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SACRAMENTO VALLEY WATER QUALITY COALITION

Water Quality Management Plan Progress Report

Prepared by

L A R R Y
W A L K E R



ASSOCIATES

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Executive Summary

The purpose of this document is to provide an update on the status of the implementation of the Sacramento Valley Water Quality Coalition's (Coalition) Water Quality Management Plan (2009 Management Plan), which was reorganized into the Comprehensive Surface Water Quality Management Plan (CSQMP) in 2015. The CSQMP was last updated in September 2016 and approved by the Central Valley Regional Water Quality Control Board (Regional Water Board) in November 2016. The 2016 CSQMP documented all active and suspended Coalition Surface Water Quality Management Plans (SQMPs) through September 2016. The Coalition's Waste Discharge Requirements (WDR), Order No. R5-2014-0030, specify the requirements for separate SWQMPs, and allow the Coalition the option of submitting separate SQMPs when they are triggered or submitting an updated CSQMP on an annual basis that would identify and described any new SQMPs triggered during the preceding monitoring year (October 1 through September 30). Since the 2016 monitoring year, the Coalition has opted to submit separate SQMPs (hereafter, Management Plans), when triggered, to satisfy these requirements. The annual updates discussing the implementation of the Coalition's CSQMP, covering Management Plans developed under the Coalition's Conditional Waiver (Conditional Waiver Order R5-2006-0053) and those developed under the 2014 WDR, are called Water Quality Management Plan Progress Reports or simply Management Plan Progress Reports (MPPRs).

In general terms, the processes to meet the requirements of the CSQMP can be distilled to these elements – source evaluation, identification of management practices needed to address exceedances, implementation of management practices, evaluation of effectiveness, and regular assessment of progress toward completion of an individual Management Plan. The Coalition has successfully developed and implemented processes for source evaluation and identification of management practices needed. Source evaluations have been completed and provided to the Regional Water Board's Irrigated Lands Regulatory Program (ILRP) for a large number of Management Plan requirements for pesticides, toxicity, pathogen indicators, and legacy organochlorine pesticide exceedances.

Management Plan Monitoring

The need for Management Plan monitoring is determined primarily based on the potential to provide useful information for source identification, in establishing causes of toxicity, and to evaluate management practice effectiveness. This monitoring may consist of water column or sediment sampling, field evaluations, or surveys of agricultural practices. Except for monitoring conducted at non-representative sites for legacy organochlorine pesticides, pathogen indicators, and field measurements, Management Plan monitoring performed during the 2019 Monitoring Year (October 1, 2018, through September 30, 2019) occurred at representative sites for source evaluation and/or compliance purposes.

Based on the evaluations of Management Plan monitoring results through September 2019 and earlier source evaluation efforts, the Coalition has submitted requests to deem complete the monitoring and other requirements for eight Management Plans, five of which received approval during the 2019 Monitoring Year and the remaining three were approved in the beginning of the 2020 Monitoring Year.

New Management Plans

As part of this MPPR, data collected by the Coalition through September 2019 were evaluated to assess the necessity for any new Management Plan requirements. Requirements for new Management Plan elements were based on observations of more than one exceedance in a three-year period, as required by the WDR. Proposed tasks and schedules to implement new Management Plan elements were developed, if necessary. If modifications to the existing scope or schedule for implementation of an approved Management Plan were proposed, then these changes are also described herein, if necessary. One new Management Plan was triggered as the result of ILRP Trigger Limit exceedances observed in Coalition monitoring conducted from October 2018 through September 2019. The Management Plan triggered was for sediment toxicity in Ulatis Creek (Solano Subwatershed). The Regional Water Board approved the Management Plan to address the *Hyaella* sediment toxicity exceedances on January 30, 2020.

Evaluation of Progress

Meeting water quality objectives (WQOs) is the ultimate goal and measure of effectiveness of the implemented management practices and progress for a Management Plan. Water quality monitoring to measure this progress is ongoing and assessed annually and has resulted in the completion of 41 Management Plans to date. As measured by the completion and ongoing work on specific Management Plan tasks and deliverables summarized above and documented throughout this MPPR, the Coalition continues to make good progress toward meeting these requirements and expects to achieve the goals of the current approved CSQMP.

Management Plan Progress Report

The purpose of this document is to provide an update on the status of the implementation of the Sacramento Valley Water Quality Coalition's (Coalition) Water Quality Management Plan (2009 Management Plan¹), which was reorganized into the Comprehensive Surface Water Quality Management Plan (CSQMP²) in 2015. The CSQMP was last updated in September 2016 and approved by the Central Valley Regional Water Quality Control Board (Regional Water Board) in November 2016. The 2016 CSQMP documented all active and suspended Coalition Surface Water Quality Management Plans (SQMPs) through September 2016. The Coalition's Waste Discharge Requirements (WDR), Order No. R5-2014-0030, specify the requirements for separate SQMPs, and also allow the Coalition the option of submitting separate SQMPs when they are triggered or submitting an updated CSQMP on an annual basis that would identify and describe any new SQMPs triggered during the preceding monitoring year (October 1 through September 30). Since the 2016 monitoring year, the Coalition has opted to submit separate SQMPs (hereafter, Management Plans), when triggered, to satisfy these requirements. The annual updates discussing the implementation of the Coalition's CSQMP, covering Management Plans developed under the Coalition's Conditional Waiver (Conditional Waiver Order R5-2006-0053³) and those developed under the 2014 WDR, are called Water Quality Management Plan Progress Reports or simply Management Plan Progress Reports (MPPRs).

Reporting for the CSQMP is intended to provide an overview of the Coalition's approach to meeting the requirements of the WDR, a list of all currently required Management Plans and their status, the Management Plans currently being implemented, and a schedule and process for development of newly triggered Management Plans. Data compilations for monitoring conducted for the CSQMP are submitted on the same quarterly schedule and in the same formats as required by the Monitoring and Reporting Program (MRP) for regular Coalition monitoring.

This MPPR provides summaries of the progress made toward completion of specific Management Plan elements, updates to the list of required Management Plan elements, and recommendations for continuation or modification of individual Management Plans. This MPPR also summarizes the results of initial source identification evaluations, where performed, and results of selected Management Plan monitoring for the previous year, provides documentation of outreach efforts, and provides a summary of baseline and ongoing management practice inventories for Management Plans developed under the WDR, as opposed to those earlier Management Practices Implementation and Performance Goals (MPIPG) written to conform to the Coalition's Conditional Waiver. In September 2016, Regional Water Board staff found all but one active MPIPG developed under the Coalition's Conditional Waiver to conform to the Management Plan requirements specified in the 2014 WDR. The one MPIPG found not to

¹ SVWQC 2009. Water Quality Management Plan. Prepared by Larry Walker Associates for the Sacramento Valley Water Quality Coalition (SVWQC). Sacramento, California. January 2009.

² SVWQC 2016, Comprehensive Surface Water Quality Management Plan. Prepared by Larry Walker Associates for the Sacramento Valley Water Quality Coalition (SVWQC). Sacramento, California. September 2016.

³ 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).

conform to WDR Management Plan requirements was updated and approved by Regional Water Board staff. A Request to Complete that Management Plan was approved in April 2019.

The MPPR includes the following components, as specified in the MRP:

Table 1. Management Plan Progress Report Requirements⁴

MRP-1 Section	MPPR Requirement	Report Section Headings	Page
	Signed Transmittal Letter	NA	-
I.F.(1)	Title page	Title page	-
I.F.(2)	Table of contents	Table of Contents	<i>i</i>
I.F.(3)	Executive Summary	Executive Summary	<i>iii</i>
I.F.(4)	Location map(s) and a brief summary of management plans covered by the report	Results of Monitoring	5-9,13
I.F.(5)	Updated table that tallies all exceedances for the management plans	Results of Monitoring	14-16
I.F.(6)	A list of new management plans triggered since the previous report	New Management Plans	19-20
I.F.(7)	Status update on preparation of new management plans	Management Plan Status Update	20-40
I.F.(8)	A summary and assessment of management plan monitoring data collected during the reporting period	Results of Monitoring	9-12
I.F.(9)	A summary of management plan grower outreach conducted	Outreach Documentation	17
I.F.(10)	A summary of the degree of implementation of management practices	Summary: Evaluation of Progress	43-44
I.F.(11)	Results from evaluation of management practice effectiveness	Summary: Evaluation of Progress	43-44
I.F.(12)	An evaluation of progress in meeting performance goals and schedules	Summary: Evaluation of Progress	43-44
I.F.(13)	Any recommendations for changes to the management plan	Proposed Changes to the Management Plan	45

The activities conducted in 2019 to implement the Coalition's CSQMP continued to primarily focus on addressing the higher priority Management Plan elements triggered by exceedances of water quality objectives or trigger limits for registered pesticides and toxicity. Deliverables completed for registered pesticides included review and evaluation of pesticide application data, identification of potential sources, and determination of likely agricultural sources, where indicated by Department of Pesticide Regulation Pesticide Use Reporting data. Implementation completed to address toxicity exceedances included review and evaluation of pesticide application data, evaluation of monitoring results to identify potential causes of toxicity, and

⁴ Monitoring and Reporting Program (Attachment B to R5-2014-0030), Appendix MRP-1: Third-Party Management Plan Requirements, Section I.F.

determination of likely agricultural sources of identified causes of toxicity. Source evaluations have been documented in the Source Evaluation Reports submitted for various Management Plan elements, where determined necessary.⁵ For registered pesticides and identified causes of toxicity, surveys of Coalition Members operating on high priority parcels were also conducted to determine the degree of implementation of relevant management practices. These survey results form the basis for establishing goals for additional management practice implementation needed to address exceedances of Basin Plan water quality objectives and ILRP Trigger Limits.

Management Plan elements with tasks completed in 2019 are listed in **Table 2**. This table provides the water body and analyte or monitoring category of concern and a summary of the major Management Plan task activity.

⁵ A Management Plan element is the specific individual combination of the water body and analyte or monitoring category requiring management, e.g., diazinon in Gilsizer Slough, or invertebrate toxicity in Coon Hollow Creek.

Table 2. Summary of Management Plan Task Activity

Management Plan Category	Subwatershed	Waterbody (Site ID)	Analyte(s)	Summary of Major Management Plan Activity and Status
DO and pH	Butte-Yuba-Sutter	Butte Slough (BTSL) ¹	DO	Unless otherwise noted, all sites monitored in 2019; Other tasks suspended on direction from Executive Officer (EO); Source Evaluations deferred; statistical analyses for the influence of agricultural activities on DO and pH exceedances submitted in July 2018.
		Gilsizer Slough (GILSL)	DO, pH	
		Lower Honcut Creek (LNHCT)	DO	
		Lower Snake River (LSNKR)	DO, pH	
		Pine Creek (PNCHY)	DO	
		Sacramento Slough (SSKNK)	DO	
	Colusa Glenn	Colusa Basin Drain (COLDR)	DO	
		Freshwater Creek (FRSHC)	pH	
		Stony Creek (STYHY) ¹	pH	
		Sycamore Slough (RARPP) ¹	DO, pH	
		Walker Creek (WLKCH)	DO, pH	
	Goose Lake	Lower Lassen Creek (LOWLC)	pH	
	Lake	McGaugh Slough (MGSLU)	DO	
		Middle Creek (MDLCR)	DO	
Pit River	Fall River (FRRRB) ¹	pH		
	Pit River at Canby (PRCAN)	DO		
	Pit River at Pittville (PRPIT)	DO, pH		
PNSSNS	Coon Creek at Brewer (CCBRW)	DO, pH ²		
	Coon Creek at Striplin (CCSTR) ¹	DO		
Sacramento/ Amador	Cosumnes River (CRTWN)	DO, pH		
	Dry Creek (DCGLT) ¹	pH		
	Grand Island Drain (GIDLR)	DO, pH		
	Laguna Creek (LAGAM) ¹	DO, pH		
Shasta/Tehama	Anderson Creek (ACACR)	DO		
	Coyote Creek (COYTR) ¹	DO		
Solano	Ulatis Creek (UCBRD)	DO, pH		
	Z-Drain (ZDDIX) ¹	DO, pH		

Management Plan Category	Subwatershed	Waterbody (Site ID)	Analyte(s)	Summary of Major Management Plan Activity and Status
DO and pH (continued)	Yolo	Cache Creek (CCCPY) ¹ Tule Canal (TCHWY) ³ Willow Slough (WLSPL)	DO, pH DO, pH DO, pH	
Legacy Pesticides	Butte-Yuba-Sutter	Gilsizer Slough (GILSL)	DDE	Monitored in 2019 to match season of historical exceedances; Request to Complete Management Plan approved Jan. 10, 2020
	Colusa Glenn	Sycamore Slough (RARPP)	DDE	Monitored in 2019 to match season of historical exceedances; Request to Complete Management Plan approved Jan. 29, 2020
	El Dorado	Coon Hollow Creek (COONH)	DDE	Monitored in 2019 to match season of historical exceedances; Request to Complete Management Plan approved Feb. 11, 2020
	Sacramento/ Amador	Grand Island Drain (GIDLR)	DDD, DDE	Monitored in 2018 to match season of historical exceedances; Request to Complete DDD Management Plan approved Apr. 3, 2019; RTC DDE Management Plan approved May 3, 2019
Pathogen Indicators	Butte-Yuba-Sutter	Gilsizer Slough (GILSL) ¹ Lower Honcut Creek (LHNCT) Lower Snake River (LSNKR) Pine Creek (PNCHY) Wadsworth Canal (WADCN) ¹	<i>E. coli</i>	Unless otherwise noted, monitored at all sites in 2019; Other tasks suspended pending Regional Water Board determination of potential new regulatory alternative for irrigated pasture operations. A Bacterial Source Identification Study based on bacteroidales DNA was conducted and completed for the Coalition in 2007. The results of this preliminary study indicated that the majority of bacteria in surface waters sampled were from human sources, and that agricultural contributions from agricultural bovine sources were rare or absent. A Source Evaluation Report for pathogen indicators (<i>E. coli</i>) was also prepared and submitted in 2011. This evaluation integrated SVWQC monitoring data, grower survey reports of implemented practices, and information about agricultural and non-agricultural sources, and concluded that agricultural was unlikely to be a significant contributing source in most monitored drainages. The Coalition submitted to the Regional Water Board on May 1, 2018, a Work Plan to Determine the Need for Pathogen Indicator Management Plans, as required by the Executive Officer [June 13, 2017, comm. from EO]. Regional Water Board staff reviewed the Work Plan, provided informal written comments in September 2018, and held a meeting with the Coalition in December 2018 for further discussion.
		Colusa Glenn		
	El Dorado	North Canyon Creek (NRTCN) ¹		
	Goose Lake	Lower Lassen Creek (LOWLC) ²		
	Lake	McGaugh Slough (MGLSU)		
		Middle Creek (MDLCR)		

