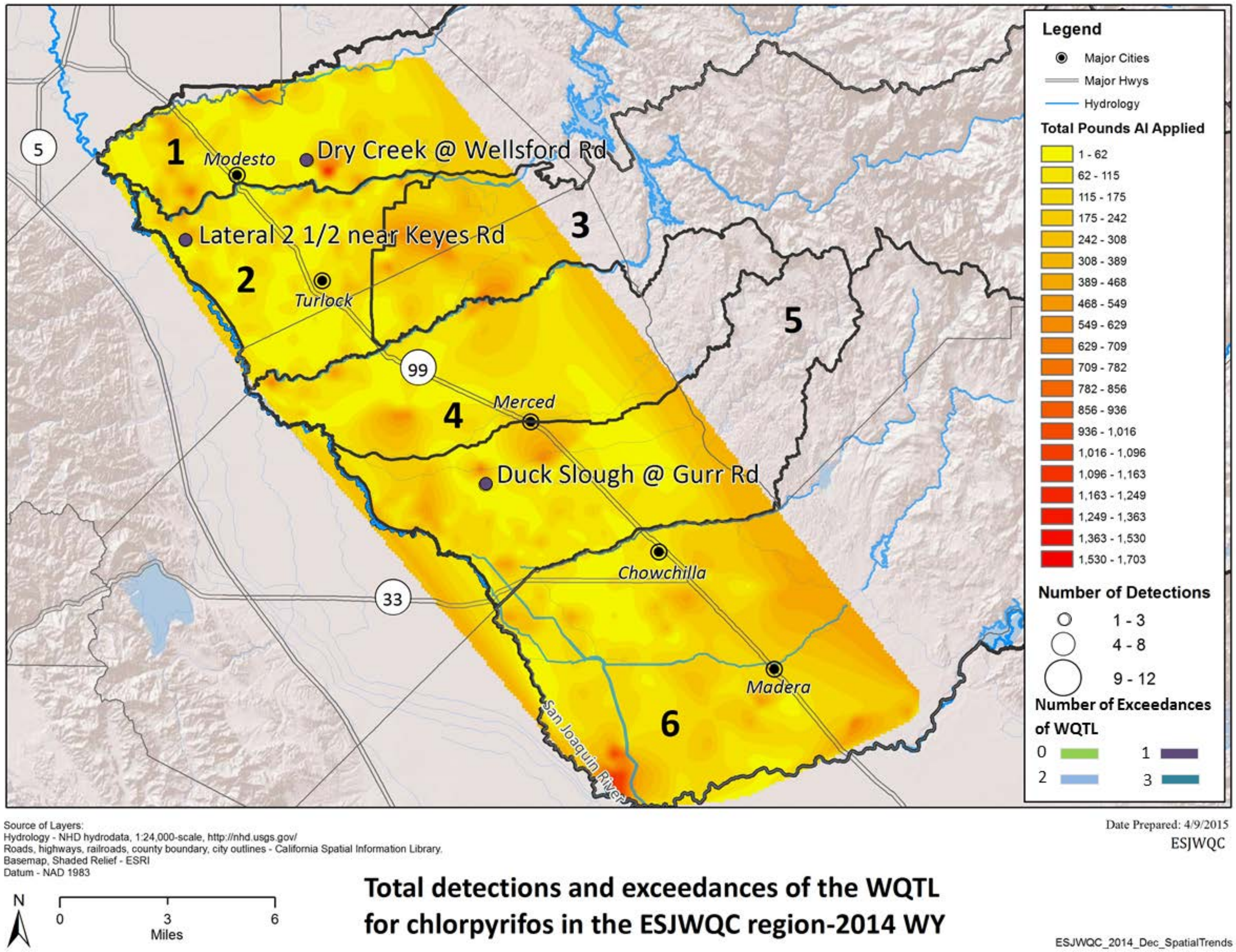


Figure 50. Frequency of detections and total number of exceedances of the WQTL for chlorpyrifos at sites in the ESJWQC region during the 2014 WY. The frequencies of detections are represented by the circle circumference and the number of exceedances of the WQTL for chlorpyrifos corresponds to the color scale in the legend. Detections in the environmental samples are included only. The underlying layer reflects the annual total lbs of chlorpyrifos applied in the ESJWQC region.



Diuron

Diuron is highly water soluble (K_{oc} of 480) and is therefore more likely to be transported to surface waters during seasons with rainfall. Diuron is applied mostly during December through February (Figure 51). In both 2009 and the 2014 WY, only a few agriculture applications of diuron were reported and overall use is decreasing within the ESJWQC region (Figure 52).

The total number of exceedances of the WQTL for diuron was the same during both 2009 and the 2014 WY. However, more samples were collected and analyzed for diuron during the 2014 WY (60 samples for seven sites) compared to 2009 (42 samples for 6 sites). Therefore, an improvement in water quality is evident when comparing the 2014 WY to 2009. In 2009, there were two detections of diuron; one was an exceedance of the WQTL on February 7, 2009 (Table 86, Figure 53). Both detections of diuron occurred in samples collected from Mootz Drain @ Langworth Rd. During the 2014 WY, there were five detections of diuron; one of the detections was an exceedance of the WQTL (Table 86, Figure 54). The detections occurred in samples collected from Prairie Flower Drain @ Crows Landing Rd (4) and Duck Slough @ Gurr Rd (1). The exceedance level detection occurred in samples collected from Prairie Flower Drain @ Crows Landing Rd.

The PUR data indicated there were no reported agricultural diuron applications that could be associated with the exceedances that occurred in samples collected from Mootz Drain @ Langworth Pond in 2009 and Prairie Flower @ Crows Landing Rd during the 2014 WY. In fact, no diuron use was reported in the Mootz Drain site subwatershed during 2009 and the last diuron applications reported in the Prairie Flower Drain @ Crows Landing Rd site subwatershed occurred in December 2012. The half-life of diuron is approximately 90 days so the diuron applications from 2012 could not have contributed to the exceedance at Prairie Flower Drain @ Crows Landing Rd in March 2014. Therefore, it is impossible to source the diuron applications that contributed to either exceedance from 2009 or the 2014 WY. There were 258 lbs of diuron applied within the Duck Slough @ Gurr Rd site subwatershed in January 2014 which corresponded with a detection of diuron (not an exceedance) on March 3, 2014 in samples collected from Duck Slough @ Gurr Rd (Table 87).

Although detections typically occur during the winter months and those months are also when applications often occur, there is a not an apparent 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. Mootz Drain downstream of Langworth Pond, Hilmar Drain @ Central Ave, and Dry Creek @ Rd 18 are currently in a management plan for diuron.

Table 86. Magnitude of detections of diuron in 2009 and the 2014 WY.

Field duplicates are not included unless the exceedance occurred in the duplicate only. Exceedances of the WQTLs are in **red bold**.

Zone	Site Subwatershed	Year	Sample Date	Diuron Result	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
2	Prairie Flower Drain @ Crows Landing Rd	2014 WY	2/10/2014	0.26	2	0.13
			3/3/2014	2.1	2	**1.05**
			5/13/2014	0.23	2	0.12
			6/10/2014	0.25	2	0.13
5	Duck Slough @ Gurr Rd	2014 WY	3/3/2014	0.38	2	0.19

[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.

Table 87. Applications of diuron in total lbs and lbs per acre to commodities in 2009 and the 2014 WY.

Table includes site subwatersheds with samples that resulted in detections of diuron in either 2009 or 2014 WY. Applications in Prairie Flower Drain @ Crows Landing Rd are not included because applications were not made in 2009 or the 2014 WY.

Zone	Site Subwatershed	Crop	Year	Month	Acres Treated	Pounds per Acres	Total Lbs AI	Percent of Total Lbs Applied	Percent Change
1	Mootz Drain[1]	Rights of Way	2014 WY	November	10	7.87	78.70	100%	NA
5	Duck Slough @ Gurr Rd	Alfalfa	2009	January	311	2.26	240.05	35%	160%
				February	112	0.96	53.75	8%	
				November	137	3.28	148.24	21%	
				December	40	1.20	47.98	7%	
			2014 WY	January	172	4.50	258.26	18%	
				March	83	0.78	65.06	4%	
				November	83	0.78	65.06	4%	
				December	782	15.60	883.33	61%	
		Cotton	2009	September	546	0.13	8.42	1%	-55%
				October	422	0.21	15.97	2%	
			2014 WY	October	251	0.18	11.07	1%	
		Walnut	2009	February	40	0.60	24.00	3%	-6%
				March	8	2.40	19.20	3%	
				November	57	9.60	136.80	20%	
			2014 WY	March	11	1.87	19.99	1%	
				November	62	9.60	148.80	10%	

[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 51. Sum of pounds of diuron applied in 2009 and the 2014 WY.
The PUR data are available through September 2014.

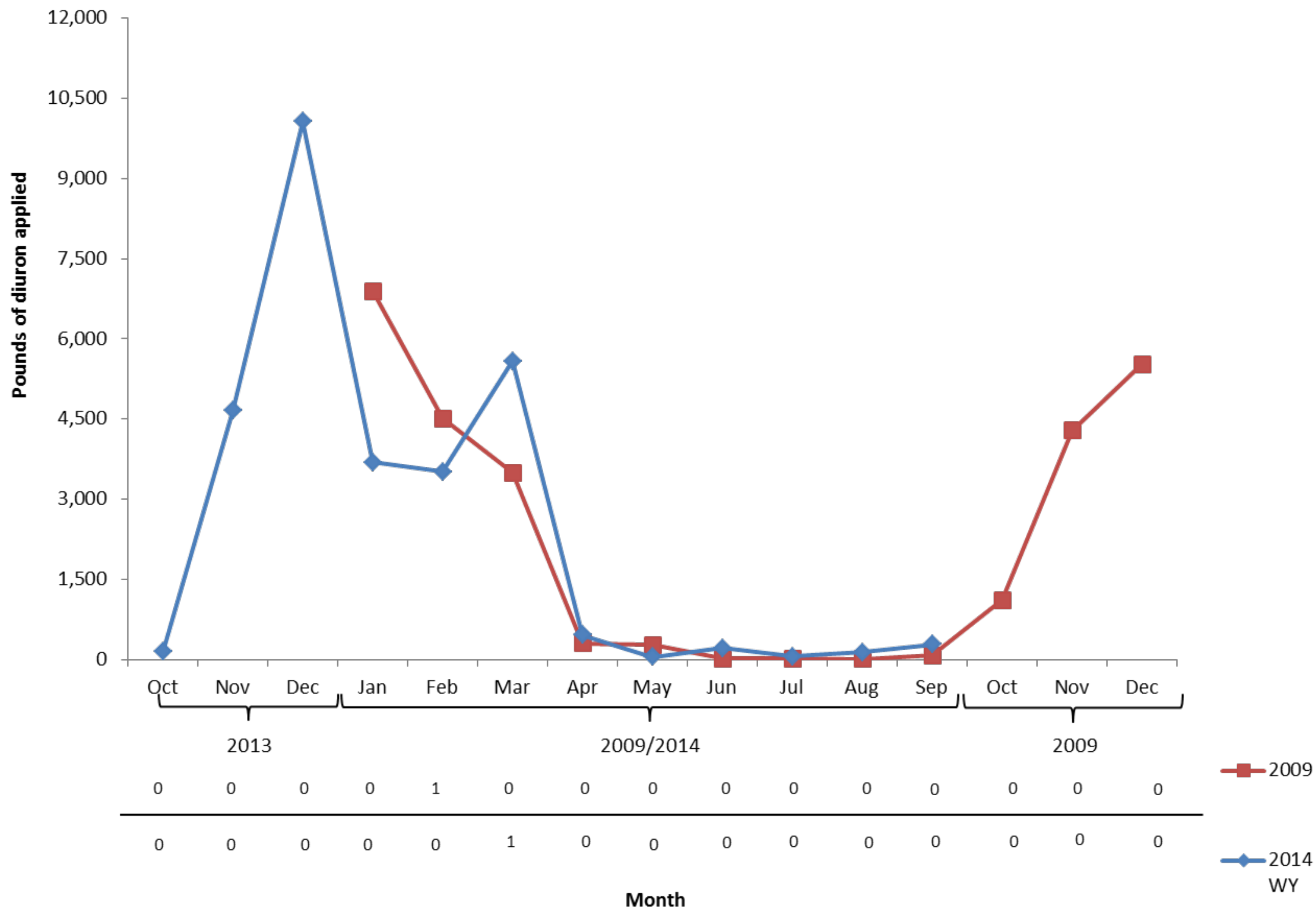


Figure 52. Change in total annual diuron use between 2009 and 2014 WY.

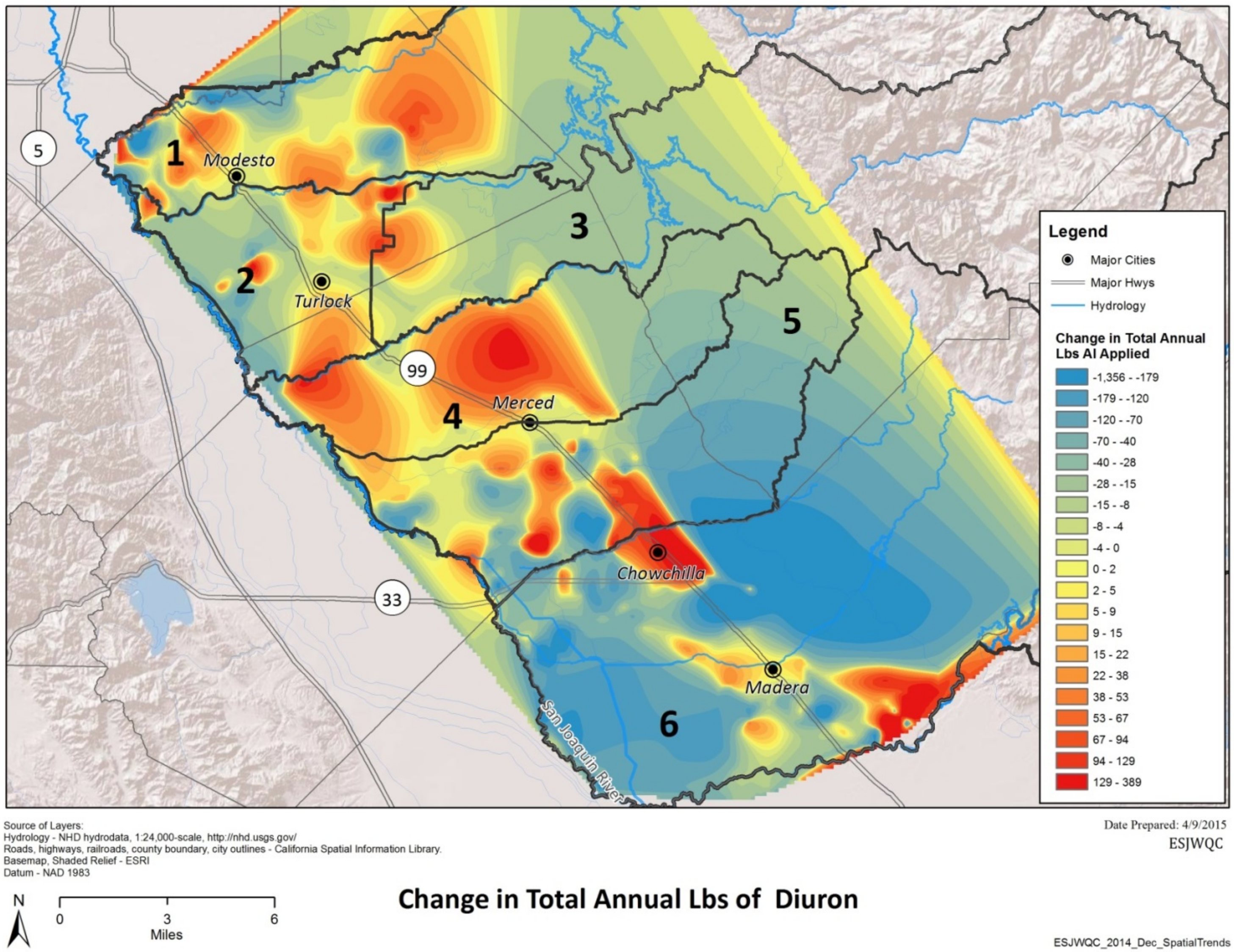


Figure 53. Frequency of detections and total number of exceedances of the WQTL for diuron at sites in the ESJWQC region during 2009.

