MAY 2016

SACRAMENTO VALLEY
WATER QUALITY COALITION

Monitoring and Reporting Program

Annual Monitoring Report 2015

Prepared by

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Executive Summary

SUMMARY OF MONITORING PROGRAM

The Sacramento Valley Water Quality Coalition (Coalition) has developed and implemented a Monitoring and Reporting Program (MRP) to meet the requirements of the *Waste Discharge Requirements General Order for Growers within the Sacramento River Watershed that are Members of a Third-Party Group* (*R5-2014-0030*) (WDR).[1] The scope of the MRP and the sampling and analytical methods used in 2015 Coalition Monitoring have been approved by the Central Valley Regional Water Quality Control Board (Water Board).

In accordance with the WDR requirements, the Coalition is achieving these objectives by implementing an MRP that evaluates samples for the presence of statistically significant toxicity and exceedances of applicable numeric water quality objectives and *Irrigated Lands Regulatory Program (ILRP)* Trigger Limits. The Coalition initiates follow-up actions designed to identify constituents causing significant toxicity when toxicity is of sufficient magnitude. Exceedances of numeric objectives and *ILRP* Trigger Limits for chemical, physical and microbiological parameters trigger follow-up actions designed to identify potential sources and to inform potential users of the constituents of concern. Additionally, the Coalition is evaluating the degree of implementation of current management practices in priority watersheds and recommending additional practices as water quality results indicate a need to do so. The Coalition is committed to the principle of adaptive management to control specific discharges of waste that are having an impact on water quality. This iterative approach allows for the most effective use of scarce human and fiscal resources.

The 2015 Coalition Monitoring was conducted in coordination with the Northeastern California Water Association, the Napa County-Putah Creek Watershed Group, the Placer-Nevada-South Sutter-North Sacramento Watershed Group, the Goose Lake Watershed Group, and the Upper Feather River Watershed Group. Monitoring in the Upper Feather River and Pit River subwatersheds was conducted in coordination the California's Surface Water Ambient Monitoring Program (SWAMP) beginning in 2012. The Coalition also continues to coordinate with the California Rice Commission (CRC) under the December 2004 Coalition-CRC Memorandum of Understanding.

The parameters monitored in 2015 by the Coalition to achieve these objectives are as specified in the current WDR and MRP (*Order No. R5-2014-0030*):

- Water column and sediment toxicity
- Physical and conventional parameters in water
- Organic carbon
- Pathogen indicator organisms in water
- Trace metals in water

[1] Prior to adoption of the WDR, the Coalition was subject to a Conditional Waiver of Waste Discharge Requirements for the Irrigated Lands Regulatory Program (ILRP) and subsequent amendments to the ILRP requirements (WQO-2004-0003, SWRCB 2004, R5-2005-0833, R5-2008-0005, R5-2009-0875).

- Pesticides in water
- Nitrogen and phosphorus compounds in water

The current WDR and MRP also requires testing for 303(d)-listed constituents identified in water bodies downstream from Coalition sites and discharged within the watershed, if irrigated agriculture has been identified as a contributing source within the Sacramento River Watershed and such monitoring has been requested by the Executive Officer.

Note that not all parameters are monitored at every site for every event. Specific individual parameters measured for 2015 Coalition Monitoring are listed in **Table 2**.

A total of 35 sampling sites were monitored by the Coalition and coordinating subwatershed monitoring programs during 2015 (**Table 3**). A map of these sites is presented in **Figure 1**.

As required by the MRP, Coalition monitoring events includes storm season monitoring and irrigation season monitoring. The sites and numbers of samples to be collected for 2015 Coalition Monitoring are summarized in **Table 4**. This *2015 Annual Monitoring Report* (AMR) includes results for October 2014 through September 2015.

Sample collection and analysis has been performed by the following agencies and subcontractors.

- Pacific EcoRisk (Fairfield, California) performs toxicity analyses and conducts sampling for all sites, with the specific exceptions noted below;
  - When monitoring is required for the Napa subwatershed, Napa County Resource Conservation District staff conducts sampling for Napa subwatershed sites;
  - Vestra Environmental conducts sampling on behalf of the Northeastern California Water Association for the Pit River subwatershed site and for the Goose Lake Watershed Group for the Lower Lassen Creek site;
  - Placer County Resource Conservation District conducted sampling for the Placer-Nevada-South Sutter-North Sacramento subwatershed;
  - Kleinfelder conducts sampling at sites on the Colusa Basin Drain and Sacramento Slough as part of monitoring work done for the California Rice Commission.
- Caltest Analytical Laboratory (Napa, California) and Basic Lab (Redding, California), conduct all conventional and microbiological analyses; and
- APPL (Fresno, California) and Physis Environmental Laboratories (Anaheim, California) conduct pesticide analyses.

TREND ANALYSIS

The results of trend analyses conducted for the 2014 Annual Monitoring Report did not indicate a need for any additional locations, events, or parameters. These evaluations will be conductd again for the 2018 AMR after the 2018 Assessment monitoring period.

MANAGEMENT PRACTICES AND ACTIONS TAKEN

Response to Exceedances

To address specific water quality exceedances, the Coalition and its partners developed a Management Plan in 2008, subsequently approved by the Water Board. The Coalition also previously developed a *Landowner Outreach and Management Practices Implementation Communications Process for Monitoring Results (Management Practices Process)* to address exceedances. Implementation of the approved Management Plan is the primary mechanism for addressing exceedances observed in the Coalition's *ILRP* monitoring.

Management Plan Status Update

The Coalition submitted the most recent Management Plan Progress Report (MPPR) to the Water Board in April 2015. The MPPR that documents the status and progress toward Management Plan requirements for 2015 is provided to the Water Board with this AMR. Activities conducted in 2015 to implement the Coalition's Management Plan included addressing exceedances of objectives for registered pesticides, completion of source evaluations for pesticides and toxicity, development of management practice implementation goals, and monitoring required for toxicity and pesticide management plans and TMDLs.

Implementation completed specifically for registered pesticides and toxicity included review and evaluation of pesticide application data, identification of potential sources, and determination of likely agricultural sources. These evaluations were documented in Source Evaluation Reports for each water body and management plan element. For registered pesticides and identified causes of toxicity, the Farm Evaluation survey data for Coalition members will be used to determine the degree of implementation of relevant management practices. These management practices data will be used to establish and track goals for additional management practice implementation needed to address exceedances of Basin Plan water quality objectives and *ILRP* Trigger Limits.

CONCLUSIONS AND RECOMMENDATIONS

The Coalition submits this *2015 Annual Monitoring Report* (AMR) as required under the Water Board's Irrigated Lands Regulatory Program (*ILRP*). The AMR provides a detailed description of our monitoring results as part of our ongoing efforts to characterize irrigated agricultural- and wetlands-related water quality in the Sacramento River Basin.

To summarize, the results from the *ILRP* monitoring in 2015 continue to indicate that with few exceptions, there are no major water quality problems with agricultural and managed wetlands discharges in the Sacramento River Basin.

This AMR characterizes potential water quality impacts of agricultural drainage from a broad geographic area in the Sacramento Valley from October 2014 through September 2015. To date, a total of 115 Coalition storm and irrigation season events have been completed since the beginning of Coalition monitoring in January 2005, with additional events collected by coordinating programs and for follow-up evaluations. For the period of record in this AMR (October 2014 through September 2015), samples were collected for 10 scheduled monthly events and 2 wet weather ("storm") events.

Pesticides were infrequently detected (~1.4% of all pesticide results for 2015 were detected), and, when detected, rarely exceeded applicable objectives. Two registered pesticides (chlorpyrifos and malathion) exceeded applicable water quality objectives or *ILRP* Trigger Limits at a total of six Coalition monitoring samples.

Many of the pesticides specifically required to be monitored in the past by the *ILRP* have rarely been detected in Coalition water samples, including glyphosate, paraquat, and all of the pyrethroid pesticides. Over 98.3% of all pesticide analyses performed to date for the Coalition have been below detection. Coalition monitoring of pesticides for the *ILRP* for 2015 was conducted based on Management Plan requirements and on reported pesticide use and relative toxicity risks for pesticides in the subwatersheds. The Coalition also conducted focused monitoring of the *ILRP*-required trace elements (arsenic, cadmium, lead, molybdenum, nickel, selenium, and zinc) informed by the Coalition's past monitoring results, which have demonstrated that most of these metals rarely approach or exceed objectives and are not likely to cause adverse impacts to aquatic life or human health in waters receiving agricultural runoff in the Coalition watershed. This focused strategy for monitoring pesticides and trace metals was implemented in 2010 in accordance with the Coalition's 2009 MRP (*Order No. R5-2009-0875*, CVRWQCB 2009), and this same strategy is consistent with the requirements of the current WDR and MRP (*Order No. R5-2014-0030*).

The majority of exceedances of adopted numeric water quality objectives continue to consist of conductivity, dissolved oxygen, and *E. coli*. Agricultural runoff and irrigation return flows may contribute to exceedances of these objectives, but these parameters are primarily controlled or significantly affected by natural processes and sources that are not controllable by agricultural management practices.

The Coalition has implemented the required elements of the *ILRP* since 2004. The Coalition developed a Watershed Evaluation Report (WER) that set the priorities for development and implementation of the initial Monitoring and Reporting Program Plan (MRPP). The Coalition successfully developed the MRPP, QAPP, and Management Plan as required by the *ILRP,* and these documents were approved by the Water Board. Subsequent revisions requested by the Water Board and the Coalition were incorporated into the Coalition's program and implemented through the Coalition's ongoing *ILRP* monitoring efforts. The Coalition also continues to adapt and improve elements of the monitoring program based on the knowledge gained through *ILRP* monitoring efforts.

The 2015 monitoring program was developed to be consistent with the requirements of the current WDR and MRP (*Order No. R5-2014-0030*) and was approved by the Water Board for "Assessment" monitoring. The Coalition has implemented the approved monitoring program in coordination with its subwatershed partners, has initiated follow-up activities required to address observed exceedances, and continues to implement the approved Management Plan. Throughout this process, the Coalition has kept an open line of communication with the Water Board and has made every effort to fulfill the requirements of the *ILRP* in a cost-effective, scientifically defensible, and management-focused manner. This AMR is documentation of the success and continued progress of the Coalition in achieving these objectives.

Introduction

The primary purpose of this report is to document the monitoring efforts and results of the Sacramento Valley Water Quality Coalition (Coalition) Monitoring and Reporting Program (MRP). This Annual Monitoring Report 2015 (AMR) also serves to document the Coalition's progress toward fulfilling the requirements of the *Waste Discharge Requirements General Order for Growers within the Sacramento River Watershed that are Members of a Third-Party Group* (*R5-2014-0030*) (WDR).[2]

The AMR includes the following elements, as specified in the WDR's MRP:

Table 1. MRP Annual Monitoring Report Requirements[3]

MRP Section	AMR Requirement	Report Section Headings	Page
V.C.1	Signed Transmittal Letter	NA	-
V.C.2	Title page	Title page	-
V.C.3	Table of Contents	Table of Contents	*i*
V.C.4	Executive Summary	Executive Summary	*vi*
V.C.5	Description of the Coalition Group geographical area	Description of the Watershed	4
V.C.6	Monitoring objectives and design	Monitoring Objectives	5
V.C.7	Sampling site descriptions and rainfall records for the time period covered under the AMR	Sampling Site Locations and Land Uses; Summary of Sampling Conditions	7; 46
V.C.8	Location map(s) of sampling sites, crops and land uses	Appendix E: Drainage Maps	CD
V.A.1;[4] V.C.9; V.C.11	An Excel workbook containing an export of all data records uploaded and/or entered into the CEDEN-comparable database (surface water data). The workbook shall contain, at a minimum, those items detailed in the most recent version of the third-party's approved QAPP Guidelines; Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible; Electronic data submittal.	Appendix C: Tabulated Monitoring Results	CD

[2] Prior to adoption of the WDR, the Coalition was subject to a Conditional Waiver of Waste Discharge Requirements for the Irrigated Lands Regulatory Program (ILRP) and subsequent amendments to the ILRP requirements (WQO-2004-0003, SWRCB 2004, R5-2005-0833, R5-2008-0005, R5-2009-0875).

[3] Monitoring and Reporting Program (Attachment B to R5-2014-0030), Section V.C.

[4] Quarterly Submittals of Monitoring Results (WDR Provision V.A) are re-submitted with the AMR.

MRP Section	AMR Requirement	Report Section Headings	Page
V.C.10	Discussion of data relative to water quality objectives/Trigger Limits and water quality management plan milestones/Basin Plan Amendment Workplan (BPAW) updates, if applicable	Data Interpretation	44
V.C.12	Sampling and analytical methods used	Sampling and Analytical Methods	17
V.A.5;[4] V.A.7.c.; V.C.13	Electronic copies of all applicable laboratory analytical reports on a CD; Chain of custody (COCs) and sample receipt documentation; Associated laboratory and field quality control samples results	Appendix B: Lab Reports and Chains of Custody	CD
V.C.14	Summary of Quality Assurance Evaluation results (as identified in the most recent version of the Coalition's QAPP for Precision, Accuracy and Completeness)	Monitoring Results	29
V.A.3-4;[4] V.C.15	Electronic copies of all field sheets; Electronic copies of photos obtained from all surface water monitoring sites, clearly labeled with the CEDEN comparable station code and date; Specification of the method(s) used to obtain estimated flow at each surface water monitoring site during each monitoring event	Appendix A: Field Log Copies	CD
V.C.16	Summary of exceedances of water quality objectives/Trigger Limits occurring during the reporting period and surface water related pesticide use information	Exceedances of Relevant Water Quality Objectives; Appendix D: Exceedance Reports	58; CD
V.C.17	Actions taken to address water quality exceedances that have occurred, including, but not limited to, revised or additional management practices implemented	Management Practices and Actions Taken; Appendix F: SVWQC Outreach Materials	85
V.C.18	Evaluation of monitoring data to identify temporal and spatial trends and patterns	Trend Analysis; Appendix G: Trend Analysis Results	78

MRP Section	AMR Requirement	Report Section Headings	Page
V.C.19	Summary of Nitrogen Management Plan information submitted to the Coalition	---[5]	NA
V.C.20	Summary of Management Practice information collected as part of Farm Evaluations	Summary of Farm Evaluation Data	87
V.C.21	Summary of Mitigation Monitoring	---[6]	NA
V.C.22	Summary of education and outreach activities	Management Practices and Actions Taken; Appendix F: SVWQC Outreach Materials	85
V.C.23	Reduced Monitoring/Management Plan Verification Option Reports	---[5]	NA
V.C.24	Conclusions and recommendations	Conclusions and Recommendations	88

All report elements required by the WDR are included in this report.

Instead of including the various notes related to Table 1 as footnotes to the document, you should include then specifically as notes to the table.

[5] This requirement will be addressed in future AMRs. No subwatersheds have yet been approved for this option.

[6] This item is not applicable because no mitigation monitoring was conducted in 2015.

Description of the Watershed

The Sacramento River watershed drains over 27,000 square miles of land in the northern part of California's Central Valley into the Sacramento River. The upper watersheds of the Sacramento River region include the Pit River watershed above Lake Shasta and the Feather River above Lake Oroville. The Sacramento Valley drainages include the Colusa, Cache Creek, and Yolo Bypass watersheds on the west side of the valley, and the Feather, Yuba, and American River watersheds on the east side of the valley. The Coalition also monitors in the Cosumnes River watershed, which is not part of the Sacramento River watershed.

Beginning near the city of Redding at its northern terminus, the Sacramento Valley stretches approximately 180 miles to the southeast, where it merges into the Sacramento-San Joaquin River Delta south of the Sacramento metropolitan area at Rio Vista. The valley is 30 to 45 miles wide in the southern to central parts, but narrows to about 5 miles wide near Redding. Its elevation decreases from 300 feet at its northern end to near sea level in the Delta. The greater Sacramento River watershed includes sites from 5,000 feet in elevation to near sea level.

The Sacramento River Basin is a unique mosaic of farm lands, refuges, and managed wetlands for waterfowl habitat; spawning grounds for numerous salmon and steelhead trout; and the cities and rural communities that make up this region. This natural and working landscape between the crests of the Sierra Nevada and the Coast Range includes the following:

- More than a million acres of family farms that provide the economic engine for the region; provide a working landscape and pastoral setting; and serve as valuable habitat for waterfowl along the Pacific Flyway. The predominant crops include: rice, general grain and hay, improved pasture, corn, tomatoes, alfalfa, almonds, walnuts, prunes, safflower, and vineyards.
- Habitat for 50% of the threatened and endangered species in California, including the winter-run and spring-run salmon, steelhead, and many other fish species.
- Six National Wildlife Refuges, more than fifty state Wildlife Areas, and other privately managed wetlands that support the annual migration of waterfowl, geese, and water birds in the Pacific Flyway. These seasonal and permanent wetlands provide for 65% of the North American Waterfowl Management Plan objectives.
- The small towns and rural communities that form the backbone of the region, as well as the State Capital that serves as the center of government for the State of California.
- The forests and meadows in the numerous watersheds of the Sierra Nevada and Coast Range.

Monitoring Objectives

The Coalition's monitoring program conforms to the goals of the Nonpoint Source (NPS) Program and achieve the following objectives as a condition of the WDR's MRP:

1. Track, monitor, assess and report program activities;
2. Ensure consistent and accurate reporting of monitoring activities;
3. Target NPS Program activities at the watershed level;
4. Coordinate with public and private partners; and
5. Track implementation of management practices to improve water quality and protect existing beneficial uses.

In accordance with the WDR requirements, the Coalition is achieving these objectives by implementing an MRP that evaluates samples for the presence of statistically significant toxicity and exceedances of applicable numeric water quality objectives and *ILRP* Trigger Limits. The Coalition initiates follow-up actions designed to identify constituents causing significant toxicity when toxicity is of sufficient magnitude. Exceedances of numeric objectives and *ILRP* Trigger Limits for chemical, physical and microbiological parameters trigger follow-up actions designed to identify potential sources and to inform potential users of the constituents of concern. Additionally, the Coalition is evaluating the degree of implementation of current management practices in priority watersheds and recommending additional practices as water quality results indicate a need to do so. The Coalition is committed to the principle of adaptive management to control specific discharges of waste that are having an impact on water quality. This iterative approach allows for the most effective use of scarce human and fiscal resources.

The parameters monitored in 2015 by the Coalition to achieve these objectives are as specified in the current WDR and MRP (*Order No. R5-2014-0030*):

- Water column and sediment toxicity
- Physical and conventional parameters in water
- Organic carbon
- Pathogen indicator organisms in water
- Trace metals in water
- Pesticides in water
- Nitrogen and phosphorus compounds in water

The current WDR and MRP also requires testing for 303(d)-listed constituents identified in water bodies downstream from Coalition sites and discharged within the watershed, if irrigated agriculture has been identified as a contributing source within the Sacramento River Watershed and such monitoring has been requested by the Executive Officer.

Note that not all parameters are monitored at every site for every event. Specific individual parameters measured for 2015 Coalition Monitoring are listed in **Table 2**.

Table 2. Constituents Monitored for the 2015 Monitoring Year

Analyte	Quantitation Limit[(a)]	Reporting Unit
Physical Parameters		
Flow	NA	CFS (Ft^3/Sec)
pH	0.1 [(b)]	$-\log[H^+]$
Conductivity	0.1 [(b)]	μmhos/cm
Dissolved Oxygen	0.1 [(b)]	mg/L
Temperature	0.1 [(b)]	˚C
Hardness, total as $CaCO_3$	10	mg/L
Turbidity	1.0	NTU
Total Suspended Solids	3.0	mg/L
Total Organic Carbon	0.5	mg/L
Grain size (in sediment)	1	% fraction
Pathogen Indicators		
E. coli bacteria	2	MPN/100 mL
Water Column Toxicity		
Ceriodaphnia, 96-h acute	NA	% Survival
Pimephales, 96-h acute	NA	% Survival
Selenastrum, 96-h short-term chronic	NA	Cell Growth
Sediment Toxicity		
Hyalella, 10-day short-term chronic	NA	% Survival
Pesticides		
Benzophenyls	(c)	µg/L
Carbamates	(c)	µg/L
Herbicides	(c)	µg/L
Organochlorine	(c)	µg/L
Organophosphorus	(c)	µg/L
Pyrethroids and chlorpyrifos	(c)	ng/g, d.w.
Trace Elements		
Arsenic	0.5	µg/L
Boron	10	µg/L
Copper	0.5	µg/L
Lead	0.25	µg/L
Selenium	0.5	µg/L
Nutrients		
Ammonia as N	0.1	mg/L
Nitrate + Nitrite as N	0.1	mg/L
Orthophosphate as P	0.1	mg/L
Phosphorus, total	0.1	mg/L

Notes:
(a) The Quantitation Limit (QL) represents the concentration of an analyte that can be routinely measured in the sampled matrix within stated limits and confidence in both identification and quantitation.
(b) Detection and reporting limits are not strictly defined. Value is required reporting precision.
(c) Limits are different for individual pesticides.

Sampling Site Descriptions

To successfully implement the monitoring and reporting program requirements contained in the *ILRP* adopted by the Water Board in June 2003, the Coalition worked directly with landowners in the 21 county watersheds to identify and develop ten (now 13) subwatershed groups. Representatives from each subwatershed group utilized agronomic and hydrologic data generated by the Coalition in an attempt to prioritize watershed areas for initial evaluation to ultimately select monitoring sites in their respective areas based upon existing infrastructure, historical monitoring data, land use patterns, historical pesticide use, and the presence of 303(d)-listed water bodies.

Coalition members selected sampling sites in priority watersheds based upon the following fundamental assumptions regarding management of non-point source discharges to surface water bodies: 1) Landscape scale sampling at the bottom of drainage areas allows determination of the presence of water quality problems using a variety of analytical methods, including water column and sediment toxicity testing, water chemistry analyses, and bioassessment; 2) Strategic source investigations utilizing Geographic Information Systems can be used to identify upstream parcels with attributes that may be related to the analytical results, including crops, pesticide applications, and soil type; and 3) Management practice effectiveness can best be assessed by coalitions at the drainage and watershed scale to determine compliance with water quality objectives in designated water bodies. Results from farm-level management practices evaluations will be used to complement Coalition efforts on the watershed scale by providing crop-specific information that will support management practice recommendations.

The Coalition uses a "Representative Monitoring" approach to achieve the goals of the 2015 MRP:

- Representative monitoring is conducted at sites in drainages representative of larger regions based on shared agricultural and geographic characteristics;
- Representative monitoring includes a cycle of two years of "Assessment" monitoring for the broader suite of *ILRP* analytes, followed by two years of sampling needed for Management Plan implementation; and
- Monitoring schedules and the analytes monitored are customized based on the characteristics of individual subwatersheds and Management Plans.

Monitoring sites for 2015 were continued from previously monitored locations and included ongoing representative sites and sites monitored only for management plans or TMDLs. A total of 17 representative sites were monitored, and Management Plan sampling was conducted at all 17 of the representative monitoring sites and at 18 additional sites.

SAMPLING SITE LOCATIONS AND LAND USES

The water and sediment sites monitored by the Coalition in 2015 are listed in **Table 3**. All sites monitored in 2015 have been approved by the Water Board as MRP compliance sites. An overall map of Coalition and subwatershed sites is presented in **Figure 1**. Site-specific drainage maps with land use patterns for all monitoring locations are also provided in **Appendix E**.

Table 3. Monitoring Sites for 2015 Coalition Monitoring

Subwatershed	Site Name	Latitude	Longitude	Agency	Site ID & Category (Fig. 1)[1]	
ButteYubaSutter	Butte Slough at Pass Road	39.1873	-121.90847	SVWQC	BTTSL	MP
ButteYubaSutter	Gilsizer Slough at George Washington Rd	39.009	-121.6716	SVWQC	GILSL	MP
ButteYubaSutter	Lower Honcut Creek at Hwy 70	39.30915	-121.59542	SVWQC	LHNCT	REP
ButteYubaSutter	Lower Snake R. at Nuestro Rd	39.18531	-121.70358	SVWQC	LSNKR	REP
ButteYubaSutter	Pine Creek at Highway 32[1]	39.75338	-121.97124	SVWQC	PNCHY	REP
ButteYubaSutter	Sacramento Slough bridge near Karnak	38.785	-121.6533	SVWQC	SSKNK	REP
ColusaGlenn	Colusa Basin Drain above KL	38.8121	-121.7741	SVWQC	COLDR	REP
ColusaGlenn	Freshwater Creek at Gibson Rd	39.17664	-122.18915	SVWQC	FRSHC	REP
ColusaGlenn	Lurline Creek at 99W	39.21215	-122.18331	SVWQC	LRLNC	MP
ColusaGlenn	Rough & Ready Pumping Plant (RD 108)	38.86209	-121.7927	SVWQC	RARPP	MP
ColusaGlenn	Stone Corral Creek near Maxwell Road	39.2751	-122.1043	SVWQC	SCCMR	MP
ColusaGlenn	Stony Creek on Hwy 45 near Rd 24	39.71005	-122.00404	SVWQC	STYHY	MP
ColusaGlenn	Walker Creek near 99W and CR33	39.62423	-122.19652	SVWQC	WLKCH	REP
ElDorado	Coon Hollow Creek	38.75335	-120.72404	SVWQC	COONH	MP
ElDorado	North Canyon Creek	38.76242	-120.70996	SVWQC	NRTCN	REP
GooseLake	Lower Lassen Creek	41.89103	-120.35594	SVWQC	LOWLC	REP
Lake	McGaugh Slough at Finley Road East	39.00417	-122.86233	SVWQC	MGSLU	MP
Lake	Middle Creek u/s from Highway 20	39.17641	-122.91271	SVWQC	MDLCR	REP
PitRiver	Fall River at Fall River Ranch Bridge	41.0351	-121.4864	NECWA	FRRRB	MP
PitRiver	Pit River at Canby Bridge	41.4017	-120.931	NECWA	PRCAN	MP
PitRiver	Pit River at Pittville	41.0454	-121.3317	NECWA	PRPIT	REP
PNSSNS	Coon Creek at Brewer Road	38.93399	-121.45184	PNSSNS	CCBRW	REP
PNSSNS	Coon Creek at Striplin Road	38.8661	-121.5803	PNSSNS	CCSTR	MP
SacramentoAmador	Cosumnes River at Twin Cities Rd	38.29098	-121.38044	SVWQC	CRTWN	REP
SacramentoAmador	Dry Creek at Alta Mesa Road	38.248	-121.226	SVWQC	DCGLT	MP
SacramentoAmador	Grand Island Drain near Leary Road	38.2399	-121.5649	SVWQC	GIDLR	REP
SacramentoAmador	Laguna Creek at Alta Mesa Rd	38.31102	-121.2263	SVWQC	LAGAM	MP
ShastaTehama	Anderson Creek at Ash Creek Road	40.418	-122.2136	SVWQC	ACACR	REP
ShastaTehama	Coyote Creek at Tyler Road	40.09261	-122.15898	SVWQC	COYTR	MP
Solano	Shag Slough at Liberty Island Bridge	38.30677	-121.69337	SVWQC	SSLIB	REP
Solano	Ulatis Creek at Brown Road	38.307	-121.794	SVWQC	UCBRD	REP
Solano	Z-Drain	38.45215	-121.6752	SVWQC	ZDDIX	MP
UpperFeatherRiver	Middle Fk Feather River above Grizzly Cr	39.816	-120.426	UFRW	MFFGR	REP
Yolo	Cache Creek at Capay Diversion Dam	38.7137	-122.0851	SVWQC	CCCPY	MP
Yolo	Tule Canal at I-80	38.5728	-121.5827	SVWQC	TCHWY	MP
Yolo	Willow Slough Bypass at Pole Line	38.59015	-121.73058	SVWQC	WLSPL	REP

Note:
[1] Beginning event 96, the Pine Creek monitoring site was moved from PNCGR to PNCHY.