Management Plan Category	Subwatershed	Waterbody (Site ID)	Analyte(s)	Summary of Major Management Plan Activity and Status
Pathogen Indicators (continued)	Napa	Pope Creek (PCULB) ¹	<i>E. coli</i> (continued)	In May 2019, the Regional Water Board informed the Coalition that it had begun an investigation with support from University of California Cooperative Extension staff to determine the risk to surface water quality posed by the potential discharge of <i>E. coli</i> from irrigated pasture operations. Regional Water Board staff is currently investigating regulatory alternatives for irrigated pasture operations and is anticipated to provide a recommendation to the Board for its consideration in Summer 2020.
	PNSSNS	Middle Coon Creek (CCBRW)		
	Sacramento/ Amador	Cosumnes River (CRWTN)		
		Dry Creek (DCGLT) ¹ Grand Island (GIDLR) Laguna Creek (LAGAM) ¹		
	Shasta Tehama	Anderson Creek (ACACR) Coyote Creek (COYTR) ¹		
	Solano	Ulatis Creek (UCBRD) Shag Slough (SSLIB) Z-Drain (ZDDIX) ¹		
	Upper Feather River	Indian Creek (INDAB) ¹ Spanish Creek (SPGRN) ¹		
Yolo	Tule Canal (TCHWY) ² Willow Slough (WLSPL)			
Registered Pesticides	Butte-Yuba-Sutter	Gilsizer Slough (GILSL)	Chlorpyrifos	Management Plan submitted to the Regional Water Board on November 30, 2016 and approved on December 16, 2016; monitoring and implementation in progress.
		Pine Creek (PNCHY)	Chlorpyrifos	Management Plan submitted to the Regional Water Board on November 14, 2016 and approved on December 6, 2016; monitoring and implementation in progress.
	Solano	Ulatis Creek (UCBRD)	Chlorpyrifos	MPIPG Addendum submitted in 2013; Management Plan that conforms to WDR requirements was submitted to Regional Water Board on May 2, 2017, and approved on June 19, 2017; Request for completion was submitted on January 23, 2019, and approved on April 2, 2019
	Yolo	Willow Slough (WLSPL)	Diuron	Request for completion submitted on December 10, 2015; Regional Water Board determined that additional monitoring is needed; monitoring and implementation continued. Request to Complete Management Plan approved May 29, 2019
Salinity	Butte-Yuba-Sutter	Gilsizer Slough (GILSL)	EC	Unless otherwise noted, all sites monitored in 2019; Continued active participation in CV-SALTS; SVWQC joined Central Valley Salinity Coalition as funding partner.
		Lower Snake River (LSNKR)	EC	
	Colusa Glenn	Colusa Basin Drain (COLDR)	EC	

Management Plan Category	Subwatershed	Waterbody (Site ID)	Analyte(s)	Summary of Major Management Plan Activity and Status
Salinity (<i>continued</i>)	Colusa Glenn (continued)	Freshwater Creek (FRSHC)	EC	
		Logan Creek ¹ (LGNCR)	TDS	
		Lurline Creek ¹ (LRLNC)	EC	
		Stone Corral Creek ¹ (SCCMR)	EC	
		Sycamore Slough ¹ (RARPP)	EC	
		Walker Creek (WLKCH)	EC	
	Lake	McGaugh Slough (MGSLU)	EC	
Sacramento/ Amador	Dry Creek ¹ (DCGLT) Grand Island Drain (GIDLR)	TDS		
		EC		
Solano	Ulatis Creek (UCBRD) Shag Slough (SSLIB) Z-Drain (ZDDIX)	EC		
		EC		
		EC		
Upper Feather River	Middle Fork Feather River (MFFGR)	EC		
Yolo	Cache Creek ¹ (CCCPY) Tule Canal ² (TCHWY) Willow Slough (WLSPL)	Boron, EC		
		Boron, EC		
		Boron, EC		
Toxicity	Solano	Ulatis Creek (UCBRD)	<i>Selenastrum</i> (<i>unknown water column toxicity</i>)	Outreach actions were taken beginning in November 2017 to address the three <i>Selenastrum</i> toxicity exceedances that triggered the Management Plan. The Regional Water Board approved the Management Plan on November 19, 2018.
			<i>Hyalella</i> (<i>sediment toxicity</i>) ²	Outreach actions were taken beginning in May 2018 to address the initial April 2018 <i>Hyalella</i> sediment toxicity exceedance. The Management Plan was triggered by an exceedance in April 2019. The Regional Water Board approved the Management Plan on Jan. 30, 2020.
	Yolo	Willow Slough (WLSPL)	<i>Ceriodaphnia</i> (chlorpyrifos)	Request for completion submitted on December 10, 2015; Regional Water Board determined that additional monitoring is needed; monitoring and implementation continued. Request to Complete Management Plan approved May 29, 2019
Trace Metals	Butte-Yuba-Sutter	Lower Honcut Creek (LHNCT)	Copper	Management plan submitted to Regional Water Board on January 20, 2017 and approved on March 7, 2017; monitoring and implementation in progress.

Management Plan Category	Subwatershed	Waterbody (Site ID)	Analyte(s)	Summary of Major Management Plan Activity and Status
Trace Metals (continued)	Butte-Yuba-Sutter	Pine Creek (PNCHY)	Copper	Management Plan monitoring initiated in 2016; Management Plan submitted to Regional Water Board on March 24, 2017 and approved on May 4, 2017; monitoring and implementation in progress.
		Lower Snake River (LSNKR)	Arsenic	Monitoring continued in 2019; Source Evaluation submitted August 2013.
	Sacramento/ Amador	Grand Island Drain (GIDLR)	Arsenic	Monitoring continued in 2019.

Notes:

DO = Dissolved Oxygen

EC = Electrical Conductivity

1. Non-representative site. Addressed through representative monitoring.
2. Management Plan triggered during 2019 Monitoring Year
3. Addressed by Delta Regional Monitoring Program (RMP) monitoring.

RESULTS OF MONITORING

Management Plan monitoring was conducted as scheduled in the Coalition's 2019 Monitoring Plan Update, as approved by the Regional Water Board. The results of monitoring conducted in the 2019 monitoring year (October 1, 2018, through September 30, 2019) for all Management Plan analytes through September 2019 have been reported in the Coalition's 2019 Annual Monitoring Report (AMR) and submitted to the Regional Water Board. Additionally, exceedances for all Management Plan sampling conducted from October 1, 2018, through September 30, 2019, have been reported in Exceedance Reports as required by the Coalition's MRP.

The 2019 monitoring year was an "Assessment" Monitoring year for all representative Coalition sites, and most Management Plan monitoring was coordinated with regular scheduled monitoring or conducted independently as needed for specific locations and parameters. Management Plan monitoring for the 2019 monitoring year was conducted at the sites shown in **Figure 1** and the results are summarized below. The results of Management Plan compliance monitoring are summarized in **Table 3**.

It should be noted that the number of sites with active Management Plan requirements – identified by Management Plan Category below – are not always sampled in a given monitoring year if (1) the site is not a representative site for the Coalition, (2) the active Management Plan is not for a registered pesticide, toxicity, or a trace metal, and/or (3) monitoring at a non-representative site without an active Management Plan for a registered pesticide, toxicity, or a trace metal is suspended by the Regional Water Board (e.g., Coalition monitoring in Tule Canal) as part of the Coalition's overall financial support to the Delta Regional Monitoring Program.

DO and pH

There are 25 sites with active Management Plan requirements for DO and 19 sites with active Management Plan requirements for pH.

- There were 129 samples collected for 17 sites with active Management Plan requirements for DO. There were 12 exceedances (9%) of the ILRP Trigger Limit for DO observed at eight sites.
- There were 98 samples collected from 12 sites with active Management Plan requirements for pH. There were seven exceedances observed (8%) of the ILRP Trigger Limit for pH at five sites.

Legacy Pesticides

At the start of the 2019 Monitoring Year, there were three sites with active Management Plan requirements for the legacy pesticide DDE and one site with an active Management Plan requirement for DDD and DDE. Prior to the first legacy pesticide monitoring event scheduled for Grand Island Drain, a Request to Complete the Management Plan for DDD at this site was submitted to the Regional Water Board for approval. Monitoring for DDE at the remaining sites proceeded and Request to Completes were submitted and approved for the remaining sites.

- There were eight DDE samples collected at four sites. All of the samples were non-detect and therefore, did not exceed the ILRP Trigger Limit for DDE.

Pathogen indicators

There are 32 sites with Management Plan requirements for pathogen indicator bacteria. Management Plan tasks for pathogen indicators are currently under review by Regional Water Board staff at the direction of the Executive Officer. The Coalition submitted to the Regional Water Board on May 1, 2018, a Work Plan to Determine the Need for Pathogen Indicator Management Plans, as required by the Executive Officer [June 13, 2017, comm. from EO]. Regional Water Board staff reviewed the Work Plan, provided informal written comments in September 2018, and held a meeting with the Coalition in December 2018 for further discussion. In May 2019, the Regional Water Board informed the Coalition that it had begun an investigation with support from University of California Cooperative Extension staff to determine the risk to surface water quality posed by the potential discharge of *E. coli* from irrigated pasture operations. Regional Water Board staff is currently investigating regulatory alternatives for irrigated pasture operations and is anticipated to provide a recommendation to the Board for its consideration in Summer 2020.

Management Plan monitoring for *E. coli* during the 2019 Monitoring Year consisted of sampling at representative and integration monitoring sites, which resulted in the collection of 132 samples from 15 sites with active Management Plan requirements for pathogen indicators. There were 42 exceedances of the ILRP Trigger Limit for *E. coli* observed at these sites during 2019 monitoring.

Registered Pesticides

The following remarks pertain to the four Coalition sites with active Management Plans for registered pesticides.

- Four samples were analyzed for chlorpyrifos in Gilsizer Slough. No samples exceeded the ILRP Trigger Limit.
- Eight samples were collected for chlorpyrifos in Pine Creek. Chlorpyrifos was not detected in any of the samples.
- Six samples were collected for chlorpyrifos in Ulatis Creek. Chlorpyrifos was not detected in any of the samples.
- One sample was collected for diuron at Willow Slough. Diuron was not detected in the sample. The request for completion of the Management Plan requirements for diuron at Willow Slough was approved by the Regional Water Board on May 29, 2019 (the Management Plan requirements for *Selenastrum* at this site were deemed complete on July 11, 2016).

Salinity

There are 19 sites with active Management Plan requirements for parameters related to salinity (specific conductivity, boron, and TDS). There were 89 sample events for EC at 12 sites, with 16 observed exceedances (18%) of the ILRP Trigger Limit for specific conductivity. Willow Slough also has a Management Plan requirement for boron. Four samples from Willow Slough were analyzed for boron and two of those samples exceeded the ILRP Trigger Limit for this analyte.

Toxicity

- Willow Slough has a Management Plan requirement for *Ceriodaphnia* toxicity and 10 samples were analyzed for toxicity to this test organism. None of the samples were observed to be toxic to *Ceriodaphnia*.
- Ulatis Creek has a Management Plan requirement for *Selenastrum* toxicity and 10 samples were analyzed for toxicity to this test organism. None of the samples were observed to be toxic to *Selenastrum*.
- Two samples were analyzed in 2019 for *Hyaella* toxicity at Ulatis Creek. One of the samples was observed to be toxic to *Hyaella* and triggered a Management Plan at this site since the exceedance marked the second toxic sediment result within a three-year period.

Trace Metals

There were four active Management Plans for trace metals in 2019 for which monitoring was conducted: copper in Pine Creek and Lower Honcut Creek, and arsenic in Grand Island Drain and Lower Snake River.

Five samples were analyzed for copper (total and dissolved; ten analyses in total) in Pine Creek and none exceeded either the 1,300 µg/L Basin Plan objective (Primary MCL) for total copper or the hardness-dependent CTR criterion that serves as the ILRP Trigger Limit for dissolved copper.

Three samples were analyzed for copper (total and dissolved; six analyses in total) in Lower Honcut Creek and none exceeded either the 1,300 µg/L Basin Plan objective (Primary MCL) for total copper or the hardness-dependent CTR criterion that serves as the ILRP Trigger Limit for dissolved copper.

Six samples were collected for arsenic in Grand Island Drain, and the concentration of the trace metal in all of the samples analyzed was above the ILRP Trigger Limit for arsenic (10 µg/L). There are both legacy and a few potential current sources of arsenic. There is very little remaining agricultural use of arsenic-based pesticide products (based on a review of the Department of Pesticide Regulation's (DPR) Pesticide Use Reporting (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 GIDLR 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 and which can potentially make its way into agricultural fields and runoff if the poultry litter is used on the field.