The frequencies of detections are represented by the circle circumference and the number of exceedances of the WQTL for diuron corresponds to the color scale in the legend. Detections in the environmental samples are included only. The underlying layer reflects the annual total lbs of diuron applied in the ESJWQC region.

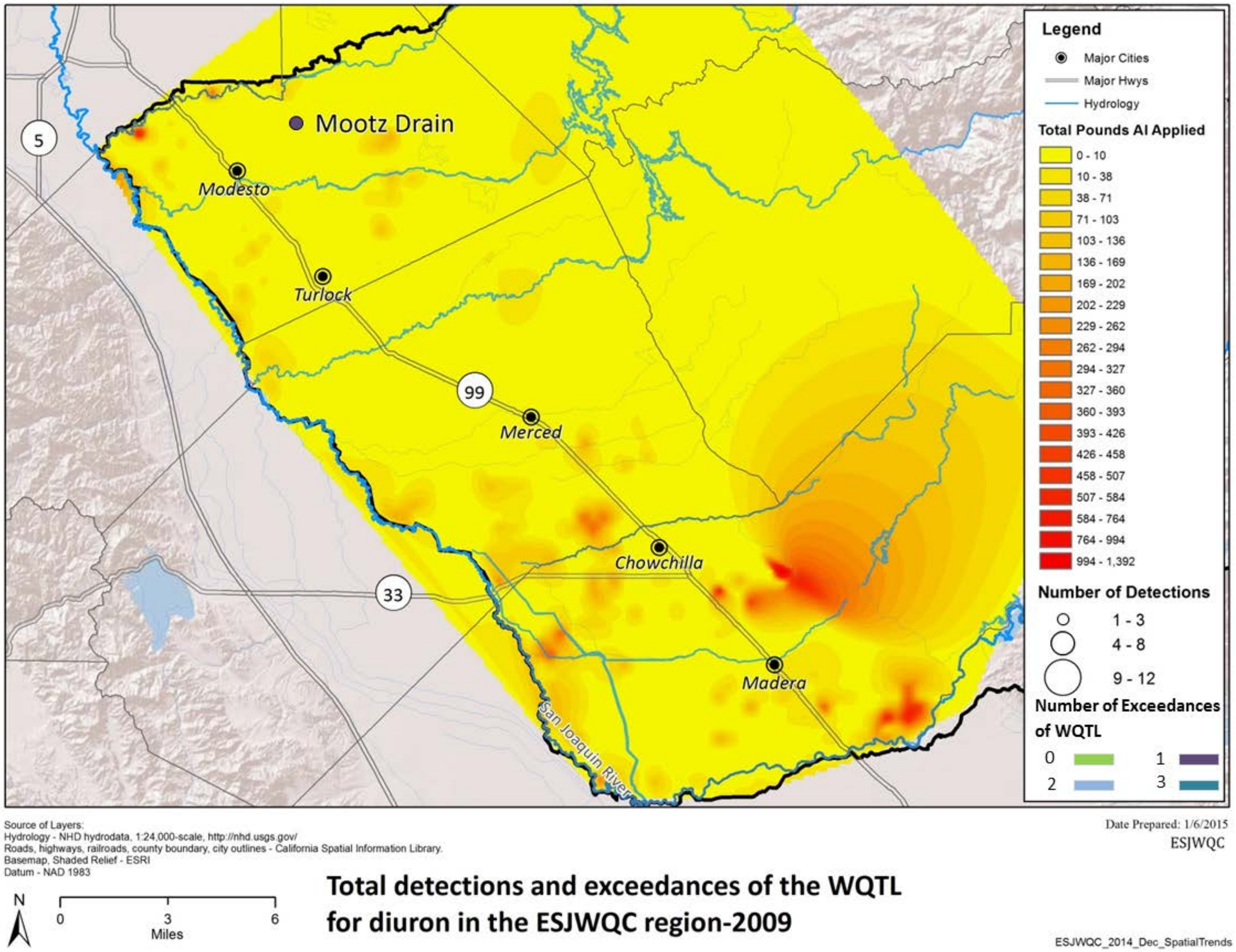
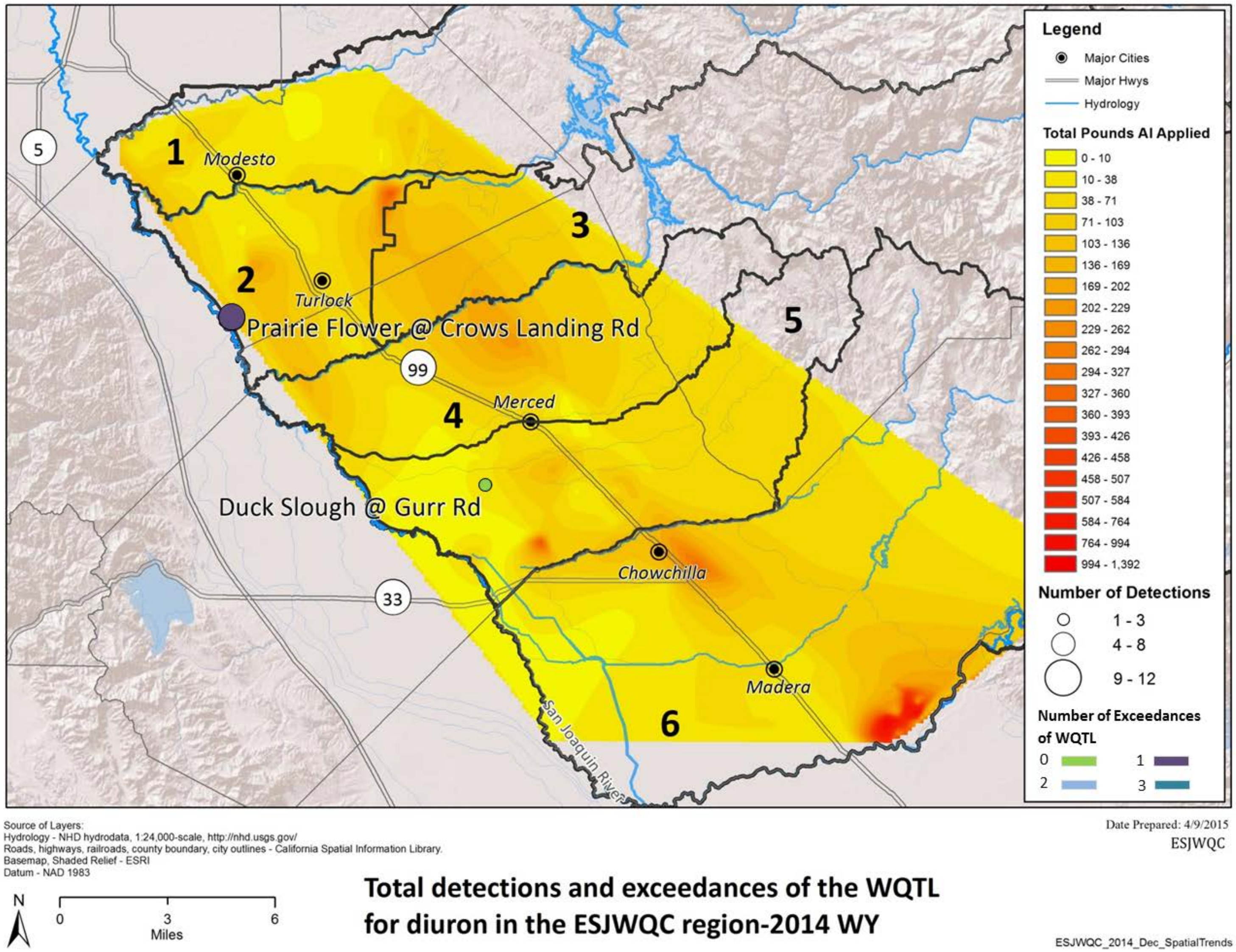


Figure 54. Frequency of detections and total number of exceedances of the WQTL for diuron at sites in the ESJWQC region during the 2014 WY.

The frequencies of detections are represented by the circle circumference and the number of exceedances of the WQTL for diuron corresponds to the color scale in the legend. Detections in the environmental samples are included only. The underlying layer reflects the annual total lbs of diuron applied in the ESJWQC region.



Copper

Pesticides containing copper are applied to a variety of agricultural crops as a fungicide or aquatic weed control. The Coalition evaluated dissolved copper for the spatial trends analysis because the dissolved fraction is more bioavailable to aquatic organisms and is the only fraction analyzed as outlined in the 2013 ESJWQC MPU.

It is also possible that geological and geographical factors could influence the amount of copper detected in samples collected by the Coalition. These factors are outside of the scope of what the Coalition is capable of improving through modified agricultural practices. It is also possible that copper detected in some waterways could be the result of a combination of naturally occurring copper combined with small amounts of applied copper leaving agriculture files that would normally not result in an exceedance level detection alone. The Coalition addresses copper as it pertains to agricultural inputs when conducting focused outreach to growers. Growers have implemented management practices that have successfully resulted in management plans being removed for pesticides across the Coalition region. The reduction in discharge of other pesticides should also reduce the amount of copper leaving agriculture lands but naturally occurring copper could influence the levels of copper detected in Coalition waterways. Since 2009, the total annual use of pesticides containing copper has not changed drastically, however; the frequency of exceedances has declined (Figure 55).

Within the Coalition region, the frequency of exceedances of the hardness based WQTLs for copper have decreased from 6.32% in 2009 to 3.85% in the 2014 WY (Table 83). The number of detections of copper declined during the 2014 WY compared to 2009 (53 vs 66 detections; respectively). The number of exceedances in 2009 vs the 2014 WY was six and four; respectively (Table 88, Figures 57-58). In both years, exceedances of the hardness based WQTL for copper occurred most frequently in samples collected from Mustang Creek @ East Ave (Tables 57-58). Exceedances occurred in February, May, October, and December 2009 and in February, March, and December during the 2014 WY (Figure 55). The magnitude of exceedances was similar in both years, with the exception of the copper detection in samples from Mustang Creek @ East Ave during the December 2013 sampling event (Table 88).

The spatial trend analysis for copper focuses on copper detections in samples collected from Zones 3, 4, and 5 because the greatest number of detections and exceedances occurred in these zones.

Zone 3 Copper:

Within Zone 3, detections of copper occurred in Highline Canal @ Hwy 99, Highline Canal @ Lombardy Rd, and Mustang Creek @ East Ave site subwatersheds. For these three site subwatersheds, the months of greatest use were in January and February during both 2009 and the 2014 WY (Table 89). However, detections at these sites occurred during multiple seasons throughout the year.

The exceedance level detections of copper in samples collected from the two Highline Canal sites occurred in March 2014 when the region was receiving rainfall. Even while rainfall was occurring, applications of pesticides containing copper were made in both site subwatersheds. Research conducted by Wilson et al. (2012) demonstrated that copper entering a receiving waterbody from stormwater runoff can be detected 1-2 days after applications. Highline Canal is a TID supply canal and does not accept drainage from adjacent parcels. However, some growers may return irrigation tailwater or stormwater to the canal. It is possible that stormwater containing copper from recent applications could have been returned to the canal by the time samples were collected from the two Highline Canal locations. Coalition members with direct drainage in the Highline Canal @ Hwy 99 site subwatershed implement management practices reducing water volumes used for surface irrigation and adjusting nozzles to spray larger droplets size.

Detections in samples collected from Mustang Creek @ East Ave occurred during every monitoring event where samples were collected; the site was dry six times in 2009 and five times in the 2014 WY. The highest concentration was in October 2009 (44 µg/L), but the magnitude of this concentration compared to the hardness based WQTL was not the greatest. The greatest magnitude of detections compared to the WQTL occurred in December 2013 (42 µg/L) which was four times greater than the WQTL (Table 88). Copper detections/exceedances associated with Mustang Creek @ East Ave do not appear to coincide with the months of greatest use. Furthermore, exceedances occurred several months after the last application was made. For example, the last application of pesticides containing copper in 2009 was made to grapes in April which was six months before the exceedance of the hardness based WQTL occurred in October 2009. Therefore, naturally occurring copper in the waterbody could be influencing copper detections within the Mustang Creek @ East Ave site subwatershed.

Zone 4 Copper:

For both years, a total of 26 copper detections occurred in samples collected from sites in Zone 4 (Table 85). In 2009, detections occurred during every month and detections occurred in January through March, July, and August in the 2014 WY (Table 88).

Copper use in Zone 4 typically occurs during winter months (January through March) and applications decrease considerably during irrigations months (Table 89). However, applications are not associated with exceedances in Zone 4. For example, an exceedance occurred in samples collected from Howard Lateral @ Hwy 140 in October 2009, however; the latest application of copper in the site subwatershed was in June 2009 (4 months before the exceedance occurred; Table 89). The copper in the waterbodies in Zone 4 could be explained by the influence of naturally occurring copper from upstream inputs.

Zone 5 Copper:

For both years, a total of 40 copper detections occurred in samples collected from sites in Zone 5 (Table 88). Copper use in Zone 5 typically occurs during winter months (January through March) and applications decrease considerably during irrigations months (Table 89). Copper detections in Zone 5 occur throughout the year and detections do not coincide with applications. This suggests naturally occurring copper sources could be influencing copper detections in Zone 5. Because both agricultural and natural sources of copper are evident within the Coalition regions, managing agricultural inputs through effective implementation of management practices should help to reduce the amount of copper detected in Coalition tributaries.

Table 88. Magnitude of detections of dissolved copper in 2009 and the 2014 WY.

Field duplicates are not included unless the exceedance occurred in the duplicate only. Exceedances of the WQTLs are in **red bold**.

Zone	Site Subwatershed	Year	Sample Date	Result	WQTL[1] (µg/L)	Magnitude
1	Dry Creek @ Wellsford Rd	2014 WY	2/10/2014	0.21	11.939	0.02
			3/3/2014	1.2	9.716	0.12
			7/8/2014	2.2	4.953	0.44
			8/12/2014	2.2	4.441	0.5
	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	2014 WY	1/14/2014	4.2	26.122	0.16
			2/10/2014	5.6	17.567	0.32
			3/5/2014	4.1	24.841	0.17
			7/8/2014	2	10.466	0.19
	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
	Prairie Flower Drain @ Crows Landing Rd	2014 WY	2/10/2014	4.3	22.898	0.19
			3/3/2014	7.4	36.638	0.2
			7/8/2014	3	25.483	0.12
			8/12/2014	1.6	24.197	0.07
3	Highline Canal @ Hwy 99	2014 WY	3/3/2014	7.1	6.764	**1.05**
			7/8/2014	0.4	1.463	0.27
			8/12/2014	0.45	1.669	0.27
	Highline Canal @ Lombardy Rd	2009	8/18/2009	0.58	1.871	0.31
		2014 WY	1/14/2014	1.2	10.466	0.11
			2/10/2014	9.6	11.206	0.86
			3/5/2014	14	8.34	**1.68**
			5/13/2014	0.94	1.463	0.64
			8/12/2014	0.5	1.669	0.3
	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**
		2014 WY	12/10/2013	42	10.466	**4.01**
			3/5/2014	14	9.716	**1.44**
			4/8/2014	5.5	18.923	0.29
4	Bear Creek @ Kibby Rd	2014 WY	1/14/2014	1	4.612	0.22
			3/5/2014	1.6	7.401	0.22
	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	2014	7/8/2014	1.8	8.495	0.21
	Merced River @ Santa Fe	2009	1/20/2009	0.4	2.645	0.15
			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

Zone	Site Subwatershed	Year	Sample Date	Result	WQTL[1] (µg/L)	Magnitude
			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
		2014 WY	2/10/2014	0.38	2.069	0.18
			3/3/2014	0.7	2.264	0.31
			7/8/2014	0.64	2.264	0.28
			8/12/2014	0.52	1.669	0.31
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**
		2014 WY	12/10/2013	4.2	13.382	0.31
			2/10/2014	1.2	20.927	0.06
			3/3/2014	4.2	14.094	0.3
			4/8/2014	2.7	13.382	0.2
			5/13/2014	2.1	5.788	0.36
			6/10/2014	2.5	12.664	0.2
			7/8/2014	0.82	3.918	0.21
			8/12/2014	0.67	4.612	0.15
			9/9/2014	1	2.833	0.35
	Duck Slough @ Hwy 99[3]	2009	6/16/2009	0.61	2.456	0.25
			7/21/2009	0.7	1.871	0.37
			8/18/2009	0.61	1.567	0.39
			9/22/2009	0.25	1.252	0.2
	Miles Creek @ Reilly Rd	2009	7/21/2009	1.5	3.018	0.5
			8/18/2009	1.6	4.268	0.37
		2014 WY	1/14/2014	2.1	16.193	0.13
			2/10/2014	0.92	8.495	0.11
			3/5/2014	2.2	10.466	0.21
			4/8/2014	1.7	11.206	0.15
			5/13/2014	1.1	7.401	0.15
			6/10/2014	0.72	5.953	0.12
			7/8/2014	0.76	3.562	0.21
			8/12/2014	0.87	3.562	0.24
6	Ash Slough @ Ave 21	2009	5/19/2009	3.00	2.167	**1.38**
	Dry Creek @ Rd 18	2014 WY	10/15/2013	2.5	14.799	0.17
			11/12/2013	0.7	11.939	0.06
			2/10/2014	12	11.206	**1.07**
			5/13/2014	2.2	11.939	0.18
			6/10/2014	1.4	12.664	0.11
			9/9/2014	6.8	14.094	0.48

[1]The WQTL for dissolved copper is variable based on hardness.
[21]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.
[3]Duck Slough @ Hwy 99 was approved for removal from the Coalition's monitoring program in 2012.

