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SACRAMENTO VALLEY WATER QUALITY COALITION

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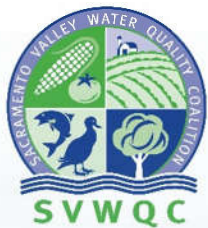
# Water Quality Management Plan Progress Report

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# TABLE OF CONTENTS

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EXECUTIVE SUMMARY .....	V
Management Plan Monitoring .....	v
New Management Plans.....	vi
Evaluation of Progress .....	vii
MANAGEMENT PLAN PROGRESS REPORT .....	1
Results of Monitoring.....	9
DO and pH.....	9
Pathogen indicators.....	9
Registered Pesticides.....	10
Salinity .....	10
Toxicity.....	11
Nutrients.....	11
Source Evaluations .....	11
Outreach Documentation .....	11
Member Surveys .....	12
Recommendations for Management Plan Monitoring.....	17
New Management Plans .....	18
Management Plan Status Updates.....	19
Diazinon in Gilsizer Slough.....	20
Pyrethroids in Lower Snake River .....	23
Pyrethroids in Pine Creek .....	25
Pyrethroids in Lower Honcut Creek.....	28
Sediment Toxicity to <i>Hyalella azteca</i> in Ulatis Creek .....	30
DO and pH Management Plan Approach .....	32
Pathogen Indicator Management Plans .....	34
Deliverables and Schedule for Active Management Plan Elements .....	35
TMDL Compliance Reporting .....	38
Summary: Evaluation of Management Plan Progress.....	39
Proposed Changes to the Comprehensive Surface Water Quality Management Plan .....	40

## LIST OF TABLES

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Table 1. Management Plan Progress Report Requirements.....	2
Table 2. Summary of Management Plan Task Activity .....	4
Table 3. Summary of Management Plan Compliance Monitoring Outcomes (October 2021 through September 2022).....	14
Table 4. Requests for Completion of Management Plans .....	18
Table 5. Baseline 2019 Focused Outreach Survey and 2020–2022 MPIR Completion Statistics for Diazinon Applications in the Gilsizer Slough Drainage.....	21
Table 6. Baseline 2019 Focused Outreach Survey and 2020–2022 MPIR Survey Management Practice Implementation Results for Diazinon Applications in the Gilsizer Slough Drainage.....	21
Table 7: 2021 MPIR Completion Statistics for Pyrethroid Pesticide Applications in the Lower Snake River Drainage and Represented Drainages.....	24
Table 8: Baseline 2021 MPIR Survey Management Practice Implementation Results for Pyrethroid Pesticide Applications in the Lower Snake River Drainage and Represented Drainages.....	24
Table 9: 2021 MPIR Completion Statistics for Pyrethroid Pesticide Applications in the Pine Creek Drainage and Represented Drainages.....	27
Table 10: Baseline 2021 MPIR Survey Management Practice Implementation Results for Pyrethroid Pesticide Applications in the Pine Creek Drainage and Represented Drainages .....	27
Table 11. 2021 Deliverables for Active Management Plans .....	36

## LIST OF FIGURES

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Figure 1. 2022 Monitoring Year Coalition Sites Visited for Regular and Management Plan Monitoring...	13
Figure 2. Diazinon Monitoring Results in Gilsizer Slough at George Washington Blvd: 2006–2022 .....	22
Figure 3: Pyrethroid Pesticides Monitoring Results in Lower Snake River at Nuestro Road: October 2020–September 2022 .....	25
Figure 4: Pyrethroid Pesticides Monitoring Results in Pine Creek at Highway 32: October 2020–September 2022 .....	28
Figure 5: Pyrethroid Pesticides Monitoring Results in Lower Honcut Creek at Highway 70: October 2020–September 2022 .....	30
Figure 6. <i>Hyalella</i> Sediment Toxicity Monitoring Results in Ulatis Creek at Brown Road: 2006 – 2022 ....	32

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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 (Central Valley 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. R5-2014-0030-11 (most recently amended by Order No. R5-2023-0001), specify the requirements for separate SWQMPs and allow the Coalition the option of submitting separate, site-specific 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 site-specific Management Plans developed since September 2016 are included as addenda to the CSQMP. The annual updates discussing the implementation of the Coalition’s CSQMP and site-specific Management Plans 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 into the following 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 a site-specific Management Plan. The Coalition has successfully developed and implemented processes for source evaluation and identification of management practices needed. Source evaluations historically have been completed and provided to the Central Valley 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. Management Plan monitoring performed during the 2022 Monitoring Year (October 2021 through September 2022) occurred at representative, special project, and integration sites for source evaluation and/or compliance purposes. The monitoring proposed and conducted during the 2022 Monitoring Year was submitted to and approved by the Central Valley Water Board’s Executive Officer on September 17, 2021. The Coalition’s approved 2022 Monitoring Plan Update included the required monitoring for Management Plan elements, assessment monitoring in subwatersheds with Reduced Monitoring Options, pyrethroid pesticide baseline monitoring as required in the Central Valley Water Board’s *Amendment to the Water Quality Control Plan for*

*the Sacramento River and San Joaquin River Basins for the Control of Pyrethroid Pesticide Discharges* in Resolution R5-2017-0057<sup>1</sup> (Pyrethroid Pesticide Basin Plan Amendment (BPA)), as well as monitoring required by the Coalition’s MRP and TMDLs for nutrients in Clear Lake and chlorpyrifos and diazinon in the Sacramento and Feather Rivers and Sacramento-San Joaquin Delta.

## **New Management Plans**

As part of this MPPR, data collected by the Coalition through September 2022 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.

A single new Management Plan was triggered as the result of an ILRP Trigger Limit exceedance observed in Coalition monitoring conducted from October 2021 through September 2022. The new Management Plan is for pyrethroid pesticides in Lower Honcut Creek, which is defined as a high priority (pesticides) Management Plan as per the Coalition’s CSQMP (SVWQC 2016). The exceedance that triggered the Management Plan was observed in January 2022 and the initial pyrethroid pesticide exceedance occurred in September 2021. The Coalition submitted a Pyrethroid Pesticide Management Plan for Lower Honcut Creek on August 1, 2022, and it was approved by the Central Valley Water Board on November 16, 2022

Results from two events (October and December 2021) at the Coalition’s Grand Island Drain at Leary Road (GIDLR) monitoring site exhibited elevated levels of nitrate + nitrite that exceeded the Title 22 Primary Maximum Contaminant Level (MCL) of 10 mg/L as N for nitrate + nitrite. These two exceedances in a three-year period potentially triggered a Management Plan for nitrate + nitrite, which is categorized as a medium priority (nutrients) Management Plan, but before drafting such a document the Coalition decided to investigate the potential source(s) of the elevated nitrate + nitrite concentrations. The Coalition conducted upstream monitoring above the GIDLR site in February 2023 within the northern portion of the Grand Island Drain drainage system and determined that the elevated nitrate + nitrite concentrations were coming from an agricultural outfall controlled by an unenrolled member. The Central Valley Water Board is currently reviewing the conclusions of the Coalition’s source identification efforts, but as of this report, the two exceedances are not considered to have triggered a Management Plan.