Five samples were analyzed for total arsenic in Lower Snake River and none exceeded the 10 µg/L Basin Plan objective (Primary MCL).

Nutrients

The Coalition has no active Management Plans for nutrients. However, a nutrient-related Management Plan requirement exists for the Clear Lake Nutrient TMDL. Monitoring for this

Management Plan requirement consisted of phosphorus analyses for two sample events at the McGaugh Slough site and four sample events at the Middle Creek site in the Lake County Subwatershed. No water quality objective currently exists for phosphorus in the Sacramento Valley Watershed.

SOURCE EVALUATIONS

There were no new Source Evaluations conducted for Management Plan elements in 2019.

OUTREACH DOCUMENTATION

The Coalition and its subwatersheds continue to work with the Regional Water Board and its staff to implement the Coalition's *Landowner Outreach and Management Practices Communications Process* and the Coalition's approved CSQMP to address exceedances of water quality objectives identified in the Sacramento Valley. The primary strategic approach taken by the Coalition has been 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 objectives or ILRP Trigger Limits. Notifications have initially focused on, but not been limited to, growers who operate directly adjacent to or within proximity to a waterbody showing an exceedance of a water quality objective or ILRP Trigger Limit. The broader outreach program, which includes both grower meetings and the notifications distributed through direct mailings, encourages the adoption of best management practices (BMPs) and modification of the uses of specific farm and wetland inputs to prevent movement of constituents of concern into Sacramento Valley surface waters.

To identify 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 options to address the specific exceedances using BMPs and/or requests for additional information regarding the management practices they currently implement. This same approach has been used to conduct management practice surveys in areas targeted by individual Management Plans.

Descriptions of the outreach and education activities conducted by the Coalition's subwatersheds in 2019 are provided in Appendix F (*SVWQC Outreach Materials*) of the Coalition's 2019 AMR.

MEMBER SURVEYS

Starting in 2014, the WDR required that the Coalition collect and aggregate summarized information from Farm Evaluations. Beginning in 2018, the Regional Board revised the reporting schedule and the Coalition was not required to conduct 2018 Crop Year Farm Evaluations. Farm Evaluations will now be submitted on a five-year cycle beginning with the 2020 Crop Year. The 2017 Farm Evaluations will be the primary source for management practices and member surveys, with additional surveys conducted on an as needed basis (see the Management Plan Status Updates section for a description of Focused Outreach Surveys).

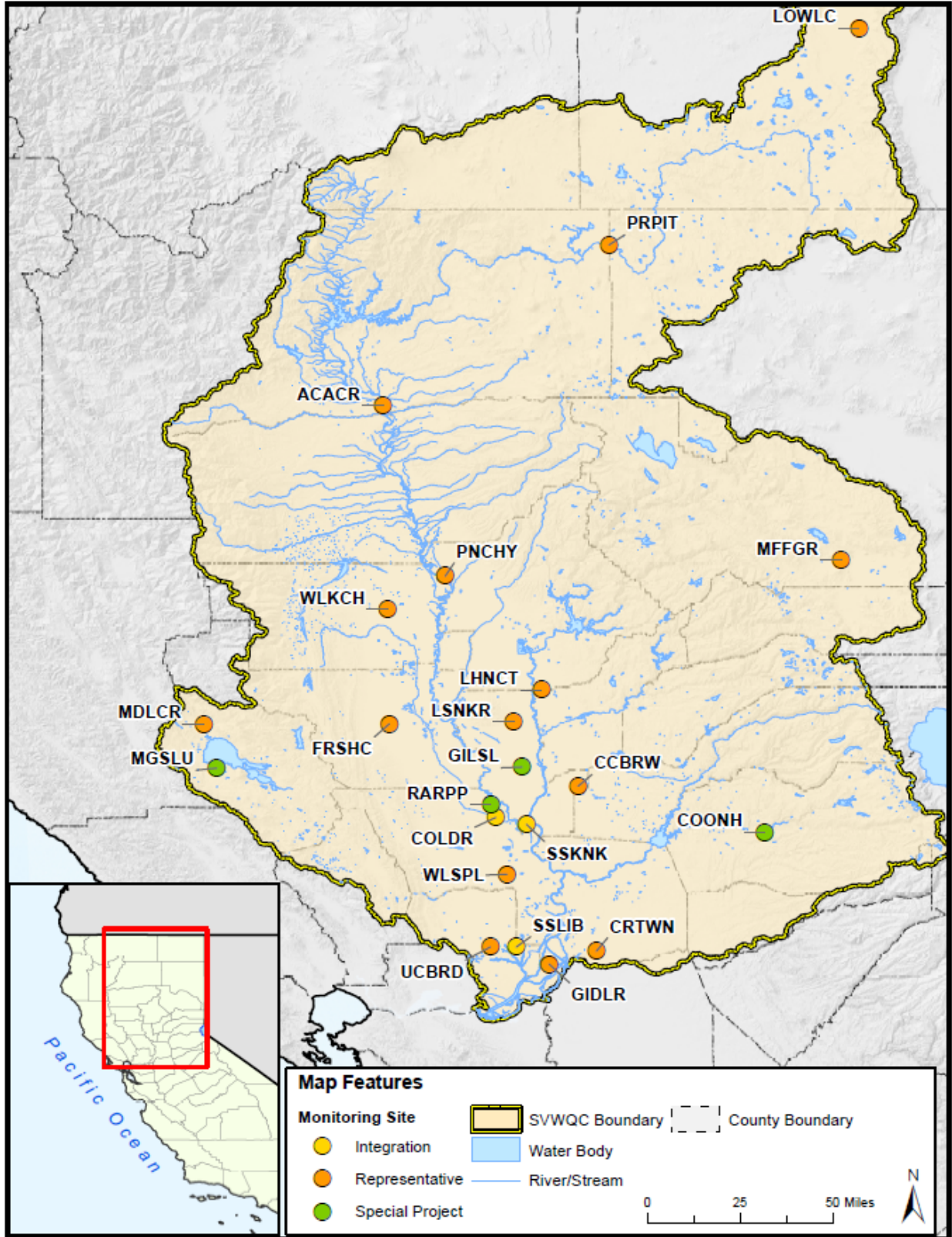


Figure 1. Coalition Monitoring Sites with 2019 Monitoring and Active Management Plans

Table 3. Summary of Management Plan Compliance Monitoring Outcomes (October 2018 to September 2019)

Management Plan Category	Analyte	Subwatershed	Site Name	Analyses	Pesticide Detections	Exceedances
DO and pH	Dissolved Oxygen	Butte-Yuba-Sutter	Gilsizer Slough at George Washington Road	5	NA	0
			Lower Honcut Creek at Hwy 70	10	NA	0
			Lower Snake River at Nuestro Road	11	NA	0
			Pine Creek at Highway 32	11	NA	1
			Sacramento Slough bridge near Karnak	4	NA	1
		Colusa Glenn	Colusa Basin Drain above KL	4	NA	1
			Sycamore Slough	2	NA	1
			Walker Creek near 99W and CR33	12	NA	0
		Lake	McGaugh Slough at Finley Road East	2	NA	0
			Middle Creek u/s from Highway 20	4	NA	0
		Pit River	Pit River at Pittville	2	NA	0
		PNSSNS	Coon Creek at Brewer Road	9	NA	0
		Sacramento/Amador	Cosumnes River at Twin Bridges Road	8	NA	0
			Grand Island Drain near Leary Road	12	NA	3
		Shasta/Tehama	Anderson Creek at Ash Creek Road	10	NA	3
	Solano	Ulatis Creek at Brown Road	12	NA	1	
	Yolo	Willow Slough Bypass at Pole Line	11	NA	1	
	pH	Butte-Yuba-Sutter	Gilsizer Slough at George Washington Road	5	NA	1
			Lower Snake River at Nuestro Road	11	NA	0
		Colusa Glenn	Freshwater Creek	11	NA	0
			Sycamore Slough	2	NA	0
			Walker Creek	12	NA	0
		Goose Lake	Lower Lassen Creek	3	NA	1
Pit River		Pit River at Pittville	2	NA	2	
PNSSNS		Coon Creek at Brewer	9	NA	2	
Sacramento/Amador		Cosumnes River at Twin Cities Road	8	NA	0	
		Grand Island Drain	12	NA	0	
Solano		Ulatis Creek at Brown Road	12	NA	1	

Management Plan Category	Analyte	Subwatershed	Site Name	Analyses	Pesticide Detections	Exceedances
DO and pH	pH	Yolo	Willow Slough Bypass at Pole Line	11	NA	0
Legacy Pesticides	DDE	Butte-Yuba-Sutter	Gilsizer Slough at George Washington Road	2	0	0
		Colusa Glenn	Sycamore Slough	2	0	0
		El Dorado	Coon Hollow Creek	3	0	0
		Sacramento Amador	Grand Island Drain	1	0	0
Pathogen Indicators	<i>E. coli</i>	Butte-Yuba-Sutter	Lower Honcut Creek at Hwy 70	10	NA	3
			Lower Snake R. at Nuestro Rd	11	NA	1
			Pine Creek at Highway 32	11	NA	3
		Colusa Glenn	Colusa Basin Drain above KL	4	NA	0
			Freshwater Creek at Gibson Rd	11	NA	4
			Walker Creek near 99W and CR33	12	NA	8
		Goose Lake	Lower Lassen Creek	3	NA	1
		Lake	Middle Creek u/s from Highway 20	4	NA	0
		PNSSNS	Coon Creek at Brewer Road	9	NA	3
			Sacramento/Amador	Cosumnes River at Twin Bridges Road	8	NA
				Grand Island Drain near Leary Road	12	NA
		Shasta/Tehama	Anderson Creek at Ash Creek Road	10	NA	3
		Solano	Shag Slough at Liberty Island Road	4	NA	1
			Ulatis Creek at Brown Road	12	NA	5
		Yolo	Willow Slough Bypass at Pole Line	11	NA	5
Registered Pesticides	Chlorpyrifos	Butte-Yuba-Sutter	Gilsizer Slough at George Washington Road	4	0	0
			Pine Creek at Highway 32	8	0	0
		Solano	Ulatis Creek at Brown Road	6	0	0
	Diuron	Yolo	Willow Slough Bypass at Pole Line	1	0	0
Salinity	Boron	Yolo	Willow Slough Bypass at Pole Line	4	NA	2
	Conductivity	Butte-Yuba-Sutter	Gilsizer Slough at George Washington Road	5	NA	0
			Lower Snake R. at Nuestro Rd	11	NA	0
		Colusa Glenn	Colusa Basin Drain above KL	4	NA	0
	Freshwater Creek at Gibson Rd	11	NA	3		

Management Plan Category	Analyte	Subwatershed	Site Name	Analyses	Pesticide Detections	Exceedances
Salinity (continued)	Conductivity (continued)	Colusa Glenn	Sycamore Slough	2	NA	0
			Walker Creek near 99W and CR33	12	NA	0
		Lake	McGaugh Slough at Finley Road East	2	NA	1
		Sacramento/Amador	Grand Island Drain near Leary Road	12	NA	3
		Solano	Ulatis Creek at Brown Road	12	NA	7
			Shag Slough	4	NA	0
		Upper Feather River	Middle Fork Feather River above Grizzly Creek	3	NA	0
		Yolo	Willow Slough Bypass at Pole Line	11	NA	2
Toxicity	<i>Ceriodaphnia</i> survival	Yolo	Willow Slough Bypass at Pole Line	10	NA	0
	<i>Hyalella</i> survival	Solano	Ulatis Creek at Brown Road	2	NA	1
	<i>Selenastrum</i> growth	Solano	Ulatis Creek at Brown Road	10	NA	0
Trace Metals	Arsenic	Sacramento/Amador	Grand Island Drain near Leary Road	6	NA	6
		Butte-Yuba-Sutter	Lower Snake R. at Nuestro Rd	5	NA	0
	Copper	Butte-Yuba-Sutter	Lower Honcut Creek at Hwy 70S	6	NA	0
			Pine Creek at Highway 32	10	NA	0

NA = Not applicable

RECOMMENDATIONS FOR MANAGEMENT PLAN MONITORING

Special project monitoring for Management Plan elements includes specific targeted monitoring or studies to address implementation of a TMDL or implementation of an individual Management Plan that results from exceedances. Management Plan monitoring is generally conducted to support source identification or effectiveness assessment, and may include surveys of agricultural practices, as well as water column or sediment sampling. The monitoring sites, special study parameters, Management Plan strategy, implementation steps, and a general schedule for Management Plan implementation have been presented previously in the Sacramento Valley Coalition Group's approved *2009 Management Plan*, approved 2016 CSQMP, individual Management Plans approved by the Regional Water Board since 2016, *Management Plan Progress Reports (2010 – 2018)*, the *Addendum to Sacramento Valley Water Quality Coalition Management Plan: Chlorpyrifos and Diazinon TMDLs*, and in the Coalition's Monitoring Plan Update that is submitted annually for approval by the Executive Officer.

The need for Management Plan monitoring is determined primarily based on the potential to provide useful information for source identification, in establishing causes of toxicity, and to evaluate management practice effectiveness. This monitoring may consist of water column or sediment sampling, field evaluations, or surveys of agricultural practices. Except for monitoring conducted at non-representative sites for legacy organochlorine and current use pesticides, pathogen indicators, and field measurements, Management Plan monitoring performed in 2019 occurred at representative sites for source evaluation and/or compliance purposes. The monitoring proposed and conducted in 2019 was submitted to and approved by the Regional Water Board's Executive Officer on November 5, 2019. The Coalition's approved 2019 Monitoring Plan Update included the required monitoring for Management Plan elements, as well as monitoring required by the Coalition's MRP and TMDLs for chlorpyrifos and diazinon.