Table 89. Applications of pesticides containing copper in total lbs and lbs per acre to commodities in 2009 and the 2014 WY.

Table includes site subwatersheds discussed in the copper section to compare use in 2009 and the 2014 WY. Table only includes top applications to crops that occurred in both years.

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 @ Hwy 99	Almond	2009	January	4243	139.19	21,114.86	51%	13%
				February	2419	118.55	4,295.81	10%	
				August	13	7.92	99.00	0%	
				November	1000	2.15	1,076.00	3%	
				December	230	2.15	247.48	1%	
				March	754	14.50	787.86	2%	
			2014WY	January	2064	261.51	10,930.08	22%	
				February	6631	235.95	9,539.08	19%	
				April	10	8.53	42.66	0%	
				November	1545	26.41	5,829.59	12%	
				December	806	22.54	3,536.80	7%	
				March	2024	16.52	1,401.20	3%	
		Grapes	2009	April	1243	4.25	1,092.75	3%	-16%
				June	64	5.98	191.23	0%	
			2014WY	January	31	4.28	66.19	0%	
				April	763	3.57	371.12	1%	
				June	136	11.44	382.46	1%	
				July	106	5.17	262.50	1%	
		Peach	2009	January	404	127.46	3,948.57	10%	82%
				February	317	144.11	1,375.28	3%	
				December	21	8.01	72.75	0%	
				March	159	11.03	160.59	0%	
			2014WY	January	442	282.73	5,316.19	11%	
				February	319	42.50	739.49	1%	
				December	418	213.67	3,912.07	8%	
				March	210	10.75	161.22	0%	
		Walnut	2009	April	1108	150.25	4,311.99	10%	-2%
				June	75	3.68	275.85	1%	
				March	90	15.06	391.35	1%	
				May	282	37.39	984.36	2%	
			2014WY	April	1247	126.50	4,687.64	9%	
				March	194	42.78	747.74	2%	
				May	153	19.15	392.50	1%	
3	Highline Canal @ Lombardy Rd	Almond	2009	January	4048	102.58	20,004.24	57%	7%
				February	2010	70.98	3,114.77	9%	
				August	13	7.92	99.00	0%	
				November	1000	2.15	1,076.00	3%	
				December	230	2.15	247.48	1%	

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
				March	715	8.47	634.48	2%	
			2014WY	January	1616	133.45	8,045.41	20%	
				February	6130	172.14	8,205.44	21%	
				April	10	8.53	42.66	0%	
				November	1545	26.41	5,829.59	15%	
				December	799	20.93	3,525.51	9%	
				March	1887	14.99	1,296.03	3%	
		Peach	2009	January	200	64.51	2,220.42	6%	75%
				February	131	60.36	594.27	2%	
				December	21	8.01	72.75	0%	
				March	126	8.07	101.68	0%	
			2014WY	January	171	146.31	2,203.99	6%	
				February	209	17.22	456.92	1%	
				December	304	70.97	2,460.59	6%	
				March	133	6.91	102.10	0%	
		Walnut	2009	April	1063	147.02	4,166.73	12%	4%
				June	75	3.68	275.85	1%	
				March	90	15.06	391.35	1%	
				May	251	27.59	680.56	2%	
			2014WY	April	1221	118.11	4,570.18	12%	
				March	194	42.78	747.74	2%	
				May	153	19.15	392.50	1%	
3	Mustang Creek @ East Ave	Almond	2009	January	1172	30.00	4,627.33	49%	219%
				February	2348	15.96	1,950.87	21%	
			2014WY	January	1942	22.65	4,958.11	22%	
				February	5610	19.60	5,964.40	27%	
				October	320	3.77	1,207.42	5%	
				November	1925	27.03	7,257.28	32%	
				December	315	8.87	1,365.90	6%	
				March	320	0.77	246.40	1%	
		Grapes	2009	April	3258	8.47	2,497.75	26%	-46%
			2014WY	April	2110	12.33	992.09	4%	
				March	778	2.77	358.66	2%	
4	Bear Creek @ Kibby Rd	Almond	2009	February	15	4.20	62.93	2%	-11%
				April	40	32.28	1,291.20	42%	
			2014WY	January	74	4.90	362.90	15%	
				November	222	7.55	836.90	34%	
		Walnut	2009	April	88	3.08	271.04	9%	46%
				March	38	3.23	122.66	4%	
				May	54	5.92	156.02	5%	
			2014WY	April	137	32.76	740.20	30%	

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
				May	15	4.27	63.99	3%	
4	Howard Lateral @ Hwy 140	Almond	2009	January	857	144.64	4,501.65	69%	42%
				February	345	41.27	1,012.59	16%	
				March	120	8.32	351.35	5%	
			2014WY	January	1344	189.58	6,902.35	59%	
				February	202	40.56	1,100.42	9%	
				December	71	15.20	355.50	3%	
		Grapes	2009	April	58	2.10	60.83	1%	395%
				June	64	5.98	191.23	3%	
			2014WY	January	11	2.13	23.46	0%	
				June	250	14.25	712.40	6%	
				July	173	7.97	450.04	4%	
				March	58	2.10	60.83	1%	
		Peach	2009	January	48	8.61	206.59	3%	409%
				February	110	6.46	178.02	3%	
			2014WY	January	119	48.61	1,152.45	10%	
				February	71	7.92	187.53	2%	
				December	66	49.33	615.83	5%	
4	Livingston Drain @ Robin Ave	Almond	2009	January	1726	209.31	8,496.73	64%	54%
				February	656	65.76	1,523.43	11%	
				April	26	0.44	11.55	0%	
				March	160	3.74	85.98	1%	
			2014WY	January	1671	309.72	9,818.68	45%	
				February	1735	111.14	5,430.98	25%	
				December	71	15.20	355.50	2%	
		Grapes	2009	April	58	2.10	60.83	0%	395%
				June	64	5.98	191.23	1%	
			2014WY	January	11	2.13	23.46	0%	
				June	250	14.25	712.40	3%	
				July	173	7.97	450.04	2%	
				March	58	2.10	60.83	0%	
		Peach	2009	January	171	36.06	784.92	6%	292%
				February	236	17.76	380.58	3%	
			2014WY	January	244	138.13	2,878.42	13%	
				February	176	23.77	465.12	2%	
				December	170	64.27	1,223.93	6%	
4	Merced River @ Santa Fe	Almond	2009	January	440	49.83	1,783.29	15%	635%
				February	1555	41.20	2,536.56	21%	
				April	60	4.90	294.24	2%	
				March	1773	8.26	924.38	8%	
			2014WY	January	1983	298.67	16,053.60	28%	

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
				February	3177	141.98	6,351.91	11%	
				October	1090	11.32	4,112.79	7%	
				November	3407	74.55	12,674.30	22%	
				December	354	6.11	1,258.28	2%	
				March	320	0.77	246.40	0%	
		Grapes	2009	April	922	1.80	552.37	5%	-2%
				June	103	5.68	292.55	2%	
			2014WY	January	102	4.20	211.42	0%	
				April	473	2.11	255.87	0%	
				March	778	2.77	358.66	1%	
		Peach	2009	January	138	13.54	781.52	6%	427%
				February	545	30.67	878.98	7%	
			2014WY	January	498	254.69	7,039.38	12%	
				February	539	66.41	1,511.36	3%	
				March	42	18.87	197.34	0%	
		Walnut	2009	April	312	43.22	2,319.12	19%	30%
				May	278	25.36	1,244.51	10%	
			2014WY	April	579	72.21	3,392.74	6%	
				March	96	16.55	486.44	1%	
				May	158	19.88	747.19	1%	
5	Deadman Creek @ Gurr Rd	Almond	2009	January	888	9.22	1,637.47	40%	-74%
				February	58	0.61	35.61	1%	
				April	244	0.71	172.64	4%	
			2014WY	January	1009	5.53	465.15	13%	
				February	24	0.84	20.14	1%	
		Grapes	2009	April	1382	8.77	1,134.65	28%	78%
			2014WY	April	917	10.41	873.61	24%	
				March	2009	14.73	1,141.49	31%	
		Tomato	2009	April	94	5.53	75.43	2%	-74%
				August	320	9.24	739.20	18%	
				October	186	1.04	64.31	2%	
				May	54	2.21	36.65	1%	
			2014WY	April	293	6.66	204.93	6%	
				March	13	2.42	10.49	0%	
				May	38	0.58	21.90	1%	
5	Duck Slough @ Gurr Rd	Almond	2009	January	70	3.15	220.50	11%	351%
				February	58	0.61	35.61	2%	
			2014WY	January	46	1.70	78.37	2%	
				February	118	7.38	454.23	9%	
				November	29	3.77	110.18	2%	
				December	90	11.41	513.47	10%	

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
		Tomato	2009	April	35	1.73	30.54	2%	-39%
				August	30	2.31	69.30	4%	
				May	56	2.44	44.95	2%	
			2014WY	April	67	2.30	35.15	1%	
				March	30	2.42	23.80	0%	
				May	65	1.38	29.87	1%	
		Walnut	2009	April	144	10.30	352.55	18%	232%
				May	115	6.46	258.21	13%	
			2014WY	April	319	38.47	1,077.71	21%	
				March	133	21.79	483.24	9%	
				May	110	8.53	469.26	9%	
5	Miles Creek @ Reilly Rd	Prune	2014WY	January	200	4.90	980.80	96%	NA
		Tomato	2014WY	April	61	2.07	42.18	4%	

Figure 55. Sum of pounds of pesticides containing copper applied in 2009 and through September 2014.

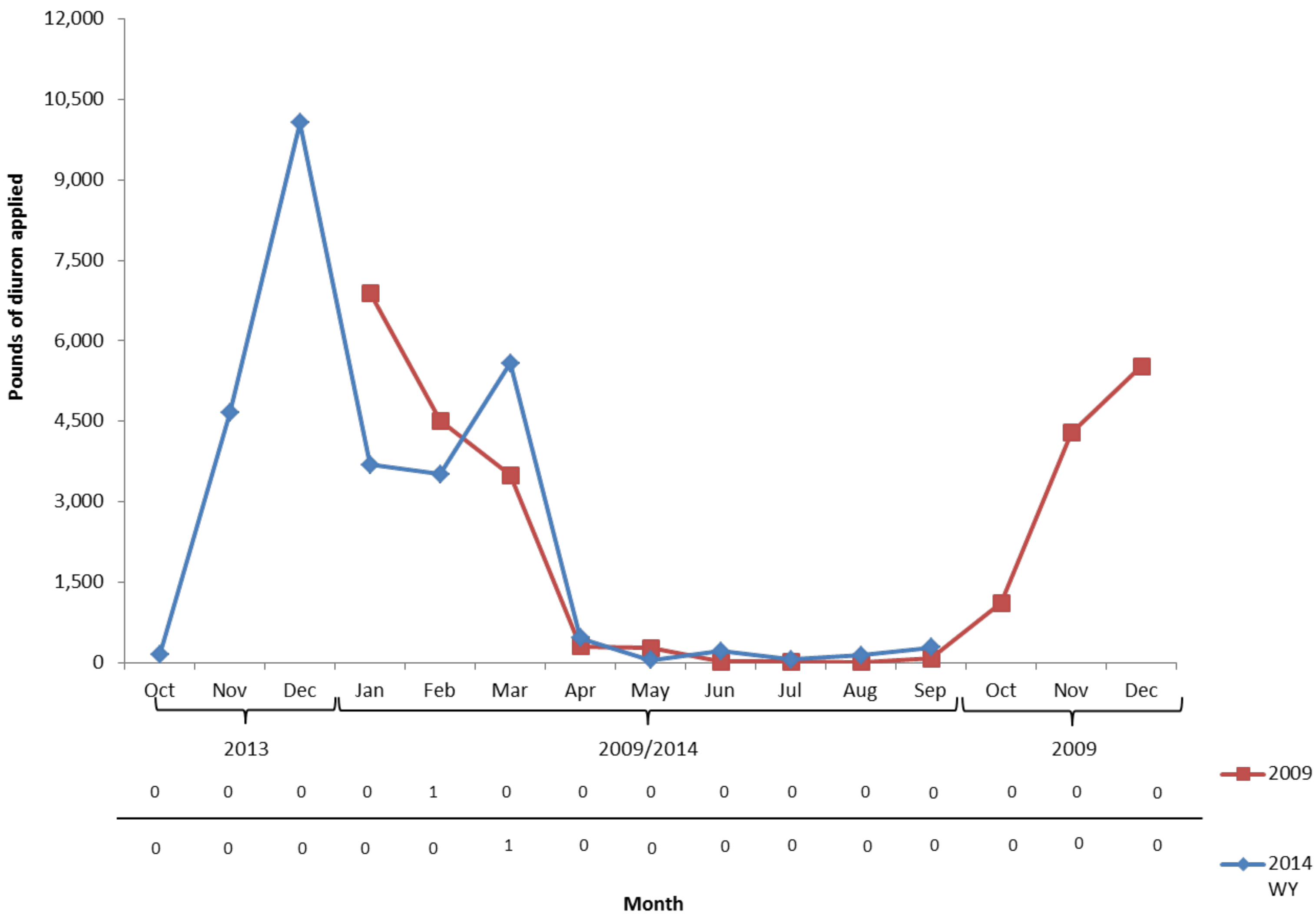


Figure 56. Change in total annual use of pesticides containing copper in 2009 and 2014 WY.