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<sup>1</sup> Central Valley Regional Water Quality Control Board. *Amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Pyrethroid Pesticide Discharges*. Resolution R5-2017-0057. Adopted on June 8, 2017.  
[https://www.waterboards.ca.gov/rwqcb5/board\\_decisions/adopted\\_orders/resolutions/r5-2017-0057\\_res.pdf](https://www.waterboards.ca.gov/rwqcb5/board_decisions/adopted_orders/resolutions/r5-2017-0057_res.pdf)

## **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 46 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 Plan<sup>2</sup>), which was reorganized into the Comprehensive Surface Water Quality Management Plan (CSQMP<sup>3</sup>) in 2015. The CSQMP was last updated in September 2016 and approved by the Central Valley 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. R5-2014-0030-11 (most recently amended by Order No. R5-2023-0001), specify the requirements for separate SQMPs and allow the Coalition the option of submitting separate, site-specific 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 site-specific Management Plans developed since September 2016 are included as addenda to the CSQMP. The annual updates discussing the implementation of the Coalition's CSQMP and site-specific Management Plans 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, results of 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 Coalition's WDR. The MPPR includes the components listed in **Table 1**, as specified in the MRP:

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<sup>2</sup> SVWQC 2009. Water Quality Management Plan. Prepared by Larry Walker Associates for the Sacramento Valley Water Quality Coalition (SVWQC). Sacramento, California. January 2009.

<sup>3</sup> 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.

**Table 1. Management Plan Progress Report Requirements<sup>4</sup>**

MRP-1 Section	MPPR Requirement	Report Section Headings	Page
	Signed Transmittal Letter	NA	-
<b>I.F.(1)</b>	Title page	Title page	-
<b>I.F.(2)</b>	Table of contents	Table of Contents	i
<b>I.F.(3)</b>	Executive Summary	Executive Summary	v-vii
<b>I.F.(4)</b>	Location map(s) and a brief summary of management plans covered by the report	Management Plan Progress Report	3-8, 13
<b>I.F.(5)</b>	Updated table that tallies all exceedances for the management plans	Results of Monitoring	14-16
<b>I.F.(6)</b>	A list of new management plans triggered since the previous report	New Management Plans	18
<b>I.F.(7)</b>	Status update on preparation of new management plans	New Management Plans	18
<b>I.F.(8)</b>	A summary and assessment of management plan monitoring data collected during the reporting period	Results of Monitoring	9-11
<b>I.F.(9)</b>	A summary of management plan grower outreach conducted	Outreach Documentation	11-12
<b>I.F.(10)</b>	A summary of the degree of implementation of management practices	Management Plan Status Update; Summary: Evaluation of Progress	19-32, 39-40
<b>I.F.(11)</b>	Results from evaluation of management practice effectiveness	Management Plan Status Update; Summary: Evaluation of Progress	19-32, 39-40
<b>I.F.(12)</b>	An evaluation of progress in meeting performance goals and schedules	Management Plan Status Update; Summary: Evaluation of Progress	19-32, 39-40
<b>I.F.(13)</b>	Any recommendations for changes to the management plan	Proposed Changes to the Management Plan	40

<sup>4</sup> Monitoring and Reporting Program (Attachment B to R5-2014-0030-07), Appendix MRP-1: Third-Party Management Plan Requirements, Section I.F.

The activities conducted during the 2022 Monitoring Year (October 2021 through September 2022) to implement the Coalition’s CSQMP continued to primarily focus on addressing the higher priority Management Plan elements triggered by exceedances of WQOs 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 (PUR) data. Implementation efforts completed to address toxicity exceedances included review and evaluation of pesticide application data, evaluation of monitoring results to identify potential causes of toxicity, and determination of likely agricultural sources of identified causes of toxicity. Source evaluations historically have been documented in the Source Evaluation Reports submitted for various Management Plan elements, where determined necessary.<sup>5</sup> 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 WQOs, ILRP Trigger Limits, and pyrethroid pesticide prohibition triggers included in the Central Valley Water Board’s *Amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Pyrethroid Pesticide Discharges* in Resolution R5-2017-0057<sup>6</sup> (Pyrethroid Pesticide Basin Plan Amendment (BPA)).

Management Plan elements with tasks completed during the 2022 Monitoring Year are listed in **Table 2**. This table provides the water body and analyte or monitoring category of concern, along with a summary of the major Management Plan task activity and status.

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<sup>5</sup> 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.

<sup>6</sup> Central Valley Regional Water Quality Control Board. Amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Pyrethroid Pesticide Discharges. Resolution R5-2017-0057. Adopted on June 8, 2017.

[https://www.waterboards.ca.gov/rwqcb5/board\\_decisions/adopted\\_orders/resolutions/r5-2017-0057\\_res.pdf](https://www.waterboards.ca.gov/rwqcb5/board_decisions/adopted_orders/resolutions/r5-2017-0057_res.pdf)

**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 (BTSSL) <sup>1</sup>	DO	Unless otherwise noted, all sites monitored in 2022; 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	
	Colusa Glenn	Sacramento Slough (SSKNK)	DO	
		Colusa Basin Drain (COLDR)	DO	
		Freshwater Creek (FRSHC)	pH	
		Stony Creek (STYHY) <sup>1</sup>	pH	
		Sycamore Slough (RARPP) <sup>1</sup>	DO, pH	
	Lake	Walker Creek (WLKCH)	DO, pH	
		McGaugh Slough (MGSLU)	DO	
	Pit River	Middle Creek (MDLCR)	DO	
		Fall River (FRRRB) <sup>1</sup>	pH	
		Pit River at Canby (PRCAN) <sup>1</sup>	DO	
	PNSSNS	Pit River at Pittville (PRPIT) <sup>3</sup>	DO, pH	
		Coon Creek at Brewer (CCBRW)	DO, pH <sup>2</sup>	
	Sacramento-Amador	Coon Creek at Striplin (CCSTR) <sup>1</sup>	DO	
		Cosumnes River (CRTWN)	DO, pH	
		Dry Creek (DCGLT) <sup>1</sup>	pH	
		Grand Island Drain (GIDLR)	DO, pH	
	Shasta/Tehama	Laguna Creek (LAGAM) <sup>1</sup>	DO, pH	
		Anderson Creek (ACACR)	DO	
		Coyote Creek (COYTR) <sup>1</sup>	DO	