Based on the evaluations of Management Plan monitoring results through September 2019 and earlier source evaluation efforts, the Coalition has submitted requests to deem complete the monitoring and other requirements for eight Management Plans, five of which received approval during the 2019 Monitoring Year and the remaining three were approved in the beginning of the 2020 Monitoring Year. These Management Plans are summarized in **Table 4**. With respect to those Management Plans not yet approved, monitoring and implementation of these Management Plans will continue until completion is approved by the Regional Water Board's Executive Officer, as required by the Coalition's MRP.

Table 4. Requests for Completion of Management Plans

Subwatershed	Water Body	Category	Analyte	RTC Status
Butte-Yuba-Sutter	Gilsizer Slough	Legacy Pesticides	DDE	Completion approved (Jan. 10, 2020)
Colusa Glenn	Sycamore Slough	Legacy Pesticides	DDE	Completion approved (Jan. 29, 2020)
El Dorado	Coon Hollow Creek	Legacy Pesticides	DDE	Completion approved (Feb. 11, 2020)
Solano	Ulatis Creek	Registered Pesticides	Chlorpyrifos	Completion approved (Apr. 2, 2019)
Sacramento Amador	Grand Island Drain	Legacy Pesticides	DDD	Completion approved (Apr. 3, 2019)
			DDE	Completion approved (May 3, 2019)
Yolo	Willow Slough at Pole Line	Registered Pesticides	Diuron	Completion approved (May 29, 2019)
		Toxicity	<i>Ceriodaphnia</i>	Completion approved (May 29, 2019)

RTC = Request to Complete Management Plan

NEW MANAGEMENT PLANS

As part of this MPPR, data collected by the Coalition through September 2019 were evaluated to assess the necessity for any new Management Plan requirements. Requirements for new Management Plan elements were based on observations of more than one exceedance in a three-year period, as required by the WDR. Proposed tasks and schedules to implement new Management Plan elements were developed, if necessary. If modifications to the existing scope or schedule for implementation of an approved Management Plan were proposed, then these changes are also described herein, if necessary. Three new Management Plans were triggered as the result of ILRP Trigger Limit exceedances observed in Coalition monitoring conducted from October 2018 through September 2019. Among the three Management Plans triggered during the 2019 monitoring year, one is defined as high priority (sediment toxicity) and two are defined as low priority (pH, *E. coli*), as per the Coalition's Comprehensive Surface Water Quality Management Plan (SVWQC 2016).

A Management Plan for sediment toxicity to *Hyalella azteca* in Ulatis Creek was triggered by an exceedance observed in April 2019; the initial observance of sediment toxicity occurred in April 2018. The Management Plan for Sediment Toxicity to *Hyalella azteca* in Ulatis Creek was submitted to the Regional Water Board in November 2019 and approved on January 30, 2020. This new Management Plan is documented for the first time in this MPPR.

The Management Plan triggered for pH occurred at the Coon Creek at Brewer Road monitoring site (PNSSNS Subwatershed) in January 2019. Because the Regional Water Board is still reviewing the Coalition's analysis of its DO and pH data submitted in July 2018, and has yet to provide the Coalition with recommendations or strategies to limit exceedances of these two water quality parameters in receiving waters, no new management practices will be implemented in the Middle Coon Creek drainage in response to this new Management Plan.

The Management Plan triggered for *E. coli* occurred at the Lower Lassen Creek monitoring site (Goose Lake Subwatershed) in July 2019. In May 2019, the Regional Water Board informed the

Coalition that it had begun an investigation with support from University of California Cooperative Extension staff to determine the risk to surface water quality posed by the potential discharge of *E. coli* from irrigated pasture operations. Regional Water Board staff is currently investigating regulatory alternatives for irrigated pasture operations and is anticipated to provide a recommendation to the Board for its consideration in Summer 2020. Until the Regional Water Board adopts a new regulatory strategy for irrigated pasture, livestock operators in the Goose Lake Subwatershed will continue to implement current management practices to limit or avoid the discharge of *E. coli* to surface waters.

MANAGEMENT PLAN STATUS UPDATES

Management Plans submitted to the Regional Water Board since 2016 (see **Table 2**) have been crafted to conform to the requirements for separate Management Plans elements specified in the Coalition's WDR, Order No. R5-2014-0030. In some ways, these new requirements differ from those set forth in the previously approved 2009 Management Plan. Current Management Plan requirements emphasize a sound Management Plan approach that includes performance goals, mechanisms for achieving goals, quantitative measures of progress, and a schedule for achieving goals. This approach requires more quantitative tracking of outreach and education efforts, as well as pesticide application practices and management practices implemented by growers that are targeted toward eliminating or reducing the concentrations of the constituent for which a particular Management Plan was developed.

In order to track changes in the implementation of specific categories of management practices by growers, the Butte-Yuba-Sutter Water Quality Coalition (BYSWQC) developed a Focused Outreach Survey that is designed to document on an annual basis the management practices implemented by growers who apply the pesticide that is the subject of a particular Management Plan. The initial Focused Outreach Surveys sent to growers in 2017 were used to capture baseline management practice implementation information and subsequent annual surveys are used to track changes in management practice implementation over the course of Management Plan implementation. The implementation status of four active BYSWQC Management Plans approved by the Central Valley Water Board in 2016 and 2017 are discussed below, followed by the discussion of other Management Plans in other subwatersheds.

Chlorpyrifos in Pine Creek

A Management Plan for Chlorpyrifos in Pine Creek was approved by the Regional Water Board on December 6, 2016. An initial Focused Outreach Survey (FOS) was sent to growers in the Pine Creek Drainage and represented drainages on February 1, 2017, to collect baseline information upon which to compare management practice implementation information provided by future surveys from those growers who apply chlorpyrifos. A third annual FOS was sent to growers in the Management Plan area in January 2020.

Activities and water quality measurements related to the satisfaction of this Management Plan's Performance Goals that occurred during the 2019 monitoring year are described below.

Performance Goal Status

PG 1: Chlorpyrifos applied by entity receiving pesticide use permit information from Butte County Agricultural Commissioner's office.

According to the Butte County Agricultural Commissioner's office, 2 restricted material permit holders in Butte County approved to apply chlorpyrifos were provided with pesticide use permit conditions for chlorpyrifos during the calendar year 2019.

PG 2, 3, & 4: Increased education and awareness of (a) end of row shutoff when spraying, (b) mechanisms to control drift, and (c) drift minimization.

Multiple BYSWQC grower meetings were held in Sutter and Butte counties to discuss the chlorpyrifos exceedances that triggered the Management Plan and establish good pesticide application practices. These meetings were held on November 14 and 28, December 5 and 12, 2018, and January 9, 16, 24, and 30, 2019. All eight meetings collectively reached 1,385 growers/pesticide applicators; covering all applicators, not just those applying chlorpyrifos.

PG 5: The tracking of management practices implemented to reduce or prevent the discharge of chlorpyrifos to surface waters in the Pine Creek Drainage and represented drainages is being accomplished through the use of a FOS. FOS forms were sent to 299 BYSWQC members in the Pine Creek Drainage and represented drainages in January 2020 to document the third and fourth years of management practice implementation specifically related to parcels where chlorpyrifos was applied. As a means to capture FOS results through the 2019 monitoring year, BYSWQC members were requested to document their management practices for both the 2018 and 2019 monitoring years during the Year 3 FOS process. The Year 1 (baseline), Year 2, and Year 3 FOS completion statistics are provided in **Table 5**, and the management practice implementation results are shown in **Table 6**.

Table 5. Year 1 (Baseline), Year 2, and Year 3 Focused Outreach Survey Completion Statistics for Chlorpyrifos Applications in the Pine Creek Drainage and Represented Drainages

Survey Year	Time Period Evaluated	# Surveys Sent	# Responses Received	% Received
1 (baseline)	10/1/2015 – 9/30/2016	350	210	60.0
2	10/1/2016 – 9/30/2017	334	209	62.6
3 (Survey 1)	10/1/2017 – 9/30/2018	299	156	52.2
3 (Survey 2)	10/1/2018 – 9/30/2019	299	143	47.8

PG 6: Maintain chlorpyrifos concentrations in Pine Creek at Highway 32 (PNCHY) to below the trigger limit for the organophosphate pesticide.

Monitoring performed at the PNCHY site has shown no exceedances of the chlorpyrifos trigger limit since July 2016, as shown in **Figure 2**. Additionally, the four data points from 2011 that are encompassed by an oval on the figure were collected when the monitoring location represented an isolated pool having water quality conditions that were not representative of contributions from irrigated agriculture. Under the provisions of the Coalition's current Quality Assurance Project Plan (QAPP), the Pine Creek monitoring site would not be sampled under those environmental conditions.

Chlorpyrifos in Gilsizer Slough

A Management Plan for Chlorpyrifos in Gilsizer Slough was approved by the Regional Water Board on December 16, 2016. An initial FOS was sent to growers in the Gilsizer Slough Drainage on March 20, 2017, to collect baseline information upon which to compare management practice implementation information provided by future surveys from those growers who apply chlorpyrifos. A third annual FOS was sent to growers in the Management Plan area in January 2020.

Activities and water quality measurements related to the satisfaction of this Management Plan's Performance Goals that occurred during the 2019 monitoring year are described below.

Performance Goal Status

PG 1: Chlorpyrifos applied by entity receiving pesticide use permit information from Sutter County Agricultural Commissioner's office.

According to the Sutter County Agricultural Commissioner's office, 1 restricted material permit holders in Sutter County approved to apply chlorpyrifos were provided with pesticide use permit conditions for chlorpyrifos during the calendar year 2019.

PG 2, 3, & 4: Increased education and awareness of (a) end of row shutoff when spraying, (b) mechanisms to control drift, and (c) drift minimization.

Multiple BYSWQC grower meetings were held in Sutter and Butte counties to discuss the chlorpyrifos exceedances that triggered the Management Plan and establish good pesticide application practices. These meetings were held on November 14 and 28, December 5 and 12, 2018, and January 9, 16, 24, and 30, 2019. All eight meetings collectively reached 1385 growers/pesticide applicators; covering all applicators, not just those applying chlorpyrifos.

PG 5: Tracking of management practices implemented to reduce or prevent the discharge of chlorpyrifos to surface waters in the Gilsizer Slough Drainage is being accomplished through the use of a FOS. FOS forms were sent to 152 BYSWQC members in the Gilsizer Slough Drainage in January 2020 to document the fourth and fifth years of management practice implementation specifically related to parcels where chlorpyrifos was applied. The Year 1 (baseline), Year 2, and Year 3 FOS completion statistics are provided in **Table 7** and the management practice implementation results are shown in **Table 8**. The baseline FOS survey (Year 1) of growers who applied chlorpyrifos in the Gilsizer Slough Drainage covered applications made during the 2015 calendar year because a chlorpyrifos exceedance was observed in August 2015 shortly before development of the Management Plan. The Year 3 FOS includes surveys of chlorpyrifos applications made in both the 2018 and 2019 calendar years as a means to bring documentation of management practice implementation in the drainage in line with those of the other Management Plans in the Butte-Yuba-Sutter (BYS) Subwatershed.

PG 6: Maintain chlorpyrifos concentrations in Gilsizer Slough at George Washington Blvd (GILSL) to below the trigger limit for the organophosphate pesticide.

Chlorpyrifos monitoring performed at the GILSL site since February 2006 is shown in **Figure 3**. A chlorpyrifos detection (0.023 µg/L) just below the Basin Plan acute objective of 0.025 µg/L was observed on August 22, 2018. This exceedance of the chronic ILRP trigger limit (0.015 µg/L) for chlorpyrifos in Gilsizer Slough extended the Management Plan requirements for the organophosphate insecticide in the drainage through at least the year 2022. The Sutter and Yuba

County Agricultural Commissioners specifically addressed the August 22, 2018, chlorpyrifos exceedance with 120 members during a meeting held specifically for this purpose on November 28, 2018.

Table 7. Year 1 (Baseline), Year 2, and Year 3 Focused Outreach Survey Completion Statistics for Chlorpyrifos Applications in the Gilsizer Slough Drainage

Survey Year	Time Period Evaluated	# Surveys Sent	# Responses Received	% Received
1 (baseline)	1/1/2015 – 12/31/2015	142	82	57.7
2 (survey 1)	1/1/2016 – 12/31/2016	131	67	51.1
2 (survey 2)	1/1/2017 – 12/31/2017	131	67	51.1
3 (survey 1)	1/1/2018 – 12/31/2018	152	76	50.0
3 (survey 2)	1/1/2019 – 12/31/2019	152	77	50.7

Table 8. Year 1 (Baseline), Year 2, and Year 3 Focused Outreach Survey Management Practice Implementation Results for Chlorpyrifos Applications in the Gilsizer Slough Drainage

Pesticide Application and Management Practice Implementation	FOS Responses				
	Year 1	Year 2 (survey 1)	Year 2 (survey 2)	Year 3 (survey 1)	Year 3 (survey 2)
Did you apply chlorpyrifos during the time period evaluated?	No = 63 Don't recall = 2 Yes = 17	No = 62 Don't recall = 0 Yes = 5	No = 62 Don't recall = 0 Yes = 5	No = 72 Don't recall = 0 Yes = 4	No = 75 Don't recall = 0 Yes = 5
Number of growers applying chlorpyrifos who implemented at least one management practice.	17	5	5	4	2
Total number of pesticide application practices implemented by those applying chlorpyrifos.	158	51	51	32	10
Total number of cultural practices for managing sediment and erosion implemented by those applying chlorpyrifos.	82	32	32	19	1
Total number of management practices implemented by those applying chlorpyrifos.	240	83	83	51	11

Lower Honcut Drainage and represented drainages in January 2020 to document the fourth and fifth years of management practice implementation specifically related to parcels where pesticides containing copper were applied. The Year 1 (baseline), Year 2, and Year 3 FOS completion statistics are provided in **Table 9** and the management practice implementation results are shown in **Table 10**. The baseline FOS survey (Year 1) of growers who applied copper in the Lower Honcut Creek Drainage and represented drainages covered applications made during the 2014 and 2015 calendar years because copper exceedances were observed in the waterbody in May of both years, which triggered the development of the Management Plan. The Year 3 FOS includes surveys of applications of pesticides containing copper made in both the 2018 and 2019 calendar years as a means to bring documentation of management practice implementation in the represented area in line with those of the other Management Plans in the Butte-Yuba-Sutter (BYS) Subwatershed.