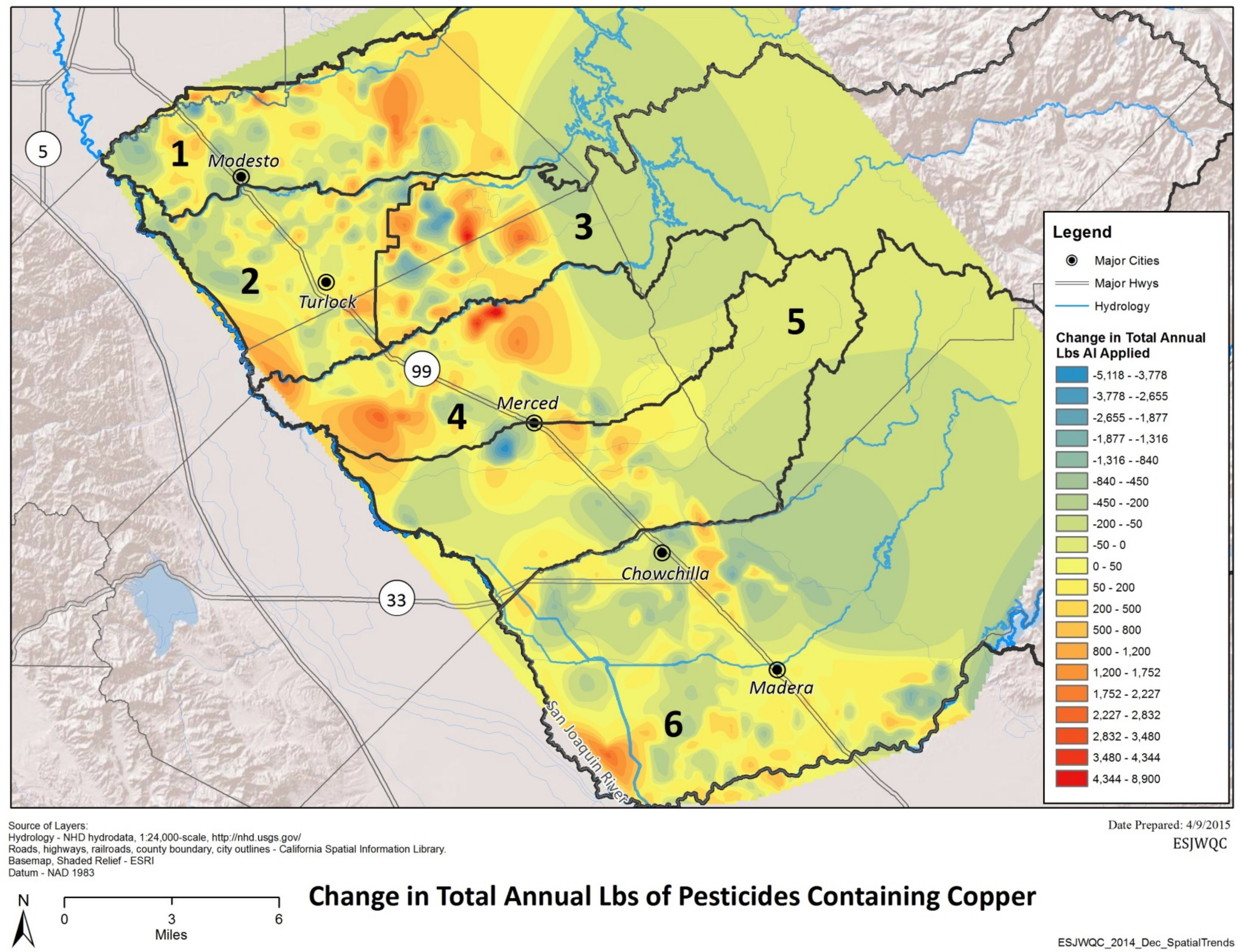


Figure 57. Frequency of detections and total number of exceedances of the WQTL for copper at sites in the ESJWQC region during 2009.

The frequencies of detections are represented by the circle circumference and the number of exceedances of the WQTL for dissolved copper corresponds to the color scale in the legend. Detections in the environmental samples are included only. The underlying layer reflects the annual total lbs of copper applied in the ESJWQC region.

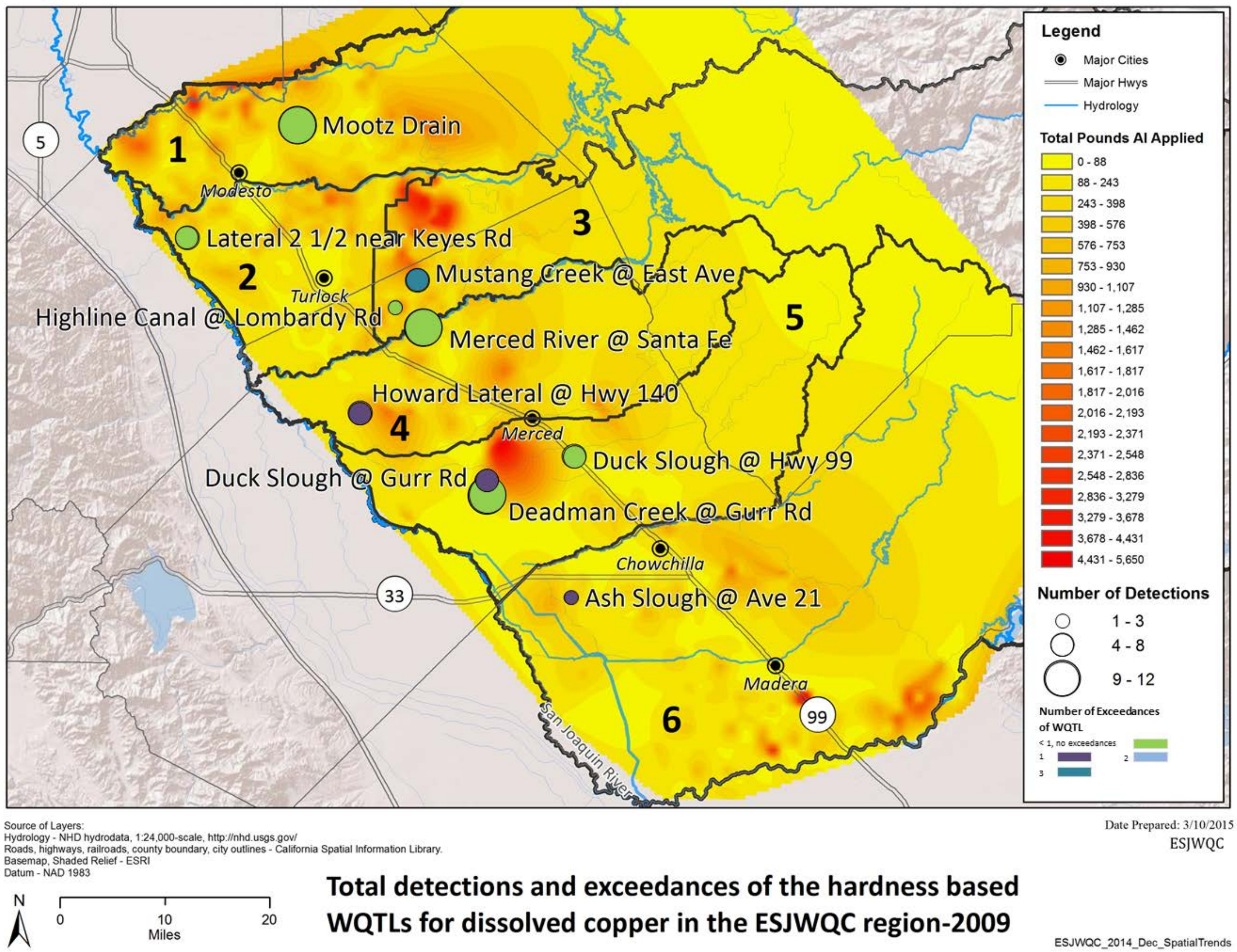
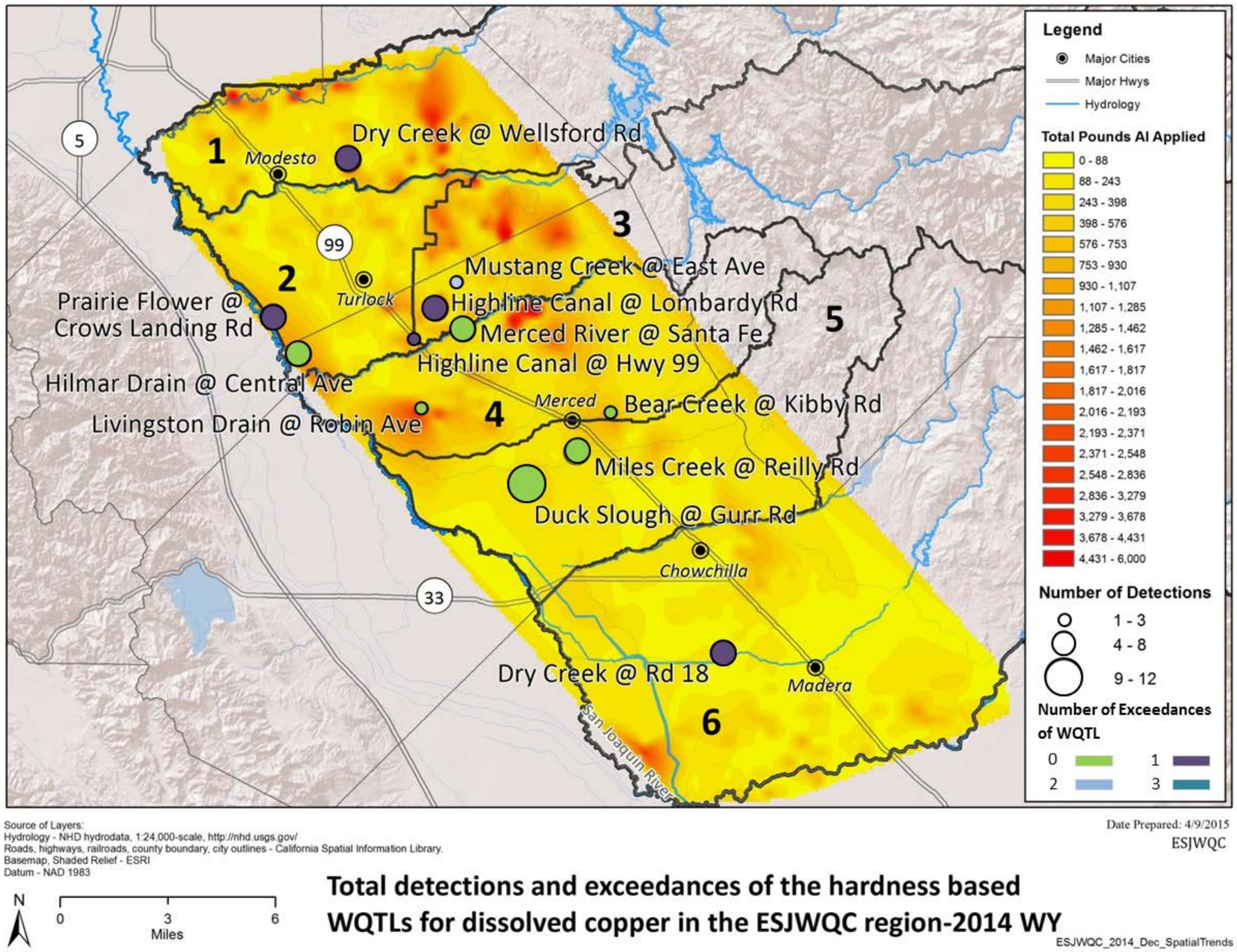


Figure 58. Frequency of detections and total number of exceedances of the WQTL for copper at sites in the ESJWQC region during the 2014 WY.

The frequencies of detections are represented by the circle circumference and the number of exceedances of the hardness based WQTL for dissolved copper corresponds to the color scale in the legend. Detections in the environmental samples are included only. The underlying layer reflects the annual total lbs of pesticides containing copper applied in the ESJWQC region.



13.c.ii. Nutrients, Bacteria, and Field Parameters

The Coalition conducted a spatial trends analysis for constituents not applied by agriculture: DO, SC, *E. coli,* and ammonia/nitrates which are constituents applied by agriculture but are not tracked through any 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. The temporal trends analysis focuses on the occurrence of detections and exceedances of WQTL across time. The analysis includes a comparison between the frequency of exceedances in samples collected during all seasons (fall, winter, and irrigation) in 2009 and the 2014 WY (Table 90-92).

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 ammonia, *E. coli*, and nitrates (cow density), and SC (groundwater depth).

As indicated in the ESJWQC 2014 Revised SQMP, submitted on March 10, 2015, constituents such as DO, SC, *E. coli*, and nitrates are not easy to source. These constituents will be the subject of source identification studies conducted by the Coalition. If irrigated agriculture is identified as a potential source, the Coalition will then determine which management practices could be effective in reducing discharges and will conduct outreach with growers to review appropriate practices.

Dissolved Oxygen

Dissolved Oxygen is a field parameter and the Coalition measures DO at all sites during every monitoring event. Waterbodies within the ESJWQC are assigned beneficial uses to protect aquatic habitats and exceedances of the WQTL for DO result in impaired Aquatic Life BUs. Dissolved oxygen is a non-conserved constituent meaning that it can increase or decrease as water moves downstream. Natural instream processes generate or remove DO from the waterbody without external inputs of agricultural constituents. Therefore, trying to assess the role of agricultural discharges on DO dynamics is an involved and expensive task. Processes affecting DO in waterways include stream flow, fluctuations in temperature, loss of vegetation around streams, as well as excessive nutrients. The Coalition evaluated the frequency of exceedances of the WQTL for DO during winter (January through March), irrigation (April through September), and fall (October through December).

The frequency of exceedances of the WQTL for DO throughout all seasons during the 2014 WY increased compared to 2009 (37 in 2009 and 77 in the 2014 WY); however the number of sites monitored has also increased (Table 90). Exceedances of the WQTL for DO are more common during the irrigation season; during the irrigation season, the average water temperature was 23.6°C and 23.1°C in 2009 and the 2014 WY. At 23°C, water can be saturated at approximately 8.5 mg/L. Other factors such as biological oxygen demand and flow may inhibit DO from reaching the saturation point in a waterbody. 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.

It is also possible that management practices implemented by growers to reduce irrigation and/or stormwater runoff result in the reduction of DO. Management practices such as using less water for irrigation are commonly implemented by growers and end up reducing water and subsequently DO in receiving waterbodies.

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 are used for agricultural purposes only, inputs from water leaving the fields are necessary to maintain DO levels at 7 mg/L, especially when temperature in the area is consistently high during the irrigation season.

Table 90. Frequency of exceedances the WQTL for DO during all seasons for 2009 and the 2014 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.

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%
		2014 WY	Winter	2	274	0.73%
			Irrigation	6	274	2.19%
			Fall	3	274	1.09%
	Mootz Drain	2009	Irrigation	7	163	4.29%
			Fall	1	163	0.61%
			Winter	1	163	0.61%
		2014 WY	Winter	1	274	0.36%
			Irrigation	1	274	0.36%
2	Hatch Drain @ Tuolumne Rd	2014 WY	Winter	3	274	1.09%
			Irrigation	6	274	2.19%
	Hilmar Drain @ Central Ave		Irrigation	4	274	1.46%
	Lateral 6 and 7 @ Central Ave	2014 WY	Winter	1	274	0.36%
			Irrigation	2	274	0.73%
	Levee Drain @ Carpenter Rd	2014 WY	Irrigation	3	274	1.09%
			Fall	1	274	0.36%
	Lower Stevinson @ Faith Home Rd	2014 WY	Winter	1	274	0.36%
	Prairie Flower Drain @ Crows Landing Rd	2009	Irrigation	1	163	0.61%
		2014 WY	Winter	2	274	0.73%
			Irrigation	2	274	0.73%
			Fall	3	274	1.09%
	Unnamed Drain @ Hogin Rd	2014 WY	Winter	2	274	0.73%
			Irrigation	4	274	1.46%
			Fall	1	274	0.36%
	Westport Drain @ Vivian Rd	2014 WY	Irrigation	3	274	1.09%
			Winter	2	274	0.73%
3	Highline Canal @ Hwy 99	2014 WY	Irrigation	2	274	0.73%
	Highline Canal @ Lombardy Rd	2014 WY	Irrigation	1	274	0.36%
	Mustang Creek @ East Ave	2009	Irrigation	2	163	1.23%
		2014 WY	Irrigation	1	274	0.36%
			Fall	1	274	0.36%
4	Black Rascal Creek @ Yosemite Rd	2014 WY	Irrigation	2	274	0.73%
	Canal Creek @ West Bellevue Rd	2014 WY	Fall	1	274	0.36%
	Howard Lateral @ Hwy 140	2009	Irrigation	1	163	0.61%
	Merced River @ Santa Fe	2009	Irrigation	2	163	1.23%
	Unnamed Drain @ Hwy 140	2014WY	Fall	1	274	0.36%
5	Deadman Creek @ Gurr Rd	2009	Irrigation	3	163	1.84%
			Fall	1	163	0.61%
			Winter	2	163	1.23%
		2014 WY	Irrigation	5	274	1.82%

Zone	Site Subwatershed	Year	Season[1]	Total Exceedances	Total Samples Collected	Frequency
			Fall	3	274	1.09%
	Duck Slough @ Gurr Rd	2014 WY	Irrigation	2	274	0.73%
			Fall	1	274	0.36%
	Duck Slough @ Hwy 99	2009	Irrigation	1	163	0.61%
	Miles Creek @ Reilly Rd	2009	Irrigation	4	163	2.45%
		2014 WY	Irrigation	3	274	1.09%
6	Ash Slough @ Ave 21	2009	Irrigation	1	163	0.61%
	Cottonwood Creek @ Rd 21	2009	Irrigation	1	163	0.61%
	Dry Creek @ Rd 18	2014WY	Irrigation	1	274	0.36%

[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, including coordinating meetings of the CV-SALTS committees. The Lower San Joaquin River Committee of CV-SALTS is tasked with reviewing relevant studies and developing the science and policy needed to justify a Basin Plan amendment for salt and boron in the San Joaquin River upstream of Vernalis. The Coalition continues to monitor SC until the CV-SALTS process is finalized.