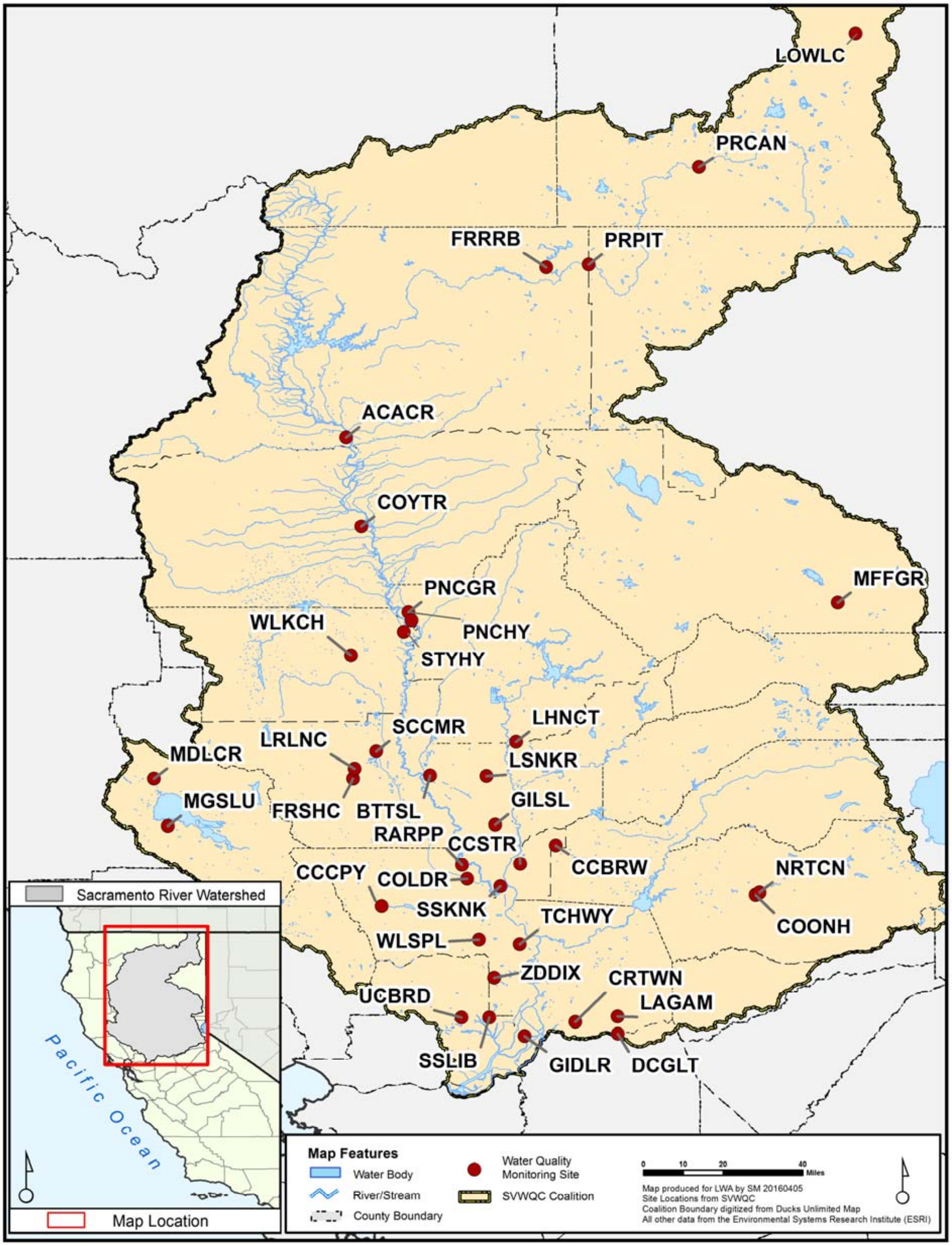

Figure 1. Coalition Monitoring Sites, 2015

SITE DESCRIPTIONS

Butte/Yuba/Sutter Subwatershed

Butte Slough at Pass Road (BTTSL)

Butte Slough is a tributary of Butte Creek. It joins Butte Creek near its outflow to the Sacramento River. The sampling location is approximately 1.5 miles from the confluence with Butte Creek. Butte Creek is a source of water in Butte Slough when irrigation withdrawals are being made. In addition to the water from Butte Creek, Butte Slough receives drainage from the wetlands of Gray Lodge Waterfowl Management Area, Butte Sink Wildlife Management Area, the fields surrounding Cherokee Canal and the orchards and fields west of Gridley and the Sutter Buttes.

Gilsizer Slough at George Washington Road (GILSL)

Gilsizer Slough is an unlined storm drainage outfall canal that runs from the Gilsizer County Drainage District's north pump station approximately 15 miles to the Sutter Bypass, draining 6,005 total acres. The monitoring location is located roughly 1.5 drainage miles from its confluence with the Sutter bypass and is a natural drainage channel that historically has drained Yuba City and the area south of town. Principal crops grown in this area include prunes, walnuts, peaches, and almonds.

Lower Honcut Creek at Highway 70 (LHNCT)

Lower Honcut Creek (in the Lower Honcut Creek drainage) was selected to represent the drainages in the eastern part of the Butte-Yuba-Sutter subwatershed. This drainage includes the dominant crops and typically has flows allowing sampling through irrigation season. The sampling site is located approximately 3.5 miles from its confluence with the Feather River. Dominant crops in this drainage include rice, walnuts, prunes, pasture, citrus, olive, grapes. Lower Honcut receives flows from North Honcut Creek and South Honcut Creek, which extend up into the foothills and include more pasture acreage.

Lower Snake River at Nuestro Road (LSNKR)

The Lower Snake River is an unlined irrigation supply and runoff canal that serves approximately 25,000 total acres and includes a relatively high percentage of rice acreage. The other predominant crops include prunes, peaches, idle acreage, and operations producing flowers, nursery stock, and Christmas trees.

Pine Creek at Highway 32 (PNCHY)

The watershed sampled upstream from the monitoring site represents approximately 28,000 acres of varied farmland, riparian habitat and farmsteads. The predominant crops in this area are walnuts, almonds, prunes, wheat, oats, barley, beans, squash, cucumbers, alfalfa, pasture, and safflower.

Sacramento Slough Bridge near Karnak (SSKNK)

This site aggregates water from all areas in the subwatershed between the Feather and Sacramento Rivers. The major contributing areas include the areas downstream of the Butte

Slough and Wadsworth monitoring sites. These areas include Sutter Bypass and its major inputs from Gilsizer Slough, RD 1660, RD 1500, and the Lower Snake River. Monitoring at this site is coordinated with the California Rice Commission.

Colusa Glenn Subwatershed

Colusa Basin Drain above Knights Landing (COLDR)

This site is near the outfall gates of the Colusa Basin Drain before its confluence with the Sacramento River. This site is downstream of all of the other monitoring sites within the basin. The upstream acreage consists of almonds, tomatoes, wetlands, pasture, corn, and walnuts. Monitoring at this site is coordinated with the California Rice Commission.

Freshwater Creek at Gibson Road (FRSHC)

The Freshwater Creek drainage includes approximately 83,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 19,000 acres. Predominant crops in the drainage are rice, tomatoes, idle, squash, grain, pasture, and safflower.

Lurline Creek at 99W (LRLNC)

The Lurline Creek drainage includes approximately 55,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 19,000 acres. Predominant crops in the drainage are rice, idle acreage, pasture, managed wetland, grain, melons, and squash.

Rough and Ready Pumping plant, RD 108 (RARPP)

The Rough & Ready Pumping Plant aggregates runoff and return flows for the Sycamore drainage. The pumps lift the water into the Sacramento River. This drainage area contains large amounts of tomatoes, safflower, wheat, melons, corn, and pasture.

Stone Corral Creek at Maxwell Road (SCCMR)

This site captures drainage from approximately 10,000 irrigated acres in the Stone Corral Creek drainage area as indicated on the Colusa Basin Subwatershed map. The primary crops include pasture, wheat, rice and safflower.

Stony Creek on Hwy 45 near Rd 24 (STYHY)

This site characterizes water from the contributing area downstream of Black Butte Reservoir just north of the town of Orland and includes approximately 20,000 acres of irrigated lands. The major irrigated crops in the Lower Stony Creek drainage are pasture, almonds, prunes, and wheat.

Walker Creek near 99W and CR33 (WLKCH)

The Walker Creek drainage is located east of Wilson Creek in Glenn County, and the Walker Creek monitoring site is located 1.3 miles north of the Town of Willows. The Walker Creek drainage includes approximately 27,000 total irrigated acres. Predominant crops in this drainage are almonds, rice, corn, and alfalfa. This is a representative site for this subwatershed.

El Dorado Subwatershed

The El Dorado subwatershed (~3500 irrigated acres) was previously in the *Management Practices (MP) Pilot Program* and has applied for the *Reduced Monitoring/Management Practices Verification Option* under the current WDR.

North Canyon Creek (NRTCN)

This site captures representative agricultural drainage from the Camino-"Apple Hill" drainage in El Dorado County. Crops grown in this region include apples, pears, wine grapes, stone fruit, and Christmas trees. This site is approximately one (1) mile upstream from the confluence with the South Fork American River and is a perennial stream. This is a representative site for this subwatershed.

Coon Hollow Creek (COONH)

This site is located in the Apple Hill area of Camino, approximately 1 mile north of the intersection of North Canyon Road and Carson Road and 1/2 mile south of the confluence with South Canyon Creek. Agricultural operations within the drainage include silviculture, apples, wine grapes, cherries, and blueberries. Coon Hollow Creek is considered a low-flow perennial stream.

Goose Lake Subwatershed

Lower Lassen Creek (LOWLC)

The land use pattern in the Lassen Creek drainage is similar to the Goose Lake Basin as a whole. Lassen Creek originates in predominately publicly owned lands that are managed primarily for dispersed recreation and livestock grazing. Lassen Creek flows out of the Warner Mountains towards Goose Lake, and land uses along this waterbody focus on dry-land alfalfa, native meadow hay production, and irrigated pasture for livestock.

Lake Subwatershed

A proposal for implementation of the *Reduced Monitoring/Management Practices Verification Option* under the current WDR was submitted.

Middle Creek Upstream from Highway 20 (MDLCR)

The Middle Creek drainage contains approximately 60,732 acres. Over 55,000 acres are listed as Native Vegetation with the US Forest Service controlling the majority of the land. Irrigated agriculture constitutes approximately 1,112 acres participating in the Lake County Watershed group. This includes 374 acres of walnuts, 308 acres of grapes, 186 acres of pears 159 acres of hay/pasture, 10 acres of specialty crops/nursery crops and about 70 acres of wild rice.

The sampling location was chosen to avoid influence for the town of Upper Lake, and captures approximately 60% of irrigated agricultural operations within this drainage. This is a representative site for this subwatershed.

McGaugh Slough at Finley Road East (MGSLU)

McGaugh Slough captures irrigated agricultural drainage from about 10,300 acres of orchard and vineyard crops in Lake County. This site characterizes the most prevalent drain for the Big Valley, which is the most intensive area for agricultural operations in Lake County.

Napa Subwatershed

The Napa subwatershed (~3500 irrigated acres) was previously in the *Management Practices (MP) Pilot Program* and has applied for the *Reduced Monitoring/Management Practices Verification Option* under the current WDR.

Pope Creek above Lake Berryessa (PCULB)

The site on Pope Creek in Napa County is downstream of major storm runoff and above Lake Berryessa. Primary crops in the drainage are vineyards and olive orchards. Additional tributaries in the Pope Creek area (Burton Creek, Swartz Creek, Maxwell Creek, and upper Pope Creek) have been sampled to help establish regional characteristics for management plan source evaluations. This site is a representative site for this subwatershed.

Pit River Subwatershed

Monitoring in this subwatershed was conducted in coordination with the Northeastern California Watershed Association (NECWA) and the California's Surface Water Ambient Monitoring Program (SWAMP).

Pit River at Pittville Bridge (PRPIT)

This site captures drainage from Big Valley, Ash Creek and Horse Creek. This site captures drainage from native pasture (the primary land use), as well as alfalfa, oat hay, grain and duck marsh, ultimately incorporating approximately 9,000 acres in the Fall River Valley. This is a representative site for this subwatershed.

Pit River at Canby (PRCAN)

This site captures drainage from the Alturas and Canby drainage areas, as well as drainage from the North and South Fork of Pit River and Hot Springs Valley. Land uses are primarily pasture and grain and hay crops. The approximate irrigated acreage is 50,000 acres.

Placer-Nevada-South Sutter-North Sacramento Subwatershed

The Placer-Nevada-South Sutter-North Sacramento (PNSSNS) Subwatershed has applied for the *Reduced Monitoring/Management Practices Verification Option* under the current WDR.

Coon Creek at Brewer Road (CCBRW)

This site captures drainage from the Middle Coon Creek drainage areas as identified in the Placer-Northern Sacramento Drainage Prioritization Table in the Coalition's Watershed Evaluation Report (WER). This site is on Coon Creek about six miles northwest of the town of Lincoln and includes predominantly agricultural acreage. The drainage includes approximately 65,000 irrigated acres of rice, pasture, grains, and sudan grass, with a high percentage of rice acreage. Irrigated acres (excluding rice) is ~ 13,000 This is a representative site for this subwatershed.

Coon Creek at Striplin Road (CCSTR)

This site captures drainage from the Lower Coon Creek drainage areas and is hydrologically isolated from the Middle Coon Creek drainage. The sampling site is on Coon Creek about one mile downstream of the confluence with Ping Slough. The site drains approximately 25,000 irrigated acres of orchards, pasture, and wheat. There may also be some urban runoff contributions at this site.

Sacramento/Amador Subwatershed

Cosumnes River at Twin Cities Road (CRTWN)

This site characterizes flows from the east via the Cosumnes River and a handful of tributary creeks that originate in the foothills. Contributing agricultural acreage includes pasture, vineyards, corn and grains. This site captures drainage from the two largest drainages in the subwatershed: Lower Cosumnes and Middle Cosumnes, which drain approximately 55,000 irrigated acres. This is a representative site for this subwatershed.

Dry Creek at Alta Mesa Road (DCGLT)

Dry Creek originates in the eastern foothills and flows through considerable agricultural acreage. The drainage includes the southern portion of Amador County, the southeast corner of Sacramento County and the northeast corner of San Joaquin County. Amador County agriculture includes grain and irrigated pasture in the Dry Creek Valley and row crops, irrigated pasture, grain, vineyard, and orchard in the Jackson Valley. Sacramento County agriculture includes vineyard, irrigated pasture, grain, and scattered dairies. Dry Creek drains approximately 329 square miles.

Grand Island Drain near Leary Road (GIDLR)

Grand Island is located in the heart of the Sacramento Delta. Crops include alfalfa, corn, safflower, apples, pears, cherries, blueberries, asparagus, grapes, and pasture land. Water is pumped on to the island at several locations. The monitoring site is located just up-slough from a station that returns water to the Delta. Approximately 8,000 irrigated acres drains to the monitoring site. This is a representative site for this subwatershed.

Laguna Creek at Alta Mesa Road (LAGAM)

Laguna Creek is a tributary to the Cosumnes River. Laguna Creek originates in Amador County and flows south-west into Sacramento County, draining Willow, Hadselville, Brown and Griffith Creeks, among others. The primary agricultural uses are vineyards, field crops, grain and hay crops and pasture.

Shasta/Tehama Subwatershed

Anderson Creek at Ash Creek Road (ACACR)

Anderson Creek was identified as the highest priority drainage in the Shasta county portion of the Shasta/Tehama subwatershed. This ranking was based on total irrigated acreage, crop types by acreage, and amount and type of pesticide use. Anderson Creek originates about three miles west of the city of Anderson and then flows into the Sacramento River. Crops are predominantly pasture, followed by walnuts and alfalfa/hay and then smaller amounts of other field and orchard crops. Total irrigated land is 8,989 acres. This is a representative site for this subwatershed.

Coyote Creek at Tyler Road (COYTR)

The Coyote Creek drainage includes approximately 37,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 6,700 acres. Predominant crops in the drainage are pasture, walnuts, prunes, almonds, and olives.

Solano Subwatershed

Shag Slough at Liberty Island Bridge (SSLIB)

Shag Slough drains a large portion of the South Yolo Bypass. Crops grown in this drainage area include corn, safflower, grain, vineyards, tomatoes, and irrigated pasture. The Liberty Island Bridge site is approximately 2.5 to 3 miles southwest of the Toe Drain in Shag Slough. Like the Toe Drain, it is a tidally influenced site and is likely to contain a mixture of Toe Drain water along with water from other sub-drainages within the South Yolo Bypass and the Southwest Yolo Bypass. Due to the difficulty in accessing the Toe Drain for sampling, Shag Slough replaced the original Toe Drain sampling location in late 2005. This is a representative site for this subwatershed.

Ulatis Creek at Brown Road (UCBRD)

Ulatis Creek is a flood control project (FCP) that drains the majority of the central portion of Solano County. The Ulatis Creek FCP monitoring site is approximately 8.5 miles south of Dixon and 1.5 miles east of State Highway 113 on Brown Road. This site drains the Cache Slough area, as designated in the Yolo/Solano subwatershed map, and empties into Cache Slough. The major crops in this area include wheat, corn, pasture, tomatoes, alfalfa, Sudan grass, walnuts and almonds. This is a representative site for this subwatershed.

Z-Drain (ZDDIX)

The Z-Drain is a tributary draining into the Yolo Bypass south of Interstate 80. This site drains the SW Yolo Bypass drainage area. The major crops in this drainage include pasture, wheat, corn, tomatoes, and alfalfa. A secondary site (ZDDSS) is located immediately downstream of ZDDIX and is occasionally sampled for follow-up source evaluations.

Upper Feather River Watershed

Agriculture in this subwatershed is localized in mountain valleys that are suitable for grazing and growing alfalfa, hay and grain crops. Monitoring in this subwatershed is therefore focused on characterizing drainage from three valleys with considerable agricultural acreage. Monitoring in this subwatershed was conducted in coordination with the Upper Feather River Watershed (UFRW) group and the California's Surface Water Ambient Monitoring Program (SWAMP).

Middle Fork Feather River above Grizzly Creek (MFFRG)

The Middle Fork above Grizzly Creek is below the last irrigated site in the Sierra Valley sub-watershed and has year-round flow in most years. This site replaced Middle Fork Feather River at County Rd A-23, which lacks year-round flows (often dry by mid-July) and has numerous non-agricultural uses, including recreation and filling water trucks. This is a representative site for this subwatershed.

Yolo Subwatershed

Cache Creek at Capay Diversion Dam (CCCPY)

The diversion dam on Cache Creek near Capay is the main diversion point for irrigation water in the 190,000 acre Yolo County Flood Control and Water Conservation District. The Diversion Dam is located 1.9 miles west of the town of Capay. During the summer irrigation season, the water at this site is released from storage approximately 50-60 miles upstream, from the Clear Lake and Indian Valley Reservoirs. There is no snow pack in this coastal watershed, therefore winter flows are very flashy (rising and falling quickly). Major crops in this drainage include tomatoes, alfalfa, corn, wheat, grapes, and orchards.

Tule Canal at North East corner of I-80 (TCHWY))

This site is near the USGS Gauging Station in the Upper Yolo Bypass and is located just South of Interstate 80. This site characterizes the East Side Canal in the bypass and serves as a major drain for croplands in the North Yolo Bypass drainage as indicated on the Yolo Solano Subwatershed map. This drainage area includes corn, wheat, tomatoes, safflower and pasture.

Willow Slough Bypass at Pole Line Road (WLSPL)

The Willow Slough is a large drainage including approximately 102,000 total acres. Irrigated acreage (excluding rice acreage) is approximately 66,000 acres. Predominant crops in the drainage are grain, pasture, corn, tomatoes, rice, almonds, and walnuts. This is a representative site for this subwatershed.

Sampling and Analytical Methods

The objective of data collection for this monitoring program is to produce data that represent, as closely as possible, *in situ* conditions of agricultural discharges and water bodies in the Central Valley. This objective will be achieved by using standard accepted methods to collect and analyze surface water and sediment samples. Assessing the monitoring program's ability to meet this objective will be accomplished by evaluating the resulting laboratory measurements in terms of detection limits, precision, accuracy, representativeness, comparability, and completeness, as described in the Coalition's QAPP (SVWQC 2010) and approved by the Water Board.

Surface water samples were collected for analysis of the constituents listed in **Table 2** as specified in the Coalition's Monitoring Plans. Surface water and sediment samples were collected for chemical analyses and toxicity testing. All samples were collected and analyzed using the methods specified in the QAPP; any deviations from these methods were explained.

SAMPLE COLLECTION METHODS

All samples were collected in a manner appropriate for the specific analytical methods used and to ensure that water column samples were representative of the flow in the channel cross-section. Water quality samples were collected using clean techniques that minimize sample contamination. Samples were cross-sectional composite samples or mid-stream, mid-depth grab samples, depending on sampling site and event characteristics. When grab sample collection methods were used, samples were taken at approximately mid-stream and mid-depth at the location of greatest flow (where feasible). Where appropriate, water samples were collected using a standard multi-vertical depth integrating method. Abbreviated sampling methods (i.e., weighted-bottle or dip sample) may be used for collecting representative water samples.

Sediment sampling was conducted at sampling sites on an approximately 50-meter reach of the waterbody near the water sampling location. If USGS methods were applicable, sediment sub-samples were collected from five to ten wadeable depositional zones. Depositional zones include areas on the inside bend of a stream or areas downstream from obstacles such as boulders, islands, sand bars, or simply shallow waters near the shore. In low-energy, low-gradient waterbodies, composite samples may be collected from the bottom of the channel using appropriate equipment, as specified in the Coalition's QAPP.

Details of the standard operating procedures (SOPs) for collection of surface water and sediment samples are provided in the Coalition's QAPP. The sites and number of samples for 2015 Coalition Monitoring are summarized in **Table 4**. The Coalition's monitoring strategy for 2015 was designed to characterize high priority drainages that are representative of a subwatershed's dominant agricultural crops and practices. This sampling approach was initially designed to comply with the requirements in *Order No. R5-2008*-0005 and with the later adopted *ILRP* MRP (*Monitoring and Reporting Program Order No. R5-2009-0875*); this approach was maintained for the current WDR and MRP (*Order No. R5-2014-0030*). The elements that are key to achieving the Coalition's goals and satisfying the intent of the requirements of the *R5-2014-0030* MRP are (1) the Coalition's prioritization process for selecting representative drainages and monitoring sites, and (2) identification of monitoring parameters and schedules appropriate for these representative drainages. This approach was detailed in the Coalition's 2009 Monitoring and Reporting Program Plan, as required by *Order No. R5-2008-0005*, and the monitoring plan is updated annually in August, as required by *Order No. R5-2014-0030*.

Table 4. 2015 Coalition Monitoring Year: Planned Samples, October 2014 – September 2015

	SAMPLING		Core Parameters				Metals						PESTICIDES IN WATER																								TOXICITY					
SiteID	Water Column Sample Events	Sediment Sample Events	pH, conductivity, DO, temperature, flow	Turbidity, TSS, TOC	Pathogen Indicators: *E. Coli*	Nutrients Group	arsenic (total)	boron (total)	copper (total and dissolved)	lead (total and dissolved)	selenium (total)	Hardness	Legacy OCLs	Legacy OCLs-GrpA	azinphos-methyl	bifenthrin	carbaryl	chlorothalonil	chlorpyrifos	cyfluthrin	cypermethrin	diazinon	dimethoate	diuron	esfenvalerate	fenpropathrin	hexazinone	lambda-cyhalothrin	malathion	methomyl	naled (dichlorvos)	oxyfluorfen	permethrin	phosmet	s-metolachlor	simazine	Algae - Selenastrum	Fathead Minnow - Pimephales	Water Flea - Ceriodaphnia	Hyalella azteca	grain size in sediments	Pyrethroids, Chlorpyrifos, TOC in sediments
ButteYubaSutter																																										
SSKNK	4	2	4	4	4	4			1			1	2	2		2		4	5	2	2	3		2	2			2	1		1	4	2		2		4		4	2	2	2
LHNCT	11	2	11	11	11	11			4			4	2			2			5	2	2	4		2	2			2				7	2				7		7	2	2	2
PNCHY	11	2	11	11	11	11			3			3	2	2		2		4	6	2	2			4	2			2				8	2			2	11		6	2	2	2
BTTSL	5		5																																							
GILSL	5		5										2						3			3																				
LSNKR	11	2	11	11	11	11	4		3			3	2	2		2		2	5	2	2	3		6	2			2				8	2				10		6	2	2	2
WADCN																																										
ColusaGlenn																																										
CODMR																																										
FRSHC	10	2	10	10	10	10			5			5	2			2		4	8	2	2	1		3	2			2	2			10	2		3		9		7	2	2	2
LRLNC	4		4										2																													
SCCMR	4		4																																							
COLDR	4	2	4	4	4	4			1			1	2	2		2		3	5	2	2	4		2	2		2	2	3	4		4	2		3		4		4	2	2	2
RARPP	4		4										2						5			5																				
LGNCR																																										
STYHY	4	2	4																																				2	2		
WLKCH	11	2	11	11	11	10			4			4	2			2		3	6	2	2	4		7	2			2				8	2			2	10		4	2	2	2
ElDorado																																										
COONH													2																													
NRTCN	7		7	7	7	7							2																								4	5	5			
Lake																																										
MGSLU	6		6			6																																				
MDLCR	9	2	9	9	9	9							2			2			5	2	2	2			2			2				6	2				6		4	2	2	2
Napa																																										
CCULB																																										
PCULB	6		6	6	6	6			2																							4					4					
NECWA																																										
FRRRB	4		4																																							
PRCAN	4		4																																							

	SAMPLING		Core Parameters				Metals						PESTICIDES IN WATER																								TOXICITY					
PRPIT	6		6	6	6	6				4		4	2																													
PNSSNS																																										
CCBRW	8	2	8	8	8	8			3			3				2			6	2	2				2			2					2				3		6	2	2	2
CCSTR	4		4																4			4																				
SacramentoAmador																																										
CRTWN	10	2	10	10	10	10			3			3	2	2		2			8		2	2		6	2	2		2	5			6	2				7		6	2	2	2
DCGLT	4		4																																							
GIDLR	11	2	11	11	11	11	6		3			3	2	2	2	2	4	2	6		2	4	2	3	2	2	3	2	2			6	2	2	3		10		8	2	2	2
LAGAM	4		4																																							
ShastaTehama																																										
ACACR	10	2	10	10	10	10			2			2	2			2			6	2	2				2			2				9	2				9		4	2	2	2
BRCWB																																										
COYTR	3		3																																							
Solano																																										
UCBRD	11	2	11	11	11	11		4	3		4	3	2	2		2			6	2	2	4		2	2		3	2	4	2		9	2		3	2	11		6	2	2	2
SSLIB	4	2	4	4	4	4		1	1		1	1	2	2		2			9	2	2	5		2	2			2				4	2		3		4		4	2	2	2
ZDDIX	4	2	4																																					2		
UFRW																																										
INDAB																																										
MFFGR	6		6	6	6	6																																				
SPGRN																																										
Yolo																																										
CCCPY	4		4																																				4			
TCHWY	4		4					4																																		
WLSPL	11	2	11	11	11	11		4	3		4	3	2	2		2		5	7	4	2	3		3	2		3	2	2			9	2		3		11		5	2	2	2
Totals	***159***	***22***	***226***	***159***	***159***	***148***	***10***	***13***	***41***	***4***	***9***	***43***	***42***	***15***	***2***	***30***	***4***	***27***	***105***	***28***	***30***	***52***	***2***	***42***	***30***	***4***	***11***	***30***	***19***	***6***	***1***	***102***	***30***	***2***	***20***		***124***	***5***	***92***	***34***	***30***	***30***

ANALYTICAL METHODS

Water chemistry samples were analyzed for filtered and unfiltered fractions of the samples. Pesticide analyses were conducted only on unfiltered (whole) samples. Laboratories analyzing samples for this program have demonstrated the ability to meet the minimum performance requirements for each analytical method, including the ability to meet the project-specified quantitation limits (QL), the ability to generate acceptable precision and recoveries, and other analytical and quality control parameters documented in the Coalition's QAPP. Analytical methods used for chemical analyses follow accepted standard methods or approved modifications of these methods, and all procedures for analyses are documented in the QAPP or are available for review and approval at each laboratory.

Toxicity Testing and Toxicity Identification Evaluations

Water quality samples were analyzed for toxicity to *Ceriodaphnia dubia*, *Selenastrum capricornutum*, and *Pimephales promelas* (fathead minnow) for 2015 Monitoring. Sediment samples were analyzed for toxicity to *Hyalella azteca*. Toxicity tests were conducted using standard USEPA methods for these species.

- Determination of acute toxicity to *Ceriodaphnia* was performed as described in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition* (USEPA 2002a). Toxicity tests with *Ceriodaphnia* were conducted as 96-hour static renewal tests, with renewal 48 hours after test initiation.
- Determination of toxicity to *Selenastrum* was performed using the non-EDTA procedure described in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition* (USEPA 2002b). Toxicity tests with *Selenastrum* were conducted as a 96-hour static non-renewal test.

For all initial screening toxicity tests at each site, 100% ambient water and a control were used for the acute water column tests. If 100% mortality to a test species was observed any time after the initiation of the initial screening toxicity test, a multiple dilution test using a minimum of five sample dilutions was conducted with the initial water sample to estimate the magnitude of toxicity.

Procedures in the Coalition's QAPP state that if any measurement endpoint from any of the three aquatic toxicity tests exhibits a statistically significant reduction in survival (*Ceriodaphnia* and *Pimephales*) or cell density (*Selenastrum*) of greater than or equal to 50% compared to the control, Toxicity Identification Evaluation (TIE) procedures will be initiated using the most sensitive species to investigate the cause of toxicity. The 50% mortality threshold is consistent with the approach recommended in guidance published by USEPA for conducting TIEs (USEPA 1996b), which recommends a minimum threshold of 50% mortality because the probability of completing a successful TIE decreases rapidly for samples with less than this level of toxicity. For samples that met these trigger criteria, Phase 1 TIEs to determine the general class of constituent (*e.g.*, metal, non-polar organics) causing toxicity or pesticide-focused TIEs were conducted. TIE methods generally adhere to the documented USEPA procedures referenced in the QAPP. TIE procedures were initiated as soon as possible after toxicity was observed to reduce the potential for loss of toxicity due to extended sample storage. Procedures for initiating and conducting TIEs are documented in the QAPP.