Table 9. Year 1 (Baseline), Year 2, and Year 3 Focused Outreach Survey Completion Statistics for Copper-Containing Pesticide Applications in the Lower Honcut Drainage and Represented Drainages

Survey Year	Time Period Evaluated	# Surveys Sent	# Responses Received	% Received
1 (baseline)	1/1/2014 – 12/31/2015	340	197	57.9
2 (survey 1)	1/1/2016 – 12/31/2016	314	149	47.5
2 (survey 2)	1/1/2017 – 12/31/2017	314	149	47.5
3 (survey 1)	1/1/2018 – 12/31/2018	389	145	37.3
3 (survey 2)	1/1/2019 – 12/31/2019	389	145	37.3

Table 10. Year 1 (Baseline), Year 2, and Year 3 Focused Outreach Survey Management Practice Implementation Results for Copper-Containing Pesticide Applications in the Lower Honcut Creek Drainage and Represented Drainages

Pesticide Application and Management Practice Implementation	FOS Responses				
	Year 1	Year 2 (survey 1)	Year 2 (survey 2)	Year 3 (survey 1)	Year 3 (survey 2)
Did you apply copper during the time period evaluated?	No = 93 Don't recall = 5 Yes = 99	No = 66 Don't recall = 1 Yes = 82	No = 66 Don't recall = 1 Yes = 82	No = 67 Don't recall = 0 Yes = 78	No = 67 Don't recall = 0 Yes = 78
Number of growers applying copper who implemented at least one management practice.	99	82	82	78	78
Total number of pesticide application practices implemented by those applying copper.	992	808	808	782	818
Total number of cultural practices for managing sediment and erosion implemented by those applying copper.	431	387	387	420	432

Pesticide Application and Management Practice Implementation	FOS Responses				
	Year 1	Year 2 (survey 1)	Year 2 (survey 2)	Year 3 (survey 1)	Year 3 (survey 2)
Total number of management practices implemented by those applying copper.	1423	1195	1195	1202	1250

PG 5: Maintain dissolved copper concentrations in Lower Honcut Creek at Highway 70 (LHNCT) to below the California Toxics Rule (CTR) hardness-dependent criterion for this trace metal.

Monitoring performed at the LHNCT site has shown no exceedances of the CTR hardness-dependent criterion for dissolved copper since May 2015, as shown in **Figure 4**.

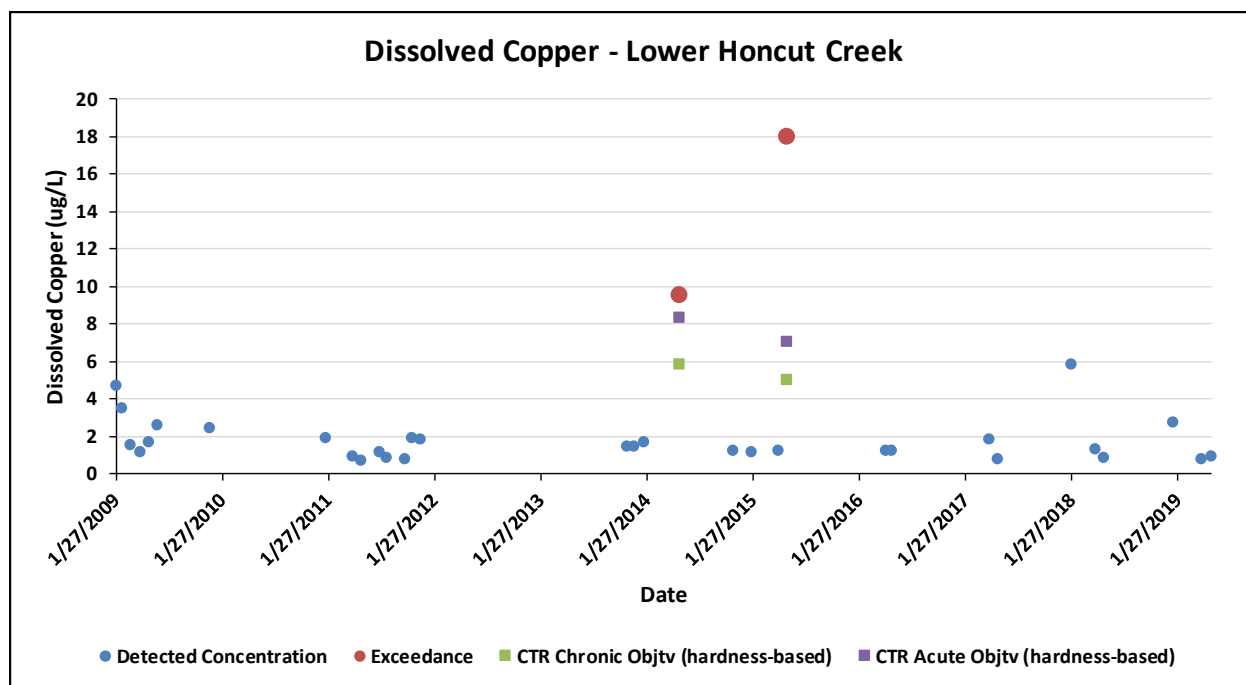


Figure 4. Dissolved Copper Monitoring Results in Lower Honcut Creek at Highway 70: 2009 – 2019

Copper in Pine Creek

A Management Plan for Copper in Pine Creek was approved by the Regional Water Board on May 4, 2017. An initial FOS was sent to growers in the Pine Creek Drainage and represented drainages on February 1, 2017, to collect baseline information upon which to compare management practice implementation information provided by future surveys from those growers who apply pesticides containing copper. A third annual FOS was sent to growers in the Management Plan area in January 2020.

Activities and water quality measurements related to the satisfaction of this Management Plan’s Performance Goals that occurred during the 2019 monitoring year are described below.

Performance Goal Status

PG 1, 2, & 3: Increased education and awareness of (a) end of row shutoff when spraying, (b) mechanisms to control drift, and (c) drift minimization.

Multiple BYSWQC grower meetings were held in Sutter and Butte counties to discuss the copper exceedances that triggered the Management Plan and establish good pesticide application practices. These meetings were held on November 14 and 28, December 5 and 12, 2018, and January 9, 16, 24, and 30, 2019. All eight meetings collectively reached 1,385 growers/pesticide applicators; covering all applicators, not just those applying pesticides containing copper.

PG 4: Tracking of management practices implemented to reduce or prevent the discharge of copper to surface waters in the Pine Creek Drainage and represented drainages is being accomplished through the use of a FOS. FOS forms were sent to 299 BYSWQC members in the Pine Creek Drainage and represented drainages in January 2020 to document the third and fourth years of management practice implementation specifically related to parcels where pesticides containing copper were applied. As a means to capture FOS results through the 2019 monitoring year, BYSWQC members were requested to document their management practices for both the 2018 and 2019 monitoring years during the Year 3 FOS process. The Year 1 (baseline), Year 2, and Year 3 FOS completion statistics are provided in **Table 11**, and the management practice implementation results are shown in **Table 12**.

Table 11. Year 1 (Baseline), Year 2, and Year 3 Focused Outreach Survey Completion Statistics for Copper-Containing Applications in the Pine Creek Drainage and Represented Drainages

Survey Year	Time Period Evaluated	# Surveys Sent	# Responses Received	% Received
1 (baseline)	10/1/2015 – 9/30/2016	350	201	57.4
2	10/1/2016 – 9/30/2017	334	207	62.0
3 (Survey 1)	10/1/2017 – 9/30/2018	299	152	50.8
3 (Survey 2)	10/1/2018 – 9/30/2019	299	140	46.8

Table 12. Year 1 (Baseline), Year 2, and Year 3 Focused Outreach Survey Management Practice Implementation Results for Copper-Containing Pesticide Applications in the Pine Creek Drainage and Represented Drainages

Pesticide Application and Management Practice Implementation	FOS Responses			
	Year 1	Year 2	Year 3 (survey 1)	Year 3 (survey 2)
Did you apply copper during the time period evaluated?	No = 112 Don't recall = 10 Yes = 79	No = 104 Don't recall = 2 Yes = 101	No = 75 Don't recall = 0 Yes = 77	No = 69 Don't recall = 0 Yes = 71
Number of growers applying copper who implemented at least one management practice.	79	101	77	71
Total number of pesticide application practices implemented by those applying copper.	796	978	760	711

Pesticide Application and Management Practice Implementation	FOS Responses			
	Year 1	Year 2	Year 3 (survey 1)	Year 3 (survey 2)
Total number of <i>cultural practices for managing sediment and erosion</i> implemented by those applying copper.	328	360	411	379
Total number of management practices implemented by those applying copper.	1124	1338	1171	1090

PG 5: Maintain dissolved copper concentrations in Pine Creek at Highway 32 (PNCHY) to below the CTR hardness-dependent criterion for this trace metal.

Monitoring performed at the PNCHY site has shown no exceedances of the CTR hardness-dependent criterion for dissolved copper since December 2011, as shown in **Figure 5**.

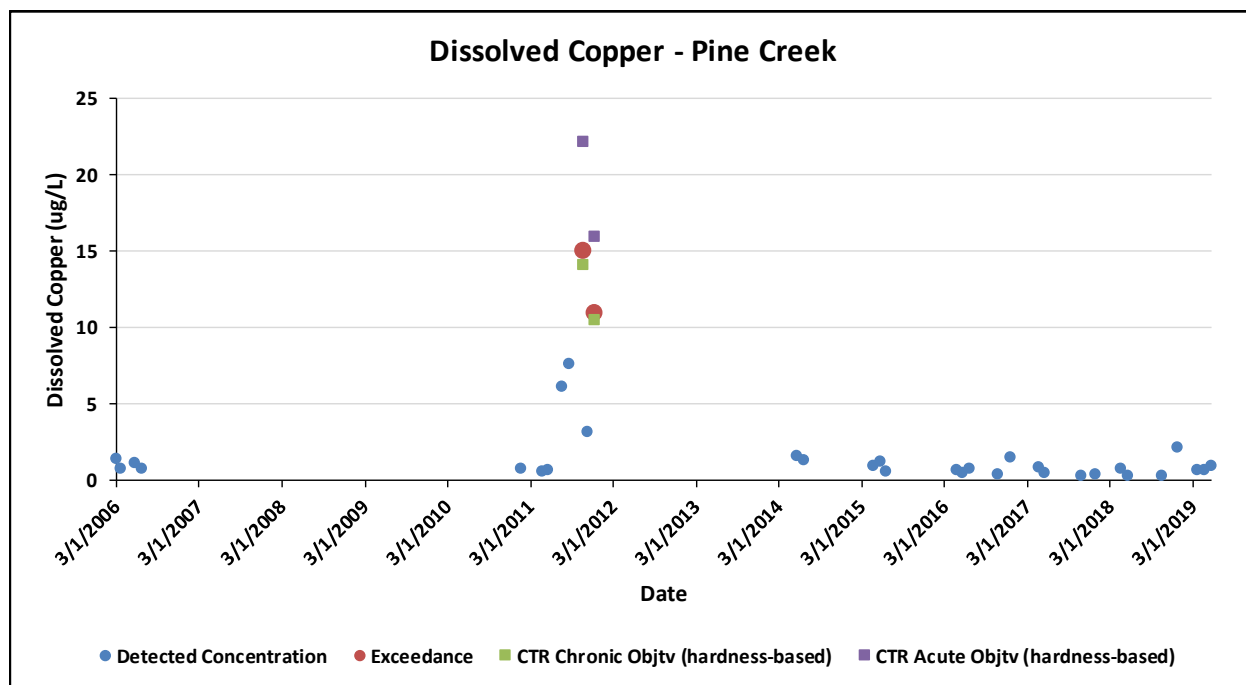


Figure 5. Dissolved Copper Monitoring Results in Pine Creek at Highway 32: 2006 – 2019

Chlorpyrifos in Ulatis Creek

The Dixon/Solano Resource Conservation District Agricultural Water Quality Coalition submitted to the Regional Water Board a Management Practices Implementation and Performance Goals (MPIPG) Report for Chlorpyrifos in Ulatis Creek in March 2013. In 2016, Regional Water Board staff requested that the Coalition review the MPIPG to determine if it conformed to the requirements for separate Management Plans specified in the Coalition’s 2014 WDR because the Management Plan was not yet amenable to completion. The Coalition determined that the existing MPIPG needed to be updated to a Management Plan for

Chlorpyrifos in Ulatis Creek to (1) conform to WDR requirements and (2) comply with chlorpyrifos use requirements related to the establishment of the pesticide as a state-restricted material on July 1, 2015. The Management Plan was submitted to the Regional Water Board on May 2, 2017 and approved on June 19, 2017.