The occurrence of exceedances of the WQTL for SC has increased from a total of 25 in 2009 to 80 in the 2014 WY, however; monitoring has also increased in the Coalition region. Specific conductance levels exceeded the 700 µs/cm WQTL most frequently during the irrigation season for 2009 and the 2014 WY. Most of the exceedances of the WQTL for SC occurred at sites in Zone 2 during both 2009 and the 2014 WY (Table 91 and Figure 59-60). The frequency of exceedances of the WQTL for SC in Zone 2 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). Salts accumulating in the root zone can impact crop productivity. When salts begin to build up within root zones, growers could determine the leaching requirement and apply more water to the area where a crop will be grown (http://www.fao.org/docrep/003/T0234E/T0234E03.htm). The water applied can move a portion of the excess salts below the root zone, thereby allowing for potentially higher crop yields. During times when water resources are scarce, such as a drought, growers may reduce the leaching requirement to move salts accumulated in the root zone. The intrusions of shallow, salty groundwater could also contribute to elevate of 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. Specific conductance measurements could have exceeded the WQTL more times at sites located in Zone 2 during the 2014 WY compared to 2009 due to growers reducing the amount of water applied to leach accumulated salts below the root zone to combat the current drought conditions or saltwater intrusion.

Table 91. Frequency of exceedances the WQTL for SC during all seasons for 2009 and the 2014 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	2014 WY	Irrigation	6	274	2.19%
			Winter	3	274	1.09%
	Hilmar Drain @ Central Ave	2009	Irrigation	2	163	1.23%
		2014 WY	Winter	3	274	1.09%
			Irrigation	4	274	1.46%
			Fall	1	274	0.36%
	Lateral 2 1/2 near Keyes Rd	2014WY	Fall	1	274	0.36%
	Lateral 5 1/2 @ South Blaker Rd	2014 WY	Winter	2	274	0.73%
			Irrigation	6	274	2.19%
			Fall	2	274	0.73%
	Lateral 6 and 7 @ Central Ave	2014 WY	Winter	3	274	1.09%
			Irrigation	5	274	1.82%
			Fall	2	274	0.73%
	Levee Drain @ Carpenter Rd	2014 WY	Winter	3	274	1.09%
			Irrigation	2	274	0.73%
	Lower Stevinson @ Faith Home Rd	2014 WY	Winter	2	274	0.73%
			Irrigation	4	274	1.46%
			Fall	1	274	0.36%
	Prairie Flower Drain @ Crows Landing Rd	2009	Irrigation	6	163	3.68%
			Fall	3	163	1.84%
			Winter	3	163	1.84%
		2014 WY	Winter	4	274	1.46%
			Irrigation	5	274	1.82%
			Fall	5	274	1.82%
	Unnamed Drain @ Hogin Rd	2014 WY	Winter	3	274	1.09%
			Irrigation	4	274	1.46%
			Fall	2	274	0.73%
	Westport Drain @ Vivian Rd	2014 WY	Winter	1	274	0.36%
			Irrigation	2	274	0.73%
3	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%
5	Deadman Creek @ Gurr Rd	2009	Fall	1	163	0.61%
			Winter	2	163	1.23%
		2014WY	Fall	3	274	1.09%
	Duck Slough @ Gurr Rd	2009	Fall	1	163	0.61%
		2014WY	Irrigation	1	274	0.36%

[1-]Storm events are included in the season it replaced.

Figure 59. Frequency of 2009 exceedances of the WQTL for SC during all seasons with depth to groundwater.

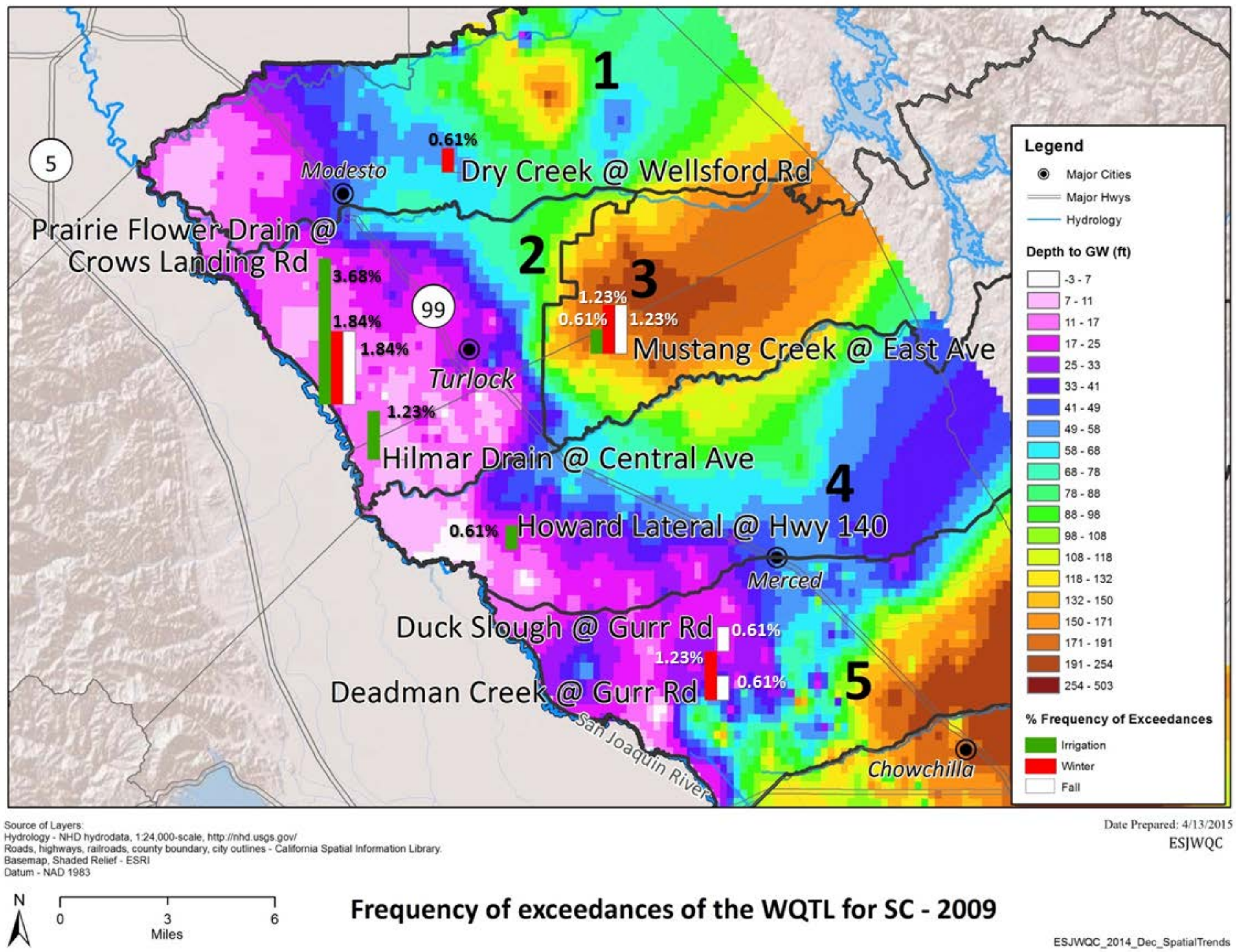
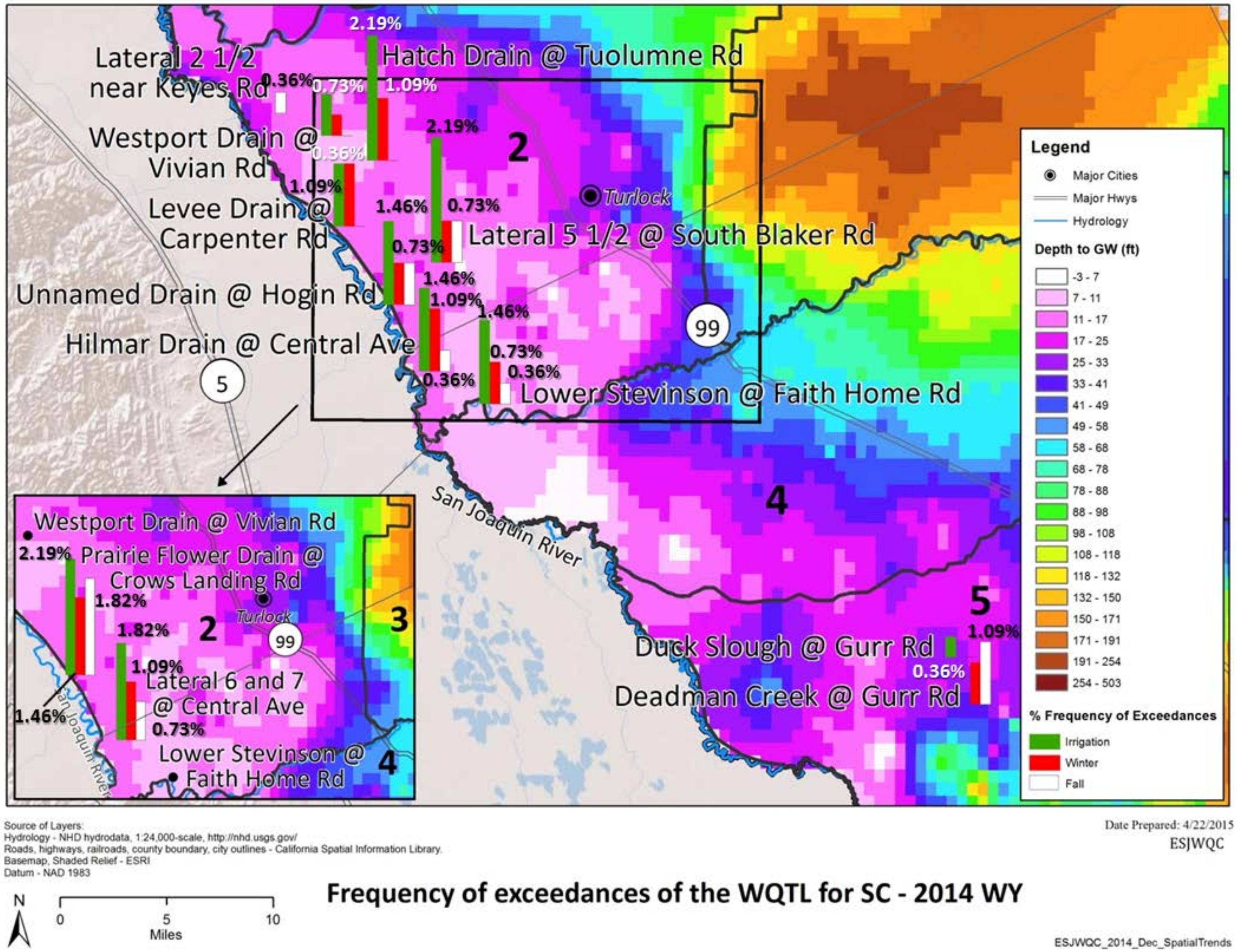


Figure 60. Frequency of 2014 WY exceedances of the WQTL for SC during all seasons with depth to groundwater.



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.

Additionally, 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 2014 WY, samples for *E. coli* analyses were collected monthly at six Core sites, which reduces the sample size, or the denominator in the calculation for the percent frequencies. In some cases, some sites had roughly the same seasonal percent frequency, but the total number of exceedances declined. For example, the percent frequency during the irrigation season for Prairie Flower Drain @ Crows Landing Rd was 2.16% in 2009 and 2.74% in the 2014 WY; however, the total number of exceedances actually declined (three in 2009 and two in the 2014 WY). Nonetheless, the total number of exceedances of the WQTL for *E. coli* declined considerably from 41 in 2009 to 12 in the 2014 WY (Table 92).

There is a spatial association between exceedances of the WQTL for *E. coli* and cow density (Figures 61-62). 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. In 2009, a greater number of exceedances occurred in samples collected during the fall season compared the other two seasons. During the 2014 WY, a greater number of exceedances occurred in samples collected during the irrigation season than the other two seasons (Figure 62).

Table 92. Frequency of exceedances the WQTL for *E. coli* during all seasons for 2009 and the 2014 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	139	2.88%
			Fall	3	139	2.16%
			Winter	1	139	0.72%
		2014 WY	Irrigation	5	73	6.85%
			Fall	1	73	1.37%
	Mootz Drain[2]	2009	Irrigation	6	139	4.32%
			Fall	2	139	1.44%
2	Prairie Flower Drain @ Crows Landing Rd	2009	Irrigation	3	139	2.16%
			Fall	3	139	2.16%
		2014WY	Irrigation	2	73	2.74%
3	Highline Canal @ Hwy 99	2009	Irrigation	1	139	0.72%
		2014WY	Irrigation	2	73	2.74%
	Mustang Creek @ East Ave	2009	Fall	1	139	0.72%
4	Howard Lateral @ Hwy 140	2009	Irrigation	1	139	0.72%
			Fall	1	139	0.72%
	Merced River @ Santa Fe	2014WY	Irrigation	1	73	1.37%
6	Deadman Creek @ Gurr Rd	2009	Fall	3	139	2.16%
			Irrigation	3	139	2.16%
			Winter	3	139	2.16%
	Duck Slough @ Gurr Rd	2009	Fall	2	139	1.44%
			Irrigation	1	139	0.72%
		2014WY	Irrigation	1	73	1.37%
6	Cottonwood Creek @ Rd 20	2009	Fall	1	139	0.72%

[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.

Figure 61. Frequency of 2009 exceedances of the WQTL for *E. coli* during all seasons with cow density.