Management Plan Category	Subwatershed	Waterbody (Site ID)	Analyte(s)	Summary of Major Management Plan Activity and Status
DO and pH <i>(continued)</i>	Solano	Ulatis Creek (UCBRD)	DO, pH	
		Z-Drain (ZDDIX) <sup>1</sup>	DO, pH	
	Yolo	Cache Creek (CCCPY) <sup>1</sup>	DO, pH	
Tule Canal (TCHWY) <sup>1</sup>		DO, pH		
Willow Slough (WLSPL)		DO, pH		
Nutrients	Yolo	Willow Slough (WLSPL) <sup>2</sup>	Ammonia as N	A Management Plan for ammonia as N was triggered on May 25, 2021. The Coalition is in the process of investigating sources of ammonia along Willow Slough.
Pathogen Indicators	Butte-Yuba-Sutter	Gilsizer Slough (GILSL) <sup>1</sup>	<i>E. coli</i>	<p>Unless otherwise noted, monitored at all sites in 2022; Other tasks suspended pending Central Valley Water Board determination of potential new regulatory alternative for irrigated pasture operations.</p> <p>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.</p> <p>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 bacteria sources, and concluded that agricultural was unlikely to be a significant contributing source in most monitored drainages.</p> <p>The Coalition submitted to the Central Valley Water Board on May 1, 2018, a Work Plan to Determine the Need for Pathogen Indicator Management Plans, as required by the</p>
		Lower Honcut Creek (LHNCT)		
		Lower Snake River (LSNKR)		
		Pine Creek (PNCHY)		
		Sacramento Slough (SSKNK) <sup>2</sup>		
	Wadsworth Canal (WADCN) <sup>1</sup>			
	Colusa Glenn	Butte Creek (BUCGR) <sup>1</sup>		
		Colusa Basin Drain (COLDR)		
Freshwater Creek (FRSHC)				
El Dorado	Logan Creek (LGNCR) <sup>1</sup>			
	Lurline Creek (LRLNC) <sup>1</sup>			
Lake	Stone Corral Creek (SCCMR) <sup>1</sup>			
	Sycamore Slough (RARPP) <sup>1</sup>			
PNSNS	Walker Creek (WLKCH)			
	North Canyon Creek (NRTCN) <sup>3</sup>			
PNSNS	McGaugh Slough (MGLSU) <sup>1</sup>			
	Middle Creek (MDLCR) <sup>3</sup>			
PNSNS	Middle Coon Creek (CCBRW)			

Management Plan Category	Subwatershed	Waterbody (Site ID)	Analyte(s)	Summary of Major Management Plan Activity and Status
Pathogen Indicators (continued)	Sacramento-Amador	Cosumnes River (CRWTN)	<i>E. coli</i> (continued)	Executive Officer [June 13, 2017, comm. from EO]. Central Valley 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 Central Valley 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.  In January 2021, Central Valley Water Board staff released irrigated pasture regulatory recommendations for the Goose Lake Subwatershed. The recommendations included the finding that <i>E. coli</i> within this specific watershed do not appear to be a significant issue associated with irrigated pasture and likely can be addressed through an alternative regulatory pathway. In August 2021, the Central Valley Water Board approved the Goose Lake Subwatershed as exempt from obtaining coverage under the ILRP.
		Dry Creek (DCGLT) <sup>1</sup>		
		Grand Island (GIDLR)		
		Laguna Creek (LAGAM) <sup>1</sup>		
	Shasta Tehama	Anderson Creek (ACACR) Coyote Creek (COYTR) <sup>1</sup>		
Solano	Ulatis Creek (UCBRD) Shag Slough (SSLIB) Z-Drain (ZDDIX) <sup>1</sup>			
Upper Feather River	Indian Creek (INDAB) <sup>1</sup> Spanish Creek (SPGRN) <sup>1</sup>			
Yolo	Tule Canal (TCHWY) <sup>1</sup> Willow Slough (WLSPL)			
Registered Pesticides	Butte-Yuba-Sutter	Lower Honcut Creek (LHNCT) <sup>2</sup>	TMDL and Pyrethroid Pesticides BPA <sup>4</sup>	Management Plan submitted to the Central Valley Water Board on August 1, 2022, and approved on November 16, 2022; monitoring and implementation in progress.
		Lower Snake River (LSNKR)		Management Plan submitted to the Central Valley Water Board on June 27, 2022, and approved on November 16, 2022; monitoring and implementation in progress.
		Pine Creek (PNCHY)		Management Plan submitted to the Central Valley Water Board on May 18, 2022, and approved on October 18, 2022; monitoring and implementation in progress.

Management Plan Category	Subwatershed	Waterbody (Site ID)	Analyte(s)	Summary of Major Management Plan Activity and Status
Registered Pesticides (continued)	Butte-Yuba-Sutter (continued)	Gilsizer Slough (GILSL)	Chlorpyrifos	A request to complete was approved on July 7, 2022.
			Diazinon	Management Plan submitted to the Central Valley Water Board on June 17, 2020, and approved on November 6, 2020; a request to complete was submitted on March 27, 2023 and approved on April 12, 2023.
Salinity	Butte-Yuba-Sutter	Gilsizer Slough (GILSL)	EC	Unless otherwise noted, all sites monitored in 2022; the Coalition’s active participation in the CV-SALTS Prioritization & Optimization Study was deemed appropriate in lieu of Management Plan requirement for dischargers of salt.
		Lower Snake River (LSNKR) Pine Creek (PNCHY)	EC EC	
	Colusa-Glenn	Colusa Basin Drain (COLDR)	EC	
		Freshwater Creek (FRSHC)	EC	
		Lurline Creek (LRLNC) <sup>1</sup>	EC	
		Stone Corral Creek (SCCMR) <sup>1</sup>	EC	
		Sycamore Slough (RARPP) <sup>1</sup>	EC	
		Walker Creek (WLKCH)	EC	
		Logan Creek (LGNCR) <sup>1</sup>	TDS	
	Lake	McGaugh Slough (MGSLU)	EC	
	Sacramento-Amador	Grand Island Drain (GIDLR)	EC	
		Dry Creek (DCGLT) <sup>1</sup>	TDS	
	Solano	Ulati Creek (UCBRD)	EC	
		Shag Slough (SSLIB)	EC	
		Z-Drain (ZDDIX) <sup>1</sup>	EC	
Upper Feather River	Middle Fork Feather River (MFFGR) <sup>3</sup>	EC		
Yolo	Cache Creek (CCCPY) <sup>1</sup>	Boron, EC		
	Tule Canal (TCHWY) <sup>1,4</sup>	Boron, EC		
	Willow Slough (WLSPL)	Boron, EC		

Management Plan Category	Subwatershed	Waterbody (Site ID)	Analyte(s)	Summary of Major Management Plan Activity and Status
Toxicity	Solano	Ulatis Creek (UCBRD)	<i>Hyalella</i> (sediment toxicity)	Management Plan submitted to the Central Valley Water Board on November 22, 2019, and approved on January 30, 2020; monitoring and implementation in progress.
Trace Metals	Butte-Yuba-Sutter	Lower Snake River (LSNKR) <sup>6</sup>	Arsenic	Source Evaluation submitted August 2013; monitoring not required as per the Coalition's 2022 MPU.
	Sacramento-Amador	Grand Island Drain (GIDLR) <sup>6</sup>	Arsenic	Monitoring not required as per the Coalition's 2022 MPU.

Notes: DO = Dissolved Oxygen, EC = Electrical Conductivity

1. Non-representative Site. Addressed through representative monitoring.
2. Management Plan triggered during 2022 Monitoring Year.
3. Representative site for a subwatershed with a Reduced Monitoring Option (RMO). No monitoring is conducted due to it being a non-assessment year for a RMO subwatershed
4. Addressed by Delta Regional Monitoring Program (RMP) monitoring.
5. TMDL and Pyrethroid Pesticides BPA require monitoring for the following pyrethroid pesticides: bifenthrin, cyfluthrin, cypermethrin, esfenvalerate/fenvalerate, lambda-cyhalothrin, and permethrin.
6. Monitoring not required as per the 2022 MPU.