Detection and Quantitation Limits

The Method Detection Limit (MDL) is the minimum analyte concentration that can be measured and reported with a 99% confidence that the concentration is greater than zero. The Quantitation Limit (QL) represents the concentration of an analyte that can be routinely measured in the sampled matrix within stated limits and confidence in both identification and quantitation. For this program, QLs were established based on the verifiable levels and general measurement capabilities demonstrated by labs for each method. Note that samples required to be diluted for analysis (or corrected for percent moisture for sediment samples) may have sample-specific QLs that exceed the established QLs. This is unavoidable in some cases.

Project Quantitation Limits

Laboratories generally establish QLs that are reported with the analytical results—these may be called *reporting limits*, *detection limits*, *reporting detection limits*, or several other terms by different laboratories. In most cases, these laboratory limits are less than or equal to the project QLs listed in **Table 5** and **Table 6**. Wherever possible, project QLs are lower than the proposed or existing relevant numeric water quality objectives or toxicity thresholds, as required by the *ILRP*.

All analytical results between the MDL and QL are reported as numerical values and qualified as estimates (Detected, Not Quantified (DNQ), or sometimes, “J-values”).

Table 5. Laboratory Method Detection Limit (MDL) and Quantitation Limit (QL) Data Quality Objectives for Analyses of Surface Water

Method	Analyte	Fraction	Units	MDL	QL	Note
Physical and Conventional Parameters						
EPA 130.2	Hardness, total as $CaCO_3$	Unfiltered	mg/L	3	5	
EPA 180.1; SM2130B	Turbidity	Unfiltered	NTU	0.1	1.0	
SM20-2540 C	Total Dissolved Solids (TDS)	Particulate	mg/L	4	10	(a)
EPA 160.2; SM2540D	Total Suspended Solids (TSS)	Particulate	mg/L	2	3	
EPA 415.1; SM5310C	Organic Carbon, Total (TOC)	Unfiltered	mg/L	0.1	0.5	
Pathogen Indicators						
SM 9223	*E. Coli* bacteria	NA	MPN/100mL	2	2	
Organophosphorus Pesticides						
EPA 625(m)	Azinphos methyl	Unfiltered	µg/L	0.05	0.1	
EPA 625(m)	Chlorpyrifos	Unfiltered	µg/L	0.005	0.01	
EPA 625(m)	Demeton-S	Unfiltered	µg/L	0.005	0.01	
EPA 625(m)	Diazinon	Unfiltered	µg/L	0.005	0.01	
EPA 625(m)	Dichlorvos	Unfiltered	µg/L	0.005	0.01	
EPA 625(m)	Dimethoate	Unfiltered	µg/L	0.005	0.01	
EPA 625(m)	Disulfoton	Unfiltered	µg/L	0.01	0.02	
EPA 625(m)	Ethoprop	Unfiltered	µg/L	0.001	0.002	(a)
EPA 625(m)	Fenchlorphos	Unfiltered	µg/L	0.002	0.004	(a)
EPA 625(m)	Fensulfothion	Unfiltered	µg/L	0.001	0.002	(a)
EPA 625(m)	Fenthion	Unfiltered	µg/L	0.002	0.004	(a)
EPA 625(m)	Malathion	Unfiltered	µg/L	0.005	0.01	
EPA 625(m)	Methamidophos	Unfiltered	µg/L	0.05	0.01	
EPA 625(m)	Methidathion	Unfiltered	µg/L	0.01	0.02	
EPA 625(m)	Mevinphos	Unfiltered	µg/L	0.008	0.0016	(a)
EPA 625(m)	Naled	Unfiltered	µg/L	0.2	0.5	(a)
EPA 625(m)	Parathion, Methyl	Unfiltered	µg/L	0.01	0.02	
EPA 625(m)	Parathion, Ethyl	Unfiltered	µg/L	0.01	0.02	
EPA 625(m)	Phorate	Unfiltered	µg/L	0.01	0.02	
EPA 625(m)	Phosmet	Unfiltered	µg/L	0.05	0.1	
EPA 625(m)	Sulprofos	Unfiltered	µg/L	0.001	0.002	(a)
EPA 625(m)	Tetrachlorvinphos	Unfiltered	µg/L	0.002	0.004	(a)
EPA 625(m)	Tokuthion	Unfiltered	µg/L	0.003	0.006	(a)
EPA 625(m)	Trichloronate	Unfiltered	µg/L	0.001	0.002	(a)
Organochlorine Pesticides						
EPA 625(m)	4,4’-DDT (o,p’ and p,p’)	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	4,4’-DDE (o,p’ and p,p’)	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	4,4’-DDD (o,p’ and p,p’)	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Aldrin	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Chlordane	Unfiltered	µg/L	0.001	0.005	
EPA 8081A	Chlorothalonil	Unfiltered	µg/L	0.1	0.2	(a)

Method	Analyte	Fraction	Units	MDL	QL	Note
EPA 625(m)	Dacthal	Unfiltered	µg/L	0.008	0.05	
EPA 625(m)	Dicofol	Unfiltered	µg/L	0.05	0.1	
EPA 625(m)	Dieldrin	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Endosulfan I	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Endosulfan II	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Endosulfan sulfate	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Endrin	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Endrin Aldehyde	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Endrin Ketone	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	HCH	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Heptachlor	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Heptachlor epoxide	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Hexachlorobenzene	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Methoxychlor	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Mirex	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Nonachlor	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Oxychlordane	Unfiltered	µg/L	0.001	0.005	
EPA 625(m)	Perthane	Unfiltered	µg/L	0.001	0.005	
Carbamate and Urea Pesticides						
EPA 8321	Aldicarb	Unfiltered	µg/L	0.2	0.4	
EPA 8321	Aminocarb	Unfiltered	µg/L	0.2	0.4	
EPA 8321	Barban	Unfiltered	µg/L	1.75	3.5	
EPA 8321	Benomyl/Carbendazim	Unfiltered	µg/L	0.2	0.4	
EPA 8321	Carbaryl	Unfiltered	µg/L	0.05	0.07	
EPA 8321	Carbofuran	Unfiltered	µg/L	0.05	0.07	
EPA 8321	Chlorpropham	Unfiltered	µg/L	0.4	0.8	
EPA 8321	Methiocarb	Unfiltered	µg/L	0.2	0.4	
EPA 8321	Methomyl	Unfiltered	µg/L	0.05	0.07	
EPA 8321	Mexacarbate	Unfiltered	µg/L	0.4	0.8	
EPA 8321	Oxamyl	Unfiltered	µg/L	0.2	0.4	
EPA 8321	Propham	Unfiltered	µg/L	1.75	3.5	
EPA 8321	Propoxur	Unfiltered	µg/L	0.2	0.4	
Pyrethroid Pesticides						
GCMS-NCI	Allethrin	Unfiltered	µg/L	0.0001	0.0015	
GCMS-NCI	Bifenthrin	Unfiltered	µg/L	0.0001	0.0015	
GCMS-NCI	Cyfluthrin	Unfiltered	µg/L	0.0002	0.0015	
GCMS-NCI	Cypermethrin	Unfiltered	µg/L	0.0002	0.0015	
GCMS-NCI	Deltamethrin/Tralomethrin	Unfiltered	µg/L	0.0002	0.003	
GCMS-NCI	Esfenvalerate/Fenvalerate	Unfiltered	µg/L	0.0002	0.003	
GCMS-NCI	Fenpropathrin	Unfiltered	µg/L	0.0002	0.0015	
GCMS-NCI	Fluvalinate	Unfiltered	µg/L	0.0002	0.0015	
GCMS-NCI	Lambda-Cyhalothrin	Unfiltered	µg/L	0.0002	0.0015	
GCMS-NCI	Permethrin	Unfiltered	µg/L	0.002	0.015	

Method	Analyte	Fraction	Units	MDL	QL	Note
GCMS-NCI	Tetramethrin	Unfiltered	µg/L	0.0002	0.0015	
Other Herbicides						
EPA 8321	Bromacil	Unfiltered	µg/L	0.2	0.4	(a)
EPA 8321	Chloroxuron	Unfiltered	µg/L	0.2	0.4	
EPA 8081A	Dacthal	Unfiltered	µg/L	0.008	0.05	
EPA 8321	Diuron	Unfiltered	µg/L	0.2	0.4	
EPA 8321	Fenuron	Unfiltered	µg/L	0.2	0.4	
EPA 8321	Fluometuron	Unfiltered	µg/L	0.2	0.4	
EPA 8141A	Hexazinone	Unfiltered	µg/L	0.1	0.5	(a)
EPA 8321	Linuron	Unfiltered	µg/L	0.2	0.4	
EPA 625	Merphos	Unfiltered	µg/L	0.001	0.002	(a)
EPA 625	Metolachlor	Unfiltered	µg/L	0.26	0.5	(a)
EPA 8321	Monuron	Unfiltered	µg/L	0.2	0.4	
EPA 8321	Neburon	Unfiltered	µg/L	0.2	0.4	
EPA 8321	Oryzalin	Unfiltered	µg/L	0.2	0.4	
EPA 8081A	Oxyfluorfen	Unfiltered	µg/L	0.008	0.05	
EPA 8321	Propachlor	Unfiltered	µg/L	0.2	0.4	(a)
EPA 8321	Siduron	Unfiltered	µg/L	0.2	0.4	
EPA 625(m)	Simazine	Unfiltered	µg/L	0.005	0.01	
EPA 8321	Tebuthiuron	Unfiltered	µg/L	0.2	0.4	
Benzophenyls						
EPA 8321	Diflubenzuron	Unfiltered	µg/L	0.2	0.4	
Trace Elements						
EPA 200.8	Arsenic	Filtered, Unfiltered	µg/L	0.08	0.5	
EPA 2008	Cadmium	Filtered, Unfiltered	µg/L	0.04	0.1	
EPA 200.8	Boron	Filtered, Unfiltered	µg/L	0.04	0.1	
EPA 200.8	Copper	Filtered, Unfiltered	µg/L	0.2	0.5	
EPA 200.8	Lead	Filtered, Unfiltered	µg/L	0.02	0.25	
EPA 200.8	Selenium	Unfiltered	µg/L	0.5	1	
Nutrients						
EPA 350.1; 350.2	Ammonia, Total as N	Unfiltered	mg/L	0.02	0.1	
EPA 353.2	Nitrate + Nitrite as N	Unfiltered	mg/L	0.02	0.05	
EPA 365.2; SM4500-P E	Orthophosphate, as P	Unfiltered	mg/L	0.01	0.05	
EPA 365.2; SM4500-P E	Phosphorus, Total	Unfiltered	mg/L	0.02	0.05	
EPA 351.3; 351.2	Total Kjeldahl Nitrogen	Unfiltered	mg/L	0.07	0.1	

Note:
(a) No QL target has been established for this analyte.

Table 6. Laboratory Method Detection Limit (MDL) and Quantitation Limit (QL) Data Quality Objectives for Analyses of Sediments for the Coalition Monitoring and Reporting Program Plan

Method	Analyte	Fraction	Units	MDL	QL
Physical and Conventional Parameters					
SM 2560D	Grain Size Analysis	NA	% fraction	NA	1
EPA 160.3	Solids (TS)	Total	%	NA	0.1
EPA 9060	Organic Carbon, Total (TOC)	Total	mg/kg d.w.	50	200
Pyrethroids					
EPA 8270C(m)	Allethrin	Total	ng/g d.w.	0.1	1
EPA 8270C(m)	Bifenthrin	Total	ng/g d.w.	0.1	1
EPA 8270C(m)	Cyfluthrin	Total	ng/g d.w.	0.1	1
EPA 8270C(m)	Cypermethrin	Total	ng/g d.w.	0.1	1
EPA 8270C(m)	Deltamethrin/Tralomethrin	Total	ng/g d.w.	0.15	1
EPA 8270C(m)	Esfenvalerate/Fenvalerate	Total	ng/g d.w.	0.15	1
EPA 8270C(m)	Fenpropathrin	Total	ng/g d.w.	0.15	1
EPA 8270C(m)	Fluvalinate	Total	ng/g d.w.	0.1	1
EPA 8270C(m)	Lambda-Cyhalothrin	Total	ng/g d.w.	0.1	1
EPA 8270C(m)	Permethrin	Total	ng/g d.w.	0.1	1
EPA 8270C(m)	Tetramethrin	Total	ng/g d.w.	0.1	1
Organochlorine Pesticides					
EPA 8270C(m)	Chlorpyrifos	Total	ng/g d.w.	0.1	3
EPA 8270C(m)	Diazinon	Total	ng/g d.w.	5	40

Monitoring Results

The following sections summarize the monitoring conducted by the Coalition and its Subwatershed partners in 2015 (October 2014 through September 2015).

SUMMARY OF SAMPLE EVENTS CONDUCTED

This report presents monitoring results from twelve Coalition sampling events (Events 104-115), as well as data for events conducted by coordinating Subwatershed monitoring programs between October 2014 and September 2015. Samples collected for all of these events are listed in **Table 7**.

The Coalition and Subwatershed monitoring events were conducted throughout the year. Analyses included water chemistry and toxicity, with pesticides monitored during months when higher use is typical. Sediment toxicity testing and/or chemistry analyses were also conducted by the Coalition at 16 sites as part of the assessment and source evaluation efforts for the Management Plan requirement for sediment toxicity. The sites and parameters for all events were monitored in accordance with the Coalition's current MRP and QAPP.

The field logs for all Coalition and Subwatershed samples collected for the October 2014 through September 2015 events, as well as associated site photographs, are provided in **Appendix A**.

Table 7. Sampling for the 2015 Coalition Monitoring Year

		Sample Count		104	105	106	107	108	109	110	111	112	113	114	115
Subwatershed (Agency)	**Site ID**	**Planned**	**Collected**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**
ButteYubaSutter (SVWQC)	BTTSL	5	5	-	-	-	-	W	W	W	W	W	-	-	-
	GILSL	7	7	-	W	-	-	W	W	-	W	W	W	W	-
	LHNCT	11	11	W	W	W	W	W	W	W,S	W	W	W	W,S	-
	LSNKR	12	12	W	W	W	W	W	W	W,S	W	W	W	W	W
	PNCHY	11	11	W	W	W	W	W	W	W,S	W	W	W	W,S	-
	SSKNK	8	8	W	-	-	W	W	W	-	W	W	W	W,S	-
ColusaGlenn (SVWQC)	COLDR	7	7	-	-	-	W	W	W	-	W	W	W	-	W,S
	FRSHC	11	11	W	W	W	W	W	W	W,S	W	W	W	W,S	-
	LRLNC	4	4	-	-	W	-	W	-	W	-	W	-	-	-
	RARPP	8	8	W	-	W	W	W	W	-	W	W	W	-	-
	SCCMR	3	3	-	-	W	-	W	-	W	-	-	-	-	-
	STYHY	8	4	-	W	W	W	W	D	D	-	D	-	D	-
	WLKCH	11	6	D	D	W	W	W	W	W,S	W	D	D	D	D
ElDorado (SVWQC)	COONH	2	2	-	-	-	-	-	W	-	-	W	-	-	-
	NRTCN	7	7	-	W	W	W	W	W	W	-	W	-	-	-
GooseLake(GLC)	LOWLC	4	4	-	-	-	-	W	W	W	W	-	-	-	-
Lake (SVWQC)	MDLCR	11	11	W	W	W	W	W	W	W,S	W	W	W	W,S	-
	MGSLU	7	4	W	D	-	D	W	W	-	-	W	-	D	-
PitRiver (NECWA)	FRRRB	0	0	-	-	-	-	-	-	-	-	-	-	-	-
	PRCAN	0	0	-	-	-	-	-	-	-	-	-	-	-	-
	PRPIT	2	2	-	-	-	-	-	-	W	W	-	-	-	-
Placer-Nevada-SSutter-	CCBRW	9	9	-	-	W	W	W	W	W,S	W	W	W	W,S	-
NSacramento (PNSSNS)	CCSTR	4	4	-	-	-	-	W	-	-	W	W	W	-	-
SacramentoAmador	CRTWN	9	4	W	D	D	-	W	W	W,S	-	D	D	D	-
(SVWQC)	DCGLT	5	2	D	-	-	-	W	-	-	-	D	-	D	W
	GIDLR	11	11	W	W	W	W	W	W	W,S	-	W	W	W,S	W

		Sample Count		104	105	106	107	108	109	110	111	112	113	114	115
Subwatershed (Agency)	**Site ID**	**Planned**	**Collected**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**
	LAGAM	3	3	-	-	-	-	W	-	-	-	W	-	-	W
ShastaTehama (SVWQC)	ACACR	10	10	W	W	W	W	W	W	W,S	W	W	W	W,S	-
	COYTR	3	3	-	-	-	-	W	-	W	-	W	-	-	-
Solano (SVWQC)	SSLIB	8	8	W	-	-	W	W	W	-	W	W	W	W,S	-
	UCBRD	11	11	W	W	W	W	W	W	W,S	W	W	W	W,S	-
	ZDDIX	2	2	-	-	-	-	-	-	W,S	-	-	-	W,S	-
Yolo (SVWQC)	CCCPY	4	4	-	-	W	-	W	-	W	-	W	-	-	-
	TCHWY	4	4	-	-	W	-	W	-	W	-	W	-	-	-
	WLSPL	11	11	W	W	W	W	W	W	W,S	W	W	W	W,S	-
UpperFeatherRiver (UFRW)	MFFGR	1	1	-	-	-	-	-	-	W	-	-	-	-	-
	Totals	**234**	**214**												

Notes:

NECWA = Northeastern California Watershed Association
PNSSNS = Placer-Nevada-SSutter-NSacramento
SVWQC = Sacramento Valley Water Quality Coalition
UFRW = Upper Feather River Watershed Group

W = Water sample collected
S = Sediment sample collected
D = Site was dry; no samples collected.
"-" = no samples planned

SAMPLE CUSTODY

All samples that were collected for the Coalition monitoring effort met the requirements for sample custody. Sample custody must be traceable from the time of sample collection until results are reported. A sample is considered under custody if:

- it is in actual possession;
- it is in view after in physical possession; and
- it is placed in a secure area (i.e., accessible by or under the scrutiny of authorized personnel only after in possession).

The chain-of-custody forms (COCs) for all samples collected by Coalition contractors for the monitoring events conducted from October 2014 through September 2015 are included with the related lab reports and are provided in **Appendix B**. All COCs for *ILRP* monitoring conducted by Coalition partners during this same period are also provided in **Appendix B** with their associated lab reports.

QUALITY ASSURANCE RESULTS

The Data Quality Objectives (DQOs) used to evaluate the results of the Coalition monitoring effort are detailed in the Coalition's QAPP. These DQOs are the detailed quality control specifications for precision, accuracy, representativeness, comparability, and completeness. These DQOs are used as comparison criteria during data quality review to determine if the minimum requirements have been met and the data may be used as planned.[7]

Results of Field and Laboratory QA/QC Analyses

Quality Assurance/Quality Control (QA/QC) data are summarized in **Table 8** through **Table 16** and discussed below. All program QA/QC results are included with the lab reports in **Appendix B** of this document, and any qualifications of the data are presented with the tabulated monitoring data. All program monitoring results discussed are tabulated in **Appendix C**.

Contamination Assessments

Absence of sample contamination from sampling and analytical procedures was assessed by analysis of field blank and method blank samples, respectively.

Field Blanks

Field Blanks were collected and analyzed for all analyses (**Table 8**). The data quality objective for field blanks is no detectible concentrations of the analyte of interest above the QL. With the exceptions discussed below, analytes of interest were generally not detected in field blanks:

[7] During the 2015 Monitoring year, the data qualification process was modified to accommodate the California Environmental Data Exchange Network (CEDEN) submittal requirements for the *ILRP* data. The discussion of quality assurance results presented herein reflects those changes and may not be directly comparable with those in past AMRs.

- Total organic carbon was detected above the QL in three field blank analyses. Three environmental results were affected.
- Total suspended solids was detected above the QL in two field blank analyses. Two environmental results were affected.
- Dissolved copper was detected above the QL in one field blank analysis. One environmental result was affected.

Method Blanks

Method Blanks were analyzed for all parameters (**Table 9**). The data quality objective for method blanks is no detectible concentrations of the analyte of interest above the QL. With the exceptions discussed below, analytes of interest were generally not detected in method blanks:

- Trace metals (copper and boron) were detected above the QL in two method blank analyses. No environmental results were affected.

Accuracy Assessments

Analytical accuracy was assessed based on compliance with analytical hold times, achievement of target analytical reporting limits, and analysis of laboratory control spikes, surrogate spikes, and matrix spike samples.

Hold Times

Results were evaluated for compliance with required preparation and analytical hold times. With the exceptions discussed below, analyses met the target DQOs:

- 1 of 239 *E. coli* results were analyzed slightly outside of their 24-hour hold times. This was considered unlikely to affect the outcome of assessment of exceedances.

Method Detection Limits and Quantitation Limits

Target Method Detection Limits (MDL) and Quantitation Limits (QL) were assessed for all parameters. With the exceptions discussed below, analyses met the target DQOs:

- 8 of 13 boron results had MDLs and QLs greater than the project DQO due to dilutions required to analyze the samples. Assessment of exceedances was not affected.
- 10 of 41 hardness as $CaCO_3$ results had QLs greater than the project DQO due to dilutions required to analyze the samples. Assessment of exceedances was not affected.
- 9 of 146 total Nitrate+Nitrite as N results had MDLs and QLs greater than the project DQO due to dilutions required to analyze the samples. Assessment of exceedances was not affected.
- 11 of 142 total orthophosphate as P results had QLs greater than the project DQO due to dilutions required to analyze the samples. Assessment of exceedances was not affected.
- 9 of 142 total suspended solid results had an MDL greater than the project DQO due to dilutions required to analyze the samples. Assessment of exceedances was not affected.

- 71 of 149 turbidity results had MDLs greater than the project DQO due to dilutions required to analyze the samples. Assessment of exceedances was not affected.

Laboratory Control Spikes

Laboratory Control Spike (LCS) recoveries were analyzed for TSS, TOC, hardness, turbidity, trace metals, nutrients, and pesticides (**Table 10**). The data quality objective for an LCS is 80-120% recovery of the analyte of interest for most analytes. The DQOs for LCS recoveries of pesticides vary by analyte and surrogate and are based on the standard deviation of actual recoveries for the method. In accordance with SWAMP data reporting protocols, the data were not specifically qualified as being high- or low-biased, but these terms are used below for the purpose of discussion. With the exceptions discussed below, all analyses met their specific DQO:

- The result of one LCS recovery analysis associated with carbamate pesticides, benzophenyls and other herbicides was outside the acceptable recovery DQO and was qualified as high-biased. The high-biased recovery resulted in one environmental result being possibly affected.
- The results of five LCS recovery analyses for organophosphate pesticides were outside the acceptable recovery DQO. Four recoveries were high-biased, and one recovery was low-biased. One environmental result was affected as high-biased and six were affected as low-biased.

Surrogate Spike Recoveries

Surrogate recoveries were analyzed for pesticide analyses (**Table 11**). The DQOs for surrogate recoveries of pesticides vary by surrogate and are based on the standard deviation of actual recoveries for the method. In accordance with SWAMP data reporting protocols, the data were not specifically qualified as being high- or low-biased, but these terms are used below for the purpose of discussion. With the exceptions discussed below, all analyses met their specific DQO:

- The results of three surrogate recovery analyses for pesticides by EPA Method 625 were outside the acceptable recovery DQO, and they were all considered low-biased. Four different surrogates were included with EPA Method 625 analyses. No samples had more than two of the surrogates exceed the recovery objectives, and results for the target pesticides in environmental samples were not significantly affected.
- The results of 15 surrogate recovery analyses for pesticides by EPA Method 8141A were outside the acceptable recovery DQO and all were considered to be high-biased. Two different surrogates were included with EPA Method 8141A analyses. Results for the target pesticides in environmental samples were not significantly affected.

Matrix Spikes

Matrix Spikes and Matrix Spike Duplicates were analyzed for trace metals, nutrients, TOC and pesticides (**Table 12**). The data quality objective for matrix spikes is 80-120% recovery for most analytes of interest. The data quality objective for matrix spike recoveries of pesticides varies for each analyte or surrogate and is based on the standard deviation of actual recoveries for the method. The data were not specifically qualified as being high- or low-biased, but these terms are used below for the purpose of discussion. With the exceptions discussed below, all analyses met their specific DQOs:

- Matrix Spike recoveries for two analyses associated with carbamate pesticides, benzophenyls, and other herbicides were outside the DQO. One result was considered to be high-biased and one was considered to be low-biased. One environmental result was affected. Assessment of exceedances was not affected.
- Matrix Spike recoveries for two nitrate+nitrite as N analyses were outside the DQO. The two results were considered to be high-biased and resulted in one environmental result being affected. Assessment of exceedances was not affected.
- Matrix Spike recoveries for three organochlorine pesticide analysis were outside the DQO. Two results were considered to be high-biased and one was considered to be low-biased. One environmental result was affected. Assessment of exceedances was not affected.
- Matrix Spike recoveries for two organophosphate pesticide analyses were outside the DQO and both were considered to be high-biased. No environmental results were affected. Assessment of exceedances was not affected.
- Matrix Spike recoveries for one total organic carbon analysis was outside the DQO and was considered to be high-biased. One associated environmental result was potentially affected. Assessment of exceedances was not affected.

Precision

Sampling and analytical precision was assessed by analysis of duplicate field samples and duplicate analysis of environmental samples, laboratory control spikes, and matrix spike samples.

Field Duplicates

Field Duplicate samples were collected and analyzed for all parameters (**Table 13**). The data quality objective for a field duplicate analysis is a Relative Percent Difference (RPD) not exceeding 25% or a difference between the environmental sample and the field duplicate that is less than the QL. With the exceptions discussed below, all field duplicates met this DQO:

- Field duplicate RPD results exceeded the DQO for five total ammonia as N analyses. All five environmental results were affected. Assessment of exceedances was not affected.
- Field duplicate RPD results exceeded the DQO for one analysis associated with carbamate pesticides, benzophenyls, and other herbicides. One environmental result was affected. Assessment of exceedances was not affected.
- Field duplicate RPD results exceeded the DQO for one *E. coli* analysis. One environmental results were affected. Assessment of exceedances was not affected.
- Field duplicate RPD results exceeded the DQO for two nitrate+nitrite as N analyses. Two environmental results were affected. Assessment of exceedances was not affected.

- Field duplicate RPD results exceeded the DQO for two organophosphate pesticide analyses. Two environmental results were affected. Assessment of exceedances was not affected.
- Field duplicate RPD results exceeded the DQO for two total phosphorus as P analyses. Two environmental results were affected. Assessment of exceedances was not affected.
- Field duplicate RPD results exceeded the DQO for two total suspended solids analyses. Two environmental results were affected. Assessment of exceedances was not affected.
- Field duplicate RPD results exceeded the DQO for two trace metals tests. Two environmental results were affected. Assessment of exceedances was not affected.
- Field duplicate RPD results exceeded the DQO for one turbidity test. One environmental result was affected. Assessment of exceedances was not affected.

Laboratory Duplicates

Laboratory Duplicates were analyzed for Nitrate + Nitrite as N, TOC, TSS, turbidity, and pesticides (**Table 14**). The data quality objective for laboratory duplicates is a Relative Percent difference (RPD) not exceeding 25%. With the exceptions discussed below, all field duplicates met this DQO:

- Laboratory duplicate RPD results exceeded the DQO for one organophosphate pesticide analyses. One environmental result was affected. Assessment of exceedances was not affected.

Laboratory Control Spike Duplicates

Laboratory Control Spike and Laboratory Control Spike Duplicate Recoveries and their associated Relative Percent Differences (RPDs) were analyzed for trace metals, TSS, turbidity, nutrients, and pesticides (**Table 15**). The data quality objective for matrix spike duplicates is a RPD not exceeding 25%. With the exceptions discussed below, all analyses met this DQO:

- Laboratory control spike duplicate results exceeded the DQO for four organophosphate pesticide RPD results. A total of 35 results were affected, but they were all below detection. Assessment of exceedances was not affected.

Matrix Spike Duplicates

Matrix Spike and Matrix Spike Duplicate Recoveries and their associated Relative Percent Differences (RPDs) were analyzed for trace metals, nutrients, TOC and pesticides (**Table 16**). The data quality objective for matrix spike duplicates is an RPD not exceeding 25%. With the exceptions discussed below, all analyses met this DQO:

- RPDs calculated for matrix spike duplicate results exceeded the DQO for three results associated with carbamate pesticides, benzophenyls, and other herbicides. Three environmental results were affected on this basis, but all were below detection. Assessment of exceedances was not affected.