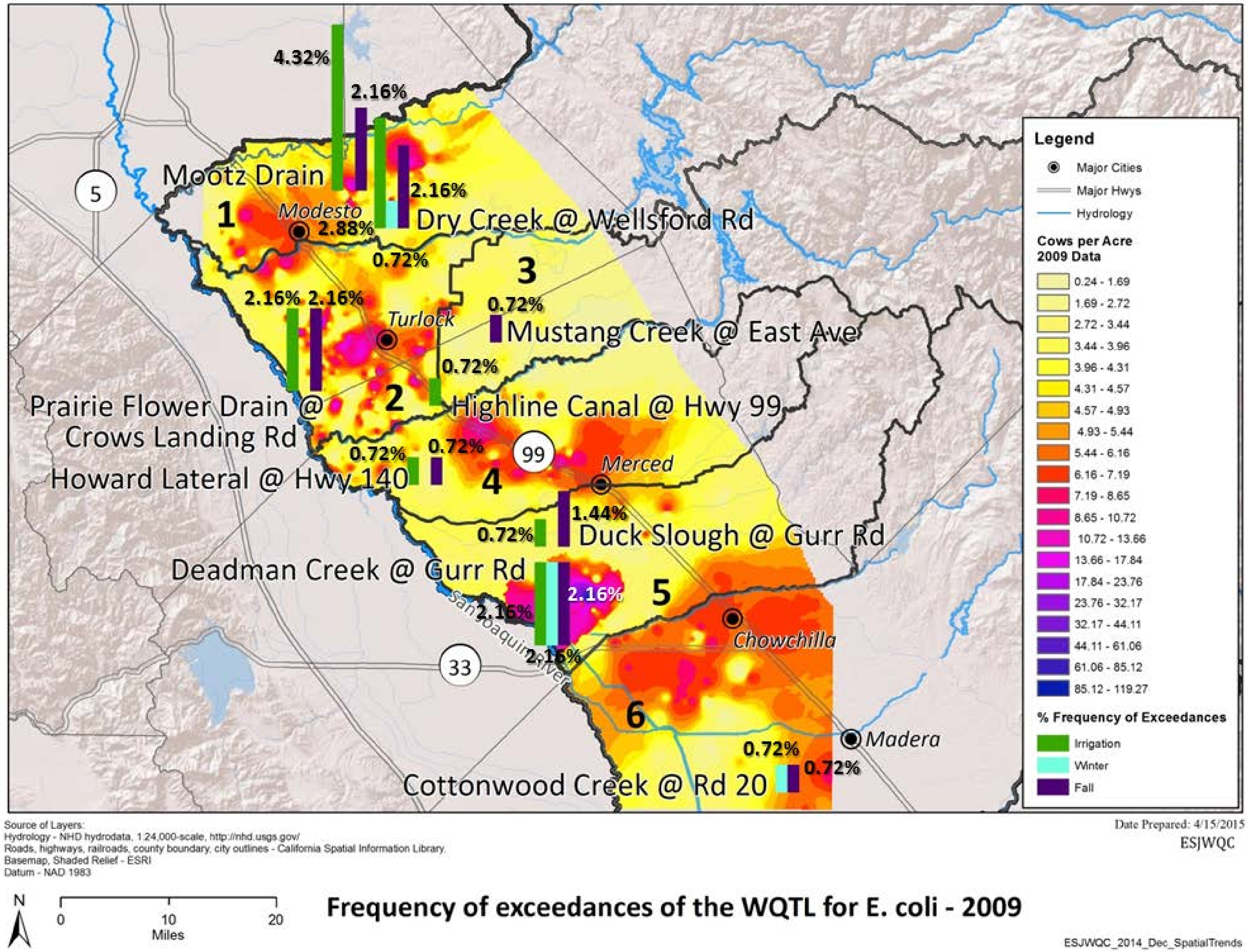
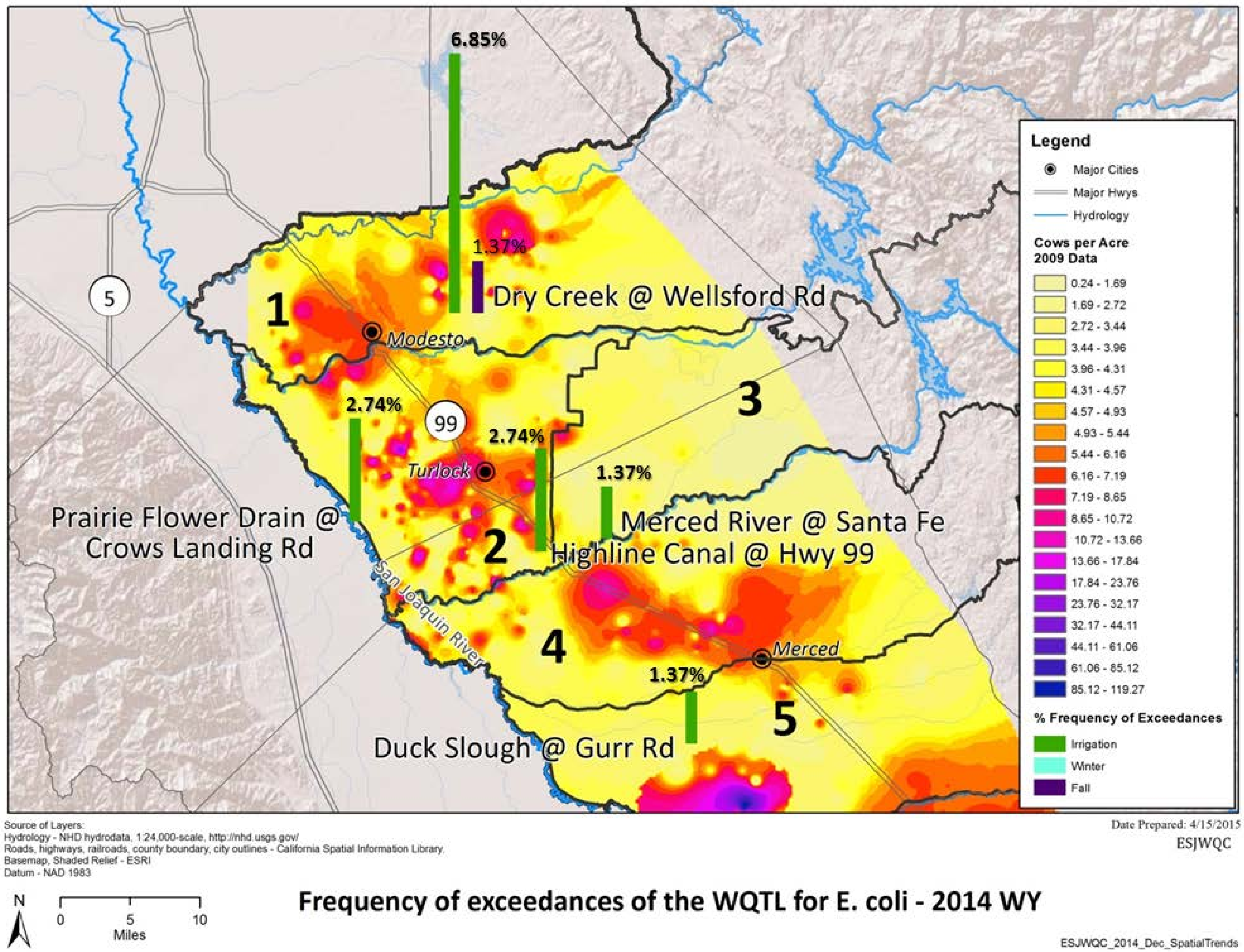


Figure 62. Frequency of 2014 WY exceedances of the WQTL for *E. coli* during all seasons with cow density.



Ammonia and Nitrates

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. Ammonium can enter a waterbody from three sources: 1) direct discharge of agricultural fertilizers as anhydrous ammonia, 2) direct discharge of animal waste, and 3) discharge from wastewater treatment plants. The most common method of anhydrous ammonium applications to fertilize agricultural field is injection into the soil. Ammonia is transformed to nitrate by nitrifying bacteria over a short period of time. This argues against the idea that direct discharge to a receiving waterbody is a possible major contributor to exceedances of the WQTLs for ammonia. Ammonium can also be formed in the waterbody through the mineralization of organic nitrogen, which is naturally occurring. 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 ammonia and 12 exceedances of the WQTL for nitrates. Exceedances of the WQTL for ammonia and nitrates occurred most frequently during the fall and irrigation season; respectively. During the 2014 WY, there was one exceedance of the WQTL for ammonia and seven exceedances of the WQTL for nitrates; all exceedances for both constituents occurred in samples collected from Prairie Flower Drain @ Crows Landing Rd (Table 93 and Figures 63-64). Prairie Flower Drain @ Crows Landing Rd is in Zone 2 and downstream of a large dairy area that consists of approximately eight cows per acre. Unless sophisticated isotopic analytical analyses are performed, it is not possible to distinguish nitrates originating from inorganic fertilizers applied to agricultural land from nitrates originating from dairies and feedlot operations.

Both ammonium and nitrates move easily through water and are commonly detected in groundwater samples. Nitrates are detected more frequently in groundwater than ammonia because of how quickly ammonia can be broken down into nitrates. Zone 2 has a shallow groundwater table and exceedances of the WQTL for ammonia and nitrates 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, nitrates in fertilizer could move to surface waters immediately after applications. Nitrates in shallow groundwater may result in exceedances of the WQTL for nitrate.

Table 93. Frequency of exceedances the WQTL for ammonia and nitrates during all seasons for 2009 and the 2014 WY.

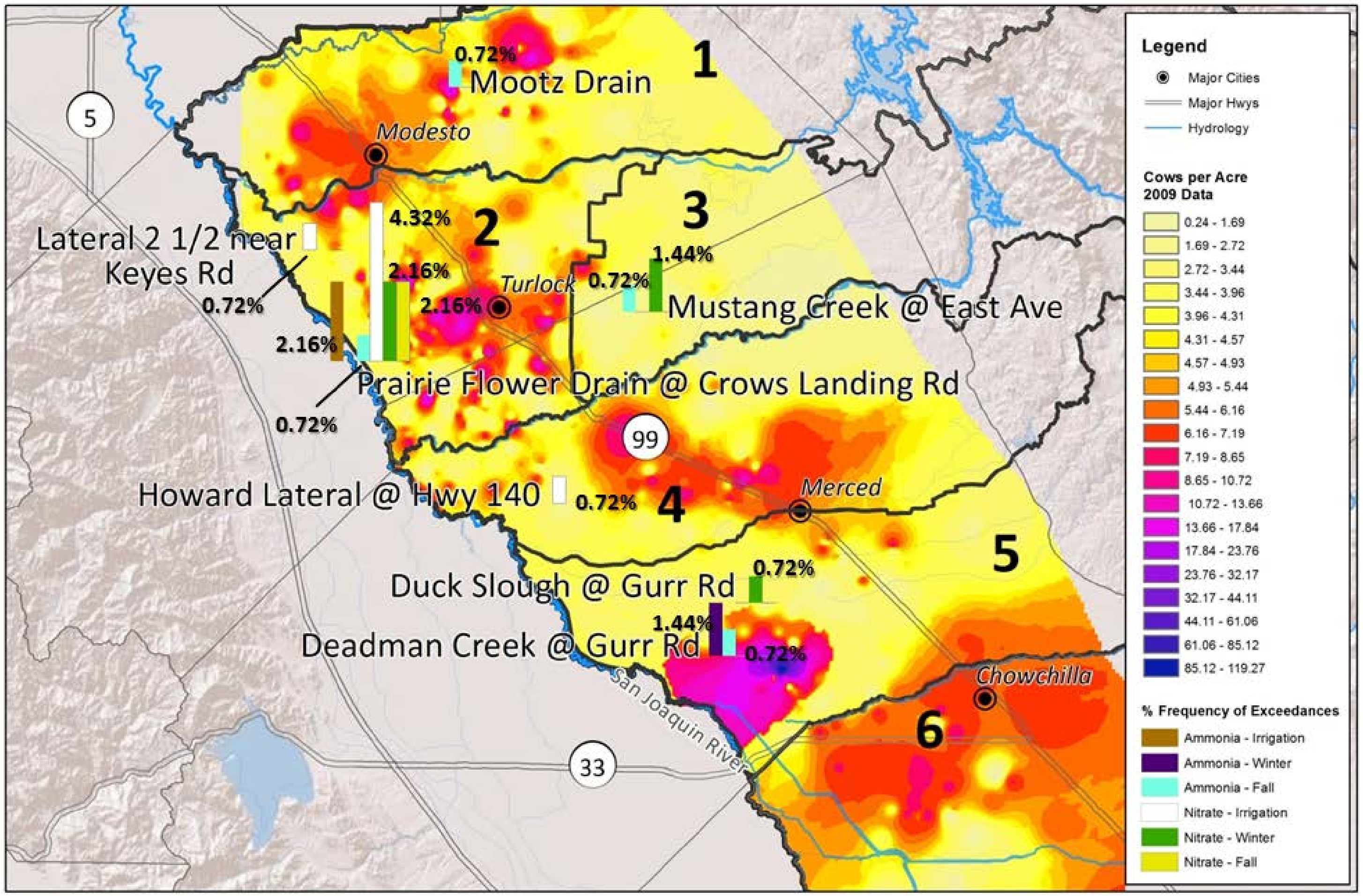
Environmental samples and dry sites included in counts; field duplicates not counted unless exceedance occurred in only that sample.

Analyte	Zone	Site Subwatershed	Year	Season[1]	Total Exceedances	Total Samples Collected	Frequency
Ammonia	1	Mootz Drain[2]	2009	Fall	1	139	0.72%
	2	Prairie Flower Drain @ Crows Landing Rd	2009	Irrigation	3	139	2.16%
				Fall	1	139	0.72%
			2014 WY	Winter	1	73	1.37%
	3	Mustang Creek @ East Ave	2009	Fall	1	139	0.72%
	5	Deadman Creek @ Gurr Rd	2009	Fall	1	139	0.72%
				Winter	2	139	1.44%
Nitrates	2	Lateral 2 1/2 near Keyes Rd	2009	Irrigation	1	139	0.72%
		Prairie Flower Drain @ Crows Landing Rd	2009	Irrigation	6	139	4.32%
				Fall	3	139	2.16%
				Winter	3	139	2.16%
			2014 WY	Winter	2	73	2.74%
				Irrigation	2	73	2.74%
				Fall	3	73	4.11%
	3	Mustang Creek @ East Ave	2009	Winter	2	139	1.44%
	4	Howard Lateral @ Hwy 140	2009	Irrigation	1	139	0.72%
	5	Duck Slough @ Gurr Rd	2009	Winter	1	139	0.72%

[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.

Figure 63. Frequency of 2009 exceedances of the WQTLs for ammonia and nitrates during all seasons with cow density.



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

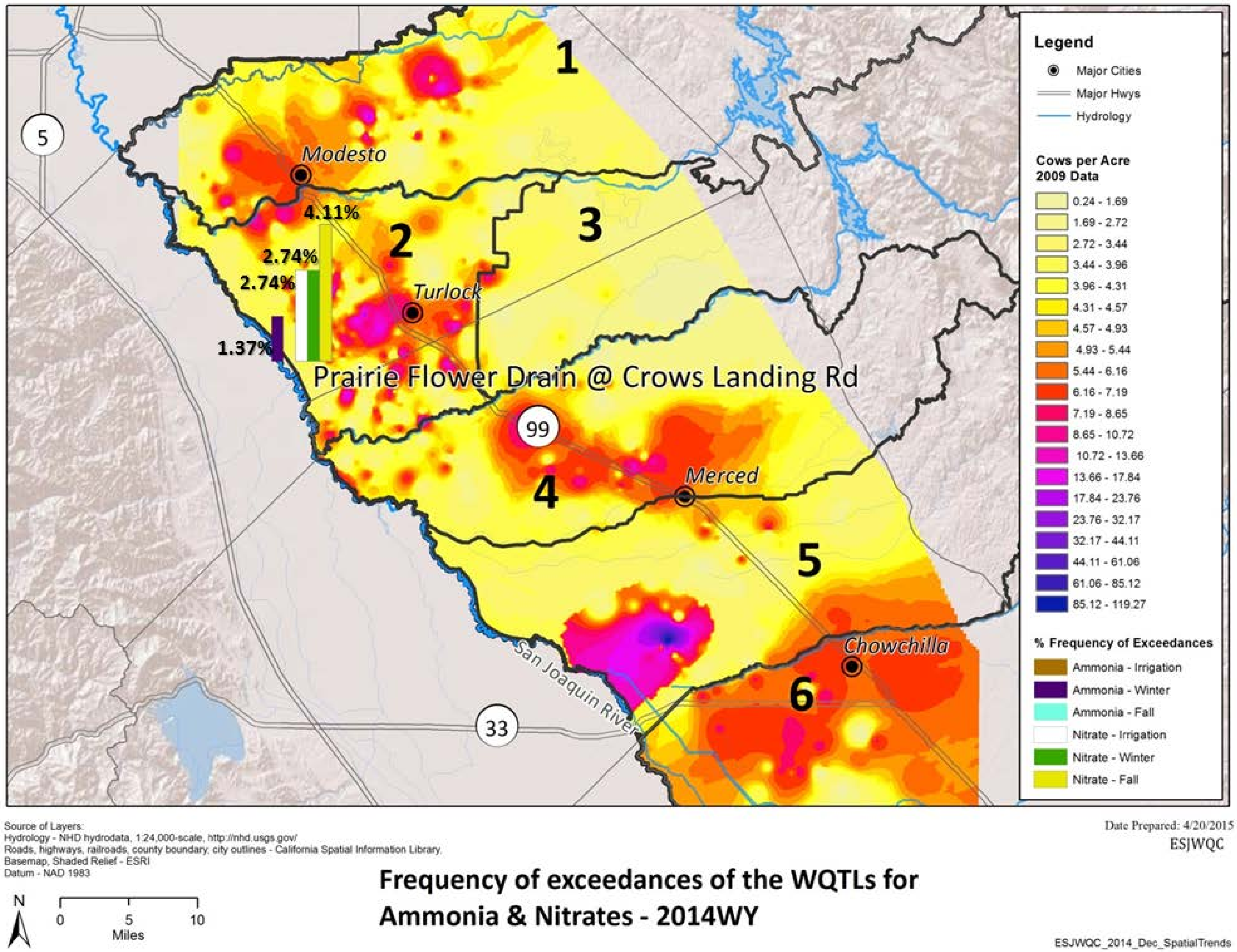
Date Prepared: 4/20/2015
ESJWQC

N 0 5 10 Miles

Frequency of exceedances of the WQTLs for Ammonia & Nitrates - 2009

ESJWQC_2014_Dec_SpatialTrends

Figure 64. Frequency of 2014 WY exceedances of the WQTLs for ammonia and nitrate during all seasons with cow density.