## RESULTS OF MONITORING

Management Plan monitoring was conducted as scheduled in the Coalition's 2022 Monitoring Plan Update, as approved by the Central Valley Water Board's Executive Officer. The results of monitoring conducted during the 2022 Monitoring Year (October 1, 2021, through September 30, 2022) for all Management Plan analytes were reported in the Coalition's 2022 Annual Monitoring Report (AMR) and submitted to the Central Valley Water Board. Additionally, exceedances for all Management Plan sampling conducted from October 1, 2021, through September 30, 2022, were reported in Exceedance Reports as required by the Coalition's MRP.

The 2022 Monitoring Year was an "Assessment" Monitoring year for all representative Coalition sites. Management Plan monitoring for the 2022 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 Central Valley 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 27 sites with active Management Plan requirements for DO and 18 sites with active Management Plan requirements for pH.

- There were 83 samples collected from 15 sites with active Management Plan requirements for DO. There were two exceedances (2%) of the ILRP Trigger Limit for DO observed at two sites.
- There were 63 samples collected from 10 sites with active Management Plan requirements for pH. There was one exceedance (2%) of the ILRP Trigger Limit for pH observed at one site.

### Pathogen indicators

There are 31 sites with Management Plan requirements for pathogen indicator bacteria. Management Plan tasks for pathogen indicators are currently under review by Central Valley Water Board staff at the direction of the Executive Officer. The Coalition submitted to the Central Valley 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]. Central Valley 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 Central Valley 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.

In January 2021, Central Valley Water Board staff released irrigated pasture regulatory recommendations for the Goose Lake Subwatershed. The recommendations included the finding that *E. coli* within this specific watershed do not appear to be a significant issue associated with irrigated pasture and likely can be addressed through an alternative regulatory pathway. The Central Valley Water Board still must consider how best to address potential *E. coli* contributions from irrigated pasture and other irrigated lands in the other subwatersheds that comprise the Sacramento Valley Coalition. On 13 August 2021, the Central Valley Water Board approved for exemption from the ILRP 7,000 irrigated acres of pasture and hay operations in the Goose Lake area.

Management Plan monitoring for *E. coli* during the 2022 Monitoring Year consisted of sampling at representative and integration monitoring sites, which resulted in the collection of 101 samples from 14 sites with active Management Plan requirements for pathogen indicators. There were 27 exceedances of the ILRP Trigger Limit for *E. coli* observed at 11 sites during the 2022 Monitoring Year.

## Registered Pesticides

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

- Three samples were collected and analyzed for diazinon in Gilsizer Slough. Diazinon was not detected in any of the samples.
- Five samples were collected and analyzed for pyrethroid pesticides in Lower Honcut Creek. There were three exceedances (60%) observed across the samples.
- Five samples were collected and analyzed for pyrethroid pesticides in Lower Snake River. There were two exceedances (40%) observed across the samples.
- Five samples were collected and analyzed for pyrethroid pesticides in Pine Creek. There were two exceedances (40%) observed across the samples.

## Salinity

There are 20 sites with active Management Plan requirements for parameters related to salinity (specific conductivity, boron, and/or TDS). There were 65 sample events for specific conductivity at 10 sites, with 23 observed exceedances (35%) of the ILRP Trigger Limit for specific conductivity.

In addition to a Management Plan for specific conductivity, Willow Slough also has a Management Plan requirement for boron. However, no samples were taken and analyzed for boron in Willow Slough during the 2022 Monitoring Year. Boron is naturally occurring in the soils in the region and is found in the local groundwater pumped and used to irrigate crops during periods when surface water supplies are limited.

## Toxicity

There is a single active Management Plan for toxicity, which is for *Hyalella azteca* in sediment at Ulatis Creek. Two samples were analyzed for toxicity to this test organism. One of the sediment samples was observed to be toxic to *Hyalella*.

## Nutrients

A nutrient-related Management Plan requirement exists as part of the Clear Lake Nutrient TMDL. Monitoring for this Management Plan requirement consisted of phosphorus analyses at the McGaugh Slough and the Middle Creek sites in the Lake County Subwatershed. However, no samples were taken because these two sites were dry during the 2022 Monitoring Year. No WQO or ILRP Trigger Limit currently exists for phosphorus in the Sacramento Valley Watershed.

## SOURCE EVALUATIONS

There were no new Source Evaluations conducted for Management Plan elements during the 2022 Monitoring Year.

## OUTREACH DOCUMENTATION

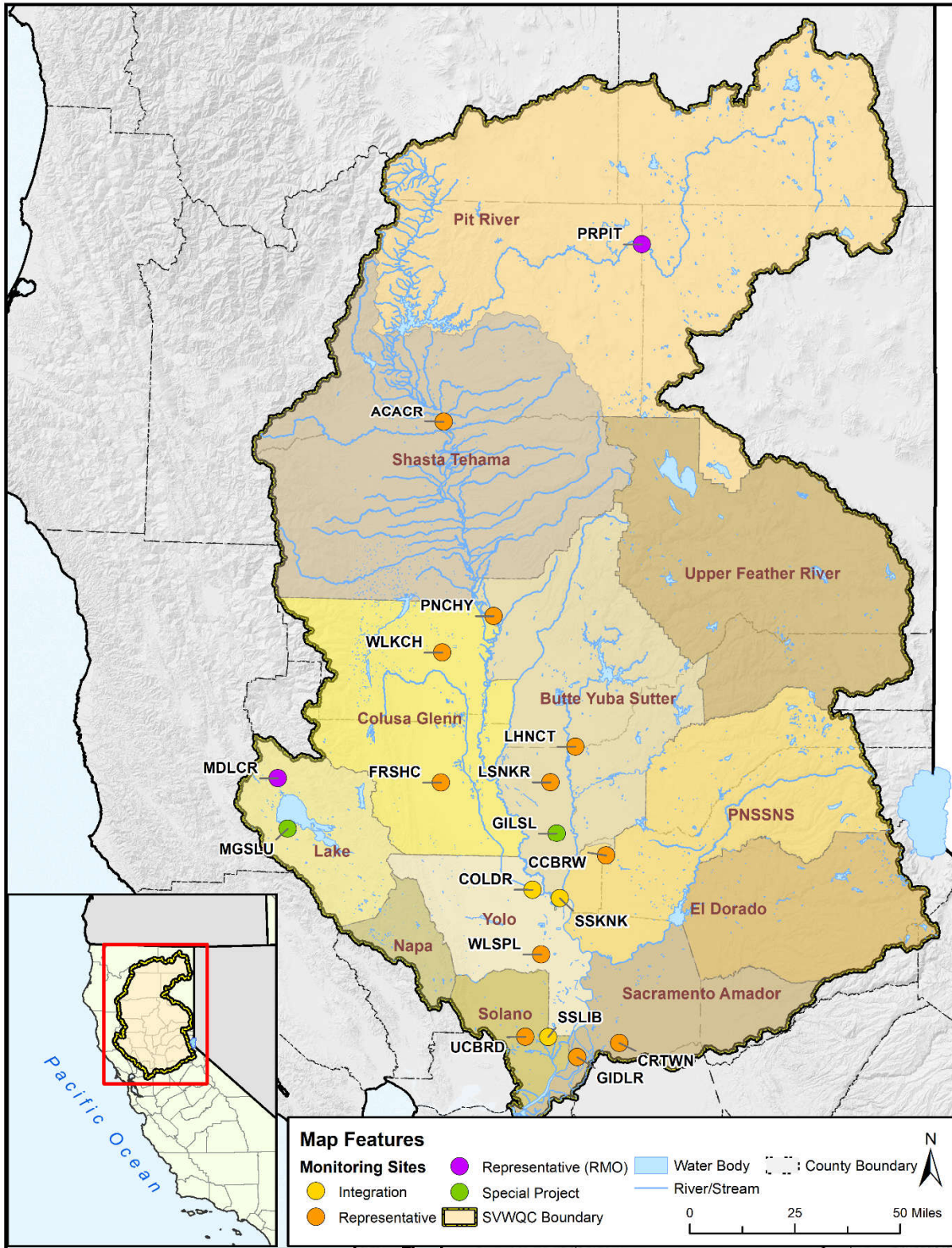
The Coalition and its subwatersheds continue to work with the Central Valley Water Board and its staff to implement the Coalition's *Landowner Outreach and Management Practices Communications Process* and the Coalition's approved CSQMP to address exceedances of WQOs identified in the Sacramento Valley. 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 WQOs or ILRP Trigger Limits. Notifications were initially focused on, but not limited to, growers who operate directly adjacent to or within proximity to a waterbody showing an exceedance of a WQO or ILRP Trigger Limit. The broader outreach program, which includes both grower meetings and 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 site-specific Management Plans.