- RPDs calculated for matrix spike duplicate results exceeded the DQO for 12 organophosphate pesticides. A total of 12 results were affected on this basis, but all were below detection. Assessment of exceedances was not affected.

Summary of Precision and Accuracy

Based on the QA/QC data for the 2015 Coalition Monitoring discussed above, the precision and accuracy of the majority of monitoring results met the DQOs adopted for the monitoring program, and there were no systematic sampling or analytical problems. These data are adequate for the purposes of the Coalition's monitoring program.

Of the 88 total qualified environmental data points, 69 results were associated with elevated variability in lab or field replicate analyses, 11 results were associated with *high-biased* or *low-biased* recoveries outside of DQOs, and eight results were potentially affected by contamination. None of the data potentially affected by contamination exceeded a water quality standard.

All QC sample types had success rates in excess of 95%. Of the 6,320 environmental analytical results generated from October 2014 through September 2015, 6,232 results required no qualification, resulting in 98% of analytical results having no restrictions on their use.

Completeness

The objectives for completeness are intended to apply to the monitoring program as a whole. As summarized in **Table 7**, 214 of the 234 initial water column and toxicity sample events planned by the Coalition and coordinating programs were conducted, for an overall sample event success rate of approximately 92%. Planned sample collection at five locations did not occur because the monitoring sites were dry or inaccessible. Planned sampling that was not completed successfully is summarized below:

- Samples for five events planned for Cosumnes River (CRTWN) were not collected because the sampling site was dry.
- Samples for three events planned for Dry Creek at Alta Mesa Rd (DCGLT) was not collected because the sampling site was dry.
- Samples for three events planned for McGaugh Slough (MGSLU) were not collected because the sampling site was dry.
- Samples for four events planned for Stony Creek (STYHY) were not collected because the sampling site was dry.
- Samples for five events planned for Walker Creek (WLKCH) were not collected because the sampling site was dry.

Sample containers are occasionally lost or broken in transit due to shipping and handling factors beyond the Coalition's control. Broken containers are relevant to program completeness if the incident prevents the Coalition from completing the required sample analyses or if they are analyzed and may potentially affect analytical quality. In general, broken bottles do not impact completeness of analyses. In most cases, sufficient remaining sample volume is available to complete the planned environmental and quality assurance analyses. If program completeness was affected, the issue of broken bottles is discussed in the AMR. The protocol that is followed if a broken bottle is reported is to contact the sampling crew and let them know of the issue so that they may review their packing and shipping procedures. Any known shipping and handling deficiencies are also noted. If samples lost or broken in shipping affect overall completeness for specific analyses at a specific location and the analyses are relevant to synoptically collected toxicity samples, additional sample volume is preferentially aliquoted from the sample collected for toxicity. If additional sample volume from another appropriately collected and preserved sample container is not available, the analyses are rescheduled for future events to ensure program completeness objectives are met. Sample containers that were received broken are summarized below:

- One bottle (collected in November 2014 for Event 105) to be analyzed for OP pesticides was received broken at APPL. Replacement volume was sent to the laboratory to complete the scheduled environmental and QA analyses.
- One bottle (collected in May 2015 for Event 111) to be analyzed for OP pesticides was received broken at APPL. There was sufficient sample remaining to complete the scheduled environmental analyses.

In addition, sample containers occasionally arrive at the analytical laboratory at a temperature that is above the recommended maximum for Coalition samples. This may occur when samples do not have sufficient time to cool down to the target temperature or when extended shipping times and higher external temperatures cause sample temperatures to increase above 6˚C. This has proven to be a challenge for toxicity samples because the sample volumes are large (1 gallon containers), require additional shipping protection (bubble wrap), and take longer to cool, particularly when ambient water temperatures exceed 25˚C. However, because toxicity tests are typically conducted at ~20˚C over four days, sample temperatures slightly elevated above 6˚C on receipt are not expected to have a significant impact on the toxicity test results. However, all samples received above recommended temperatures are qualified as required (*BY; Sample received at improper temperature*). In each case, the sampling crews are notified and the conditions and shipping procedures are reviewed to attempt to determine the cause of the elevated temperatures.

Sample shipments for 2015 monitoring were all received at temperatures below 6˚C.

All samples collected were analyzed, for an analytical success rate of 100%.

As summarized in **Table 7**, all 15 sediment samples planned by the Coalition were collected, for an overall sediment sample event success rate of 100%. In addition, all analyses planned for these sediment samples were completed, for an analytical success rate of 100%.

Table 8. Summary of Field Blank Quality Control Sample Evaluations for 2015 Coalition Monitoring

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 350.1 / SM20-4500-NH3 C	Ammonia, Total as N	< PQL	15	15	100%
EPA 8321A / 8081A	Carbamate Pesticides, Benzophenyls, and other Herbicides	< PQL	312	312	100%
SM20-9223	E. coli	< PQL	17	17	100%
SM20-2340C	Hardness as CaCO3	< PQL	3	3	100%
EPA 353.2	Nitrate+Nitrite, as N	< PQL	16	16	100%
EPA 625 / 8081A	Organochlorine Pesticides	< PQL	128	128	100%
EPA 625 / GCMS-NCI-SIM	Organophosphate Pesticides	< PQL	112	112	100%
EPA 365.2 / SM4500-P E	Orthophosphate, as P	< PQL	43	43	100%
SM20-4500-P E	Phosphorus as P, Total	< PQL	8	8	100%
SM20-5310 B / SM5310C	Total Organic Carbon	< PQL	15	12	80%
SM20-2540D	Total Suspended Solids	< PQL	13	11	85%
EPA 200.8	Trace Metals	< PQL	28	27	96%
EPA 180.1 / SM 2130B	Turbidity	< PQL	13	13	100%
Totals			**723**	**717**	**99.2%**

Table 9. Summary of Method Blank Results for 2015 Coalition Monitoring

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 350.1 / SM20-4500-NH3 C	Ammonia, Total as N	<QL	42	42	100%
EPA 625 / 8081A / 9141A / 8321A	Carbamate Pesticides, Benzophenyls, and other Herbicides	<QL	438	438	100%
SM20-9223	E. coli	<QL	37	37	100%
SM20-2340C	Hardness as CaCO3	<QL	18	18	100%
EPA 353.2	Nitrate+Nitrite, as N	<QL	40	40	100%
EPA 625 / 8081A	Organochlorine Pesticides	<QL	206	206	100%
EPA 625 / 8141A	Organophosphate Pesticides	<QL	236	236	100%
EPA 365.2 / SM4500-P E	Orthophosphate, as P	<QL	38	38	100%
SM20-4500-P E	Phosphorus as P, Total	<QL	10	10	100%
SM20-5310 B / SM5310C	Total Organic Carbon	<QL	50	50	100%
SM20-2540D	Total Suspended Solids	<QL	43	43	100%
EPA 200.8	Trace Metals	<QL	61	59	97%
EPA 180.1 / SM 2130B	Turbidity	<QL	34	34	100%
Totals			**1253**	**1251**	**99.8%**

Table 10. Summary of Lab Control Spike Results for 2015 Coalition Monitoring

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 350.1 / SM20-4500-NH3 C	Ammonia, Total as N	90 - 110%	41	41	100%
EPA 625 / 8081A / 9141A / 8321A	Carbamate Pesticides, Benzophenyls, and other Herbicides	[1]	438	437	100%
SM20-2340C	Hardness as CaCO3	80 - 120%	18	18	100%
EPA 353.2	Nitrate+Nitrite, as N	90 - 110%	40	40	100%
EPA 625 / 8081A	Organochlorine Pesticides	[1]	206	206	100%
EPA 625 / 8141A	Organophosphate Pesticides	[1]	236	231	98%
EPA 365.2 / SM4500-P E	Orthophosphate, as P	90 - 110%	38	38	100%
SM20-4500-P E	Phosphorus as P, Total	90 - 110%	10	10	100%
SM20-5310 B/ SM5310C	Total Organic Carbon	80 - 120%	50	50	100%
SM20-2540D	Total Suspended Solids	80 - 120%	43	43	100%
EPA 200.8	Trace Metals	85 - 115%	62	62	100%
EPA 180.1 / SM 2130B	Turbidity	90 - 110%	34	34	100%
Totals			**1216**	**1210**	**99.5%**

1. Data Quality Objectives for pesticide LCS recoveries vary by parameter and are based on 3x the standard deviation of the lab's actual recoveries for each parameter.

Table 11. Summary of Surrogate Recovery Results for 2015 Coalition Monitoring

Method	Analytes	DQO	Number of Analyses	Number Passing	% Success
EPA 625	Organophosphorus, Organochlorine, Carbamate, Benzophenyls and other Pesticides	[1]	308	305	99%
EPA 8081		[1]	388	388	100%
EPA 8141A		[1]	298	283	95%
EPA 8321		[1]	105	105	100%
Totals			**1099**	**1081**	**98.4%**

1. Data Quality Objectives for pesticide surrogate recoveries vary by parameter and are based on 3x the standard deviation of the lab's actual recoveries for each parameter.

Table 12. Summary of Matrix Spike Recovery Results for 2015 Coalition Monitoring

Method	Analyte	DQO	Number of Analyses	Number Passing	% Success
EPA 350.1 / SM20-4500-NH3 C	Ammonia, Total as N	90 - 110%	3	3	100%
EPA 625 / 8081A / 9141A / 8321A	Carbamate Pesticides, Benzophenyls, and other Herbicides	[1]	310	308	99%
SM20-2340C	Hardness as CaCO3	80 - 120%	3	3	100%
EPA 353.2	Nitrate+Nitrite, as N	90 - 110%	18	16	89%
EPA 625 / 8081A	Organochlorine Pesticides	[1]	129	126	98%
EPA 625 / 8141A	Organophosphate Pesticides	[1]	166	164	99%
EPA 365.2 / SM4500-P E	Orthophosphate, as P	90 - 110%	15	15	100%
SM20-5310 B/ SM5310C	Total Organic Carbon	80 - 120%	23	22	96%
EPA 200.8	Trace Metals	85 - 115%	24	24	100%
Totals			**691**	**681**	**98.6%**

1. Data Quality Objectives for pesticide matrix spike recoveries vary by parameter and are based on 3x the standard deviation of the lab's actual recoveries for each parameter.

Table 13. Summary of Field Duplicate Quality Control Sample Results for 2015 Coalition Monitoring

Method	Analyte	DQO	Number of Pairs Analyzed	Number Passing	% Success
EPA 350.1 / SM20-4500-NH3 C	Ammonia, Total as N	RPD ≤25%	14	9	64%
EPA 625 / 8081A / 9141A / 8321A	Carbamate Pesticides, Benzophenyls, and other Herbicides	RPD ≤25%	313	312	100%
SM20-9223	E. coli	RPD ≤25%	16	15	94%
SM20-2340C	Hardness as CaCO3	RPD ≤25%	6	6	100%
EPA 353.2	Nitrate+Nitrite, as N	RPD ≤25%	14	12	86%
EPA 625 / 8081A	Organochlorine Pesticides	RPD ≤25%	128	128	100%
EPA 625 / 8141A	Organophosphate Pesticides	RPD ≤25%	112	110	98%
EPA 365.2 / SM4500-P E	Orthophosphate, as P	RPD ≤25%	15	15	100%
SM20-4500-P E	Phosphorus as P, Total	RPD ≤25%	5	3	60%
SM20-5310 B/ SM5310C	Total Organic Carbon	RPD ≤25%	13	13	100%
SM20-2540D	Total Suspended Solids	RPD ≤25%	15	13	87%
EPA 200.8	Trace Metals	RPD ≤25%	26	24	92%
EPA 180.1 / SM 2130B	Turbidity	RPD ≤25%	15	14	93%
Totals			**692**	**674**	**97.4%**

Table 14. Summary of Lab Duplicate Results for 2015 Coalition Monitoring

Method	Analyte	DQO	Number of Pairs Analyzed	Number Passing	% Success
EPA 350.1 / SM20-4500-NH3 C	Ammonia, Total as N	RPD ≤25%	1	1	100%
EPA 625 / 8081A / 9141A / 8321A	Carbamate Pesticides, Benzophenyls, and other Herbicides	RPD ≤25%	2	2	100%
EPA 353.2	Nitrate+Nitrite, as N	RPD ≤25%	3	3	100%
EPA 625 / 8141A	Organophosphate Pesticides	RPD ≤25%	100	99	99%
EPA 365.2 / SM4500-P E	Orthophosphate, as P	RPD ≤25%	4	4	100%
SM20-5310 B/ SM5310C	Total Organic Carbon	RPD ≤25%	3	3	100%
SM20-2540D	Total Suspended Solids	RPD ≤25%	9	9	100%
EPA 180.1 / SM 2130B	Turbidity	RPD ≤25%	17	17	100%
Totals			**139**	**138**	**99.3%**

Table 15. Summary of Lab Control Spike Duplicate Precision Results for 2015 Coalition Monitoring

Method	Analyte	DQO	Number of Pairs Analyzed	Number Passing	% Success
EPA 350.1 / SM20-4500-NH3 C	Ammonia, Total as N	RPD <25%	39	39	100%
EPA 625 / 8081A / 9141A / 8321A	Carbamate Pesticides, Benzophenyls, and other Herbicides	RPD <25%	90	90	100%
EPA 353.2	Nitrate+Nitrite, as N	RPD <25%	3	3	100%
EPA 625 / 8081A	Organochlorine Pesticides	RPD <25%	116	116	100%
EPA 625 / 8141A	Organophosphate Pesticides	RPD <25%	222	218	98%
EPA 365.2 / SM4500-P E	Orthophosphate, as P	RPD <25%	1	1	100%
SM20-5310 B/ SM5310C	Total Organic Carbon	RPD <25%	4	4	100%
SM20-2540D	Total Suspended Solids	RPD <25%	1	1	100%
EPA 200.8	Trace Metals	RPD <25%	1	1	100%
Totals			**477**	**473**	**99.2%**

Table 16. Summary of Matrix Spike Duplicate Precision Results for 2015 Coalition Monitoring

Method	Analyte	DQO	Number of Pairs Analyzed	Number Passing	% Success
EPA 350.1 / SM20-4500-NH3 C	Ammonia, Total as N	RPD ≤25%	2	2	100%
EPA 625 / 8081A / 9141A / 8321A	Carbamate Pesticides, Benzophenyls, and other Herbicides	RPD ≤25%	310	307	99%
SM20-2340C	Hardness as CaCO3	RPD ≤25%	3	3	100%
EPA 353.2	Nitrate+Nitrite, as N	RPD ≤25%	14	14	100%
EPA 625 / 8081A	Organochlorine Pesticides	RPD ≤25%	129	129	100%
EPA 625 / 8141A	Organophosphate Pesticides	RPD ≤25%	166	154	93%
EPA 365.2 / SM4500-P E	Orthophosphate, as P	RPD ≤25%	11	11	100%
SM20-5310 B/ SM5310C	Total Organic Carbon	RPD ≤25%	22	22	100%
EPA 200.8	Trace Metals	RPD ≤25%	24	24	100%
Totals			**681**	**666**	**97.8%**

TABULATED RESULTS OF LABORATORY ANALYSES

Copies of final laboratory reports and all reported QA/QC data for Coalition monitoring results are provided in **Appendix B**. The tabulated results for all validated and Quality Assurance-evaluated (QA) data are provided in **Appendix C**. These data were previously submitted as part of the quarterly data submittals.

Data Interpretation

SUMMARY OF SAMPLING CONDITIONS

Samples were collected throughout the year for the Coalition (see **Table 7**, Sampling for the 2015 Coalition Monitoring Year). Sample collection for the October 2014 – March 2015 monitoring period was characterized by above-average precipitation during the month of December and below-average precipitation during all other months.[8] The 2015 water year (extending from October 1, 2014 through September 30, 2015) was classified as "Critical" for the Sacramento Valley by the California Department of Water Resources, with an estimated 51% of average total runoff (based on 1961-2010 mean).[9,10]

Sample collection for the April 2015 – September 2015 Coalition Irrigation Season was characterized by dry weather, with no single month recording above average precipitation. Mean temperatures were generally warmer than historical averages; during the 2015 water year, temperatures were warmer than historical mean temperatures (1949-2005) by up to six and a half degrees (ºF). Statewide, at the end of the 2015 water year, precipitation was 75% of average and reservoir storage was 55% of average.[11]

Regional precipitation patterns for October 2014 – September 2015 are illustrated in **Figure 2-a** through **Figure 2-e**. In previous annual monitoring reports, the Sacramento Metropolitan Airport (SMF) precipitation gauge was used to characterize the precipitation in the Lower Sacramento Valley. During the 2015 water year, the SMF station experienced maintenance issues, which rendered the data unusable. The California Irrigation Management Information System (CIMIS) monitoring site in the City of Woodland (site #226) was used to temporarily fill this roll. Precipitation data for the Lower Sacramento Valley as measured at the Woodland CIMIS site is shown in **Figure 2-e**.

Beginning in October 2014, the 2015 water year was characterized by predominately dry weather. Several precipitation events in December 2014 and February 2015 were the exceptions, resulting in higher storm flows during those months (**Figure 3-a** through **Figure 3-f**). With the exception of some February 2015 events, samples were primarily collected during low-flow hydrological conditions.

Based on climate data available for the Sacramento Executive Airport weather station, with the exception of the month of April there was less than average rainfall during the April – September 2015 irrigation season (**Table 17**). No precipitation (or only trace amounts) occurred from May through August. Besides a wet December, precipitation was below normal from October through

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[8] Climate data (general trends) for the Sacramento-Delta region available at: http://www.wrcc.dri.edu/monitor/cal-mon/frames_version.html

[9] http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST

[10] Sacramento River Region unimpaired runoff, for water year 2015, was about 9.27 million acre-feet (MAF), approximately 51% of average. During water year 2015, the observed Sacramento River Region unimpaired runoff through September 30, 2013 was about 7.47 MAF, about 41% of average.

[11] http://www.water.ca.gov/floodmgmt/hafoo/hb/csm/docs/Monthly_Weather_Summary_092014.pdf

January. The maximum temperature exceeded 90 degrees Fahrenheit on two days in April, one day in May, 21 days in June, 21 days in July, 22 days in August, and 16 days in September.

Table 17. Summary of Climate Data[12] at Sacramento Executive Airport, October 2014 – September 2015

Month	Departure from Normal Mean Temperature	Days with Maximum Temperature ≥ 90°F	Precipitation Total (Inches)	Departure from Normal Precipitation
October 2014	-4.0	8	0.53	-0.42
November 2014	3.0	0	1.25	-0.83
December 2014	7.3	0	8.6	5.35
January 2015	3.6	0	Trace	-3.64
February 2015	4.9	0	2.82	-0.65
March 2015	6.7	0	0.22	-2.53
April 2015	3.2	2	1.85	0.70
May 2015	-0.6	1	0.07	-0.61
June 2015	4.8	21	0.07	-0.14
July 2015	2.0	21	Trace	0
August 2015	1.9	22	Trace	-0.05
September 2015	2.4	16	0.04	-0.25

[12] Preliminary monthly climate data (temperature and precipitation) for Sacramento Executive Airport weather station available at: http://www.weather.gov/climate/index.php?wfo=sto

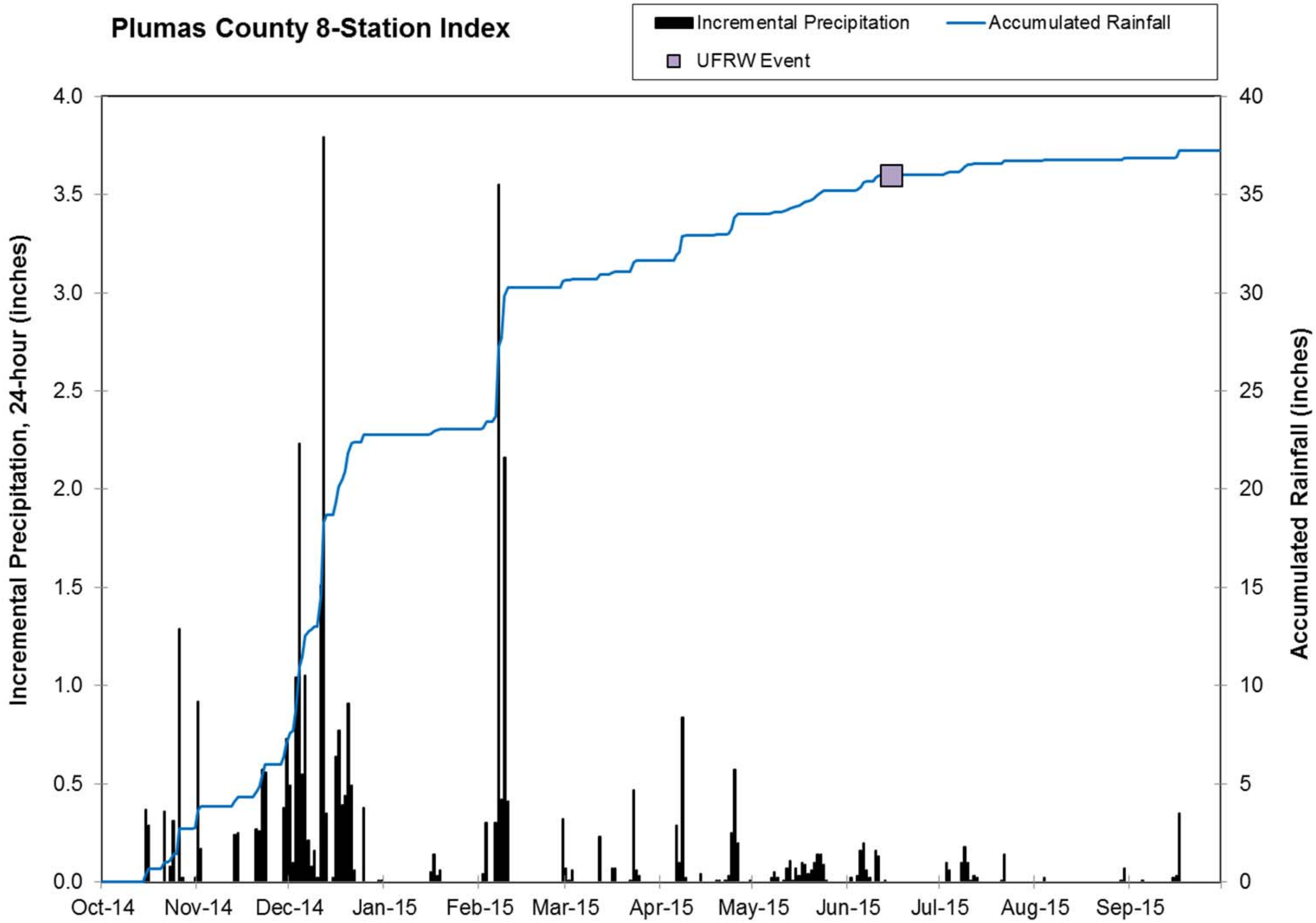

Figure 2-a. Precipitation during 2015 Coalition Monitoring: Plumas County

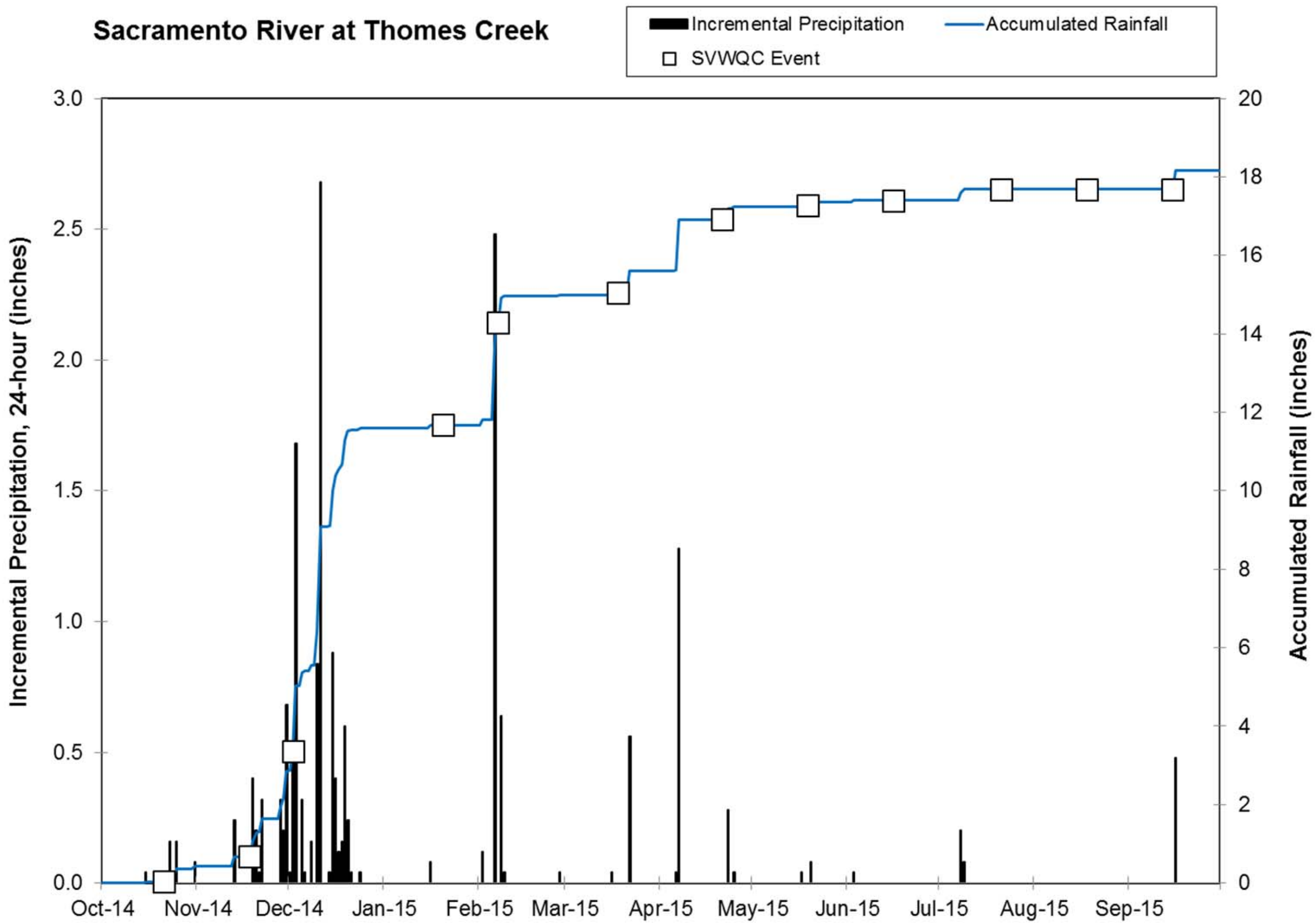

Figure 2-b. Precipitation during 2015 Coalition Monitoring: Upper Sacramento Valley