13.D. QUESTION 4: WHAT ARE THE MANAGEMENT PRACTICES THAT ARE BEING IMPLEMENTED TO REDUCE THE IMPACTS OF IRRIGATED AGRICULTURE ON WATERS OF THE STATE WITHIN THE COALITION GROUP BOUNDARIES AND WHERE ARE THEY BEING APPLIED?

The Coalition 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.

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 Coalition conducted meetings with targeted growers to document current management practices in the first through sixth priority subwatersheds. Follow-up contacts occurred in the first through fifth priority subwatersheds with those targeted growers to document newly implemented management practices. Newly implemented practices include those recommended by the Coalition as well as additional practices growers implement without specific recommendations.

The 2011 MPUR included a summary of all currently implemented management practices in the first priority subwatersheds, the 2012 MPUR summarized currently implemented management practices in the second and third priority subwatersheds and newly implemented management practices in the first and second priority subwatersheds, the 2013 MPUR included a summary of all currently implement management practices in the fourth priority site subwatersheds, and the 2014 Annual Report included a summary of currently implement management practices in the fifth priority site subwatersheds. The Coalition sent out follow-up contacts in the fifth priority subwatersheds and conducted individual meetings with targeted growers in the sixth priority subwatersheds; these results are reported in the Member Actions Taken to Address Exceedances of the Water Quality Objectives of this report.

The Coalition summarized the information about acres associated with newly implemented management practices designed to reduce the impacts of irrigated agriculture in the first through fifth priority subwatersheds (Table 66). When evaluating management practices and the associated acreage, a parcel may be included under multiple management practices. Therefore, the acreages in Table 66 cannot be summed together across management practices for each subwatershed, but can be used to evaluate number of acres with a particular practice within the overall targeted direct drainage acreage of the subwatershed.

A majority of the practices listed in Table 66 affect the amount of irrigation and/or stormwater runoff and include: installing microirrigation systems, reducing the amount of water used in surface irrigation, installing a device to control the amount and/or timing of discharge into a waterway, implementing sediment ponds and/or implementing a recirculation/tailwater return system. Drainage basins and recirculation/tailwater return systems also have a double purpose of reducing sediment discharge in addition to reducing or eliminating pesticide discharge into a downstream waterbody. Grass row centers and filter strips are already commonly implemented practices and do not represent a high percentage of the targeted acreage (<1%); most growers are already implementing these practices when applicable. Both grass rows and filter strips can be effective in reducing the amount of pesticides and fine particulate matter in agricultural discharges to surface waters. Of the high priority subwatersheds in Table 66, only one subwatershed in the first priority set had acreage with polyacrylaminde (PAM; 150 acres in Prairie Flower Drain subwatershed). The use of PAM is to help fine particles settle out (as well as any pesticide or metal bound to those fine particles) prior to surface water discharge. Using PAM is effective in certain situations where water can be held for a certain amount of time prior to discharge. The most used practices documented as newly implemented are specific to spray drift management and include: shutting off outside nozzles when spraying outer rows next to sensitive sites (4% of targeted acreage), spraying areas close to waterbodies when the wind is blow away from them (11%), using air blast applications when the wind is 3-10 mph and upwind of sensitive sites (<1%), using electronic spray nozzles (<1%), and using nozzles that provide the largest effect droplet size to minimize drift (1%; Table 66).

In the fifth priority subwatersheds, members reported newly implemented management practices for storm and irrigation runoff control and dormant pest spray management. The largest percentage (11%) of newly implemented management practices by growers is controlling the timing of spraying close to the waterbodies (Table 66).

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 to protect water quality while trend data are collected through monitoring. Management practices that are designed to protect the quality of groundwater should be implemented, where applicable, by members in high or low vulnerability areas. A Farm Evaluation summary is provided in the Summary of Required Grower Submittals section of this report.

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

The Coalition completed two years of its focused outreach strategy in all first through fifth priority site subwatersheds including documenting management practices. Management Plan Monitoring occurred during years of focused outreach and continues until the site/constituent is removed from a management plan (Table 56). The Coalition analyzes the results of all monitoring (Core, Represented, and MPM) to evaluate the effectiveness of current and newly implemented management practices. Across the 19 site subwatersheds, 71 members implemented 95 new management practices from 2009 through March 2015 (Tables 65 and 66). The most common practices implemented include reducing the volume of water used for irrigation, installing a device to control the timing of discharge (tailwater and/or stormwater runoff, and controlling the timing of spraying areas close to waterbodies. Implemented management practices have been effective at improving water quality as indicated by the significant decrease of exceedances of the WQTLs for high priority constituents throughout the first through fifth site subwatersheds (Tables 67 and 68).

Due to improved water quality, the Coalition received approval to remove multiple constituents from first through fifth site subwatershed management plans: chlorpyrifos was removed from five management plans, diazinon was removed from two management plans, diuron was removed from three management plans, and copper was removed from three management plans.

Exceedances of the WQTL for chlorpyrifos (3), diuron (1), malathion (1), copper (5), water column toxicity (21), and sediment toxicity (5) are still occurring in site subwatersheds across the Coalition region (Appendix III). Non-members do not receive focused outreach and could be contributing to exceedances. 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.

A complete evaluation of management practice effectiveness based on water quality results in the first through fifth priority site subwatersheds is provided in the Evaluation of Management Practice Effectiveness section of this report.

13.F. 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. Effective outreach implemented through annual grower meetings and individual farm visits has resulted in additional management practices implemented by members. The Coalition has demonstrated the effectiveness of those practices with improved water quality and the removal of constituents from site subwatershed management plans sometimes in as little as two years. Growers have taken steps to prevent the offsite movement of agricultural constituents, including implementing additional management practices, regardless of the priority level of their subwatershed. A complete evaluation of the Coalition's management plans and effectiveness of outreach and management practices is included in the Management Plan section of this report.

13.a. Coalition Wide Evaluation

Monitoring results indicate the Coalition's focused outreach and management practice tracking strategy have been effective in improving water quality across the Coalition region in several high priority site subwatersheds. The Coalition received approval on October 15, 2013 to remove eight specific site subwatershed/constituent pairs from seven site subwatershed management plans. On June 5, 2014, the Coalition submitted a request to remove an additional 18 site subwatershed/ constituent pairs from 11 site subwatershed management plans. Overall, water quality within the ESJWQC has significantly improved due to the implementation of the Coalition's Management Plan Strategy. Since focused outreach began, the number and percentage of exceedances for chlorpyrifos, copper, diazinon, and diuron have been reduced considerably (Tables 94-95, Figure 65-66).

Growers applied less chlorpyrifos across the Coalition region since outreach began; 173,545 lbs AI were applied in 2009, compared to 59,008 lbs of AI applied during the 2014 WY (Table 94). Monitoring results from the 2014 WY indicate only 3% of the samples analyzed for chlorpyrifos resulted in an exceedance of the WQTL, compared to 12% in 2008. During the 2014 WY, three exceedances occurred within three site subwatersheds; Dry Creek @ Wellsford (Zone 1), Duck Slough @ Gurr Rd (Zone 5), and Lateral 2 ½ near Keyes Rd (Zone 2).

During the 2014 WY, exceedances of the hardness based WQTL for dissolved copper occurred within Zone 6 (Dry Creek @ Rd 18) and Zone 3 (Highline Canal @ Hwy 99, Highline Canal @ Lombardy Rd, Mustang Creek @ East Ave). The exceedances that occurred within Zone 3 and Zone 6 were triggered by runoff from multiple storms. Due to the effectiveness of management practices and monitoring for the dissolved fraction, exceedances of the hardness based WQTL for copper have decreased throughout the Coalition region. In 2008, 51 exceedances (29%) occurred compared to five exceedances (3%) during the 2014 WY (Table 94). Additional sources of copper in waterways within the region include naturally elevated concentrations of copper in the soils or source waters, anthropogenic sources including applications by growers and applications by water districts, and from runoff during a storm from vehicle brake pads. The Coalition discusses copper during focused outreach and growers have implemented management practices designed to reduce the offsite movement of copper.

Exceedances of the WQTL for diazinon have decreased in the ESJWQC region; diazinon has been removed from management plans for the Cottonwood Creek @ Rd 20 and Dry Creek @ Rd 18 site subwatersheds. The amount of diazinon applied each year has significantly decreased. In 2008 there were 3,952 lbs AI of diazinon applied compared to only 1,360 lbs AI applied in the 2014 WY (Table 94). During the 2014 WY, no exceedances of the WQTL for diazinon occurred within the ESJWQC region (Figure 65). Miles Creek @ Reilly Rd (Zone 5) is the only site subwatershed currently in a management plan for diazinon; however, the Coalition completed follow-up surveys in 2014 and improvements in water quality have been observed. Overall, the majority of the Coalition region has never had an exceedance of the WQTL for diazinon and the necessary actions are being taken by growers to address the impairment within Zone 5.

A single exceedance of the WQTL for diuron occurred in samples collected from Prairie Flower Drain @ Crows Landing Rd (Zone 2) during storm sampling in March 2014; this was the first time an exceedance occurred at the site (Table 94). The sample was collected from a non-contiguous waterbody and the PUR data associated with the exceedance indicate no applications occurred. Based on the information available, the Coalition is unable to determine the source of the exceedance. However, focused outreach has been complete within the Prairie Flower Drain site subwatershed. Growers are aware of water quality concerns and documented management practices implemented to reduce to offsite movement of high priority constituents since 2009.

Management practices implemented by targeted growers are aimed at reducing the offsite movement of pesticides and other agricultural-related constituents impairing water quality. Additionally, the use of high priority pesticides has decreased throughout the Coalition region and the effects are reflected in the decreasing trend in toxicity (Table 95). Samples collected from the majority of the Coalition region have not been toxic to a *C. dubia* or *P. promelas* since 2008; toxicity has occurred only within Zones 2 and 5 (Figure 66). The Coalition added four new sites within Zone 2 and three new sites in Zone 4 during the 2014 WY to gain a better understanding of water quality trends and make further improvements to water quality in the Coalition region. Throughout the Coalition region, toxicity to *S. capricornutum* and *H. azteca* increased during the 2014 WY compared to 2013, primarily in Zone 2 and 3. Largely, the Coalition region has seen significant reductions in the frequency of samples toxic to *S. capricornutum* and *H. azteca*. In 2008, 26% of *S. capricornutum* samples resulted in toxicity, compared to only 9% during the 2014 WY and 57% of *H. azteca* samples resulted in toxicity in 2009, compared to 13% in the 2014 WY.

Table 94. Count of exceedances of the WQTL and samples collected for chlorpyrifos from 2006 through 2014 WY across the ESJWQC region.

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	17	115	15%	218080	23	61	37%	936935	0	95	0%	6928	0	75	0%	24233
2007	19	180	11%	189325	54	119	45%	570981	1	129	1%	7122	7	125	6%	28103
2008	27	218	12%	100185	51	175	29%	451285	2	145	1%	3952	7	141	5%	15775
2009	5	97	5%	173545	6	139	4%	397993	0	70	0%	2656	1	60	2%	14806
2010	9	93	10%	126259	8	172	5%	641888	0	63	0%	1588	1	66	2%	19839
2011	3	147	2%	98694	30	274	11%	763491	0	119	0%	1250	1	122	1%	30411
2012	0	82	0%	78520	9	111	8%	648938	0	48	0%	1516	0	52	0%	22524
2013	1	92	1%	149051	13	155	8%	551273	1	44	2%	898	1	44	2%	10943
2014 WY	3	126	3%	59008	5	155	3%	328960	0	74	0%	1360	1	79	1%	9996

[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 2012.

Table 95. Count of toxicity and samples collected for toxicity from 2006 through 2014 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%	7	30	23%
2007	10	144	7%	1	135	1%	14	146	10%	7	35	20%
2008	10	185	5%	4	174	2%	52	200	26%	33	58	57%
2009	2	78	3%	3	81	4%	5	92	5%	1	15	7%
2010	2	80	3%	2	84	2%	1	100	1%	1	18	6%
2011	1	120	1%	2	117	2%	6	127	5%	3	22	14%
2012	0	66	0%	0	61	0%	2	68	3%	1	15	7%
2013	4	78	5%	1	63	2%	6	88	7%	4	24	17%
2014 WY	2	120	2%	3	109	4%	16	186	9%	5	40	13%

[1] Samples refers to all samples collected for constituent analysis (dry sites included).

Figure 65. Percentage of exceedances of high priority constituents per Zone during the 2014 WY.