Descriptions of the outreach and education activities conducted by the Coalition's subwatersheds during the 2022 Monitoring Year are provided in Appendix F (*SVWQC Outreach Materials*) of the Coalition's 2022 AMR.

## MEMBER SURVEYS

Starting in 2014, the WDR required the Coalition to collect and aggregate summarized information from Farm Evaluations; surveys filled out by growers regarding the various management practices implemented on the acreage they farm. In 2018, the Central Valley Water Board revised the reporting schedule for these surveys and the Coalition will now collect, aggregate, and summarize Farm Evaluations on a five-year cycle beginning with the 2020 crop year. The Coalition submitted the 2020 crop year data to the Central Valley Water Board on November 30, 2021.



**Figure 1. 2022 Monitoring Year Coalition Sites Visited for Regular and Management Plan Monitoring**



**Table 3. Summary of Management Plan Compliance Monitoring Outcomes (October 2021 through September 2022)**

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	2	N/A	0
			Lower Honcut Creek at Hwy 70	8	N/A	0
			Lower Snake River at Nuestro Road	8	N/A	0
			Pine Creek at Highway 32	9	N/A	2
			Sacramento Slough bridge near Karnak	3	N/A	0
		Colusa Glenn	Colusa Basin Drain above KL	4	N/A	0
			Freshwater Creek at Gibson Road	8	N/A	0
		Lake	McGaugh Slough at Finley Road East <sup>1</sup>	--	N/A	--
			Middle Creek u/s from Highway 20	3	N/A	0
		Pit River	Pit River at Pittville	1	N/A	0
		PNSSNS	Coon Creek at Brewer Road	9	N/A	0
		Sacramento/Amador	Cosumnes River at Twin Bridges Road	5	N/A	0
			Grand Island Drain near Leary Road	11	N/A	0
		Shasta/Tehama	Anderson Creek at Ash Creek Road	1	N/A	0
		Solano	Ulatis Creek at Brown Road	11	N/A	0
	Yolo	Willow Slough Bypass at Pole Line	6	N/A	1	
	pH	Butte-Yuba-Sutter	Gilsizer Slough at George Washington Road	2	N/A	0
			Lower Snake River at Nuestro Road	8	N/A	1
		Colusa Glenn	Freshwater Creek at Gibson Rd	8	N/A	0
			Walker Creek near 99W and CR33	2	N/A	0
		Pit River	Pit River at Pittville	1	N/A	0
		PNSSNS	Coon Creek at Brewer	9	N/A	0

Management Plan Category	Analyte	Subwatershed	Site Name	Analyses	Pesticide Detections	Exceedances
DO and pH (continued)	pH (continued)	Sacramento/Amador	Cosumnes River at Twin Cities Road	5	N/A	0
			Grand Island Drain near Leary Road	11	N/A	0
		Solano	Ulatis Creek at Brown Road	11	N/A	0
		Yolo	Willow Slough Bypass at Pole Line	6	N/A	0
Pathogen Indicators	E. coli	Butte-Yuba-Sutter	Lower Honcut Creek at Hwy 70	8	N/A	1
			Lower Snake R. at Nuestro Rd	10	N/A	0
			Pine Creek at Highway 32	10	N/A	1
			Sacramento Slough Bridge near Karnak	4	N/A	1
		Colusa Glenn	Colusa Basin Drain above KL	4	N/A	1
			Freshwater Creek at Gibson Rd	9	N/A	2
			Walker Creek near 99W and CR33	2	N/A	1
		Lake	McGaugh Slough at Finley Road East <sup>1</sup>	--	N/A	--
			Middle Creek u/s from Highway 20 <sup>1</sup>	--	N/A	--
		PNSSNS	Coon Creek at Brewer Road	9	N/A	1
		Sacramento/Amador	Cosumnes River at Twin Bridges Road	5	N/A	0
			Grand Island Drain near Leary Road	12	N/A	9 <sup>2</sup>
		Shasta/Tehama	Anderson Creek at Ash Creek Road	1	N/A	0
		Solano	Shag Slough at Liberty Island Road	5	N/A	1
			Ulatis Creek at Brown Road	13	N/A	10 <sup>2</sup>
Yolo	Willow Slough Bypass at Pole Line	9	N/A	2		
Registered Pesticides	Diazinon	Butte-Yuba-Sutter	Gilsizer Slough at George Washington Road	3	0	0
	Pyrethroids	Butte-Yuba-Sutter	Lower Honcut Creek at Hwy 70	6	5	3
	Pyrethroids	Butte-Yuba-Sutter	Lower Snake R. at Nuestro Rd	5	5	2
	Pyrethroids	Butte-Yuba-Sutter	Pine Creek at Highway 32	5	4	2

Management Plan Category	Analyte	Subwatershed	Site Name	Analyses	Pesticide Detections	Exceedances
Salinity	Conductivity	Butte-Yuba-Sutter	Gilsizer Slough at George Washington Road	2	N/A	0
			Lower Snake R. at Nuestro Rd	8	N/A	0
		Colusa Glenn	Colusa Basin Drain above KL	4	N/A	3
			Freshwater Creek at Gibson Rd	8	N/A	3
			Walker Creek near 99W and CR33	2	N/A	0
		Lake	McGaugh Slough at Finley Road East <sup>1</sup>	--	N/A	--
		Sacramento/Amador	Grand Island Drain near Leary Road	11	N/A	3
		Solano	Ulatis Creek at Brown Road	11	N/A	8
			Shag Slough at Liberty Island Road	4	N/A	0
		Yolo	Willow Slough Bypass at Pole Line	6	N/A	6
Toxicity	Hyaella survival (sediment)	Solano	Ulatis Creek at Brown Road	2	N/A	1 <sup>2</sup>

N/A = Not applicable

1. Site was dry during the 2022 Monitoring Year.

2. One (or more) exceedance observed in the field duplicate sample, but not the associated environmental sample.



## 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 a site-specific 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's approved *2009 Management Plan*, approved 2016 CSQMP, site-specific Management Plans approved by the Central Valley Water Board since 2016, *Management Plan Progress Reports (2010 – 2021)*, 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 and/or sediment sampling, field evaluations, or surveys of agricultural practices. Management Plan monitoring performed during the 2022 Monitoring Year occurred at representative, special project, and integration sites for source evaluation and/or compliance purposes. The monitoring proposed and conducted during the 2022 Monitoring Year was submitted to and approved by the Central Water Board's Executive Officer on September 16, 2021. The Coalition's approved 2022 Monitoring Plan Update included the required monitoring for Management Plan elements, as well as monitoring required by the Coalition's MRP and the TMDL for nutrients in Clear Lake.