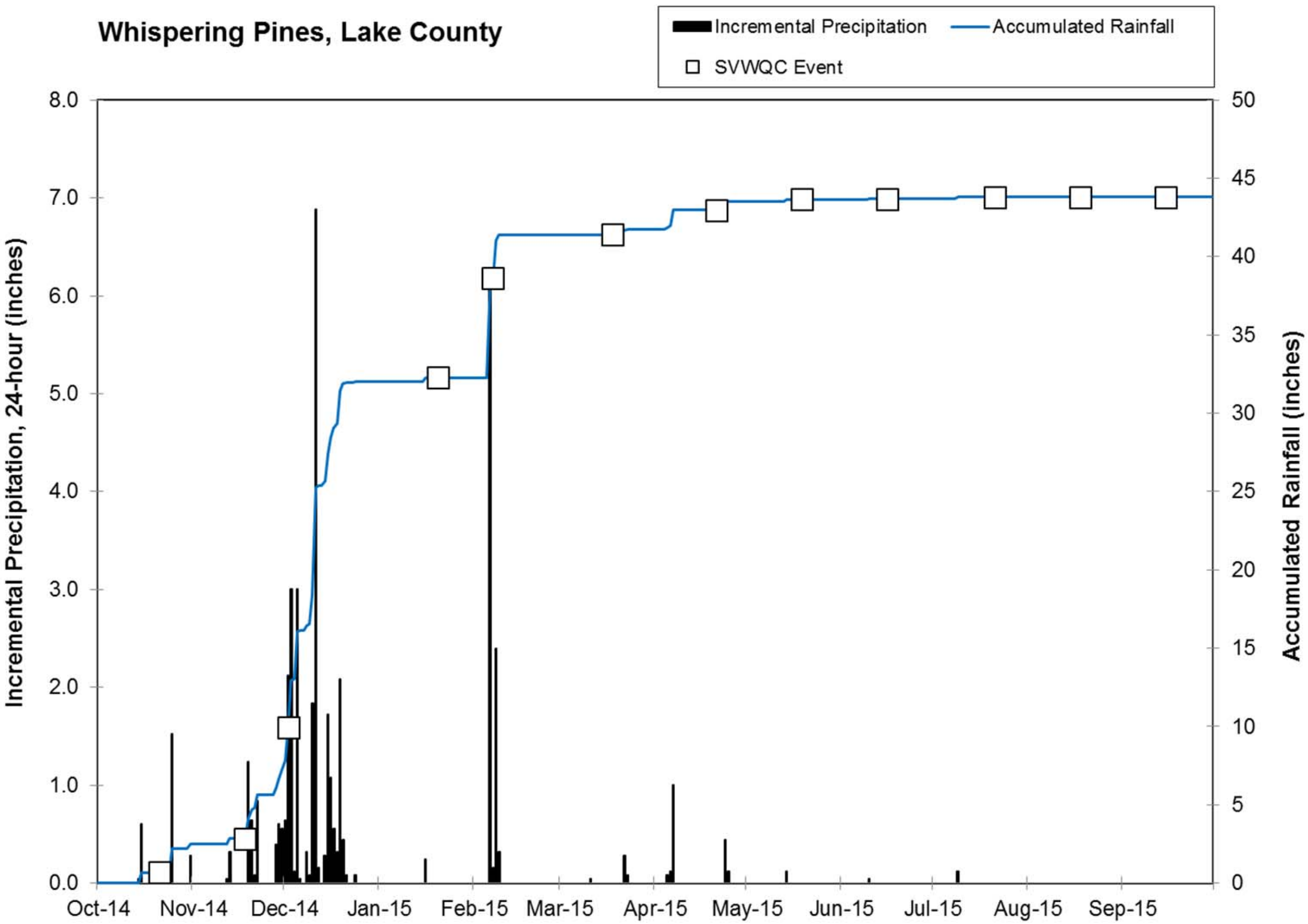

Figure 2-c. Precipitation during 2015 Coalition Monitoring: Lake County

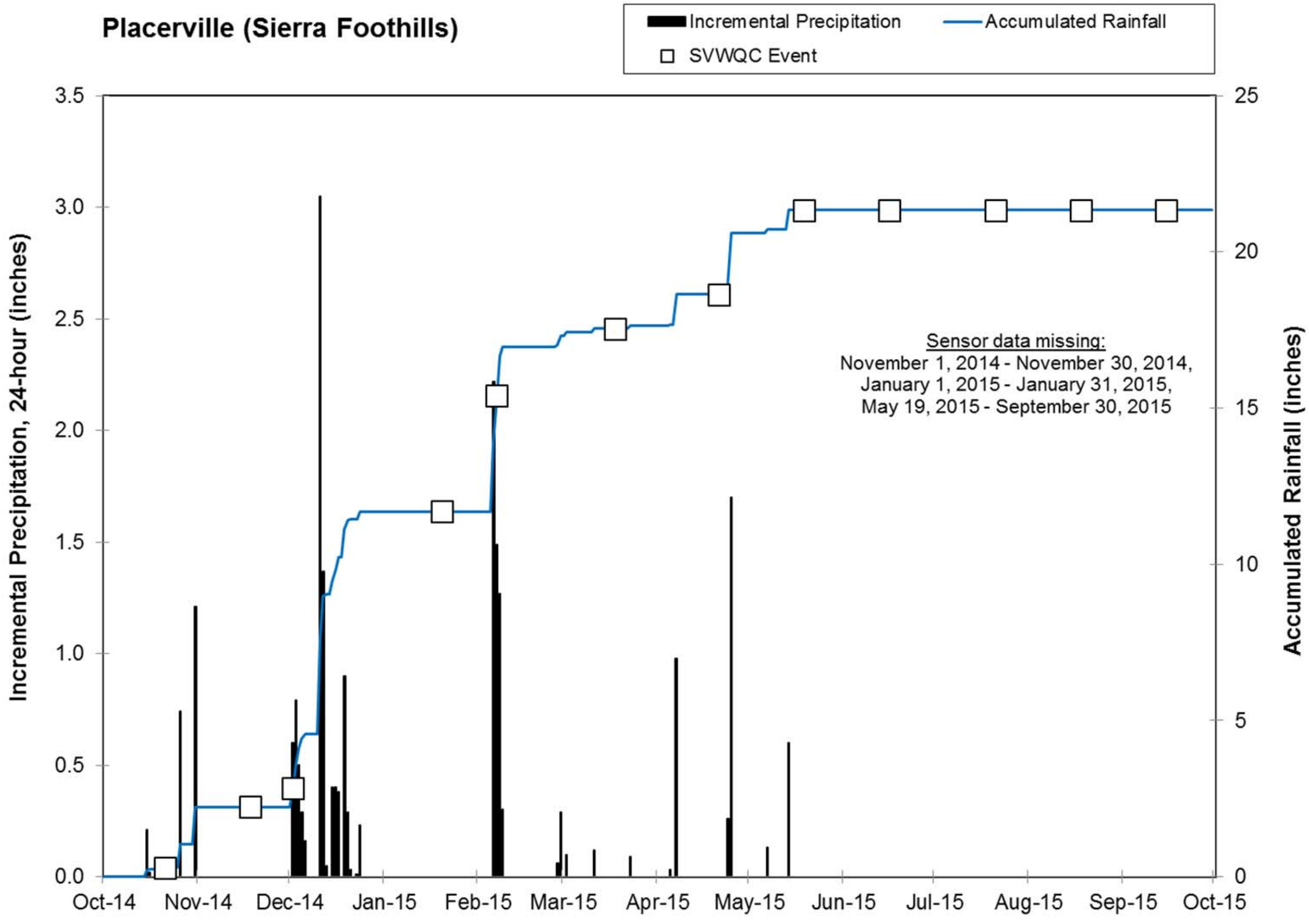

Figure 2-d. Precipitation during 2015 Coalition Monitoring: Sierra Foothills

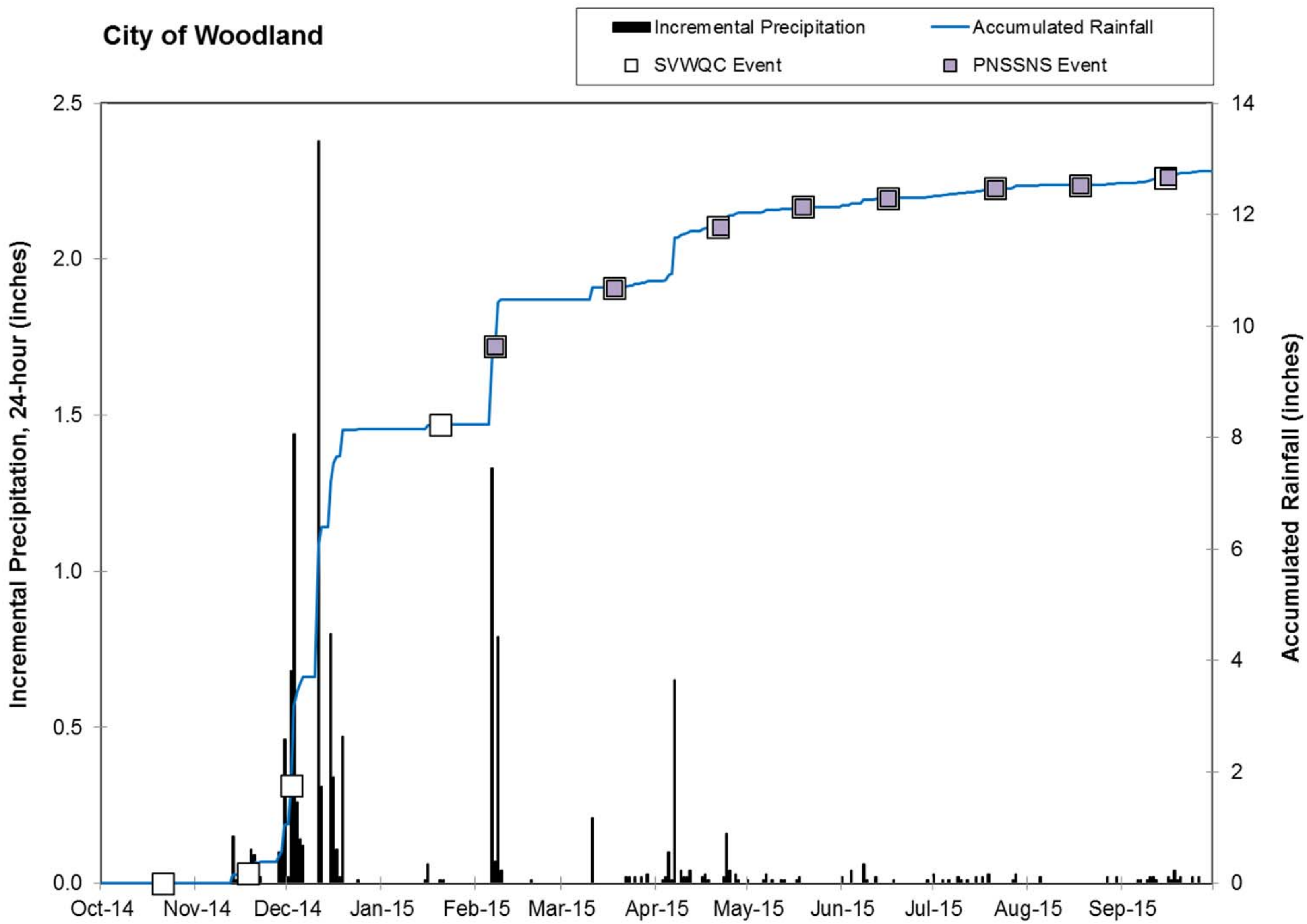

Figure 2-e. Precipitation during 2015 Coalition Monitoring: Lower Sacramento Valley

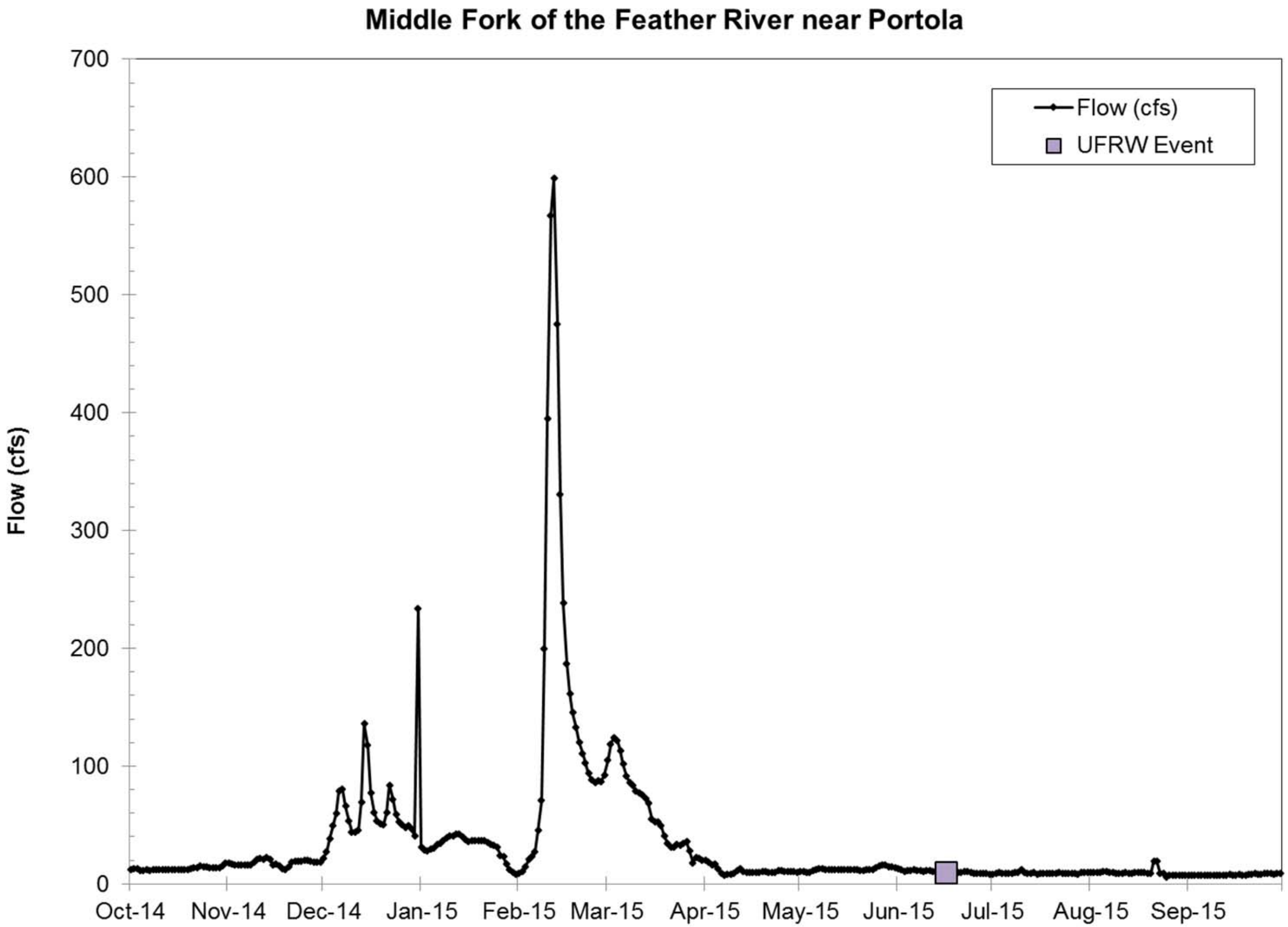

Figure 3-a. Flows during 2015 Coalition Monitoring: Plumas County

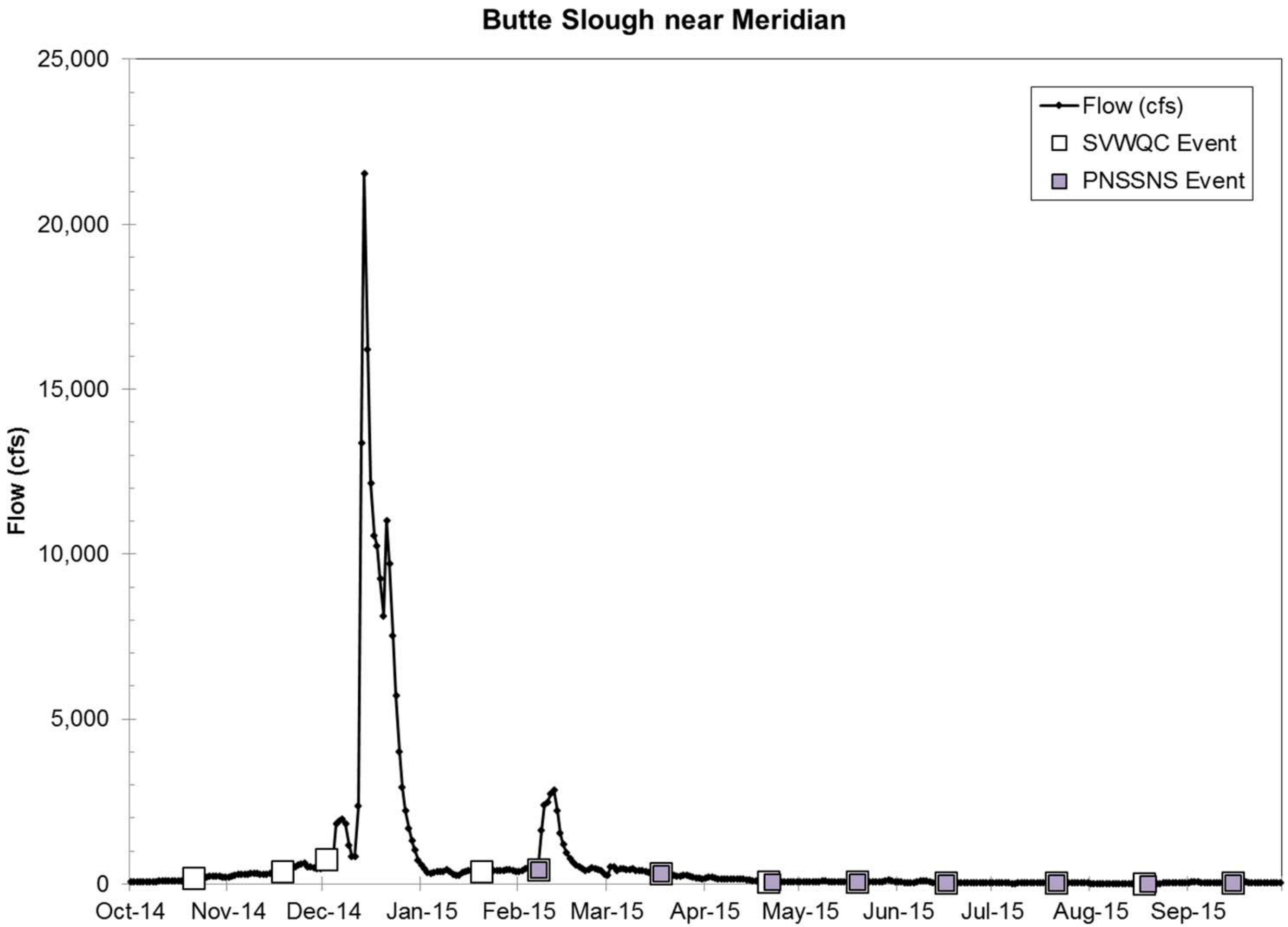

Figure 3-b. Flows during 2015 Coalition Monitoring: East Sacramento Valley

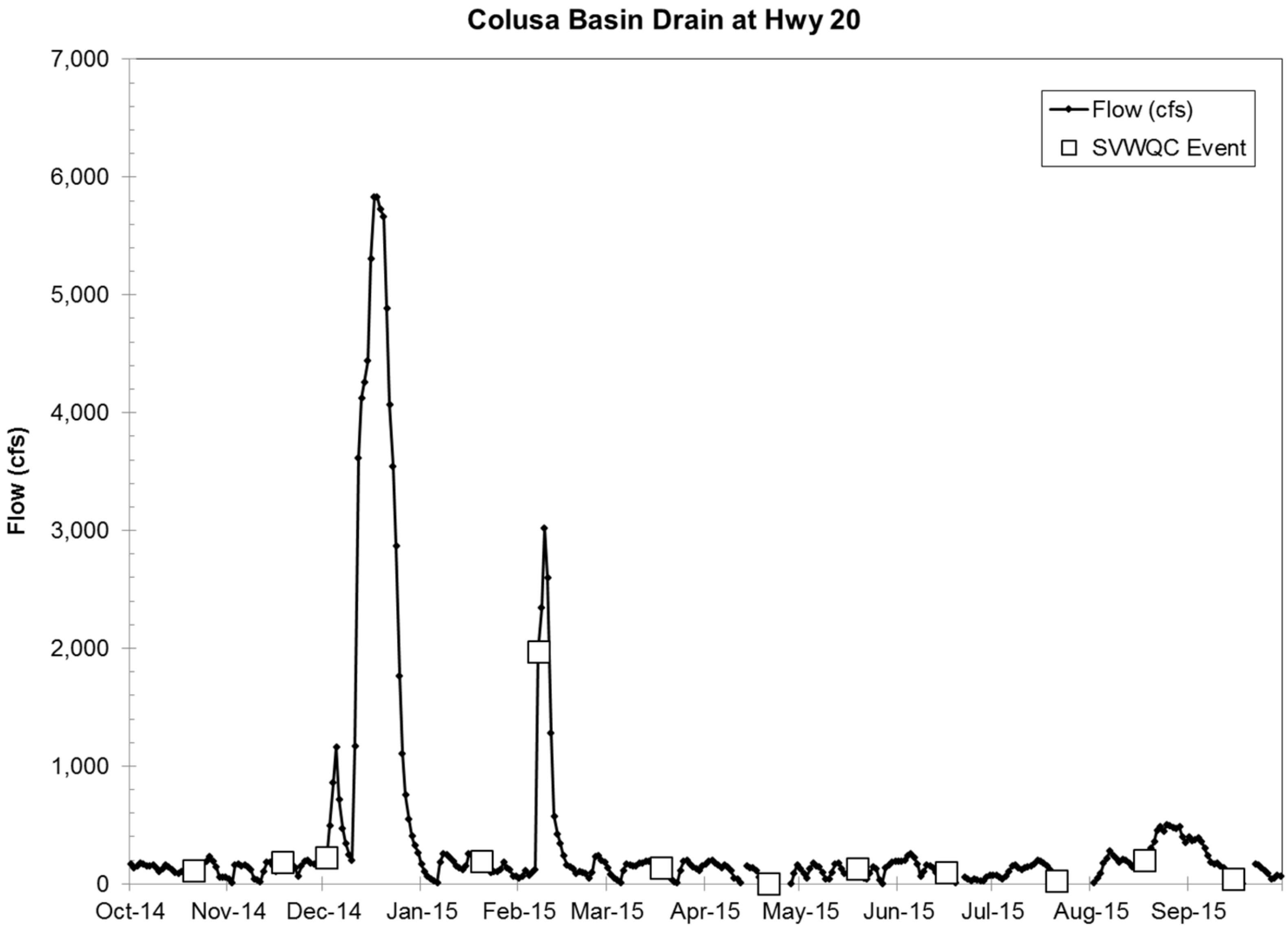

Figure 3-c. Flows during 2015 Coalition Monitoring: West Sacramento Valley

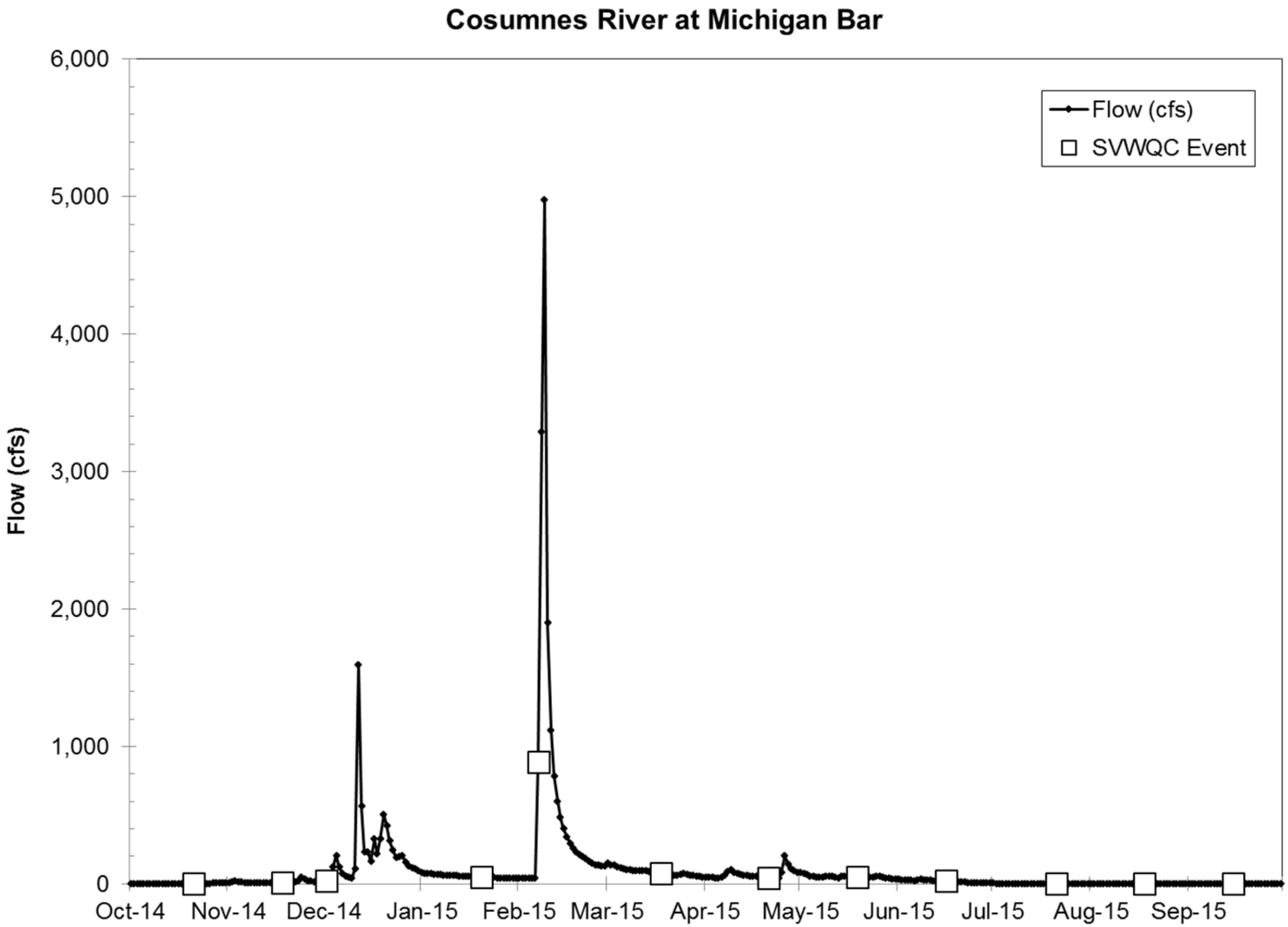

Figure 3-d. Flows during 2015 Coalition Monitoring: Lower Sacramento Valley

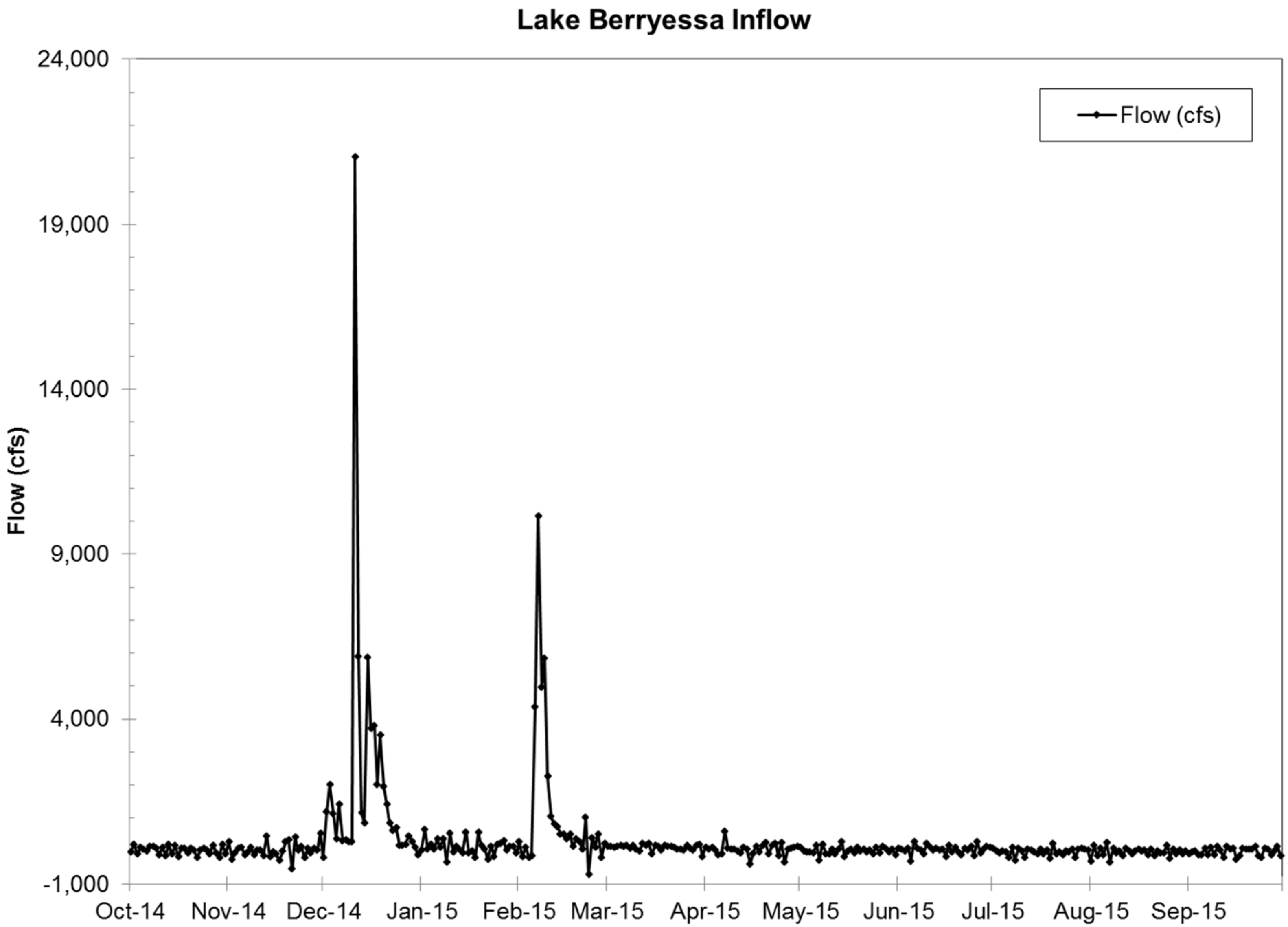

Figure 3-e. Flows during 2015 Coalition Monitoring: Lake Berryessa (Reservoir Inflow)