Activities and water quality measurements related to the satisfaction of this Management Plan's Performance Goals that occurred during the 2019 monitoring year are described below. A request to complete the Management Plan was submitted to the Regional Water Board on January 31, 2019, and approved on April 2, 2019.

Performance Goal Status

PG 1: Chlorpyrifos applied by entity receiving pesticide use permit information from Solano County Agricultural Commissioner's office.

According to the Solano County Agricultural Commissioner's office, 44 restricted material permit holders approved to apply chlorpyrifos were provided with pesticide use permit conditions for chlorpyrifos during the calendar year 2019.

PG 2, 3, & 4: Increased education and awareness of (a) end of row shutoff when spraying, (b) mechanisms to control drift, and (c) drift minimization.

Three separate Solano Agricultural Commissioner Pesticide Applicator Training meetings were held on November 13, December 13, 2018, and January 17, 2019. The three meetings collectively reached 154 pesticide applicators; covering all applicators of pesticides, not just those applying chlorpyrifos. In addition, 23 Coalition members were updated on the Chlorpyrifos Management Plan in Ulatis Creek at the Annual Member Informational Meeting held on November 8, 2018, and all 600 members received an update in the annual member newsletter dated October 1, 2018. Additional information regarding these outreach events is provided in Appendix F (*SVWQC Outreach Material*) of the Coalition's 2019 AMR.

PG 5: Tracking of management practices implemented to reduce or prevent the discharge of chlorpyrifos to surface waters in the Cache Slough drainage and represented drainages is being accomplished through the use of Coalition Farm Evaluation data. Pesticide application practices and cultural practices to manage sediment and erosion taken from Coalition Farm Evaluations are presented in **Table 13** for the crop years 2015 – 2017. The 2017 crop year was the most recent year that Coalition members were required to submit a Farm Evaluation. The next Farm Evaluation will be completed for the 2020 crop year and submitted in March 2021. Because all Dixon/Solano Coalition members receive the same outreach and education information, regardless of the pesticides they apply, it is not necessary to track separately the management practice implementation of chlorpyrifos applicators.

Table 13. Comparison of Management Practices Implemented in the Cache Slough Drainage and Represented Drainages in 2015 – 2017 to Prevent Chlorpyrifos from Entering Surface Waters

PRACTICE CATEGORY	2015 % Total Acres (125,454 acres)	2016 % Total Acres (121,236 acres)	2017 % Total Acres (127,088 acres)
Individual Practice			
PESTICIDE APPLICATION PRACTICES			
Follow label restrictions	91.7	91.0	91.1
Avoid surface water when spraying	90.4	89.8	90.0
Monitor wind conditions	89.8	89.9	89.6
County permit followed	88.7	88.0	87.9
Use PCA recommendations	88.3	87.3	86.8
Attend trainings	85.7	85.9	85.4
Monitor rain forecasts	84.6	86.5	86.4
Use appropriate buffer zones	83.4	82.7	82.3
End of row shutoff when spraying	83.0	82.2	83.2
Use drift control agents	81.3	81.9	82.2
Sensitive areas mapped	60.4	59.8	62.8
Reapply rinsate to treated field	54.4	52.9	52.5
Use vegetated drain ditches	37.7	38.7	39.3
Target sensing sprayer used	14.9	16.0	17.1
No pesticides applied	8.6	9.5	9.3
Other1	5.1	4.2	5.1
Chemigation	5.1	4.8	--
No Selection	0.1	0.1	0.02
CULTURAL PRACTICES TO MANAGE SEDIMENT AND EROSION			
Soil water penetration has been increased through the use of amendments, deep ripping and/or aeration.	69.5	69.4	71.3
Crop rows are graded, directed and at a length that will optimize the use of rain and irrigation water.	56.6	60.6	60.5
Minimum tillage incorporated to minimize erosion.	46.7	52.0	51.2
Vegetated ditches are used to remove sediment as well as water soluble pesticides, phosphate fertilizers and some forms of nitrogen.	38.1	40.4	39.4
Cover crops or native vegetation are used to reduce erosion.	33.6	35.8	38.1
Storm water is captured using field borders.	32.1	37.6	36.7
Berms are constructed at low ends of fields to capture runoff and trap sediment.	20.9	22.7	21.6
Sediment basins / holding ponds are used to settle out sediment and hydrophobic pesticides such as pyrethroids from irrigation and storm runoff	18.7	19.7	17.7
Subsurface pipelines are used to channel runoff water.	18.6	18.2	15.9

PRACTICE CATEGORY	2015 % Total Acres (125,454 acres)	2016 % Total Acres (121,236 acres)	2017 % Total Acres (127,088 acres)
Individual Practice			
CULTURAL PRACTICES TO MANAGE SEDIMENT AND EROSION			
Creek banks and stream banks have been stabilized.	13.9	15.1	15.6
Vegetative filter strips and buffers are used to capture flows.	12.3	14.4	17.2
Hedgerows or trees are used to help stabilize soils and trap sediment movement.	9.9	13.9	15.9
No storm drainage due to field or soil conditions.	7.0	6.5	7.9
Other	6.8	5.6	5.6
Field is lower than surrounding terrain.	2.7	3.1	4.5
No Selection	1.3	1.5	0.9

PG 6: Maintain chlorpyrifos concentrations in Ulatis Creek at Brown Road (UCBRD) to below the trigger limit for the organophosphate pesticide.

Monitoring performed at the UCBRD site has shown no exceedances of the chlorpyrifos trigger since May 2015, as shown in **Figure 6**.

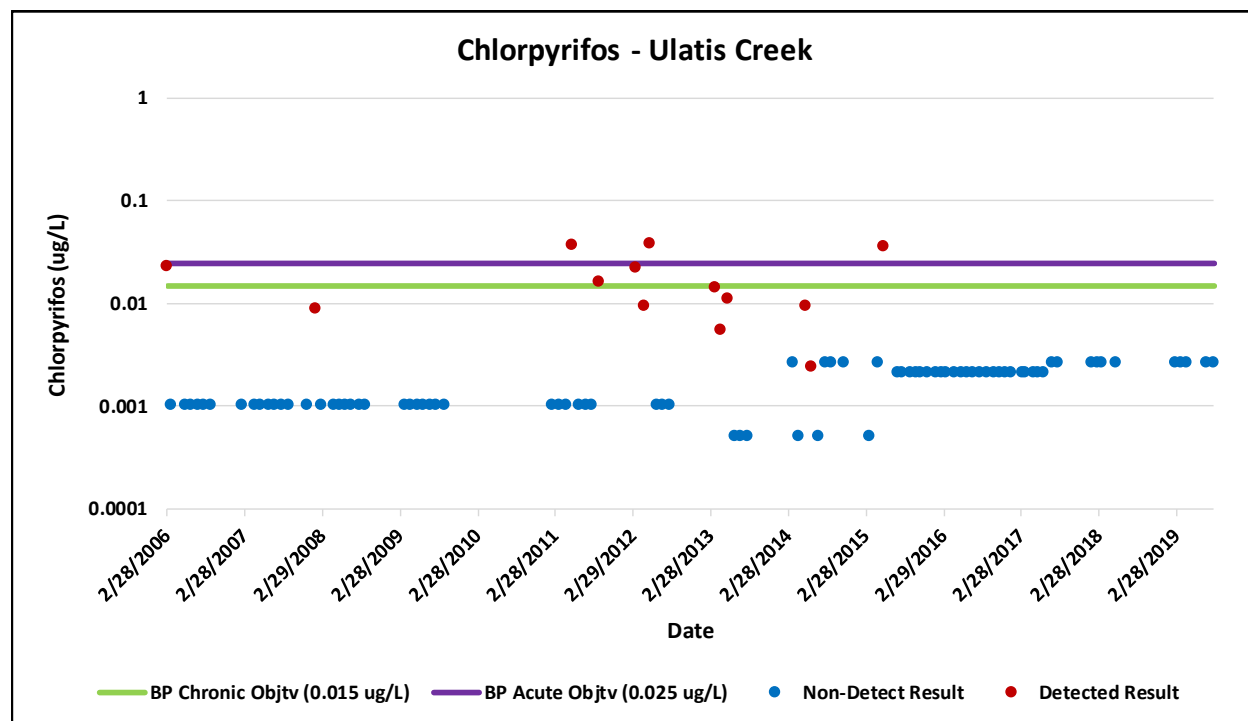


Figure 6. Chlorpyrifos Monitoring Results in Ulatis Creek at Brown Road: 2006 – 2019

Unknown Toxicity to *Selenastrum capricornutum* in Ulatis Creek

Three water column toxicity to algae (*Selenastrum capricornutum*) events were observed in Ulatis Creek in 2015 and 2016 while the Delta Regional Monitoring Program was performing surface water quality monitoring in the waterbody on behalf of the Coalition to satisfy its ILRP monitoring requirements. These toxicity events were observed in September 2015, February 2016, and November 2016. Based on Delta RMP water column pesticides data and inconclusive toxicity identification evaluation (TIE) results for the November 2016 sample, the potential cause of the three observed *Selenastrum* toxicities is unknown. A review of contemporaneous pesticide analyses associated with the three observed toxicity events showed no individual pesticide or collection of pesticides as the potential cause of the observed toxicity when comparing detected pesticide concentrations to relevant ecotoxicology benchmarks for algae. A Management Plan for Unknown Toxicity to *Selenastrum capricornutum* in Ulatis Creek was approved by the Regional Water Board on November 19, 2018.

Activities and water quality measurements related to the satisfaction of this Management Plan's Performance Goals that occurred during the 2019 monitoring year are described below.

PG 1: Maintain education and awareness of herbicide application and runoff management practices that minimize the potential for impacts to surface waters.

Three separate Solano Agricultural Commissioner Pesticide Applicator Training meetings were held on November 13, December 13, 2018, and January 17, 2019. The three meetings collectively reached 154 pesticide applicators; covering all pesticides applied in the subwatershed. In addition, 23 Coalition members were updated on the *Selenastrum* Toxicity Management Plan in Ulatis Creek at the Annual Member Informational Meeting held on November 8, 2018, and all 600 members received an update in the annual member newsletter dated October 1, 2018. Additional information regarding these outreach events is provided in Appendix F (*SVWQC Outreach Material*) of the Coalition's 2019 AMR.

PG 2: Maintain implementation of herbicide application and runoff management practices that minimize the potential for impacts to surface waters in the Cache Slough and represented drainages.

Tracking of management practices implemented to reduce or prevent the discharge of herbicides to surface waters in the Cache Slough drainage and represented drainages is being accomplished through the use of Coalition Farm Evaluation data. Pesticide application practices and culture practices to manage sediment and erosion taken from Coalition Farm Evaluations are presented in **Table 14** for the crop years 2016 and 2017. Because all Dixon/Solano Coalition members receive the same outreach and education information, regardless of the pesticides they apply, it is not necessary to track separately the management practice implementation of herbicide applicators.

Table 14. Comparison of Management Practices Implemented in the Cache Slough Drainage and Represented Drainages in 2016 and 2017 to Prevent Herbicides from Entering Surface Waters

PRACTICE CATEGORY	2016 % Total Acres (121,236 acres)	2017 % Total Acres (127,088 acres)
Individual Practice		
PESTICIDE APPLICATION PRACTICES		
Follow label restrictions	91.0	91.1
Avoid surface water when spraying	89.8	90.0
Monitor wind conditions	89.9	89.6
County permit followed	88.0	87.9
Use PCA recommendations	87.3	86.8
Attend trainings	85.9	85.4
Monitor rain forecasts	86.5	86.4
Use appropriate buffer zones	82.7	82.3
End of row shutoff when spraying	82.2	83.2
Use drift control agents	81.9	82.2
Sensitive areas mapped	59.8	62.8
Reapply rinsate to treated field	52.9	52.5
Use vegetated drain ditches	38.7	39.3
Target sensing sprayer used	16.0	17.1
No pesticides applied	9.5	9.3
Other1	4.2	5.1
Chemigation	4.8	--
No Selection	0.1	0.02
CULTURAL PRACTICES TO MANAGE SEDIMENT AND EROSION		
Soil water penetration has been increased through the use of amendments, deep ripping and/or aeration.	69.4	71.3
Crop rows are graded, directed and at a length that will optimize the use of rain and irrigation water.	60.6	60.5
Minimum tillage incorporated to minimize erosion.	52.0	51.2
Vegetated ditches are used to remove sediment as well as water soluble pesticides, phosphate fertilizers and some forms of nitrogen.	40.4	39.4
Cover crops or native vegetation are used to reduce erosion.	35.8	38.1
Storm water is captured using field borders.	37.6	36.7
Berms are constructed at low ends of fields to capture runoff and trap sediment.	22.7	21.6
Sediment basins / holding ponds are used to settle out sediment and hydrophobic pesticides such as pyrethroids from irrigation and storm runoff	19.7	17.7
Subsurface pipelines are used to channel runoff water.	18.2	15.9
Creek banks and stream banks have been stabilized.	15.1	15.6
Vegetative filter strips and buffers are used to capture flows.	14.4	17.2

PRACTICE CATEGORY	2016 % Total Acres (121,236 acres)	2017 % Total Acres (127,088 acres)
Individual Practice		
CULTURAL PRACTICES TO MANAGE SEDIMENT AND EROSION		
Hedgerows or trees are used to help stabilize soils and trap sediment movement.	13.9	15.9
No storm drainage due to field or soil conditions.	6.5	7.9
Other	5.6	5.6
Field is lower than surrounding terrain.	3.1	4.5
No Selection	1.5	0.9

PG 3: Avoid exceedances (caused by agricultural activities) of ILRP toxicity trigger limit in Ulatis Creek at Brown Road water column samples.