Based on the evaluations of Management Plan monitoring results through September 2022 and earlier source evaluation efforts, the Coalition submitted a request to deem complete the monitoring and other requirements for the Management Plan for chlorpyrifos in Gilsizer Slough, which received approval by the Central Valley Water Board Executive Officer on July 7, 2022. Additionally, the Coalition submitted a request to deem complete the Management Plan for diazinon in Gilsizer Slough on March 27, 2023 and the Executive Officer approved the request on April 12, 2023. Requests for Completion (a.k.a., Requests to Complete or RTCs) of Management Plans are summarized in **Table 4**.

**Table 4. Requests for Completion of Management Plans**

Subwatershed	Water Body	Category	Analyte	RTC Status
Butte-Yuba-Sutter	Gilsizer Slough	Registered Pesticides	Chlorpyrifos	RTC approved July 7, 2022
Butte-Yuba-Sutter	Gilsizer Slough	Registered Pesticides	Diazinon	RTC submitted to the Central Valley Water Board on March 27, 2023, and approved on April 12, 2023.

RTC = Request to Complete Management Plan

## NEW MANAGEMENT PLANS

As part of this MPPR, data collected by the Coalition through September 2022 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.

A single new Management Plan was triggered as the result of an ILRP Trigger Limit exceedance observed in Coalition monitoring conducted from October 2021 through September 2022. The new Management Plan is for pyrethroid pesticides in Lower Honcut Creek, which is defined as a high priority (pesticides) Management Plan as per the Coalition’s CSQMP (SVWQC 2016). The exceedance that triggered the Management Plan was observed in January 2022 and the initial pyrethroid pesticide exceedance occurred in September 2021. The Coalition submitted a Pyrethroid Pesticide Management Plan for Lower Honcut Creek on August 1, 2022, and it was approved by the Central Valley Water Board’s Executive Officer on November 16, 2022.

Results from two events (October and December 2021) at the Coalition’s Grand Island Drain at Leary Road (GIDLR) monitoring site exhibited elevated levels of nitrate + nitrite that exceeded the Title 22 Primary Maximum Contaminant Level (MCL) of 10 mg/L as N for nitrate + nitrite. These two exceedances in a three-year period potentially triggered a Management Plan for nitrate + nitrite, which is categorized as a medium priority (nutrients) Management Plan, but before drafting such a document the Coalition decided to investigate the potential source(s) of the elevated nitrate + nitrite concentrations. The Coalition conducted monitoring upstream of the GILDR site in February 2023 within the northern portion of the Grand Island Drain drainage system and determined that the elevated nitrate + nitrite concentrations were coming from an agricultural outfall controlled by an unenrolled member. The Central Valley Water Board is currently reviewing the conclusions of the Coalition’s source identification efforts, but as of this report, the two exceedances are not considered to have triggered a Management Plan.

## MANAGEMENT PLAN STATUS UPDATES

Management Plans submitted to the Central Valley 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. R5-2014-0030-11 (most recently amended by Order No. R5-2023-0001). 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 in 2017 that was 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 Central Valley Water Board used this same approach in its Management Practice Implementation Report (MPIR) requirement to specifically survey growers and applicators who apply a pesticide of concern in a drainage that either has an active Management Plan or is represented by one for a particular pesticide or category of pesticides. Coalition members were required to complete their first MPIR beginning with the 2020 crop year.

Monitoring performed during the 2021 Monitoring Year (October 2021 through September 2022) revealed the triggering of two pyrethroid pesticide Management Plans while conducting pyrethroid pesticide baseline monitoring as required by the Pyrethroid Pesticide BPA. Two exceedances of the pyrethroid pesticide prohibition trigger in a three-year period through either the exceedance of the Pyrethroid Pesticide BPA chronic Concentration Goal Unit (CGU) of 1 (unitless) or through the observance of water column toxicity to *Hyalella azteca* coupled with the detection of one or more pyrethroid pesticides above their reporting limits is sufficient to trigger a Management Plan for pyrethroid pesticides. The observance of water column toxicity to *Hyalella azteca* in combination with one or more detected pyrethroids is considered equivalent to an exceedance of the prohibition trigger. A Management Plan at Lower Snake River was triggered after exceedances of the pyrethroid pesticide prohibition observed trigger in May and July 2021. A second Management Plan was triggered at Pine Creek after exceedances of the prohibition trigger in July and August 2021. These two Pyrethroid Pesticide Management Plans were in development at the time the 2021 MPPR was submitted to the Central Valley Water Board. Both Management Plans were approved by the Central Valley Water Board's Executive Officer and the status of each Management Plan is discussed below.

The implementation status of four active BYSWQC Management Plans is discussed below, followed by the discussion of one active Management Plan in the Solano Subwatershed.

## Diazinon in Gilsizer Slough

A Management Plan for Diazinon in Gilsizer Slough was approved by the Central Valley Water Board on November 6, 2020. The Management Plan was triggered by an exceedance of both the chronic (0.10 µg/L) and acute (0.16 µg/L) Basin Plan objectives for the orthophosphate pesticide on January 17, 2020. The prior diazinon exceedance observed in Gilsizer Slough occurred on January 23, 2018. Both exceedances occurred when the vast majority of diazinon applications in the drainage were dormant season applications to peaches. An initial FOS was sent to growers in the Gilsizer Slough Drainage in September 2020 to collect baseline 2019 crop year management practice implementation information upon which to compare future management practice implementation information collected through the MPIR process. Beginning with the 2020 crop year, the management practices implemented by members in the Gilsizer Slough Drainage who applied diazinon were contained in the 2020 MPIR data compilation.

Outreach activities and water quality measurements related to the satisfaction of this Management Plan's Performance Goals that occurred during the 2022 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.

Due to COVID-19 restrictions in place during much of the 2020 and 2021 Monitoring Years, in-person outreach opportunities to discuss (1) the diazinon exceedances that triggered the Management Plan, (2) cultural practices for managing sediment and erosion, and (3) pesticide application practices to avoid/limit the movement of pesticides from where they are applied were limited to the BYSWQC Annual Meetings in November and December 2020 and a Grower Day in December 2020. To augment and reinforce much of the information presented during the Annual Meeting, BYSWQC and University of California Cooperative Extension staff produced a 20-minute online video in September 2020 that discusses the active Management Plan in the Butte-Yuba-Sutter Subwatershed and practices to reduce pesticide loss from orchards, with an emphasis on over spray, drift control, and sprayer calibration during dormant and growing season applications. Information about the Diazinon Management Plan in Gilsizer Slough and management practices that can be implemented to reduce movement of the pesticide from its point of application was provided across eight emails sent to 155 growers in the Gilsizer Slough drainage during the 2022 Monitoring Year. Additional information regarding these outreach events and materials is provided in **Appendix F (SVWQC Outreach Material)** of the Coalition's 2022 AMR.