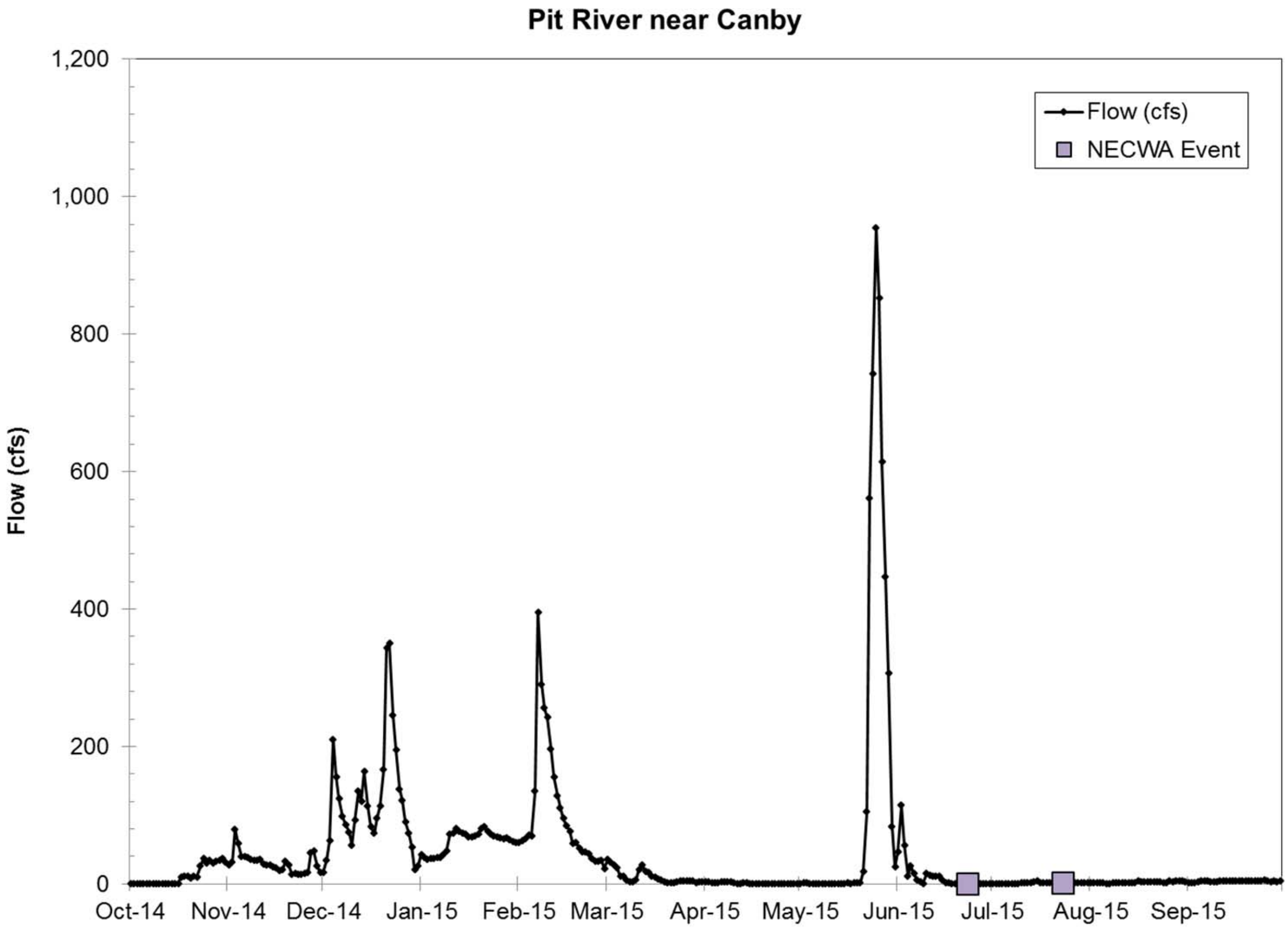

Figure 3-f. Flows during 2015 Coalition Monitoring: Pit River near Canby

Assessment of Data Quality Objectives

The QA/QC data for the Coalition's monitoring program have been evaluated and discussed previously in this document (*Quality Assurance Results*). Based on these evaluations, the program DQOs of completeness, representativeness, precision, and accuracy of monitoring data have been achieved. These results indicate that the data collected are valid and adequate to support the objectives of the monitoring program, and demonstrate compliance with the requirements of the *ILRP*. The results of these evaluations were summarized previously in **Table 8** through **Table 16**.

EXCEEDANCES OF RELEVANT WATER QUALITY OBJECTIVES

Coalition and subwatershed monitoring data were compared to *ILRP* Trigger Limits. Generally, these trigger limits are based on applicable narrative and numeric water quality objectives in the Central Valley Basin Plan (CVRWQCB 2011), subsequent adopted amendments, the California Toxics Rule (USEPA 2000), and numeric interpretations of the Basin Plan narrative objectives. Observed exceedances of the *ILRP* Trigger Limits are the focus of this discussion.

Other relevant non-regulatory toxicity thresholds were also considered for the purpose of identifying potential causes of observed toxicity. It should be noted that these unadopted non-regulatory toxicity thresholds are not appropriate criteria for determining exceedances for the purpose of the Coalition's monitoring program and evaluating compliance with the *ILRP*. The additional toxicity thresholds were acquired from USEPA's Office of Pesticide Programs (OPP) Ecotoxicity database (USEPA 2007).

Water quality objectives and other relevant water quality thresholds discussed in this section are summarized in **Table 18** and **Table 19**. Monitored analytes without relevant water quality objectives or *ILRP* Trigger Limits are listed in **Table 20**.

The data evaluated for exceedances in this document include all Coalition collected results, as well as the compiled results from the Subwatershed monitoring programs presented in this report. The results of these evaluations are discussed below.

Table 18. Adopted Basin Plan and California Toxics Rule Objectives for Analytes Monitored for 2015 Coalition Monitoring

Analyte	Most Stringent Objective(1)	Units	Objective Source(2)
Aldicarb	3	µg/L	CA 1˚ MCL
Aldrin	0.00013	µg/L	CTR
Ammonia, Total as N	narrative	mg/L	Basin Plan
Arsenic, total	50	µg/L	CA 1˚ MCL
Cadmium, dissolved	hardness dependent(3)	µg/L	CTR
Carbofuran	0.4(4)	µg/L	BP
Chlordane, cis	0.00057	µg/L	CTR
Chlordane, trans	0.00057	µg/L	CTR
Chlorpyrifos	0.015	µg/L	Basin Plan
Copper, dissolved	hardness dependent(3)	µg/L	CTR
DDD (o,p' and p,p')	0.00083	µg/L	CTR
DDE (o,p' and p,p')	0.00059	µg/L	CTR
DDT (o,p' and p,p')	0.00059	µg/L	CTR
Diazinon	0.10	µg/L	Basin Plan
Dieldrin	0.00014	µg/L	CTR
Dissolved Oxygen	5	mg/L	Basin Plan
Endosulfan I	110	µg/L	CTR
Endosulfan II	110	µg/L	CTR
Endosulfan sulfate	110	µg/L	CTR
Endrin	0.036	µg/L	CTR
Endrin aldehyde	0.76	µg/L	CTR
HCH	0.0039	µg/L	CTR
Heptachlor	0.00021	µg/L	CTR
Heptachlor epoxide	0.0001	µg/L	CTR
Lead, dissolved	hardness dependent(3)	µg/L	CTR
Malathion	0.1(4)	µg/L	Basin Plan
Methoxychlor	30	µg/L	CA 1˚ MCL
Nitrate, as N	10	mg/L	CA 1˚ MCL
Oxamyl	50	µg/L	CA 1˚ MCL
Parathion, Methyl	0.13(4)	µg/L	Basin Plan
pH	6.5-8.5	-log[H+]	Basin Plan
Selenium, total	5.0	µg/L	CTR
Temperature	narrative	µg/L	Basin Plan
Toxicity, Algae (*Hyalella*) Survival	narrative	µg/L	Basin Plan
Toxicity, Algae (*Selenastrum*) Cell Density	narrative	µg/L	Basin Plan

Analyte	Most Stringent Objective[(1)]	Units	Objective Source[(2)]
Toxicity, Fathead minnow (*Pimephales*) Survival	narrative	µg/L	Basin Plan
Toxicity, Water Flea (*Ceriodaphnia*) Survival	narrative	µg/L	Basin Plan
Turbidity	narrative	µg/L	Basin Plan

Notes:

1. For analytes with more than one limit, the most limiting applicable adopted water quality objective is listed.
2. *CA 1˚ MCLs* are California's Maximum Contaminant Levels for treated drinking water; *CTR* = California Toxics Rule criteria.
3. Objective varies with the hardness of the water.
4. These values are Basin Plan performance goals. The Basin Plan states: "…discharge is prohibited unless the discharger is following a management practice approved by the Board." This has been interpreted as an *ILRP* Trigger Limit of ND (Not Detected).

Table 19. Unadopted Water Quality Limits Used to Interpret Narrative Water Quality Objectives for Analytes Monitored for 2015 Coalition Monitoring

Analyte	Unadopted Limit[(1)]	Units	Limit Source
Boron, total	700	µg/L	Ayers and Westcott 1988
Conductivity	700	µS/cm	Ayers and Westcott 1988
Conductivity	900	µS/cm	CA Recommended 2˚ MCL
E. coli [(1)]	235	MPN/100mL	Basin Plan Amendment
Total Dissolved Solids	500	mg/L	CA Recommended 2˚ MCL
Total Dissolved Solids	450	mg/L	Ayers and Westcott 1988
Azinphos methyl	0.01	µg/L	USEPA NAWQC[(2)]
Carbaryl	2.53	µg/L	USEPA NAWQC
Dichlorvos	0.085	µg/L	Cal/EPA Cancer Potency Factor
Dimethoate	1	µg/L	CDPH Notification Level[(3)]
Disulfoton	.05	µg/L	USEPA NAWQC
Diuron	2	µg/L	USEPA Health Advisory
Linuron	1.4	µg/L	USEPA IRIS Reference Dose
Methamidophos	0.35	µg/L	USEPA IRIS Reference Dose
Methidathion	0.7	µg/L	USEPA IRIS Reference Dose
Methiocarb	0.5	µg/L	USFW Acute Toxicity
Methomyl	0.52	µg/L	USEPA NAWQC
Phorate	0.7	µg/L	NAS Health Advisory
Phosmet	140	µg/L	USEPA IRIS Reference Dose

Note:

1. Adopted by the Water Board but not approved by State Water Resources Control Board
2. USEPA National Ambient Water Quality Criteria
3. Notification levels (formerly called "action levels") are published by the California Department of Public Health (CDPH) for chemicals for which there is no drinking water MCL.

Table 20. Analytes Monitored for 2015 Coalition Monitoring without Applicable Adopted or Unadopted Limits

Analytes		
% Solids	Fenchlorphos	Orthophosphate, as P
Allethrin	Fenpropathrin	Oryzalin
Aminocarb	Fensulfothion	Oxychlordane
Barban	Fenthion	Oxyfluorfen
Benomyl/Carbendazim	Fenuron	Permethrin
Bifenthrin	Fluometuron	Perthane
Bromacil	Fluvalinate	Phosphorus as P, Total
Chlorothalonil	Hardness as CaCO3	Propachlor
Chloroxuron	Hexachlorobenzene	Propham
Chlorpropham	Hexazinone	Propoxur
Cyfluthrin	L-Cyhalothrin	Siduron
Cypermethrin	Metolachlor	Sulprofos
Dacthal	Mevinphos	Tebuthiuron
Deltamethrin/Tralomethrin	Mexacarbate	Tetrachlorvinphos
Demeton	Mirex	Tetramethrin
Dicofol	Monuron	Tokuthion
Diflubenzuron	Naled	Total Coliforms
Discharge (flow)	Neburon	Total Organic Carbon
Endrin Ketone	Nitrate+Nitrite, as N	Total Suspended Solids
Esfenvalerate/Fenvalerate	Nonachlor, cis-	Trichloronate
Ethoprop	Nonachlor, trans-	

Toxicity and Pesticide Results

A summary of the toxicity and pesticide results from 2015 Coalition Monitoring is provided in this section.

Toxicity Exceedances in Coalition Monitoring

There were 268 individual toxicity results (including 28 field duplicates) analyzed in water column and sediment samples collected from 22 different sites during 2015 Coalition Monitoring. Analyses were conducted for *Selenastrum capricornutum, Pimephales promelas, Ceriodaphnia dubia,* and *Hyalella azteca.*

All statistically significant results for samples collected during 2015 Coalition Monitoring were reported to the Water Board by the Coalition in "Exceedance Reports" as required by the *ILRP* and the Coalition's MRP. The Exceedance Reports detailing these results are provided in **Appendix D**.

There were 236 water column toxicity results (including 28 field duplicates) from 21 different sites. Statistically significant toxicity was only observed in one result (*Ceriodaphnia dubia*) in 2015 Coalition Monitoring. Samples exhibiting statistically significant toxicity are summarized in **Table 21.**

Statistically significant toxicity was not observed in any of the 32 individual toxicity results analyzed in sediment samples collected from 16 different sites in 2015 Coalition Monitoring (29 environmental results plus three field duplicates).

Table 21. Toxicity Exceedances in Water in 2015 Coalition Monitoring

Site ID	Water Body	Sample Date	Analyte	% of Control
PNCHY	Pine Creek at Highway 32	4/22/2015	*Ceriodaphnia dubia* Survival	0

Significantly toxic results and any follow-up evaluations or testing conducted on the samples are summarized below by event.

Event 110, April 2015 – Pine Creek at Highway 32, Ceriodaphnia toxicity

In a water column toxicity test conducted with *Ceriodaphnia dubia*, the Coalition observed survival of 0% compared to control at Pine Creek at Highway 32. The high level of toxicity observed in the samples (100% mortality) triggered a series of dilutions to determine the magnitude of toxicity, as well as a Toxicity Identification Evaluation (TIE). The TIE found that that a metabolically activated pesticide (e.g., organophosphate insecticide) was likely the cause of the toxicity. Chlorpyrifos was the only detected pesticide observed in the water sample and its concentration (0.26 µg/L) was greater than the Basin Plan chronic water quality objective (0.015 µg/L). Due to the TIE findings and the chemical results, chlorpyrifos was determined to be the likely cause of the toxicity.

Pesticides Detected in Coalition Monitoring

There were 4,014 individual pesticide results analyzed in 302 water column samples (including 36 duplicates) collected from 22 different sites, including both Representative and Management

Plan or Special Study sites, during 2015 Coalition Monitoring. Analyses were conducted for organophosphates, carbamates, organochlorines, benzophenyls, pyrethroids, and a variety of herbicides. Within these monitored categories, 14 different pesticides were detected (57 total detected results) in 49 separate samples (including six field duplicates) collected for Coalition monitoring. Approximately 84% of samples collected had no detected pesticides, and more than 98.6% of all pesticide results were below detection.

It should be noted that detections of pesticides are not equivalent to exceedances (with the exception of malathion, which has a prohibition of discharge in the Basin Plan). Two registered pesticides (chlorpyrifos and malathion) exceeded applicable water quality objectives or *ILRP* Trigger Limits in a total of six Coalition monitoring samples.

Discussion of Pesticides Detected in Water Column in Coalition Monitoring

All pesticides detected in water column samples for 2015 Coalition Monitoring are listed in

Table 22. Pesticides were compared to relevant numeric and narrative water quality objectives, and to toxicity threshold concentrations published in USEPA's *ECOTOX Database (USEPA 2007; accessed on multiple occasions in 2015)*. A discussion of these detections and exceedances follows below.

- The insecticide carbaryl was detected in three samples from two sites (Colusa Basin Drain and Walker Creek). One of these detections was below the reporting limit. Carbaryl did not exceed or approach the unadopted USEPA National Ambient Water Quality Criteria limit (2.53 µg/L) in any sample.
- The insecticide chlorpyrifos was detected in 13 samples, from eight different sites. Chlorpyrifos exceeded the Basin Plan Amendment chronic objective (0.015 µg/L) in five of these samples from three sites (Gilsizer Slough, Pine Creek, and Ulatis Creek).
  - Gilsizer Slough (Event 107): There were nine reported applications of chlorpyrifos in the month prior to the January 20, 2015 exceedance. Chlorpyrifos was applied to approximately 694 acres of peaches and other deciduous trees in the Gilsizer Slough drainage during the month of December 2014. There was an additional application to four acres on the morning of the exceedance. All of the applications were ground applications. Although standing water was present in the drain, there was no observable or detectable flow at this site. The area received approximately 0.1 inches of rain**Error! Bookmark not defined.** in the month preceding the exceedance, but no single event recorded greater than a few hundredths of an inch of rain, so precipitation and runoff were expected to have had minimal impact on the exceedance. Toxicity tests for *Ceriodaphnia, Pimephales,* and *Selenastrum* were performed with this sample, and no toxicity was observed.
  - Pine Creek (Event 110): There were three reported applications of chlorpyrifos in the month prior to the April 22, 2015 exceedance. Chlorpyrifos was applied to approximately 470 acres of almonds and 52 acres of beets in the Pine Creek drainage during that time. The beets application occurred less than a week before the exceedance occurred and was applied aerially. Although water was present in the creek, field crews were unable to measure flow at this site. Flow was visually estimated to be 0.2 feet per second. The area received approximately 0.79 inches of rain[14] in the month preceding the exceedance, but the area was dry for 14 days preceding the event. Toxicity tests for *Ceriodaphnia*, *Pimephales*, and *Selenastrum* were performed with this sample, the sample was found to be toxic to *Ceriodaphnia*.
  - Ulatis Creek (Event 111): There were 11 reported applications of chlorpyrifos in the month prior to the May 19, 2015 exceedance. Chlorpyrifos was applied to approximately 835 acres of alfalfa and other miscellaneous crops in the Ulatis Creek drainage during the months of April and May. Early applications in April

[13] Based on precipitation data from CDEC site "Bear River Near Wheatland (BRW)" (http://cdec.water.ca.gov/cdecstation/?staid=brw)

[14] Based on precipitation data from CDEC site "Chico (CHI)" (http://cdec.water.ca.gov/cdecstation/?staid=chi)

were done aerially. The most recent application prior to the date of exceedance was applied to 100 acres, two weeks prior to the exceedance. Field crews observed water in the creek and estimated the discharge to be 21.7 cubic feet per second. The area received approximately 0.1 inches of rain[15] in the month preceding the exceedance. No toxicity tests were performed for this sample.

- Gilsizer Slough (Event 113): There were 10 reported applications of chlorpyrifos in the month prior to the July 21, 2015 exceedance. Chlorpyrifos was applied to approximately 254 acres of almonds and 203 acres of walnuts in the Gilsizer Slough drainage during the months of June and July. Field crews observed water in the drain and estimated the discharge to be 2.9 cubic feet per second. The area received no rain**Error! Bookmark not defined.** in the month preceding the exceedance. No aerial applications were performed. No toxicity tests were performed for this sample.
- Gilsizer Slough (Event 114): There were eight reported applications of chlorpyrifos in the month prior to the August 18, 2015 exceedance. Chlorpyrifos was applied to approximately 238 acres of walnuts in the Gilsizer Slough drainage during the months of June and July. Although standing water was present in the drain, there was no observable or detectable flow at this site. The area received no rain**Error! Bookmark not defined.** in the month preceding the exceedance. No aerial applications were performed. No toxicity tests were performed for this sample.

- The insecticide dichlorvos was detected in one sample at Gilsizer Slough on January 20, 2015. This detection of 0.35 µg/L exceeded the Cal/EPA Cancer Potency Factor (0.085 µg/L). Dichlorvos is not typically used directly as an agricultural pesticide, but it is a degradate of the more commonly used pesticides naled and trichlorfon. Naled was also detected in this sample, indicating that naled was the likely source of the dichlorvos exceedance.
  - There were no reported applications of dichlorvos or naled in the Gilsizer Slough drainage in the month prior to the exceedance observed on January 20, 2015. The area received approximately 0.1 inches of rain**Error! Bookmark not defined.** in the month preceding the exceedance, but no single event recorded greater than a few hundredths of an inch of rain, so precipitation and runoff were expected to have had minimal impact on the exceedance. Toxicity tests for *Ceriodaphnia, Pimephales,* and *Selenastrum* were performed with this sample, and no toxicity was observed.
- The organochlorine pesticide dicofol was detected in two samples (including one field duplicate) from Willow Slough. There is currently no *ILRP* Trigger Limit or adopted water quality objective for dicofol.
- The insecticide diflubenzuron was detected in one sample from Walker Creek. There is currently no *ILRP* Trigger Limit or adopted water quality objective for diflubenzuron.

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[15] Based on precipitation data from CDEC site "Liberty Island – Yolo Bypass (LIY)" (http://cdec.water.ca.gov/cdecstation/?staid=liy)

- The herbicide diuron was detected in six samples from four sites (Pine Creek, Ulatis Creek, Walker Creek, and Willow Slough). Diuron exceeded the narrative objective (2 µg/L) in one sample (2.1 µg/L) from Lower Snake River on February 7, 2015.
    - There was one reported application of diuron to more than 22 acres of olives in the Lower Snake River drainage in the month prior to the exceedance observed on February 7, 2015. The area received significant rain[16] in the month preceding (2.73 inches) and 1.79 inches coming just a few days before the exceedance. There were no aerial applications.
- The herbicide hexazinone was detected in one sample from Gilsizer Slough. There is currently no *ILRP* Trigger Limit or adopted water quality objective for hexazinone.
- The insecticide malathion was detected in one sample (Anderson Creek). Detection of malathion is an exceedance of the Basin Plan prohibition.
    - There were 14 reported applications of malathion to 5 acres of walnuts and 365 acres of wild rice in the Anderson Creek drainage in the month prior to the exceedance observed on July 22, 2015. The area received only 0.04 inches of rain[17] in the month preceding the exceedance, and all applications were made by ground. The detected concentration (0.0174 µg/L) is below concentrations expected to cause toxicity to sensitive invertebrates (0.5 µg/L *Daphnia magna* 2-day EC50, USEPA ECOTOX database). Toxicity tests for *Ceriodaphnia* and *Pimephales* were performed with this sample, and no toxicity was observed.
- The herbicide methomyl was detected in one sample (0.073 µg/L) at Colusa Basin Drain. The detection did not exceed the unadopted USEPA National Ambient Water Quality Criteria limit (0.52 µg/L).
- The herbicide metolachlor was detected in three samples (including one field duplicate) from two sites. There is currently no *ILRP* Trigger Limit or adopted water quality objective for metolachlor.
- The organophosphate pesticide naled was detected in one sample from Gilsizer Slough. There is currently no *ILRP* Trigger Limit or adopted water quality objective for naled.
- The herbicide oryzalin was detected in three samples (including one field duplicate) from three sites. There is currently no *ILRP* Trigger Limit or adopted water quality objective for oryzalin.
- The herbicide oxyfluorfen was detected in 24 samples (including three field duplicates) from 11 sites. Of these, 16 were below the reporting limit. There is currently no *ILRP* Trigger Limit or adopted water quality objective for oxyfluorfen.
- The herbicide simazine was detected in one sample from Gilsizer Slough. Simazine did not exceed the 1˚ MCL water quality objective of 4 µg/L.

[16] Based on precipitation data from CDEC site "Chico (CHI)" (http://cdec.water.ca.gov/cdecstation/?staid=hyg)

[17] Based on precipitation data from CDEC site "Redding Airport (RDD)" (http://cdec.water.ca.gov/cdecstation/?staid=hyg)

Table 22. Pesticides Detected in 2015 Coalition Monitoring

Site ID	Date	Analyte	Result[(1)] (µg/L)		Trigger Limit[(2)]	Basis for Limit[(3)]
WLKCH	12/3/2014	Carbaryl	=	0.44	2.53	USEPA NAWQC
WLKCH	2/8/2015	Carbaryl	=	0.21	2.53	USEPA NAWQC
COLDR	8/25/2015	Carbaryl	DNQ	0.054	2.53	USEPA NAWQC
GILSL	**1/20/2015**	**Chlorpyrifos**	**=**	**0.2**	**0.015**	**BP (chronic)**
CCSTR	4/22/2015	Chlorpyrifos	=	0.0019	0.015	BP (chronic)
PNCHY	**4/22/2015**	**Chlorpyrifos**	**=**	**0.26**	**0.015**	**BP (chronic)**
UCBRD	**5/19/2015**	**Chlorpyrifos**	**=**	**0.035**	**0.015**	**BP (chronic)**
GILSL	**7/21/2015**	**Chlorpyrifos**	**=**	**0.0249**	**0.015**	**BP (chronic)**
LHNCT	7/21/2015	Chlorpyrifos	=	0.005	0.015	BP (chronic)
LSNKR	7/21/2015	Chlorpyrifos	=	0.0054	0.015	BP (chronic)
RARPP	7/21/2015	Chlorpyrifos	=	0.0018	0.015	BP (chronic)
GILSL	**8/18/2015**	**Chlorpyrifos**	**=**	**0.74**	**0.015**	**BP (chronic)**
CCSTR	9/15/2015	Chlorpyrifos	=	0.0015	0.015	BP (chronic)
GILSL	9/15/2015	Chlorpyrifos	=	0.0078	0.015	BP (chronic)
ACACR	9/16/2015	Chlorpyrifos	DNQ	0.0007	0.015	BP (chronic)
LSNKR	9/16/2015	Chlorpyrifos	=	0.0019	0.015	BP (chronic)
GILSL	**1/20/2015**	**Dichlorvos**	**=**	**0.35**	**0.015**	**BP (chronic)**
WLSPL	4/21/2015	Dicofol	=	0.052	NA	
WLSPL	4/21/2015	Dicofol[(4)]	=	0.055	NA	
WLKCH	2/8/2015	Diflubenzuron	=	1.3	NA	
LSNKR	**2/7/2015**	**Diuron**	**=**	**2.1**	**2**	**USEPA Health Advisory**
WLKCH	2/8/2015	Diuron	=	0.92	2	USEPA Health Advisory
GILSL	1/20/2015	Hexazinone	=	35	NA	
ACACR	**7/22/2015**	**Malathion**	**=**	**0.0174**	**ND[(5)]**	**BPA (acute)**
COLDR	3/18/2015	Methomyl	=	0.073	0.52	USEPA NAWQC
GIDLR	5/19/2015	Metolachlor	DNQ	0.01456	NA	
GIDLR	5/19/2015	Metolachlor[(4)]	DNQ	0.01511	NA	
UCBRD	5/19/2015	Metolachlor	=	1.01479	NA	
GILSL	1/20/2015	Naled	DNQ	0.35	NA	
LHNCT	12/3/2014	Oryzalin	=	0.46	NA	
GIDLR	2/7/2015	Oryzalin[(4)]	=	0.57	NA	
LSNKR	2/7/2015	Oryzalin	DNQ	0.2	NA	
LHNCT	11/18/2014	Oxyfluorfen	DNQ	0.0092	NA	
WLSPL	12/2/2014	Oxyfluorfen	DNQ	0.022	NA	
FRSHC	12/3/2014	Oxyfluorfen	=	0.11	NA	
LHNCT	12/3/2014	Oxyfluorfen	=	0.069	NA	
LSNKR	12/3/2014	Oxyfluorfen	DNQ	0.013	NA	

Site ID	Date	Analyte	Result[1] (µg/L)		Trigger Limit[2]	Basis for Limit[3]
LSNKR	12/3/2014	Oxyfluorfen[4]	DNQ	0.013	NA	
WLKCH	12/3/2014	Oxyfluorfen	DNQ	0.016	NA	
GIDLR	1/20/2015	Oxyfluorfen[4]	DNQ	0.017	NA	
GIDLR	1/20/2015	Oxyfluorfen	DNQ	0.016	NA	
LSNKR	1/20/2015	Oxyfluorfen	=	0.056	NA	
ACACR	1/21/2015	Oxyfluorfen	DNQ	0.018	NA	
GIDLR	2/7/2015	Oxyfluorfen	DNQ	0.011	NA	
LSNKR	2/7/2015	Oxyfluorfen	=	0.072	NA	
UCBRD	2/7/2015	Oxyfluorfen	=	0.15	NA	
WLSPL	2/7/2015	Oxyfluorfen	=	1.3	NA	
FRSHC	2/8/2015	Oxyfluorfen	DNQ	0.017	NA	
MDLCR	2/8/2015	Oxyfluorfen	DNQ	0.0086	NA	
WLKCH	2/8/2015	Oxyfluorfen	=	0.22	NA	
FRSHC	3/19/2015	Oxyfluorfen	DNQ	0.014	NA	
FRSHC	4/22/2015	Oxyfluorfen	=	0.24	NA	
LRLNC	4/23/2015	Oxyfluorfen	DNQ	0.013	NA	
LSNKR	5/20/2015	Oxyfluorfen	DNQ	0.0084	NA	
LSNKR	5/20/2015	Oxyfluorfen[4]	DNQ	0.009	NA	
PNCHY	5/20/2015	Oxyfluorfen	DNQ	0.014	NA	
GILSL	1/20/2015	Simazine	DNQ	0.24	4	1˚ MCL

BOLD = Exceedance

1. "DNQ" (Detected Not Quantified) indicates that the detected value was less than the quantitation or reporting limit (QL).
2. Water Quality Objective or Narrative Interpretation Limits for *ILRP*. "NA" if no *ILRP* limit established.
3. Water Quality Objective Basis: BP = Central Valley Basin Plan; BPA = Basin Plan Amendment;
Cal/EPA = Cal/EPA Cancer Potency Factor; CDPH Notification Level = Notification levels (formerly called "action levels") are published by the California Department of Public Health (CDPH) for chemicals for which there is no drinking water MCL; CTR = California Toxics Rule; Narrative = unadopted limits used to interpret Basin Plan narrative objectives by the Central Valley Regional Board; USEPA Health Advisory = Drinking water health advisory.
4. Field duplicate sample
5. The Basin Plan states: "…discharge is prohibited unless the discharger is following a management practice approved by the Board." This has been interpreted as an *ILRP* Trigger Limit of ND (Not Detected). The Basin Plan performance goal for malathion is 0.1 µg/L.