The ILRP trigger limit (based on the Basin Plan’s narrative toxicity objective) for water column toxicity to algae (*Selenastrum capricornutum*) is a statistically significant reduction in growth as compared to the control. The Basin Plan’s narrative toxicity objective exists to control toxic substances in concentrations that produce detrimental responses in human, plant, animal, or aquatic life. The Coalition compares all of its *Selenastrum* monitoring data to this ILRP trigger limit.

Water column toxicity monitoring for algae performed using water samples collected at the UCBRD site has shown no exceedances of the ILRP trigger limit since November 2016, as shown in **Figure 7**.

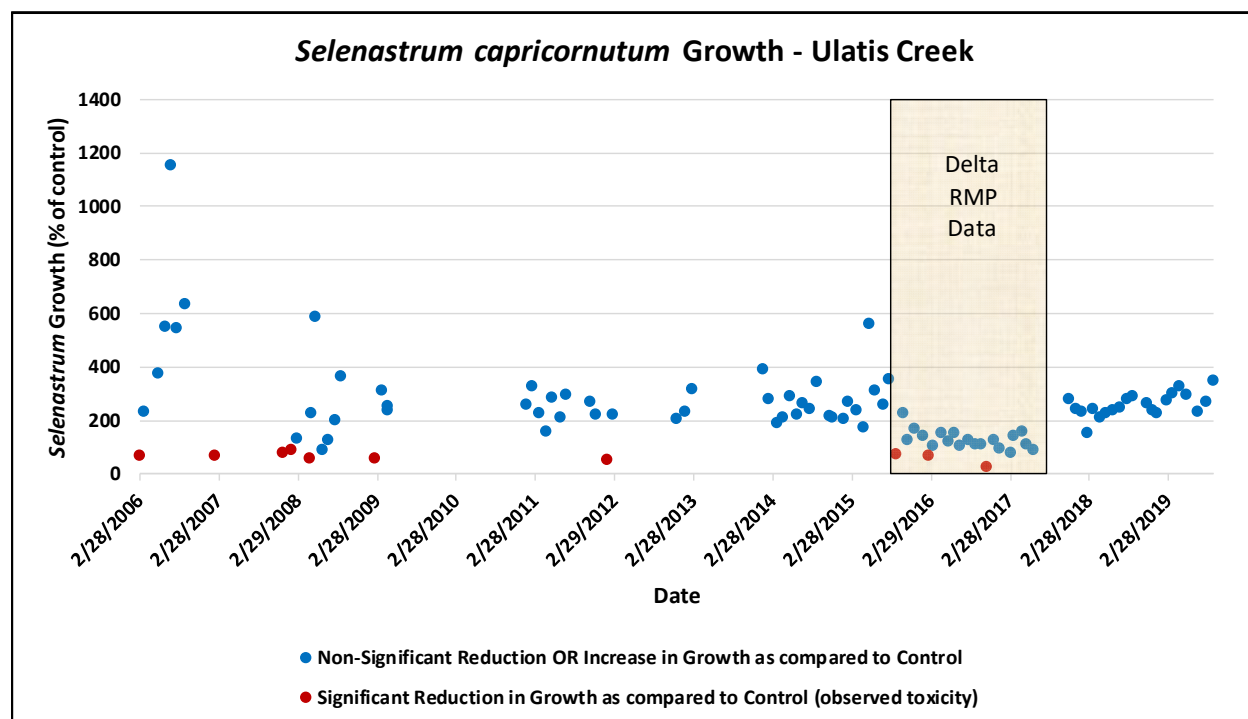


Figure 7. Selenastrum Toxicity Monitoring Results in Ulatis Creek at Brown Road: 2006 – 2019

Sediment Toxicity to *Hyalella azteca* in Ulatis Creek

Two sediment toxicity to amphipod (*Hyalella azteca*) events were observed in Ulatis Creek in April 2018 and April 2019. *Hyalella* is sensitive to a group of synthetic pesticides named pyrethroids that are similar to the natural pesticide pyrethrum. A review of California Department of Pesticide Regulation (CDPR) Pesticide Use Reporting (PUR) data showed pyrethroid applications in the Cache Slough drainage during the two months prior to the observed toxicity exceedances. These pyrethroid applications were made for both agricultural and non-agricultural purposes. Based on the review of contemporaneous sediment pesticide analyses associated with the two observed *Hyalella* sediment toxicity exceedances, no individual pyrethroid or collection of pyrethroids were identified as the potential cause of the *Hyalella* sediment toxicity observed in April 2018 when comparing detected pesticides concentrations to a relevant ecotoxicology benchmark for the freshwater amphipod (Amweg et al., 2005⁶). Sediment pesticide analyses associated with the April 2019 *Hyalella* sediment toxicity exceedance did indicate that the pyrethroids bifenthrin and lambda-cyhalothrin were present in the sediment at concentrations sufficient to cause the observed toxicity to *Hyalella*. A Management Plan for Sediment Toxicity to *Hyalella azteca* in Ulatis Creek was submitted to the Regional Water Board on November 22, 2019 and approved on January 30, 2020. The implementation goals included in the Management Plan are intended to maintain management practices that minimize pyrethroid discharges and prevent sediment toxicity to sensitive invertebrates due to the agricultural uses of pyrethroids in the Cache Slough drainage and represented drainages.

Even through the Management Plan wasn't submitted for approval until the beginning of the 2020 monitoring year, the Solano Subwatershed continued its education and outreach activities related to the initial April 2018 sediment toxicity exceedance as part of its 2019 efforts. Activities and water quality measurements related to the satisfaction of this Management Plan's Performance Goals that occurred during the 2019 monitoring year are described below.

PG 1: Maintain education and awareness of pyrethroid application and runoff management practices that minimize the potential for impacts to surface waters.

Outreach in support of this Management Plan was initially provided to 320 members and pest control advisors (PCAs) on May 24, 2018, shortly after the initial *Hyalella* sediment toxicity exceedance was observed on April 17, 2018. The May 24 email was designed to alert members and PCAs to the April 17 exceedance and remind them to implement BMPs when applying pesticides – especially, pyrethroids – throughout the subwatershed. During the 2019 Monitoring Year, three separate Solano Agricultural Commissioner Pesticide Applicator Training meetings were held on November 13, December 13, 2018, and January 17, 2019. The three meetings collectively reached 154 pesticide applicators; covering all pesticides applied in the subwatershed. Finally, a group comprised of 35 members, 53 PCAs, and 29 pesticide applicators were alerted to the forthcoming Management Plan for Sediment Toxicity to *Hyalella azteca* in Ulatis Creek with a “Save the Date” email on September 12, 2019, to inform attendees of an upcoming meeting on October 17, 2019 for pesticide-related water quality exceedances in the Ulatis Creek drainage. Additional information regarding these outreach events is provided in Appendix F (*SVWQC Outreach Material*) of the Coalition's 2019 AMR.

⁶ Amweg, E.L., D.P. Weston, N.M. Ureda. 2005. Use and toxicity of pyrethroid pesticides in the Central Valley, California, USA. *Environ Toxicol Chem* 24:966-972; Correction: 24L1300-1301.

PG2: Maintain implementation of pyrethroid application and runoff management practices that minimize the potential impacts to surface waters in the Cache Slough drainage and represented drainages.

During the first 18 months of Management Plan implementation and leading up to the Coalition's next Farm Evaluation conducted for the 2020 crop year, Dixon/Solano RCD Water Quality Coalition staff will utilize the Coalition's new online data management system to specifically track (1) pesticide application practices, (2) irrigation practices for managing sediment and erosion, and (3) cultural practices to manage sediment and erosion employed by those growers who apply pyrethroids in the Cache Slough drainage and represented drainages. Information from the 2020 crop year Farm Evaluation as it relates to the implementation of management practices that minimize pyrethroid discharges and prevent sediment toxicity will be presented in the 2020 MPPR. The most recent tabulation of management practices implemented in the Cache Slough drainage and represented drainages was derived from the 2017 Farm Evaluation and presented in **Table 14**.

PG 3: Avoid exceedances (caused by agricultural activities) of ILRP toxicity trigger limit in Ulatis Creek at Brown Road sediment samples.

The ILRP trigger limit (based on the Basin Plan's narrative toxicity objective) for sediment toxicity to a sensitive amphipod (*Hyaella azteca*) is statistically significant toxicity and less than (<) 80% organism survival as compared to controls. The Basin Plan's narrative toxicity objective exists to control toxic substances in concentrations that produce detrimental responses in human, plant, animal, or aquatic life. The Coalition compares all of its *Hyaella* monitoring data to this ILRP trigger limit.

Sediment toxicity results for *Hyaella azteca* using sediment samples collected at the UCBRD monitoring site are shown in **Figure 8**. Only one additional sediment toxicity test was performed during the 2019 monitoring year after the April 2019 sediment toxicity exceedance.

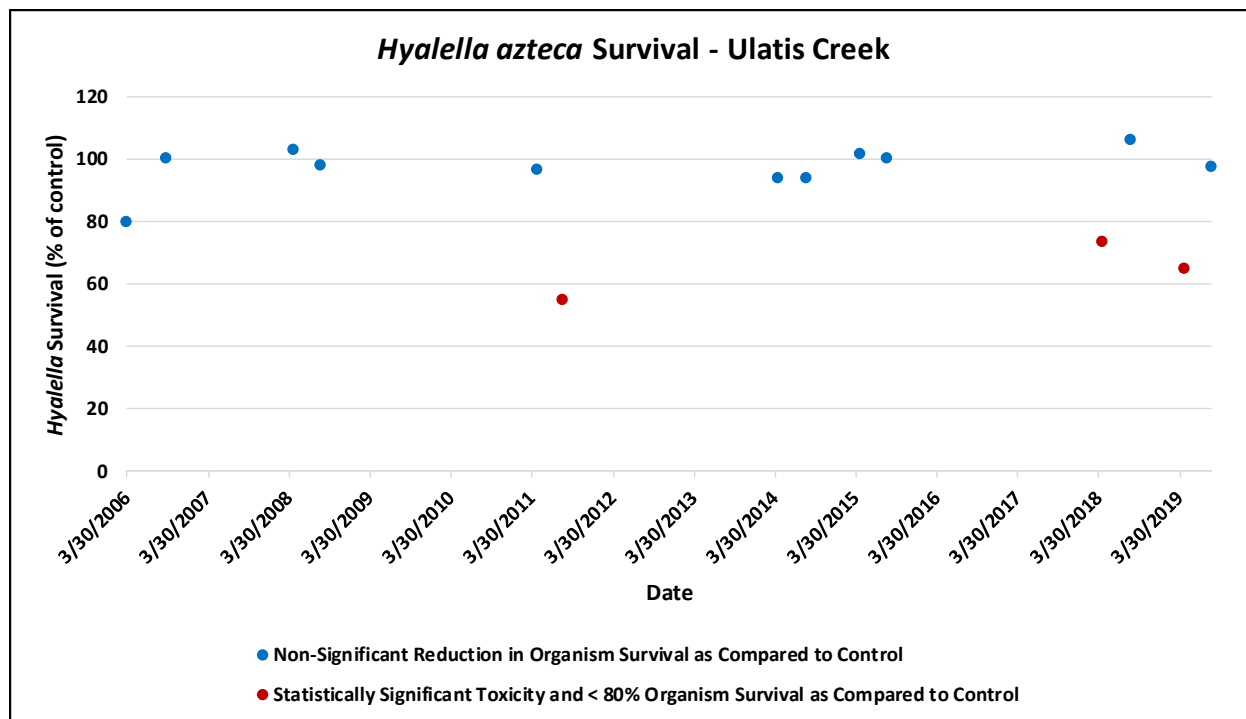


Figure 8. *Hyalella* Sediment Toxicity Monitoring Results in Ulatis Creek at Brown Road: 2006 – 2019

DO and pH Management Plan Approach

Management Plans for dissolved oxygen (DO) and pH were triggered at numerous Coalition monitoring sites during the earliest years of Coalition monitoring and these parameters continue to exceed their relevant water quality objectives (WQOs) at many monitoring sites. The development of DO and pH Management Plans has been given a low priority by the Regional Water Board and the Coalition, relative to other parameters, for the following reasons:

DO and pH show (1) moderate potential for affecting aquatic life; (2) low probability of affecting other uses; (3) low probability of significant direct agricultural sources with high probability of natural causes; (4) long-term management of multiple sources likely required even with successful management of agricultural sources; and (5) lower probability of meeting WQOs by implementing management practices.

Regional Water Board Management decided in 2016 to pursue the development of DO and pH Management Plans for all Central Valley Coalitions where such Management Plans have been triggered and asked the SVWQC to develop a Management Plan approach/methodology for these two parameters.

The Coalition has pursued a multistep analysis approach that used statistical methods (conventional parametric multiple regression/ANOVA and non-parametric methods (Spearman's rank-order correlation)) and typical graphical methods to first evaluate all Coalition DO and pH data for relationships with non-agricultural environmental event-based factors including: flow, water temperature, time of day, time of year (season), event type (wet/dry), and electrical conductivity (EC was included as a factor only in the pH regression analysis). Statistics were

calculated for each site for frequency of exceedance and residuals of regression on non-agricultural environmental factors. These tasks constituted Step 1 of the analysis. The results of Step 1 provided the following information:

- The DO regression model explained 21% of observed variability in DO concentration; and
- The pH regression model explained 15% of observed variability in pH concentrations.

Step 2 of the analysis evaluated the relationships between relevant drainage (site) characteristics and DO or pH exceedance statistics for each site using the Spearman's rank-order correlation. Drainage characteristics were divided into the following two groups with a check for inter-relationship between agricultural and non-agricultural characteristics, as necessary:

Agricultural-related Characteristics: percent (%) irrigation method, average nutrient concentration, and percent (%) implementation of sediment and erosion control practices.