**PG 4:** Tracking of management practices implemented to reduce or prevent the discharge of diazinon to surface waters in the Gilsizer Slough Drainage has been accomplished through the MPIR process since the 2020 crop year. Baseline FOS and 2020–2022 crop year MPIR completion statistics are provided in **Table 5** and the management practice implementation results compiled for the 2019–2022 crop years are shown in **Table 6**. A summary of the individual management practices implemented on acreage receiving diazinon applications

across the years 2019–2022, as compared to the total acreage where diazinon was applied, is provided in **Appendix A, Table A-1**.

**PG 5:** Maintain diazinon concentrations in Gilsizer Slough at George Washington Blvd (GILSL) to below the trigger limit for the organophosphate pesticide.

Diazinon monitoring performed at the GILSL site since February 2006 is shown in **Figure 2**. Diazinon concentrations above either the chronic or acute Basin Plan objectives measured from February 2006 through February 2011 were addressed through an earlier Management Plan that was deemed complete by the Central Valley Water Board on July 11, 2016. The focus of the current Management Plan for Diazinon in Gilsizer Slough is the exceedances that were observed in January 2018 and January 2022. No additional exceedances of the Basin Plan chronic and acute objectives have been observed in the last ten samples collected at the monitoring site.

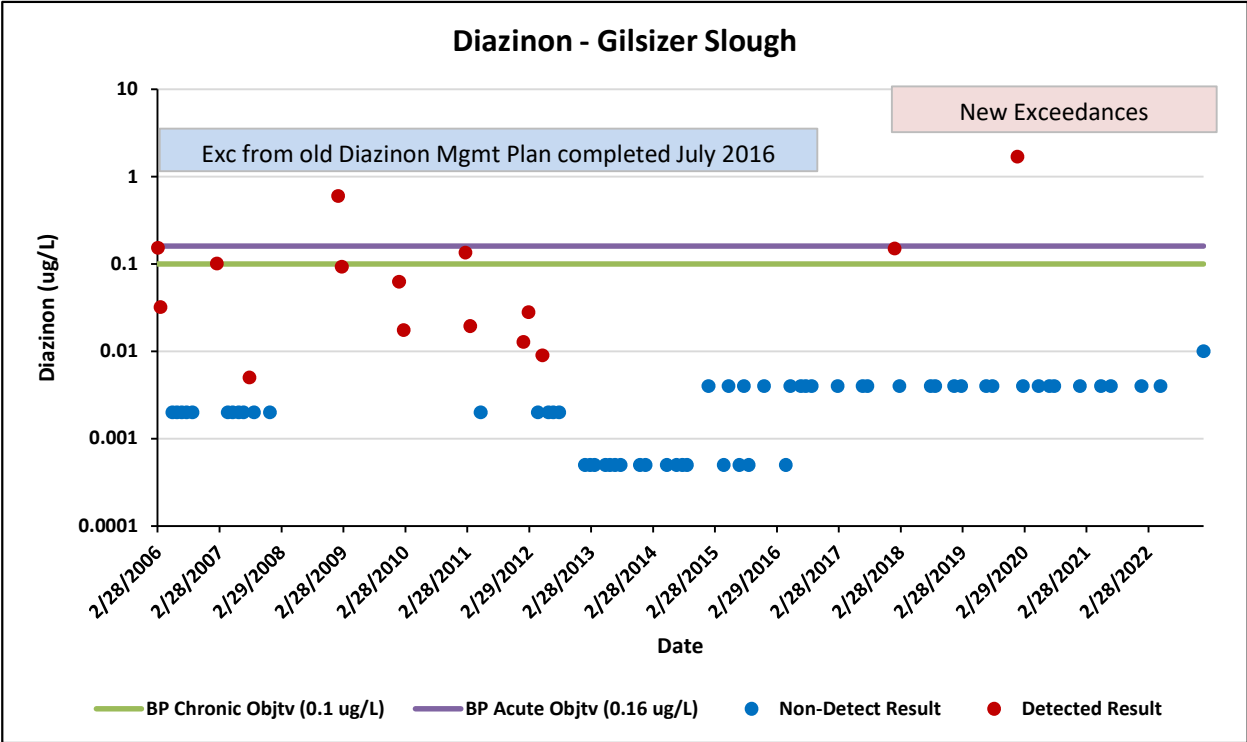
**Table 5. Baseline 2019 Focused Outreach Survey and 2020–2022 MPIR Completion Statistics for Diazinon Applications in the Gilsizer Slough Drainage**

Survey Year	Time Period Evaluated	# Surveys Sent	# Responses Received	% Received
Year 1 (2019 baseline)	1/1/2019 – 12/31/2019	150	80	53.3
Year 2 (2020 MPIR)	1/1/2020 – 12/31/2020	163	130	79.8
Year 3 (2021 MPIR)	1/1/2021 – 12/31/2021	142	103	72.5
Year 4 (2022 MPIR)	1/1/2022 – 12/31/2022	155	146	94.2

**Table 6. Baseline 2019 Focused Outreach Survey and 2020–2022 MPIR Survey Management Practice Implementation Results for Diazinon Applications in the Gilsizer Slough Drainage**

Pesticide Application and Management Practice Implementation	FOS and MPIR Responses			
	Year 1 (2019 baseline)	Year 2 (2020)	Year 3 (2021)	Year 4 (2022)
Did you apply diazinon during the period evaluated?	No = 75 Yes = 5	No = 129 Yes = 1	No = 103 Yes = 0	No = 146 Yes = 0
Number of growers applying diazinon who implemented at least one management practice.	5	1	---	---

Pesticide Application and Management Practice Implementation	FOS and MPIR Responses			
	Year 1 (2019 baseline)	Year 2 (2020)	Year 3 (2021)	Year 4 (2022)
Total number of <i>pesticide application practices</i> implemented by those applying diazinon.	44	9	---	---
Total number of <i>cultural practices for managing sediment and erosion</i> implemented by those applying diazinon.	23	3	---	---
Total number of management practices implemented by those applying diazinon.	67	12	---	---



**Figure 2. Diazinon Monitoring Results in Gilsizer Slough at George Washington Blvd: 2006–2022**

## Pyrethroids in Lower Snake River

A Management Plan for pyrethroid pesticides in Lower Snake River was approved by the Central Valley Water Board on November 16, 2022. The Management Plan was triggered by an exceedance of the Pyrethroid Pesticide BPA chronic Concentration Goal Unit (CGU) of 1 (unitless) on July 22, 2021. The prior pyrethroid pesticides exceedance observed in Lower Snake River occurred on May 24, 2021. The pyrethroid bifenthrin was detected in the water quality samples related to both exceedances. The pyrethroid lambda-cyhalothrin was detected in the May 2021 water quality sample. A 2021 MPIR survey was sent to growers in the Lower Snake River drainage and its represented drainages to collect baseline 2021 crop year management practice implementation information upon which to compare future management practice implementation information collected through the MPIR process. However, due to Butte-Yuba-Sutter Water Quality Coalition staff being on maternity leave during the time that the Coalition was compiling all 2021 MPIR results for a November 30, 2022, submittal, the 2021 MPIR results for the Lower Snake River Management Plan were not submitted. Both 2021 and 2022 crop year MPIR results for the Lower Snake River Management Plan will be submitted to the Irrigated Lands Regulatory Program by November 30, 2023.