Other Coalition-Monitored Water Quality Parameters

Exceedances of adopted Basin Plan objectives, CTR criteria, or *ILRP* Trigger Limits were observed for conductivity, dissolved oxygen, *E. coli*, total ammonia as N, pH, and trace metals during 2015 Coalition Monitoring (**Table 23**).

Conductivity

Conductivity was monitored in 211 samples, including ten field duplicate samples, from 34 Coalition sites. Conductivity exceeded the unadopted UN Agricultural Goal (700 µS/cm) in a total of 39 samples (including two field duplicates) and also exceeded the California recommended 2˚ MCL (900 µS/cm) for drinking water in 22 of the 39 samples. Exceedances were observed at 11 of the 34 monitored sites. Willow Slough (WLSPL) and Ulatis Creek (UCBRD) observed the highest number of exceedances, at nine and eight exceedances, respectively.

Dissolved Oxygen

During 2015 Coalition Monitoring, dissolved oxygen was measured in 219 samples, including 11 field duplicate samples, from 34 sites. Dissolved oxygen concentrations were below the Basin Plan lower limit of 5.0 mg/L for waterbodies with a WARM designated beneficial use in 13 samples (including two field duplicates) from seven sites, and below the Basin Plan lower limit of 7.0 mg/L for waterbodies with a COLD designated beneficial use in an additional 47 samples (including seven field duplicates) from 13 sites.

Dissolved oxygen exceedances were caused primarily by low flows, stagnant conditions, or extensive submerged aquatic vegetation in some cases. The low flows and stagnant conditions have the potential to increase diurnal variability or limit oxygen production by instream algae and also to trap organic particulates that contribute to instream oxygen consumption.

E. coli Bacteria

E. coli bacteria were monitored in 159 samples, including 15 field duplicate samples, from 20 sites. *E. coli* results exceeded the single sample maximum objective (235 MPN/100mL) in 57 samples (including four field duplicates) from 14 different Coalition monitoring locations.

The Basin Plan objectives are intended to protect contact recreational uses where ingestion of water is probable (e.g., swimming). Agricultural lands commonly support a large variety (and very large numbers seasonally) of birds and other wildlife. These avian and wildlife resources are known to be significant sources of *E. coli* and other bacteria in agricultural runoff and irrigation return flows. Other potential sources of *E. coli* include, but are not limited to, cattle, horses, septic systems, treated wastewater, and urban runoff.

Total Ammonia as N

Total ammonia as N was monitored in 156 samples, including 27 field duplicate samples, from 13 different Coalition sites.

Total ammonia as N exceeded the Basin Plan objective in five samples including one field duplicate. The exceeded objectives were based on EPA 2013 NRWQC criteria for ammonia in freshwater and ranged from 0.04 to 0.69 mg/L. Exceedances were observed at Lower Snake River (LSNKR), Walker Creek (WLKCH), Willow Slough (WLSPL), and Ulatis Creek (UCBRD).

The Coalition has requested that the Regional Water Board make a determination that the exceedances of ammonia water quality objectives (WQOs) observed for Walker Creek in August 2014 and May 2015 are not valid as a trigger for Management Plan requirements. The water quality samples collected at Walker Creek in both August 2014 (Event 102) and May 2015 (Event 111) were collected from isolated pools in the water body. At the time these water quality samples were collected, the isolated pools from which they were collected had no upstream or downstream hydrologic connection to the rest of the water body, contained stagnant water, and supported significant algal growth. The lack of flow and observed stagnant conditions directly cause elevated temperatures and pH that result in lowering the ammonia criterion. These conditions are not caused by agricultural discharges. While measured ammonia (as N) concentrations in the samples exceeded chronic criteria. the Coalition contends that the elevated ammonia concentrations and exceedances were not the result of agricultural discharges, should not be used to characterize agricultural discharge quality, and therefore, are not valid as a trigger for Management Plan requirements for ammonia in Walker Creek.

pH

During 2015 Coalition Monitoring, pH was measured in 211 samples, including ten field duplicate samples, from 34 Coalition sites. pH exceeded the Basin Plan maximum of 8.5 standard pH units (-log[H+]) in eight Coalition samples collected from six sites and exceeded the Basin Plan minimum of 6.5 pH units in one Coalition sample at one site.

The Basin Plan limit for pH is intended to be assessed based on "*…an appropriate averaging period that will support beneficial uses*" (CVRWQCB 2011). This parameter typically exhibits significant natural diurnal variation over 24 hours in natural waters with daily fluctuations controlled principally by photosynthesis, rates of respiration, and buffering capacity of the water. These processes are controlled by light and nutrient availability, concentrations of organic matter, and temperature. These factors combine to cause increasing pH during daylight hours and decreasing pH at night. Diurnal variations in winter are typically smaller because less light is available and there are lower temperatures and higher flows. Irrigation return flows may influence this variation primarily by increasing or decreasing in-stream temperatures or by increasing available nutrients or organic matter.

The reason for these pH exceedances was not immediately obvious or easily determined. In most cases, the marginal pH exceedances were likely due primarily to in-stream algal respiration, caused in part by low flows or ponded and stagnant conditions.

Trace Metals

Trace metals monitored during 2015 Coalition Monitoring included both unfiltered metals (total arsenic, boron, copper, lead, and selenium) and filtered metals (dissolved cadmium, copper, and lead). Total trace metals were monitored in 93 samples (including 21 field duplicates) from 17 Coalition sites, and dissolved metals were monitored in 43 samples (including three field duplicates) from 16 Coalition sites.

Arsenic

Arsenic was monitored in 16 samples (including six field duplicates) from two Coalition sites (Grand Island Drain and Lower Snake River). Thirteen (13) samples (including five field duplicates) from both sites exceeded the California 1˚ MCL (50 µg/L).

There are both legacy and a few current sources of arsenic. There is very little remaining agricultural use of arsenic-based pesticide products (based on review of DPR's PUR data), and arsenic has only a few potentially significant sources: (1) natural background from arsenic in the soils, (2) arsenic remaining from legacy lead arsenate use in orchards, (3) arsenic used in various landscape maintenance and structural pest control applications (non-agriculture), and (4) arsenic used in wood preservatives. One possible source is the wooden bridge structure just upstream of the Grand Island Drain sampling site, if arsenic-based preservatives were used in the wood. A final, but somewhat unlikely source is an arsenic-based additive that may still be used for chicken feed[18] and which can potentially make its way through the chicken and into agricultural fields and runoff if the poultry litter is used on the field.

Boron

Boron was monitored in 18 samples (including five field duplicates) from four different Coalition sites. Eight samples (including one field duplicate) at two sites (Tule Canal, Willow Slough) exceeded the *ILRP* Trigger Limit (700 µg/L, based on Ayers and Westcott).

Boron is a naturally-occurring mineral that is not applied by agriculture, but it is elevated in some irrigation supplies (especially groundwater) and soils, and concentrations may be elevated through consumptive use of irrigation water. It is known to be naturally elevated in the groundwater and major tributaries supplying irrigation water in the Willow Slough drainage.

Copper

Dissolved copper was monitored in 55 samples (including four field duplicates) from 14 different Coalition sites. Dissolved copper exceeded the site-specific, hardness-dependent CTR objective in one samples from Lower Honcut Creek.

Copper is widely used by agriculture as a fungicide, but it also occurs naturally in soils and is commonly used for maintenance of septic systems. In the Lower Honcut drainage, the heaviest agricultural use typically occurs in April and May, with the bulk of applications on walnuts, rice, and olives.

Selenium

Selenium was monitored in 13 samples (including four field duplicates) from three different Coalition sites. Selenium exceeded the CTR objective (5 µg/L) in four samples from one site (Willow Slough).

Selenium is a naturally-occurring mineral that is not applied by agriculture, but it is elevated in some irrigation supplies (especially groundwater) and soils, and concentrations may be elevated

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[18] http://water.usgs.gov/owq/AFO/proceedings/afo/pdf/Wershaw.pdf

through consumptive use of irrigation water. It is known to be naturally elevated in the groundwater supplying irrigation water in the Willow Slough drainage.

Table 23. Other Physical, Chemical, and Microbiological Parameters Observed to Exceed Numeric Objectives in 2015 Coalition Monitoring

Site ID	Sample Date	Analyte	Units	Result	Trigger Limit(1)	Basis for Limit(2)	Mgt Plan(3)
LSNKR	4/21/2015	Ammonia, Total as N	mg/L	0.24	0.17	BP T&O	No
UCBRD	7/21/2015	Ammonia, Total as N	mg/L	2	0.69	BP T&O	No
WLKCH	5/20/2015	Ammonia, Total as N	mg/L	0.21	0.17	BP T&O	No
WLSPL	7/21/2015	Ammonia, Total as N	mg/L	0.13	0.09	BP T&O	No
WLSPL	7/21/2015	Ammonia, Total as N(6)	mg/L	0.22	0.09	BP T&O	No
GIDLR	11/18/2014	Arsenic	µg/L	12	10	1° MCL(5)	Active
GIDLR	11/18/2014	Arsenic(6)	µg/L	11	10	1° MCL(5)	Active
GIDLR	1/20/2015	Arsenic	µg/L	12	10	1° MCL(5)	Active
GIDLR	3/18/2015	Arsenic	µg/L	20	10	1° MCL(5)	Active
GIDLR	3/18/2015	Arsenic(6)	µg/L	20	10	1° MCL(5)	Active
GIDLR	5/19/2015	Arsenic	µg/L	14	10	1° MCL(5)	Active
GIDLR	5/19/2015	Arsenic(6)	µg/L	14	10	1° MCL(5)	Active
GIDLR	6/16/2015	Arsenic	µg/L	13	10	1° MCL(5)	Active
LSNKR	12/3/2014	Arsenic	µg/L	13	10	1° MCL(5)	No
LSNKR	1/20/2015	Arsenic	µg/L	11	10	1° MCL(5)	No
LSNKR	1/20/2015	Arsenic(6)	µg/L	11	10	1° MCL(5)	No
LSNKR	2/7/2015	Arsenic(6)	µg/L	11	10	1° MCL(5)	No
LSNKR	3/18/2015	Arsenic	µg/L	13	10	1° MCL(5)	No
TCHWY	2/7/2015	Boron	µg/L	750	700	Narrative	Active
TCHWY	6/17/2015	Boron	µg/L	1300	700	Narrative	Active
TCHWY	8/18/2015	Boron	µg/L	1000	700	Narrative	Active
TCHWY	8/18/2015	Boron(6)	µg/L	1000	700	Narrative	Active
WLSPL	1/20/2015	Boron	µg/L	2300	700	Narrative	Active
WLSPL	2/7/2015	Boron	µg/L	1600	700	Narrative	Active
WLSPL	3/19/2015	Boron	µg/L	2900	700	Narrative	Active
WLSPL	4/21/2015	Boron	µg/L	2200	700	Narrative	Active
CCCPY	4/22/2015	Conductivity	µS/cm	1086	700, 900(4)	Narrative	Active
COLDR	3/18/2015	Conductivity	µS/cm	1034	700, 900(4)	Narrative	Active
COLDR	4/21/2015	Conductivity	µS/cm	778	700, 900(4)	Narrative	Active
COLDR	5/12/2015	Conductivity	µS/cm	924	700, 900(4)	Narrative	Active
COLDR	5/12/2015	Conductivity(6)	µS/cm	929	700, 900(4)	Narrative	Active
COLDR	7/21/2015	Conductivity	µS/cm	1372	700, 900(4)	Narrative	Active
COLDR	7/21/2015	Conductivity(6)	µS/cm	1399	700, 900(4)	Narrative	Active
FRSHC	12/3/2014	Conductivity	µS/cm	735	700, 900(4)	Narrative	Active
FRSHC	1/21/2015	Conductivity	µS/cm	729	700, 900(4)	Narrative	Active
GIDLR	1/20/2015	Conductivity	µS/cm	893	700, 900(4)	Narrative	Active
GIDLR	2/7/2015	Conductivity	µS/cm	827	700, 900(4)	Narrative	Active
GIDLR	3/18/2015	Conductivity	µS/cm	840	700, 900(4)	Narrative	Active
GILSL	8/18/2015	Conductivity	µS/cm	716	700, 900(4)	Narrative	Active
LRLNC	4/23/2015	Conductivity	µS/cm	790	700, 900(4)	Narrative	Active

Site ID	Sample Date	Analyte	Units	Result	Trigger Limit[1]	Basis for Limit[2]	Mgt Plan[3]
LSNKR	4/21/2015	Conductivity	µS/cm	728	700, 900[4]	Narrative	No
RARPP	11/18/2014	Conductivity	µS/cm	937	700, 900[4]	Narrative	Active
RARPP	2/7/2015	Conductivity	µS/cm	706	700, 900[4]	Narrative	Active
RARPP	3/18/2015	Conductivity	µS/cm	1375	700, 900[4]	Narrative	Active
RARPP	4/21/2015	Conductivity	µS/cm	857	700, 900[4]	Narrative	Active
TCHWY	2/7/2015	Conductivity	µS/cm	885	700, 900[4]	Narrative	Active
TCHWY	4/23/2015	Conductivity	µS/cm	737	700, 900[4]	Narrative	Active
TCHWY	8/18/2015	Conductivity	µS/cm	983	700, 900[4]	Narrative	Active
UCBRD	11/18/2014	Conductivity	µS/cm	1133	700, 900[4]	Narrative	Active
UCBRD	1/20/2015	Conductivity	µS/cm	1092	700, 900[4]	Narrative	Active
UCBRD	3/18/2015	Conductivity	µS/cm	1069	700, 900[4]	Narrative	Active
UCBRD	4/21/2015	Conductivity	µS/cm	710	700, 900[4]	Narrative	Active
UCBRD	5/19/2015	Conductivity	µS/cm	998	700, 900[4]	Narrative	Active
UCBRD	6/16/2015	Conductivity	µS/cm	773	700, 900[4]	Narrative	Active
UCBRD	8/18/2015	Conductivity	µS/cm	793	700, 900[4]	Narrative	Active
UCBRD	9/15/2015	Conductivity	µS/cm	1252	700, 900[4]	Narrative	Active
WLSPL	1/20/2015	Conductivity	µS/cm	1324	700, 900[4]	Narrative	Active
WLSPL	2/7/2015	Conductivity	µS/cm	924	700, 900[4]	Narrative	Active
WLSPL	3/19/2015	Conductivity	µS/cm	1535	700, 900[4]	Narrative	Active
WLSPL	4/21/2015	Conductivity	µS/cm	1278	700, 900[4]	Narrative	Active
WLSPL	5/19/2015	Conductivity	µS/cm	1011	700, 900[4]	Narrative	Active
WLSPL	6/16/2015	Conductivity	µS/cm	856	700, 900[4]	Narrative	Active
WLSPL	7/21/2015	Conductivity	µS/cm	923	700, 900[4]	Narrative	Active
WLSPL	8/18/2015	Conductivity	µS/cm	978	700, 900[4]	Narrative	Active
WLSPL	9/17/2015	Conductivity	µS/cm	1435	700, 900[4]	Narrative	Active
LHNCT	5/20/2015	Copper	µg/L	18	4.95	CTR[7]	No
ACACR	4/22/2015	Dissolved Oxygen	mg/L	6.15	7	BP [SSO COLD]	Active
ACACR	7/22/2015	Dissolved Oxygen	mg/L	5.26	7	BP [SSO COLD]	Active
ACACR	9/16/2015	Dissolved Oxygen	mg/L	6.17	7	BP [SSO COLD]	Active
BTTSL	4/21/2015	Dissolved Oxygen	mg/L	4.73	7	BP [SSO COLD]	Active
BTTSL	5/13/2015	Dissolved Oxygen	mg/L	6.09	7	BP [SSO COLD]	Active
BTTSL	5/13/2015	Dissolved Oxygen[6]	mg/L	5.53	7	BP [SSO COLD]	Active
BTTSL	6/10/2015	Dissolved Oxygen	mg/L	4.51	7	BP [SSO COLD]	Active
BTTSL	6/10/2015	Dissolved Oxygen[6]	mg/L	3.97	7	BP [SSO COLD]	Active
BTTSL	7/22/2015	Dissolved Oxygen	mg/L	6.67	7	BP [SSO COLD]	Active
BTTSL	7/22/2015	Dissolved Oxygen[6]	mg/L	6.44	7	BP [SSO COLD]	Active
BTTSL	8/26/2015	Dissolved Oxygen	mg/L	4.84	7	BP [SSO COLD]	Active
BTTSL	8/26/2015	Dissolved Oxygen[6]	mg/L	6.07	7	BP [SSO COLD]	Active
CCBRW	5/19/2015	Dissolved Oxygen	mg/L	6.8	7	BP [SSO COLD]	Active
CCCPY	8/19/2015	Dissolved Oxygen	mg/L	5.28	7	BP [SSO COLD]	Active
COLDR	5/12/2015	Dissolved Oxygen	mg/L	4.85	7	BP [SSO COLD]	Active
COLDR	5/12/2015	Dissolved Oxygen[6]	mg/L	5.07	7	BP [SSO COLD]	Active

Site ID	Sample Date	Analyte	Units	Result	Trigger Limit(1)	Basis for Limit(2)	Mgt Plan(3)
COLDR	7/21/2015	Dissolved Oxygen	mg/L	4.1	7	BP [SSO COLD]	Active
COLDR	7/21/2015	Dissolved Oxygen(6)	mg/L	4.71	7	BP [SSO COLD]	Active
COLDR	8/25/2015	Dissolved Oxygen	mg/L	5.33	7	BP [SSO COLD]	Active
COLDR	8/25/2015	Dissolved Oxygen(6)	mg/L	6.01	7	BP [SSO COLD]	Active
COLDR	9/15/2015	Dissolved Oxygen	mg/L	5.85	7	BP [SSO COLD]	Active
COYTR	4/22/2015	Dissolved Oxygen	mg/L	1.88	7	BP [SSO COLD]	Active
COYTR	6/16/2015	Dissolved Oxygen	mg/L	5.04	7	BP [SSO COLD]	Active
COYTR	8/19/2015	Dissolved Oxygen	mg/L	2.06	7	BP [SSO COLD]	Active
CRTWN	4/23/2015	Dissolved Oxygen	mg/L	6.67	7	BP [SSO COLD]	Active
CRTWN	5/19/2015	Dissolved Oxygen	mg/L	5.04	7	BP [SSO COLD]	Active
GIDLR	4/23/2015	Dissolved Oxygen	mg/L	4.82	5	BP [SSO WARM]	Active
GIDLR	6/16/2015	Dissolved Oxygen	mg/L	4.61	5	BP [SSO WARM]	Active
GILSL	12/2/2014	Dissolved Oxygen	mg/L	4.83	5	BP [SSO WARM]	Active
GILSL	8/18/2015	Dissolved Oxygen	mg/L	1.21	5	BP [SSO WARM]	Active
LAGAM	10/21/2014	Dissolved Oxygen	mg/L	2.84	7	BP [SSO COLD]	Active
LAGAM	4/23/2015	Dissolved Oxygen	mg/L	3.3	7	BP [SSO COLD]	Active
LAGAM	8/20/2015	Dissolved Oxygen	mg/L	4.4	7	BP [SSO COLD]	Active
LHNCT	11/18/2014	Dissolved Oxygen	mg/L	5.76	7	BP [SSO COLD]	Active
LHNCT	4/21/2015	Dissolved Oxygen	mg/L	3.68	7	BP [SSO COLD]	Active
LHNCT	7/21/2015	Dissolved Oxygen	mg/L	4.45	7	BP [SSO COLD]	Active
LHNCT	8/18/2015	Dissolved Oxygen	mg/L	5.95	7	BP [SSO COLD]	Active
MDLCR	11/19/2014	Dissolved Oxygen	mg/L	4.81	7	BP [SSO COLD]	No
MDLCR	7/22/2015	Dissolved Oxygen	mg/L	2.32	7	BP [SSO COLD]	Active
MDLCR	8/19/2015	Dissolved Oxygen	mg/L	4.23	7	BP [SSO COLD]	Active
MDLCR	9/17/2015	Dissolved Oxygen	mg/L	5.78	7	BP [SSO COLD]	Active
MGSLU	3/19/2015	Dissolved Oxygen	mg/L	6.52	7	BP [SSO COLD]	No
MGSLU	4/22/2015	Dissolved Oxygen	mg/L	5.94	7	BP [SSO COLD]	Active
MGSLU	5/20/2015	Dissolved Oxygen	mg/L	5.08	7	BP [SSO COLD]	Active
PNCHY	11/19/2014	Dissolved Oxygen	mg/L	2.89	7	BP [SSO COLD]	Active
PNCHY	4/22/2015	Dissolved Oxygen	mg/L	4.34	7	BP [SSO COLD]	Active
PNCHY	6/17/2015	Dissolved Oxygen	mg/L	6.13	7	BP [SSO COLD]	Active
PNCHY	7/22/2015	Dissolved Oxygen	mg/L	5.83	7	BP [SSO COLD]	Active
PNCHY	8/19/2015	Dissolved Oxygen	mg/L	1.62	7	BP [SSO COLD]	Active
PNCHY	9/16/2015	Dissolved Oxygen	mg/L	5	7	BP [SSO COLD]	Active
SCCMR	6/16/2015	Dissolved Oxygen	mg/L	3.77	5	BP [SSO WARM]	Active
SSKNK	4/21/2015	Dissolved Oxygen	mg/L	4.81	5	BP [SSO WARM]	Active
SSKNK	7/22/2015	Dissolved Oxygen	mg/L	4.79	5	BP [SSO WARM]	Active
SSKNK	7/22/2015	Dissolved Oxygen(6)	mg/L	4.75	5	BP [SSO WARM]	Active
SSKNK	8/26/2015	Dissolved Oxygen	mg/L	3.36	5	BP [SSO WARM]	Active
SSKNK	8/26/2015	Dissolved Oxygen(6)	mg/L	4.9	5	BP [SSO WARM]	Active
SSKNK	9/15/2015	Dissolved Oxygen	mg/L	4.35	5	BP [SSO WARM]	Active
TCHWY	8/18/2015	Dissolved Oxygen	mg/L	2.4	5	BP [SSO WARM]	No

Site ID	Sample Date	Analyte	Units	Result	Trigger Limit[1]	Basis for Limit[2]	Mgt Plan[3]
UCBRD	9/15/2015	Dissolved Oxygen	mg/L	4.26	5	BP [SSO WARM]	Active
WLSPL	6/16/2015	Dissolved Oxygen	mg/L	4.12	7	BP [SSO COLD]	Active
WLSPL	7/21/2015	Dissolved Oxygen	mg/L	6.22	7	BP [SSO COLD]	Active
ZDDIX	*6/16/2015*	Dissolved Oxygen	mg/L	3.5	5	BP [SSO WARM]	Active
ACACR	11/19/2014	E. coli	MPN/100mL	770.1	235	BP	Suspended
ACACR	2/8/2015	E. coli	MPN/100mL	920.8	235	BP	Suspended
ACACR	3/19/2015	E. coli	MPN/100mL	365.4	235	BP	Suspended
ACACR	4/22/2015	E. coli	MPN/100mL	488.4	235	BP	Suspended
ACACR	7/22/2015	E. coli	MPN/100mL	517.2	235	BP	Suspended
ACACR	8/19/2015	E. coli	MPN/100mL	1413.6	235	BP	Suspended
ACACR	9/16/2015	E. coli	MPN/100mL	1956.3	235	BP	Suspended
CCBRW	2/7/2015	E. coli	MPN/100mL	>2419.6	235	BP	Completed
CCBRW	6/16/2015	E. coli	MPN/100mL	248.1	235	BP	Completed
CCBRW	7/21/2015	E. coli	MPN/100mL	755.6	235	BP	Completed
CCBRW	9/15/2015	E. coli	MPN/100mL	1553.1	235	BP	Completed
CRTWN	2/7/2015	E. coli	MPN/100mL	920.8	235	BP	Suspended
CRTWN	4/23/2015	E. coli	MPN/100mL	275.5	235	BP	Suspended
CRTWN	5/19/2015	E. coli	MPN/100mL	248.1	235	BP	Suspended
FRSHC	11/19/2014	E. coli	MPN/100mL	613.1	235	BP	Suspended
FRSHC	12/3/2014	E. coli	MPN/100mL	1553.1	235	BP	Suspended
FRSHC	1/21/2015	E. coli	MPN/100mL	235.9	235	BP	Suspended
FRSHC	2/8/2015	E. coli	MPN/100mL	>2419.6	235	BP	Suspended
FRSHC	3/19/2015	E. coli	MPN/100mL	648.8	235	BP	Suspended
FRSHC	4/22/2015	E. coli	MPN/100mL	1553.1	235	BP	Suspended
FRSHC	7/22/2015	E. coli	MPN/100mL	547.5	235	BP	Suspended
GIDLR	10/21/2014	E. coli	MPN/100mL	248.1	235	BP	Suspended
GIDLR	11/18/2014	E. coli	MPN/100mL	410.6	235	BP	Suspended
GIDLR	11/18/2014	E. coli[6]	MPN/100mL	488.4	235	BP	Suspended
GIDLR	12/2/2014	E. coli	MPN/100mL	579.4	235	BP	Suspended
GIDLR	12/2/2014	E. coli[6]	MPN/100mL	866.4	235	BP	Suspended
GIDLR	2/7/2015	E. coli	MPN/100mL	>2419.6	235	BP	Suspended
LHNCT	12/3/2014	E. coli	MPN/100mL	727	235	BP	Suspended
LHNCT	2/7/2015	E. coli	MPN/100mL	>2419.6	235	BP	Suspended
LHNCT	6/17/2015	E. coli	MPN/100mL	248.9	235	BP	Suspended
LHNCT	7/21/2015	E. coli	MPN/100mL	365.4	235	BP	Suspended
LSNKR	12/3/2014	E. coli	MPN/100mL	770.1	235	BP	Suspended
LSNKR	2/7/2015	E. coli	MPN/100mL	>2419.6	235	BP	Suspended
LSNKR	7/21/2015	E. coli	MPN/100mL	307.6	235	BP	Suspended
LSNKR	7/21/2015	E. coli[6]	MPN/100mL	365.4	235	BP	Suspended
MDLCR	2/8/2015	E. coli	MPN/100mL	648.8	235	BP	Suspended
MDLCR	9/17/2015	E. coli	MPN/100mL	2419.6	235	BP	Suspended
NRTCN	5/19/2015	E. coli	MPN/100mL	260.3	235	BP	Suspended

Site ID	Sample Date	Analyte	Units	Result	Trigger Limit[1]	Basis for Limit[2]	Mgt Plan[3]
NRTCN	8/20/2015	E. coli	MPN/100mL	770.1	235	BP	Suspended
PCULB	12/2/2014	E. coli	MPN/100mL	>2419.6	235	BP	No
PCULB	1/20/2015	E. coli	MPN/100mL	236.7	235	BP	No
PCULB	2/9/2015	E. coli	MPN/100mL	410.6	235	BP	No
PCULB	4/21/2015	E. coli	MPN/100mL	791.5	235	BP	No
PNCHY	11/19/2014	E. coli	MPN/100mL	325.5	235	BP	Suspended
PNCHY	2/8/2015	E. coli	MPN/100mL	>2419.6	235	BP	Suspended
PNCHY	4/22/2015	E. coli	MPN/100mL	290.9	235	BP	Suspended
UCBRD	12/2/2014	E. coli	MPN/100mL	325.5	235	BP	Suspended
UCBRD	2/7/2015	E. coli	MPN/100mL	>2419.6	235	BP	Suspended
UCBRD	2/7/2015	E. coli[6]	MPN/100mL	>2419.6	235	BP	Suspended
UCBRD	5/19/2015	E. coli	MPN/100mL	517.2	235	BP	Suspended
WLKCH	12/3/2014	E. coli	MPN/100mL	>2419.6	235	BP	Suspended
WLKCH	2/8/2015	E. coli	MPN/100mL	>2419.6	235	BP	Suspended
WLKCH	3/19/2015	E. coli	MPN/100mL	344.8	235	BP	Suspended
WLSPL	11/18/2014	E. coli	MPN/100mL	>2419.6	235	BP	Suspended
WLSPL	12/2/2014	E. coli	MPN/100mL	>2419.6	235	BP	Suspended
WLSPL	2/7/2015	E. coli	MPN/100mL	658.6	235	BP	Suspended
WLSPL	4/21/2015	E. coli	MPN/100mL	344.8	235	BP	Suspended
WLSPL	5/19/2015	E. coli	MPN/100mL	387.3	235	BP	Suspended
GIDLR	11/18/2014	pH	std. units	8.62	6.5-8.5	BP	Active
GILSL	8/18/2015	pH	std. units	4.82	6.5-8.5	BP	Active
LSNKR	4/21/2015	pH	-log[H+]	8.73	6.5-8.5	BP	No
RARPP	4/21/2015	pH	-log[H+]	8.6	6.5-8.5	BP	No
RARPP	5/19/2015	pH	-log[H+]	8.52	6.5-8.5	BP	No
STYHY	1/21/2015	pH	std. units	8.73	6.5-8.5	BP	Active
WLKCH	5/19/2015	pH	-log[H+]	9.95	6.5-8.5	BP	Active
WLSPL	1/20/2015	pH	std. units	8.7	6.5-8.5	BP	Active
WLSPL	7/21/2015	pH	std. units	9.09	6.5-8.5	BP	Active
WLSPL	1/20/2015	Selenium	µg/L	8.2	5	CTR	Active
WLSPL	2/7/2015	Selenium	µg/L	5.1	5	CTR	Active
WLSPL	3/19/2015	Selenium	µg/L	6.2	5	CTR	Active
WLSPL	4/21/2015	Selenium	µg/L	6.4	5	CTR	Active

Notes:
1. Water Quality Objective or Narrative Interpretation Limits for *ILRP*.
2. Water Quality Objective Basis: BP = Central Valley Basin Plan; BPA = Basin Plan Amendment; CTR = California Toxics Rule; Narrative = unadopted limits used to interpret Basin Plan narrative objectives by the Central Valley Regional Board.
3. Indicates whether sites and parameter are currently being addressed by an ongoing management plan, study, or TMDL
4. Conductivity exceeded the unadopted UN Agricultural Goal (700 µS/cm) and/or the California recommended 2˚ MCL (900 µS/cm) for drinking water.
5. California 1˚ MCL (10 mg/L as N) for drinking water.
6. Field duplicate
7. CTR Freshwater Chronic and Acute

Trend Analysis

As part of the evaluation of monitoring results, the WDR requires the Coalition to conduct trend analyses to…

"… identify potential trends[19] and patterns in surface and groundwater quality that may be associated with waste discharge from irrigated lands. As part of this evaluation, the third-party must analyze all readily available monitoring data that meet program quality assurance requirements to determine deficiencies in monitoring for discharges from irrigated agricultural lands and whether additional sampling locations or sampling events are needed or if additional constituents should be monitored. If deficiencies are identified, the third-party must propose a schedule for additional monitoring or source studies. … The third-party should incorporate pesticide use information, as needed, to assist in its data evaluation."