Non-Agricultural Characteristics: average gradient, drainage size, and elevation.

The correlation analysis was used to determine the strength of the relationships between both the agricultural-related characteristics and the non-agricultural characteristics and observed exceedances of WQOs. The results of Step 2 provided the following information:

- The agricultural practice of laser leveling fields was the only practice identified as statistically significant, with a negative relationship between (a) implementation and median DO and pH water column concentrations, and (b) exceedances of the WQO for pH;
- Nitrate showed a significant positive relationship between its median concentration and median DO concentrations in the water column;
- Phosphorus showed a significant negative relationship between (a) its median concentration and median DO and pH water column concentrations, (b) a positive relationship between its median concentration and exceedances of the WQO for DO, and (c) a negative relationship between its median concentration and exceedances of the WQO for pH.
- Total organic carbon showed a significant negative relationship between (a) its median concentration and median DO water column concentrations, and (b) a positive relationship between its median concentration and exceedances of the WQO for DO.

The above results were presented to Regional Water Board staff during two separate meetings held on September 22, 2017, and March 1, 2018. With respect to the absence of significant relationships between percent implementation of agricultural-related practices and exceedances of WQOs for DO and pH at the current levels of management practice implementation (with the noted exception of laser leveling), it bears noting that additional implementation of management practices would not be expected to influence observed rates of WQO exceedances for DO and pH. Additionally, it should be noted that because phosphorus naturally occurs in soils of the Sacramento Valley, the agricultural use of phosphorus has little effect on DO exceedances.

The Coalition provided to the Regional Water Board's Executive Officer a summary report of these two statistical analyses on July 23, 2018. The Coalition has yet to receive any comments on its summary report, nor recommendations or strategies to limit exceedances of these two water quality parameters in receiving waters.

Pathogen Indicator Management Plans

Since the beginning of the Coalition's Monitoring Program, Management Plans for *E. coli* have been triggered at many Coalition monitoring sites. The indicator bacteria, *E. coli*, is used as a surrogate for waterborne pathogens when monitoring streams to assess potential impacts to human health. These triggered Management Plans were suspended by the Executive Officer of the Regional Water Board in a letter dated December 5, 2011, that stated the Board would develop a region-wide approach to the management of pathogens. Before and after the suspension by the Regional Water Board, the Coalition has produced reports outlining the various potential sources of pathogens measured at its monitoring sites. In 2007, the Coalition conducted a Pathogen Source Identification Study, which used Quantitative Polymerase Chain Reaction (qPCR) analysis targeting genetic markers to determine the source(s) of the *E. coli* measured in Coalition water quality samples. In March 2011, LWA submitted a Pathogen Indicator Source Evaluation Report (2011 SER), which analyzed Coalition monitoring data, survey results, and information relating to other pathogen sources to classify a subset of drainages as not requiring a monitoring plan.

All Central Valley Agricultural Water Quality Coalitions received a letter from the Executive Officer dated June 13, 2017, that requested third-party groups to develop a strategy for addressing agricultural discharges of *E. coli* in their jurisdictions. The Coalition submitted to the Regional Water Board a draft Work Plan to Determine the Need for Pathogen Indicator Management Plans (Work Plan) on May 1, 2018. The Coalition received informal written comments from Regional Water Board staff on the draft Work Plan in September 2018 and followed this with an in-person discussion with staff to discuss the comments and other related items on December 5, 2018. The Coalition was making revisions to its Work Plan in Spring 2019 when Regional Water Board staff informed the Coalition via conference call on May 24, 2019, that it had begun an investigation with support from University of California Cooperative Extension staff to determine the risk to surface water quality posed by the potential discharge of *E. coli* from irrigated pasture operations, and that further development of the Work Plan should be stopped. Regional Water Board staff is currently investigating regulatory alternatives for irrigated pasture operations and is anticipated to provide a recommendation to the Board for its consideration in Summer 2020. Until the Regional Water Board adopts a new regulatory strategy for irrigated pasture, livestock operators throughout the Coalition will continue to implement current management practices to limit or avoid the discharge of *E. coli* to surface waters.

Deliverables and Schedule for Active Management Plan Elements

Deliverables to be completed in 2020 for existing Management Plans are listed in **Table 15**. The specific tasks for these existing Management Plans have been provided earlier in this document, as well as presented in detail in previously submitted Management Practices Implementation and Performance Plans (MPIPGs) and separate Management Plans.

Table 15. 2020 Deliverables for Active Management Plans

Analyte Category	Analytes	Subwatershed	Water Body	Status	Next Deliverable
Registered Pesticides	Chlorpyrifos	Butte-Yuba-Sutter	Gilsizer Slough	Continue monitoring and implementation of Management Plan	Provide annual information on Performance Goal achievement
	Chlorpyrifos	Butte-Yuba-Sutter	Pine Creek	Continue monitoring and implementation of Management Plan	Submit RTC Late Spring 2020
Toxicity	<i>Selenastrum</i> (Unknown Water Column Toxicity)	Solano	Ulatis Creek	Management Plan approved November 19, 2018; continue monitoring and implementation of Management Plan	Provide annual information on Performance Goal achievement
	<i>Hyaella</i> (Sediment Toxicity)	Solano	Ulatis Creek	Management Plan approved January 30, 2020; continue monitoring and implementation of Management Plan	Provide annual information on Performance Goal achievement
Trace Metals	Arsenic	Sacramento Amador	Grand Island Drain	Continue monitoring; SER submitted in 2013	None established
	Arsenic	Butte-Yuba-Sutter	Lower Snake River	Continue monitoring	None established
	Copper	Butte-Yuba-Sutter	Lower Honcut Creek	Continue monitoring and implementation of Management Plan	Submit RTC Late Spring 2020
	Copper	Butte-Yuba-Sutter	Pine Creek	Continue monitoring and implementation of Management Plan	As above
Pathogen Indicators	<i>E. coli</i>	Butte-Yuba-Sutter, Colusa Glenn, Lake, Napa, Sacramento-Amador, Shasta-Tehama, Solano, Upper Feather River, Yolo	32 water bodies	Monitoring required; other tasks suspended pending potential new regulation of discharges from irrigated pasture by Regional Water Board	No deliverable requirements established

Analyte Category	Analytes	Subwatershed	Water Body	Status	Next Deliverable
Salinity	Conductivity, TDS, Boron	Butte-Yuba-Sutter, Colusa Glenn, Lake, Sacramento-Amador, Solano, Yolo, Upper Feather River, Yolo	19 water bodies	Monitoring required; tasks to be conducted pursuant to Notice to Comply letter from Regional Water Board regarding implementation of Central Valley Salt and Nitrate Control Program	To be determined
DO and pH	DO, pH	Butte-Yuba-Sutter, Colusa Glenn, Lake, Sacramento-Amador, Shasta Tehama, Pit River, PNSSNS, Solano, Yolo	33 water bodies	Monitoring required; Coalition submitted summary report of DO and pH analyses on July 23, 2018	No deliverable requirements established

Notes:

RTC = Request to Complete Management Plan

TMDL COMPLIANCE REPORTING

Chlorpyrifos and Diazinon TMDL

Based on the results of the routine Coalition and TMDL monitoring, compliance with the TMDL water quality objectives and load allocations is achieved in the overwhelming percentage of samples. These results demonstrate that outreach and education, the resulting changes in use patterns and changes in management practices, and modifications to pesticide labeling have been successful in reducing instream ambient concentrations of chlorpyrifos and diazinon to the degree required by the TMDL. The relatively low rate of exceedances since the beginning of the Coalition's ILRP monitoring suggests that many of the changes were successfully implemented prior to or soon after 2005. Although exceedances are still occasionally observed, the overall trend from 2005 through September 2018 has been a decrease in the rate of annual exceedances. Exceedances observed in the TMDL tributaries monitored for compliance were determined unlikely to cause exceedances of the TMDL Load Allocations in the named TMDL receiving water bodies under any reasonably probable scenario.

Continuing efforts to further reduce exceedances are being implemented through the Coalition Management Plans for sites that have triggered Management Plan requirements for these pesticides. Currently, the Coalition only has two active Management Plans for chlorpyrifos; no Management Plans for diazinon. Additionally, the Coalition aggressively investigates all exceedances and conducts follow-up contact with growers reporting applications that have the potential to cause specific observed exceedances. These combined efforts and the establishment of state-restricted material status for chlorpyrifos as of July 1, 2015, are expected to result in a continuation of the decreasing trend in the number of exceedances for both pesticides.

Clear Lake Nutrient TMDL

In 2006, the Regional Water Board adopted the Clear Lake Nutrient TMDL with the goal of achieving a 40% reduction in non-point source contributions. The Coalition provided information to assist in the 2012 update of the TMDL. In July 2016, the Coalition prepared a second memorandum⁷ to support Regional Water Board staff in its 2016 update of the Clear Lake Nutrient TMDL. The 2016 memorandum provides follow-up responses to a set of questions originally asked by Regional Water Board staff in 2011. A summary of this memorandum was included in the 2017 MPPR.

SUMMARY: EVALUATION OF MANAGEMENT PLAN PROGRESS

The Coalition's Management Plan approach implements the processes and elements that are outlined in the Coalition's Water Quality Management Plan (2009 Management Plan), which was reorganized into the Comprehensive Surface Water Quality Management Plan (CSQMP) in 2015. The Coalition's approved CSQMP was most recently updated in November 2016. The CSQMP complies with the requirements set forth in the Coalition's Waste Discharge Requirements (WDR), Order No. R5-2014-0030, and associated Monitoring and Reporting Program (MRP) adopted by the Regional Water Board in March 2014.

⁷ *Memorandum: Clear Lake Nutrient TMDL Progress Information Update Request: July 15, 2016. Prepared for the Sacramento Valley Water Quality Coalition by Larry Walker Associates, Davis, CA.*

In general terms, the processes to meet the requirements of the Management Plan can be distilled to these elements – source evaluation, identification of management practices needed to address exceedances, implementation of management practices, evaluation of effectiveness, and regular assessment of progress toward completion of the Management Plan. The Coalition has successfully developed and implemented processes for source evaluation and identification of management practices needed. Source evaluations have been completed and provided to the Regional Water Board for a large number of Management Plan requirements for pesticides, toxicity, pathogen indicators, and legacy organochlorine pesticide exceedances.

Changes in practices and implementation of additional management practices to minimize discharges of waste contributing to exceedances have been ongoing since the ILRP was initiated, as a result of the outreach and education efforts of the Coalition and its members and partners. Specific trackable goals (identified in Management Practice Implementation and Performance Goals or MPIPGs) for a number of pesticide and toxicity Management Plans were developed and submitted to the Regional Water Board beginning in 2011. Although most of these MPIPGs were never comprehensively reviewed by the Board, implementation of management practices to meet these goals was initiated in the subwatersheds in anticipation of Regional Water Board approval. Assessment of progress toward specific implementation goals will continue to be conducted regularly as documented in individual approved MPIPG documents and as required by the current WDR and approved CSQMP until these pre-2014 Management Plans are completed.

With regard to new Management Plans developed pursuant to the WDR and CSQMP and submitted to the Regional Water Board beginning in 2016, assessment of progress toward completion of the Management Plan will be based on the tracking of actions focused on reducing the risk of exceedances of the target constituent above its water quality objective (WQO) and thus, helping to improve surface water quality in the representative drainage and represented drainages, as applicable. Actions will be implemented by responsible parties (subwatershed leads and staff, along with their designees) according to a schedule that results in compliance with a specific WQO in a time frame that is as short as practicable, but may not exceed 10 years from the date the Management Plan was submitted for approval by the Regional Water Board's Executive Officer.

The approach to managing a target constituent will include the establishment of performance goals meant to reduce the discharge of the constituent to surface waters. Performance goals are typically represented as changes in behaviors of those applying a particular constituent (pesticide). A typical mechanism for achieving changes in behaviors is through general outreach and education to growers and applicators, as well as targeted outreach and education to growers and applicators who apply a pesticide in the drainage where the Management Plan exists. A quantitative measure of progress is evaluated based on achievement of outreach and education goals, along with the tracking of changes in behaviors as measured by the frequency of implementation of specific management practices likely to reduce the discharge of a target constituent to surface waters. The frequency of management practices implementation is measured at the beginning of the Management Plan (baseline management practices assessment – using the annual Farm Evaluation or Focused Outreach Surveys) and over time as growers and applicators are exposed to continued outreach and education and as subsequent water quality monitoring data are collected. Management practices implementation will commonly be reassessed on an annual basis. Finally, the Coalition, subwatersheds, and Regional Water Board

staff will assess the achievement of performance goals according to the schedule for their attainment included in an approved Management Plan and reported in annual MPPRs.

Meeting water quality objectives is the ultimate goal and measure of effectiveness of the implemented management practices and progress for the Management Plan. Water quality monitoring to measure this progress is ongoing and assessed annually and has resulted in the completion of 41 Management Plans to date. As measured by the completion and ongoing work on specific Management Plan tasks and deliverables summarized above and documented throughout this MPPR, the Coalition continues to make good progress toward meeting these requirements and expects to achieve the goals of the current approved CSQMP.

PROPOSED CHANGES TO THE COMPREHENSIVE SURFACE WATER QUALITY MANAGEMENT PLAN

The Coalition's approved 2009 Management Plan was reorganized into a Comprehensive Surface Water Quality Management Plan (CSQMP) in 2015 to meet the requirements of the Coalition's WDR, Order No. R5-2014-0030, and associated Monitoring and Reporting Program (MRP) adopted by the Regional Water Board in March 2014. The Coalition's approved CSQMP was most recently updated in November 2016. The Coalition currently proposes no changes to the 2016 CSQMP.