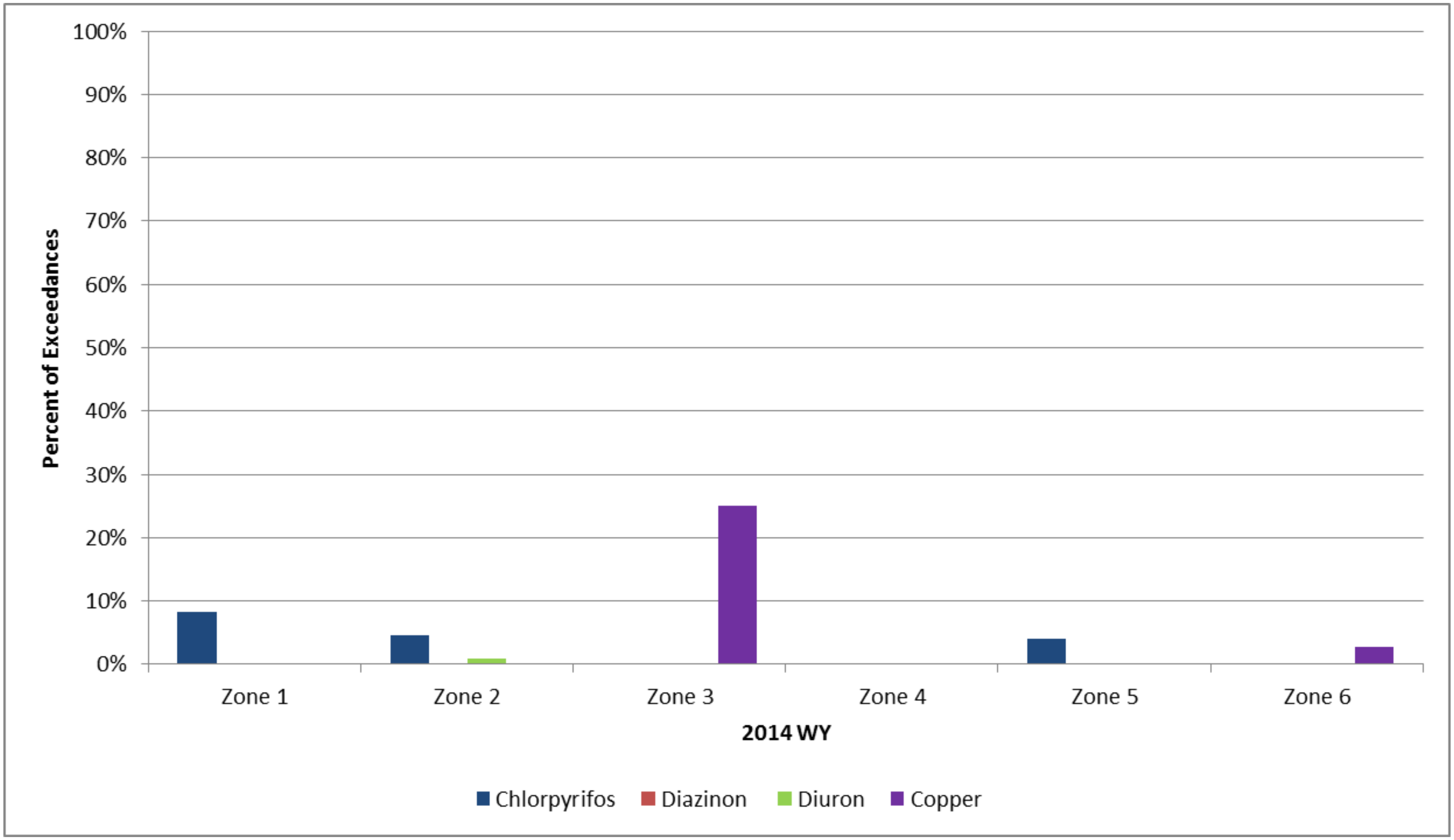
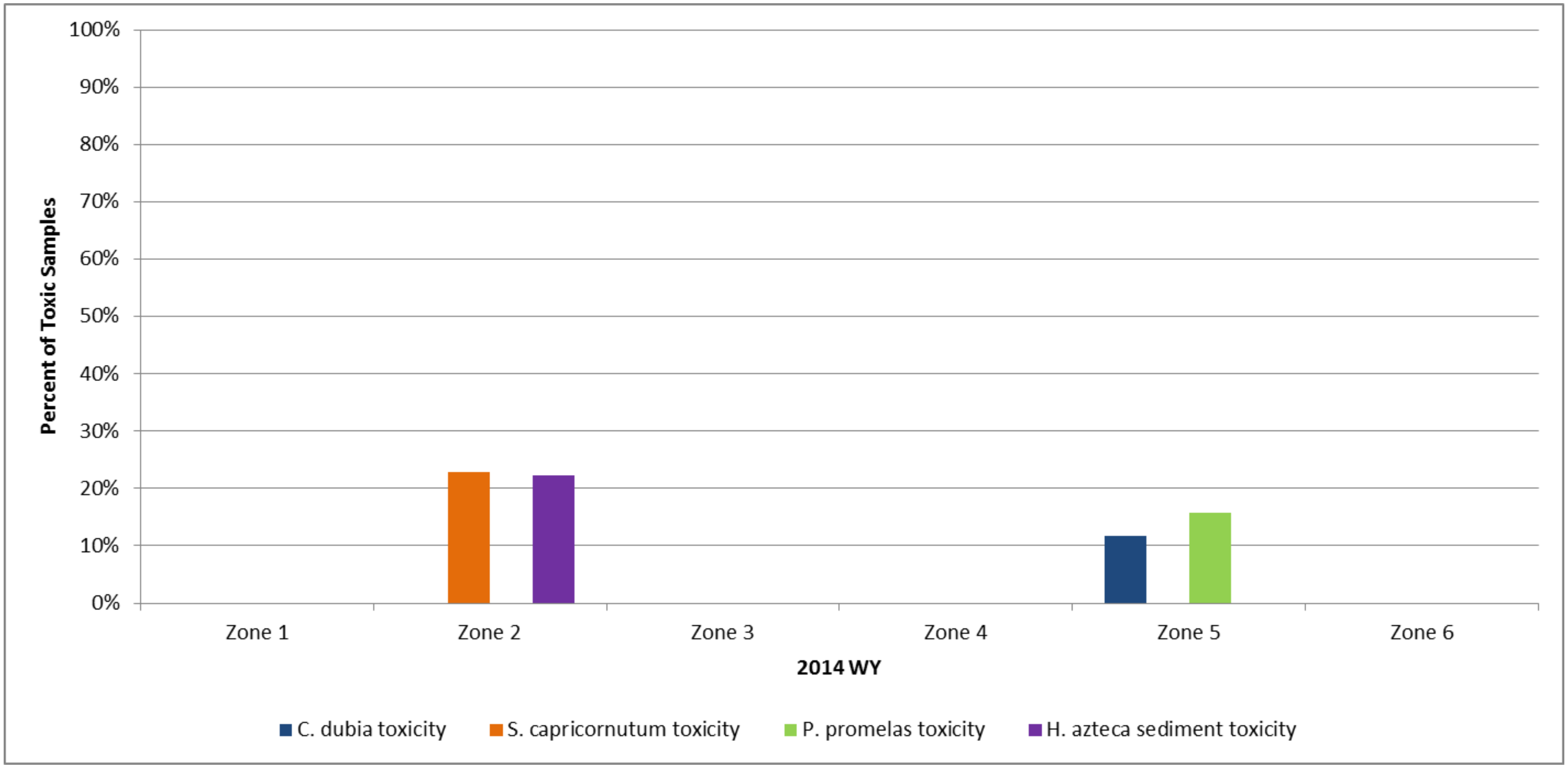


Figure 66. Percentage of toxic samples per Zone during the 2014 WY in the ESJWQC region.



13.a.i. Funding Resources

In addition to focused outreach, the Coalition strives to secure unique opportunities to assist growers in achieving their goal of reducing the impact of agricultural discharge on water quality. The Coalition reviewed funding data provided by organizations managing the distribution of financial support to growers for the implementation of management practices. The two main organizations are the Coalition for Urban/Rural Environmental Stewardship (CURES) and the Natural Resource Conservation Service (NRCS). The NRCS offices manage the distribution of the Agricultural Water Enhancement Program (AWEP) and the Environmental Quality Incentives Program (EQIP) funding cost share programs. Data from CURES and NRCS (from Madera, Merced, and Stanislaus Counties) provide insight to the type of management practices growers are implementing in the ESJWQC region.

Proposition 84 funds focus on irrigation management. Proposition 84 funding data obtained from CURES indicate there were no new contracts awarded to counties in the ESWQC region since the 2012-2013 funding cycle (reported in the ESJWQC 2013 MPUR and the 2014 Annual Report).

The NRCS offices for the three counties (Madera, Merced, and Stanislaus) in the ESJWQC region award 100% of their appropriated AWEP and EQIP funds and always have more applicants than available funds. Table 96 summarizes total contract acreage associated with EQIP and AWEP management practices awarded in the 2013-2014 funding cycle. Growers from ESWQC received funding to implement management practices designed to improve water quality across 26,530 acres of land (Table 96).

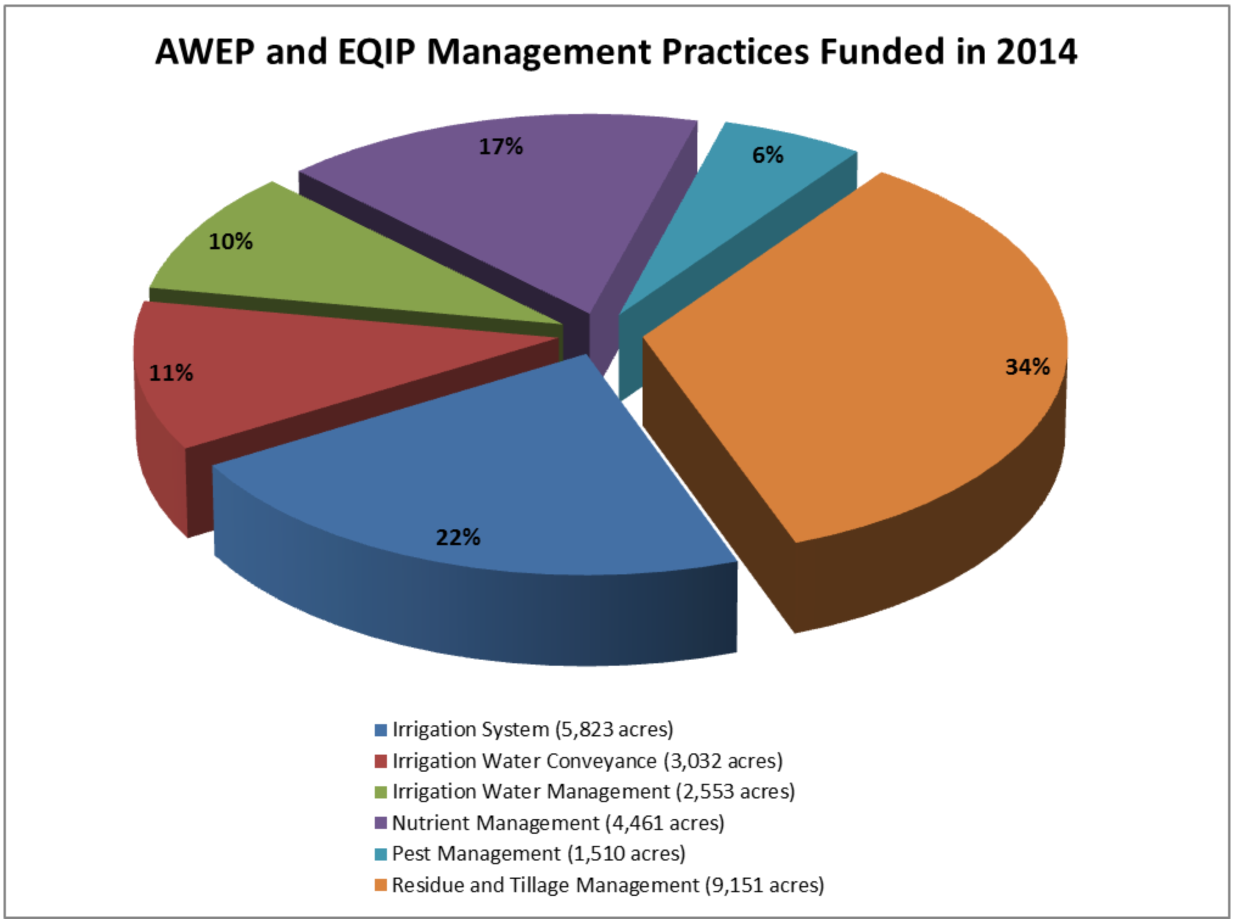
Table 96. AWEP and EQIP funding and associated acreage in ESJWQC counties for 2013-2014 funding cycle.
Data provided to the Coalition are considered preliminary since counties may still be updating funding award records.

Practice Group	Practice Name	Madera		Merced		Stanislaus		Total Acres
		AWEP	EQIP	AWEP	EQIP	AWEP	EQIP	
Irrigation System	Microirrigation	147	942	581	1423	592	1707	5391
	Tailwater Recovery			75	212		39	326
	Sprinkler System						106	106
Total Irrigation System Acreage								**5823**
Irrigation Water Conveyance	Ditch and Canal Lining, High/Low Pressure Pipelines		189	109	930	276	460	1964
	Structure for Water Control		175		278		199	652
	Pumping Plant/ Underground Structure		58		75	15	268	416
Total Irrigation Water Conveyance Acreage								**3032**
Irrigation Water Management	Irrigation Land Leveling				618		141	759
	Irrigation Water Management		472		938		385	1794
Total Irrigation Water Management Acreage								**2553**
Nutrient Management	Comprehensive Nutrient Management Plan		192		76			269
	Cover Crop		176		579		59	815
	Mulching		73		8			81
	Nutrient Management		856	8	1100	27	1269	3260
	Pond Sealing or Lining, Flexible Membrane		37					37
Total Nutrient Management Acreage								**4461**
Pest Management	Integrated Pest Management		262		463			725
	Precision Pest Control Application		229		134		421	784
Total Pest Management Acreage								**1510**
Residue and Tillage Management	Forage Harvest Management		145					145
	Reduce-Till, No-Till		565	8	6280		1386	8239
	Residue Treatment/Management		408		336		23	767
Total Residue and Tillage Management Acreage								**9151**
Total Acres Per County		**147**	**4779**	**780**	**13450**	**910**	**6463**	**26530**

Of the management practices funded by AWEP and EQIP funds in the Coalition region during 2014, Residue and Tillage Management was associated with the most acreage (9,151 acres), followed by Irrigation Systems like microspray and sprinklers (5,823 acres), and Nutrient Management (4,461 acres). Funding awarded for other management practices (Irrigation Water Conveyance, Irrigation Water Management, and Pesticide Management) was for 7,095 acres or 27% of the total acreage funded (Figure 67).

The management practices funded by AWEP and EQIP programs to date include several of the management practices recommended by the Coalition during focused outreach. Funding data from these sources indicate growers are utilizing financial resources to implement management practices. These management practices are designed to prevent offsite movement of agricultural constituents to adjacent waterways, therefore improving water quality.

Figure 67. Acres awarded AWEP and EQIP funding in ESJWQC counties during 2013-2014 funding cycle.
Refer to Table 96 for all management practice categories.



14. CONCLUSIONS AND RECOMMENDATIONS

Monitoring results from the 2014 WY indicate that although there are substantial improvements in water quality in many areas, water quality is still not protective of beneficial uses across the entire Coalition region. The most common exceedances of WQTLs involved field and physical parameters (such as DO and salts) resulting in impaired Agricultural and Aquatic Life beneficial uses (BUs). Other constituents that impaired Aquatic Life BUs were ammonia, chlorpyrifos, and dissolved copper. Impairment to the Municipal and Domestic Supply BU occurred as a result of elevated concentrations of diuron, nitrate/nitrite, and ammonia. Numerous exceedances of the WQTL for *E. coli* resulted in impaired Recreational BU in many waterbodies. The most common exceedances involve 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 impairments to beneficial uses. For many parameters it is not clear to what extent WQTL exceedances result from agricultural activities. Source identification is difficult especially for non-conserved constituents such as DO and pH. Even diuron is used by non-agricultural entities and exceedances could result from their activities. Other pesticide detections are the result of agricultural applications that enter surface waters from spray drift or surface water runoff. In the event of exceedances of pesticide WQTLs or the occurrence of toxicity, the Coalition identifies sources through the analysis of preliminary PUR data, assessment of water quality data and evaluation of current management practices of targeted growers.

Conclusions from data provided in the Management Practice Effectiveness, Farm Evaluations, Coalition Wide Evaluation, Status of TMDL Constituents, and Spatial and Temporal trends 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. Results from the 2014 WY monitoring indicate fewer exceedances overall in high priority site subwatersheds where both general and focused outreach occurred, as well as in site subwatersheds where only general outreach occurred.
6. Remaining exceedances may be difficult to eliminate because the cause/source of the problems may not be irrigated agriculture and if they are, management practices that are very effective in eliminating exceedances of pesticides are not effective in reducing exceedances of WQTLs for parameters such as DO, SC (salts), *E. coli*, ammonia/nitrates, or pH.

7. Agriculture may not be the only cause of water quality impairments that are the result of elevated concentrations of copper in the Coalition region.
8. The Coalition's focused management practice outreach and tracking strategy is effective at improving water quality. The Coalition received approval on October 15, 2013 to remove eight specific site subwatershed/ constituent pairs from the active management plan of seven site subwatersheds.
9. Continued improvements in water quality are expected based on past grower outreach efforts and upcoming focused outreach in new priority subwatersheds.
10. Water quality impairments will continue if there remain growers in the Coalition region who do not have to comply with discharge requirements.

Based on the information provided in the response to the programmatic questions, the Coalition will pursue the following during the 2015 WY:

1. Monitor according to the WDR adopted in December 2012 and the monitoring outline in the 2014 Monitoring Plan Update (MPU).
2. Continue to document and assess management practices implemented by Coalition growers through focused outreach and Farm Evaluations.
3. Continue to focus outreach and education efforts around constituents applied by agriculture while also educating growers about non-conserved constituents such as dissolved oxygen and salinity.

The Coalition identified several areas in which 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 within priority subwatersheds that are using chlorpyrifos and/or copper which may be affecting downstream beneficial uses.
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 difficult issues such as contamination of surface waters by *E. coli*.
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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