As part of the 2014 AMR, the Coalition conducted the trend analysis for all representative monitoring sites, as well as all pesticides that were detected with ≥5% detection[20]. From this dataset, it was determined that the sites and constituents in **Table 24** had potential or degradation.

Table 24. Significant Trends Further Evaluated for Potential Degradation (2014)

Category	Analyte	Site Name
Physical	Conductivity	Anderson Creek at Ash Creek Road
		Colusa Basin Drain above KL
		Freshwater Creek at Gibson Rd
		Lower Snake R. at Nuestro Rd
		Middle Creek u/s from Highway 20
		North Canyon Creek
		Pine Creek at Nord Gianella Road
		Pit River at Pittville
		Sacramento Slough bridge near Karnak
		Ulatis Creek at Brown Road
		Walker Creek near 99W and CR33
		Willow Slough Bypass at Pole Line
	Dissolved Oxygen	Coon Creek at Brewer Road
		Lower Snake R. at Nuestro Rd
		Middle Creek u/s from Highway 20
		Middle Fork Feather River above Grizzly Cr
		Pine Creek at Highway 32
		Pine Creek at Nord Gianella Road

19 "All results (regardless of whether exceedances are observed) must be included to determine whether there are trends in degradation that may threaten applicable beneficial uses."

20 Pesticides with lower than 5% detection rates were considered to have insufficient detected data to reliably identify trends.

Category	Analyte	Site Name
		Ulatis Creek at Brown Road
	pH	Colusa Basin Drain above KL
		Lower Snake R. at Nuestro Rd
		Pope Creek upstream from Lake Berryessa
	Temperature	Middle Creek u/s from Highway 20
	Total Organic Carbon	Pine Creek at Nord Gianella Road
		Walker Creek near 99W and CR33
	Total Suspended Solids	Grand Island Drain near Leary Road
Nutrients	Ammonia, Total as N	Pine Creek at Nord Gianella Road
	Nitrate+Nitrite, as N	Freshwater Creek at Gibson Rd
	Orthophosphate, as P	Lower Honcut Creek at Hwy 70
		Pine Creek at Nord Gianella Road
Toxicity	Selenastrum growth	Anderson Creek at Ash Creek Road

For 2015, the Coalition proposed a prioritized approach that would focus on reanalyzing the higher priority trends from 2014. This approach was approved by the Regional Water Board for the second year of Assessment periods and for non-Assessment years. The modified trend assessment reanalyzed the following:

- High priority pesticides with high detection rates
  - Chlorpyrifos
  - Diazinon
  - Diuron
- Sites with active Management Plans for Ceriodaphnia and Selenastrum
- Nutrient data for the 2014 sites that were listed in the “potential degradation subsection”

The methods used to analyze and evaluate the data were as follows:

- Data were initially evaluated using Spearman's non-parametric test for trend (concentrations vs. sample date). Table of the initial Spearman’s test results are provided in **Appendix G**.
  - Data below detection were coded as "0" for initial non-parametric Spearman's evaluation
  - Data were analyzed separately for each site for all parameters
  - The threshold for statistical significance was set at $p<0.05$
- Significant preliminary results ($p<0.05$) were screened for potential degradation impacts
  - Increasing trends in pesticides, metals, nutrients, pathogen indicators
  - Decreasing trends in toxicity survival or growth results

   - The subset of the initial Spearman's test results with potential degradation impacts are provided in **Appendix G**.
- Parameters with potential degradation trend indicators were plotted (concentration vs. date) for further evaluation (plots are provided in **Appendix G**.)
   - Data below detection were plotted at the detection limit
   - Reviewed for potential outliers
   - Linear, log-linear, or robust trend lines were plotted to illustrate trends (the selected method was based on visual inspection and best professional judgment)
   - Plots were evaluated for other (non-trend) patterns

A determination of the significance of a potential degradation trend was based on the likelihood of a continuing trend and the likelihood of adverse impacts on beneficial uses. Evaluations of beneficial use impacts were based on a continued increasing probability of exceedances of trigger limits. These determinations are provided in **Appendix G**, and significant findings are discussed below.

Pesticide use data are evaluated during the process of developing the annual monitoring plan update, as required by the WDR, and no additional evaluations of pesticide use data were conducted for this Annual Report. The results of pesticide evaluations conducted in 2013 and 2014 were incorporated into the 2014 and 2015 monitoring plans that were approved by the Regional Water Board. Pesticide use information will next be evaluated in 2017 for the 2018 assessment monitoring period using the method being developed by the Regional Water Board and ILRP stakeholders, and approved for this use by the Regional Water Board.

DISCUSSION OF RESULTS

The Coalition's 2016 Monitoring Plan Update was approved by Regional Water Board staff as meeting the requirements of the WDR. The WDR provides no additional guidance or criteria for making a determination that there are "deficiencies in monitoring" or that additional locations or events are needed, and none were identified as a result of the trend analysis conducted for this report.

Summary of initial Spearman's test results

- 87 site-parameter combinations were evaluated
- 75 results were not significant ($p \geq 0.05$)
- 28 results were not significant due to insufficient detected data
- Seven results were initially determined to have potentially significant trends ($p < 0.05$)
   - Two significant results were identified for trends with no potential negative impacts (i.e., they indicated potentially improving water quality)
   - Five initially significant results were identified as suggesting degradation with potential negative impacts on beneficial uses and were further evaluated

- Five results (~5% of the beginning number of evaluations) were determined to have significant increasing or decreasing trends suggesting potential degradation (**Table 25**) and were evaluated further.

Table 25. Significant Trends Further Evaluated for Potential Degradation

Category	Analyte	Site Name
Pesticide	Chlorpyrifos	Ulatis Creek at Brown Road
Nutrients	Ammonia, Total as N	Pine Creek at Nord Gianella Road
	Nitrate+Nitrite, as N	Freshwater Creek at Gibson Rd
	Orthophosphate, as P	Lower Honcut Creek at Hwy 70
		Pine Creek at Nord Gianella Road

Five cases of significant increasing trends in nutrient concentrations were observed:

Dissolved orthophosphate exhibited a significant increasing trend in samples from Lower Honcut Creek (**Figure 4-a**). The trend appeared to be due primarily to elevated concentrations observed in the 2014 and 2015 monitoring years. These concentrations peaked early in both monitoring years, but decreased as the monitoring year went on. After the initial spike the results approached the baseline concentrations observed previously, and did not appear to indicate a continuing long-term trend. There is no specific trigger limit or water quality objective associated with orthophosphate, and the observed concentrations and short term trends did not suggest a need for additional monitoring events or locations.

Dissolved orthophosphate and ammonia exhibited significant increasing trends in samples from Pine Creek (**Figures 4 b-c**). Concentrations were elevated in 2011 and 2014 monitoring years. There is no specific trigger limit or water quality objective associated with orthophosphate, and the observed concentrations and short term trends did not suggest a need for additional monitoring events or locations. This Pine Creek site is no longer used as a representative site due to unreliable flows that resulted in sampling from isolated pools, or many events with no water to sample and was replaced by a downstream site in February of 2014. The new site (Pine Creek at Highway 32) reported concentrations much lower in 2015 and will provide a better long-term picture of trends in nutrient concentrations.

Nitrate+nitrite concentrations were elevated above the average for the site in 2011 and 2013 in Freshwater Creek samples (**Figure 4-d**), but returned to more typical levels in 2014. Concentrations in 2015 were higher in the early parts of the year, but trended to the average as the monitoring year progressed. None of the samples exceeded the Trigger Limit for nitrate as N (10 mg/L), and the return to lower concentrations indicated that this did not represent a longer-term trend of degradation. Tracking this potential trend is adequately addressed with ongoing approved ILRP assessment monitoring.

Chlorpyrifos concentrations at Ulatis Creek were elevated above the average for the site between 2011 and 2013 (**Figure 4-**e). The trend since Management Plan triggered is predominantly improving with the exception of a recent exceedance in the 2015 monitoring year; Conclude that risk of degradation and need for tracking are addressed by ongoing Management Plan and monitoring.

In summary, the results of trend analyses conducted for this AMR did not indicate a need for any additional locations, events, or parameters. We recommend that these evaluations are conducted no more often than once per assessment period.

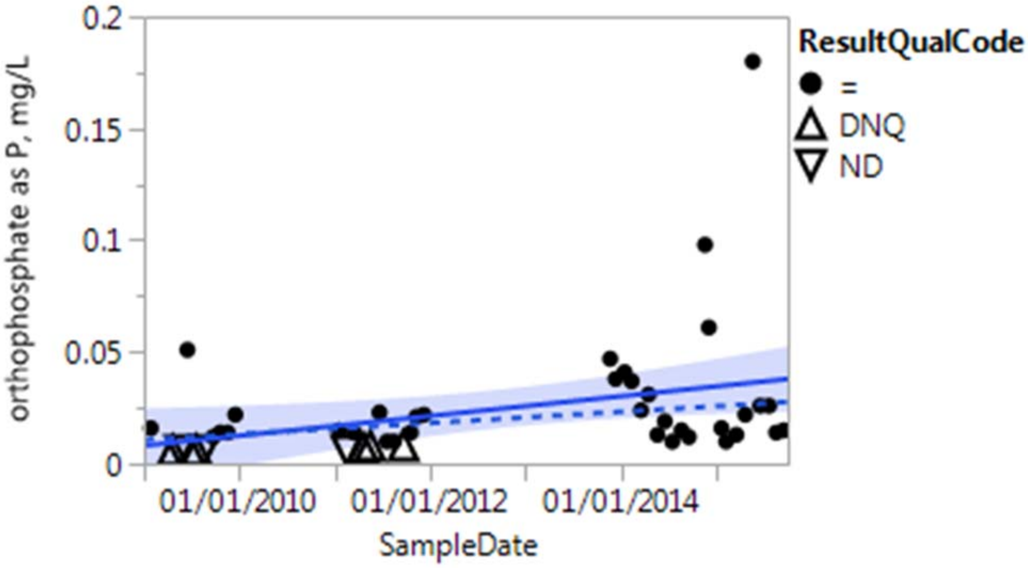

Figure 4-a. Dissolved Orthophosphate as P, Lower Honcut Creek

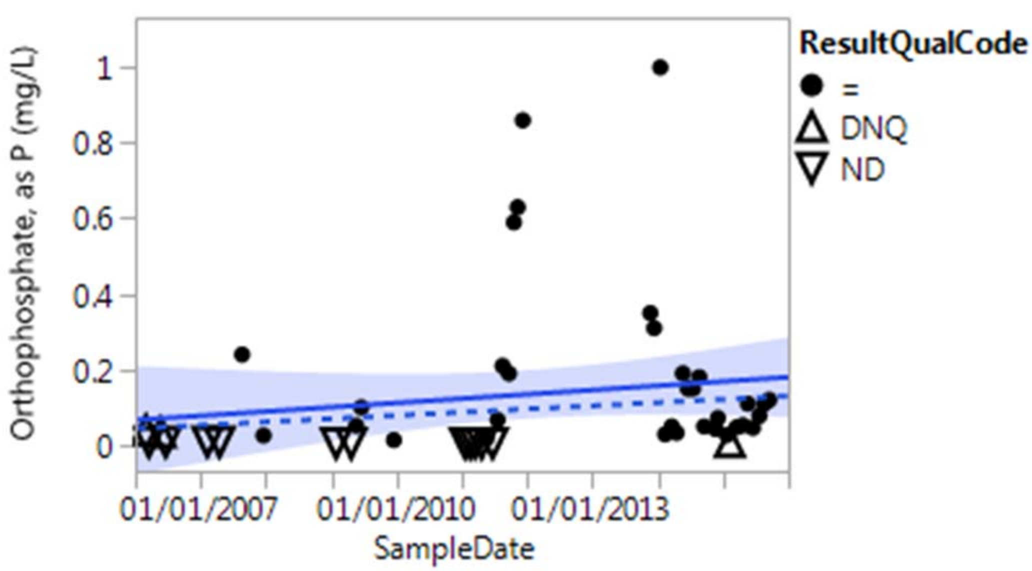

Figure 4-b. Dissolved Orthophosphate as P, Pine Creek at Nord-Gianella Road/Highway 32

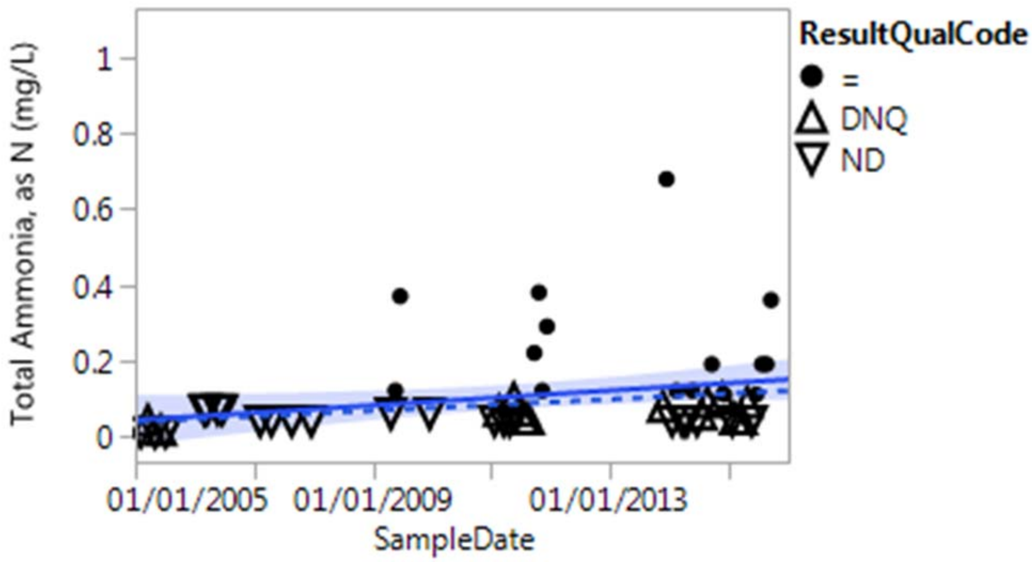

Figure 4-c. Total Ammonia as N, Pine Creek at Nord-Gianella Road/Highway 32

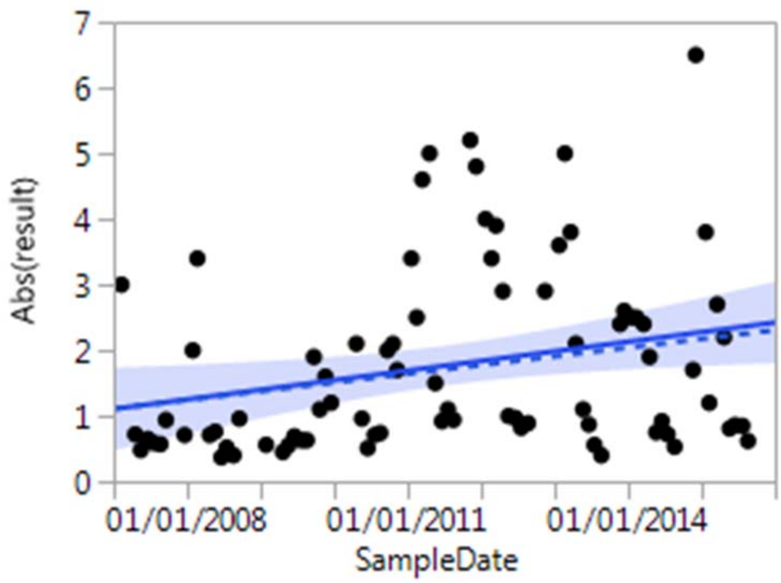

Figure 4-d. Nitrate+Nitrite as N, Freshwater Creek at Gibson Rd

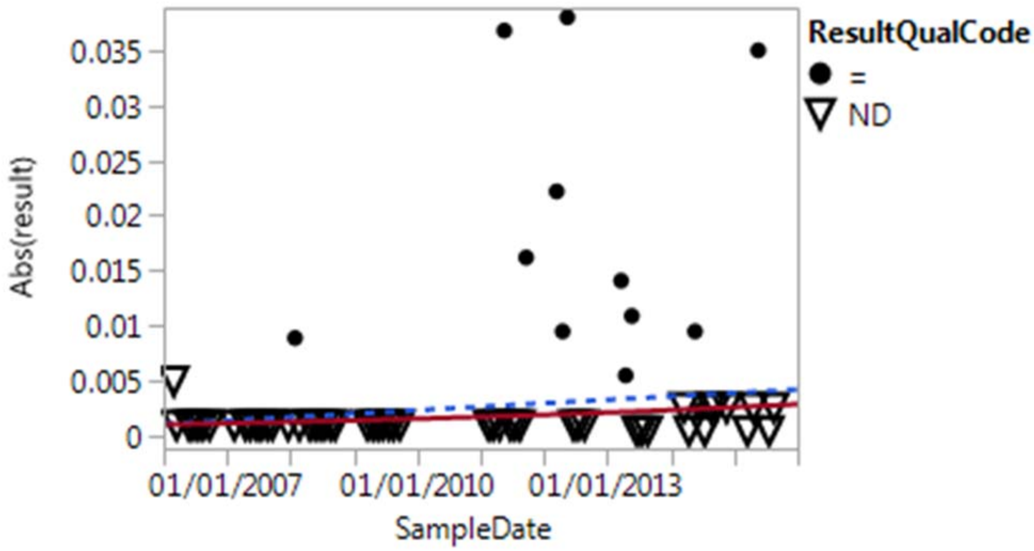

Figure 4-e. Chlorpyrifos, Ulatis Creek at Brown Road

Management Practices and Actions Taken

RESPONSE TO EXCEEDANCES

To address specific water quality exceedances, the Coalition and its partners initially developed a Management Plan in 2008, subsequently approved by the Water Board. The Coalition also previously developed a *Landowner Outreach and Management Practices Implementation Communications Process for Monitoring Results (Management Practices Process)* to address exceedances. The Coalition subsequently developed an updated Comprehensive Surface Water Quality Management Plan[21] (CSQMP) in 2015 to comply with specific requirements of the current WDR. Implementation of the CSQMP is the primary mechanism for addressing exceedances observed in the Coalition's *ILRP* surface water monitoring.

Management Plan Status Update

The Management Plan Progress Report (MPPR) documenting the status and progress toward meeting Management Plan requirements for 2015 is provided to the Water Board with this Annual Monitoring Report. Activities conducted in 2015 to implement the Coalition's Management Plan included addressing exceedances of objectives for registered pesticides, completion of source evaluations for pesticides and toxicity, development of management practice implementation goals, and monitoring required for toxicity and pesticide management plans and TMDLs.

Implementation completed specifically for registered pesticides and toxicity included review and evaluation of pesticide application data, identification of potential sources, and determination of likely agricultural sources. These evaluations were documented in Source Evaluation Reports for each water body and management plan. Prior to 2015, for Management Plans for registered pesticides and identified causes of toxicity, surveys of Coalition members operating on high priority parcels were conducted to determine the degree of implementation of relevant management practices. Beginning in 2015, these surveys were replaced with data compiled from Coalition member Farm Evaluations. The survey results and Farm Evaluation data have been used to establish goals for additional management practice implementation needed to address exceedances of Basin Plan water quality objectives and *ILRP* Trigger Limits.

LANDOWNER OUTREACH EFFORTS

The Coalition and its subwatersheds, working with the Coalition for Urban/Rural Environmental Stewardship (CURES), stand committed to working with the Water Board and its staff to implement the *Management Practices Process* and the Coalition's CSQMP to address water quality problems identified in the Sacramento Valley. The primary strategic approach taken by the Coalition is to notify and educate the subwatershed landowners, farm operators, and/or wetland managers about the cause(s) of toxicity and/or exceedance(s) of water quality standards. Notifications are focused on (but not limited to) growers who operate directly adjacent to or within close proximity to the waterway. The broader outreach program, which includes both

[21] *SVWQC Comprehensive Surface Water Quality Management Plan. Prepared for the Sacramento Valley Water Quality Coalition (SVWQC) by Larry Walker Associates, Davis, California. June 2015.*

grower meetings and the notifications distributed through direct mailings, encourages the adoption of BMPs and modification of the uses of specific farm and wetland inputs to prevent movement of constituents of concern into Sacramento Valley surface waters.

Targeted Outreach Efforts

The Coalition's targeted outreach approach is to focus on the growers with fields directly adjacent to or near the actual waterway of concern where statistically significant toxicity and exceedances of applicable numeric water quality objectives and *ILRP* Trigger Limits have been observed. To identify those landowners operating in high priority lands, the Coalition identifies the assessor parcels and subsequently the owners of agricultural operations nearest the water bodies of interest. From the list of assessor parcel numbers, the Coalition identifies its members and mails to them an advisory notice along with information on how to address the specific exceedances using BMPs. This same approach was also used to conduct management practice surveys in areas targeted by the Management Plan.

General Outreach Efforts

Highlights of outreach efforts conducted by the Coalition and its partners for specific subwatersheds during the monitoring period are summarized in an Excel table for each watershed in **Appendix F**.[22] Available outreach materials are also included as attachments in **Appendix F**.

[22] Outreach information for the Lake Subwatershed was not available as of April 30, 2015. This information will be submitted as soon as possible.

Summary of Farm Evaluation Data

The WDR requires that the Coalition collect and aggregates summarized information from Farm Evaluations. The summary of the management practice data includes a:

- quality assessment of the information by township
- description of corrective actions to be taken regarding any deficiencies in the quality of data submitted

This information is provided as a separate report developed by Michael Johnson, LLC (MLJ) for SVWQC (Farm Evaluation Summary Report). The Farm Evaluation Summary Report will be submitted with the AMR on May 1, 2016.

Conclusions and Recommendations

The Coalition submits this *2015 Annual Monitoring Report* (AMR) as required under the Water Board's Irrigated Lands Regulatory Program (*ILRP*). The AMR provides a detailed description of our monitoring results as part of our ongoing efforts to characterize irrigated agricultural and wetlands related water quality in the Sacramento River Basin.

To summarize, the results from the *ILRP* monitoring in 2015 continue to indicate that with few exceptions, there are no major water quality problems with agricultural and managed wetlands discharges in the Sacramento River Basin.

This AMR characterizes potential water quality impacts of agricultural drainage from a broad geographic area in the Sacramento Valley from October 2014 through September 2015. To date, a total of 115 Coalition storm and irrigation season events have been completed since the beginning of Coalition monitoring in January 2005, with additional events collected by coordinating programs and for follow-up evaluations. For the period of record in this AMR (October 2014 through September 2015), samples were collected for 10 scheduled monthly events and 2 wet weather ("storm") events.

Pesticides were infrequently detected (~1.4% of all pesticide results for 2015 were detected), and, when detected, rarely exceeded applicable objectives. Two registered pesticides (chlorpyrifos and malathion) exceeded applicable water quality objectives or *ILRP* Trigger Limits in a total of six Coalition monitoring samples.

Many of the pesticides specifically required to be monitored in the past by the *ILRP* have rarely been detected in Coalition water samples, including glyphosate, paraquat, and all of the pyrethroid pesticides. Over 98.3% of all pesticide analyses performed to date for the Coalition have been below detection. Coalition monitoring of pesticides for the *ILRP* for 2015 was conducted based on Management Plan requirements and on reported pesticide use and relative toxicity risks for pesticides in the subwatersheds. The Coalition also conducted focused monitoring of the *ILRP*-required trace elements (arsenic, cadmium, lead, molybdenum, nickel, selenium, and zinc) informed by the Coalition's past monitoring results, which have demonstrated that most of these metals rarely approach or exceed objectives and are not likely to cause adverse impacts to aquatic life or human health in waters receiving agricultural runoff in the Coalition watershed. This focused strategy for monitoring pesticides and trace metals was implemented in 2010 in accordance with the Coalition's 2009 MRP (*Order No. R5-2009-0875*, CVRWQCB 2009), and this same strategy is consistent with the requirements of the current WDR and MRP (*Order No. R5-2014-0030*).

The majority of exceedances of adopted numeric objectives continue to consist of conductivity, dissolved oxygen, and *E. coli*. Agricultural runoff and irrigation return flows may contribute to exceedances of these objectives, but these parameters are primarily controlled or significantly affected by natural processes and sources that are not controllable by agricultural management practices.

The Coalition has implemented the required elements of the *ILRP* since 2004. The Coalition developed a Watershed Evaluation Report (WER) that set the priorities for development and implementation of the initial Monitoring and Reporting Program Plan (MRPP). The Coalition successfully developed the MRPP, QAPP, and Management Plan as required by the *ILRP,* and these documents were approved by the Water Board. Subsequent revisions requested by the

Water Board and the Coalition were incorporated into the Coalition's program and implemented through the Coalition's ongoing *ILRP* monitoring efforts. The Coalition also continues to adapt and improve elements of the monitoring program based on the knowledge gained through *ILRP* monitoring efforts.

The 2015 monitoring program was developed to be consistent with the requirements of the current WDR and MRP (*Order No. R5-2014-0030*) and was approved by the Regional Water Board for this purpose with the understanding that it would serve as the first "Assessment" monitoring for the new MRP. The Coalition has implemented the approved monitoring program in coordination with its subwatershed partners, has initiated follow-up activities required to address observed exceedances, and continued to implement the previously approved Management Plan while updating the CSQMP in 2015. Throughout this process, the Coalition has kept an open line of communication with the Water Board and has made every effort to fulfill the requirements of the *ILRP* in a cost-effective, scientifically defensible, and management-focused manner. This AMR is documentation of the success and continued progress of the Coalition in achieving these objectives.

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Appendices

The following appendices are available in electronic form on the CD provided.

Appendix A: Field Log Copies

Appendix B: Lab Reports and Chains-of-Custody

Appendix C: Tabulated Monitoring Results

Appendix D: Exceedance Reports

Appendix E: Site-Specific Drainage Maps

Appendix F: SVWQC Outreach Materials

Appendix G: Trend Analysis Results