Outreach activities and water quality measurements related to the satisfaction of this Management Plan's Performance Goals that occurred during the 2021 and 2022 Monitoring Years are described below.

### *Performance Goal Status*

**PG 1, 2, & 3:** (a) Increased education and awareness of pyrethroid pesticide application practices and irrigation and cultural practices to manage sediment and erosion that minimize the potential for impacts to surface waters, (b) maintain existing implementation of pyrethroid pesticide application practices and irrigation and cultural practices to manage sediment and erosion that minimize the potential for impacts to surface waters, and (c) avoid exceedances of Pyrethroid Pesticide BPA prohibition trigger limit caused by agricultural activities.

To support effective outreach and education to prevent continued exceedances of the Pyrethroid Pesticide BPA's prohibition trigger, a tiered approach to outreach and education efforts is recommended. The intent of the escalated outreach and education is to increase messaging about and exposure to BMPs that should be implemented when applying pyrethroid pesticides if prohibition trigger exceedances continue to be observed.

Information about the Lower Snake River Pyrethroid Pesticides Management Plan and management practices that can be implemented to reduce the movement of pyrethroids from their point of application was presented at five years during the 2022 Monitoring year, which were collectively attended by 350 growers. A total of 1430 growers throughout the BYS Subwatershed were also contacted eight times via email during the 2022 Monitoring Year to inform them of pyrethroid pesticide exceedances. Additional information regarding these outreach events and materials is provided in **Appendix F** (SVWQC Outreach Material) of the Coalition's 2022 AMR.

**PG 4:** Tracking of management practices implemented to reduce or prevent the discharge of pyrethroid pesticides to surface waters in the Lower Snake River drainage and represented



drainages is accomplished through the MPIR process. MPIR completion statistics for the 2021 crop year are provided in **Table 7** and the management practice implementation results compiled for the 2021 crop year are shown in **Table 8**. A summary of the individual management practices implemented on acreage receiving pyrethroid applications during the 2021 crop year, as compared to the total acreage where pyrethroid pesticides were applied, is provided in **Appendix A, Table A-2**.

**PG 5:** Maintain pyrethroid pesticide concentrations in Lower Snake River at Nuestro Road (LSNKR) to below the Pyrethroid Pesticide BPA prohibition trigger limit.

Pyrethroid pesticides monitoring performed at the LSNKR site since October 2020 is shown in **Figure 3**. The focus of the current Management Plan for Pyrethroid Pesticides in Lower Snake River is the exceedance of the Pyrethroid Pesticide BPA chronic Concentration Goal Unit (CGU) of 1 (unitless) that were observed during the Pyrethroid Pesticide BPA Baseline Monitoring period (October 2020 through September 2021) and thereafter. Two exceedances of the pyrethroid pesticides prohibition trigger limit within a 3-year period beginning on October 1, 2020, are sufficient to trigger a Management Plan.

**Table 7: 2021 MPIR Completion Statistics for Pyrethroid Pesticide Applications in the Lower Snake River Drainage and Represented Drainages**

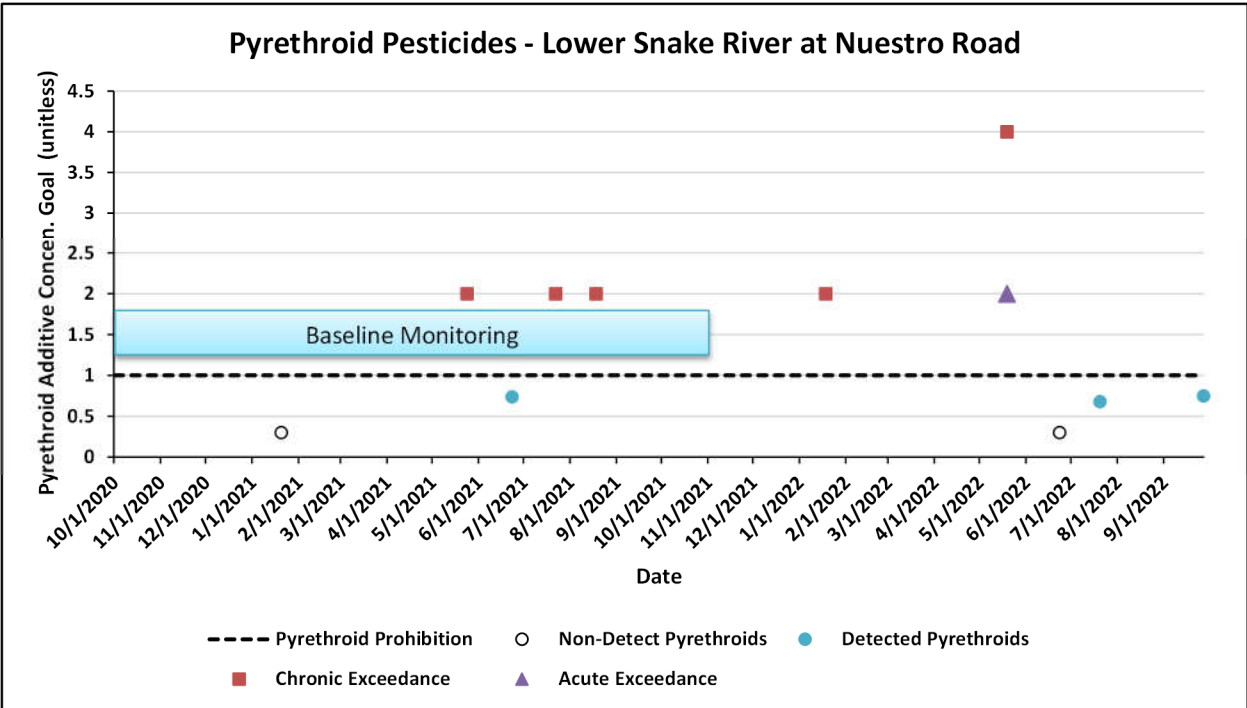
Survey Year	Time Period Evaluated	# Surveys Sent	# Responses Received	% Received
Year 1 (2021 baseline)	1/1/2021 – 12/31/2021	117	94	80.3%

**Table 8: Baseline 2021 MPIR Survey Management Practice Implementation Results for Pyrethroid Pesticide Applications in the Lower Snake River Drainage and Represented Drainages**

Pesticide Application and Management Practice Implementation	MPIR Responses
	Year 1 (2021 baseline)
Did you apply pyrethroid pesticides during the period evaluated?	No = 50 Yes = 44
Did you apply pyrethroid pesticides as a dormant spray during the period evaluated?	No = 33 Yes = 11
Number of growers applying pyrethroid pesticides who implemented at least one management practice.	44
Total number of <i>pesticide application practices</i> implemented by those applying pyrethroid pesticides.	1,710
Total number of <i>dormant season practices</i> implemented by those applying pyrethroid pesticides during dormant season.	217



Pesticide Application and Management Practice Implementation	MPIR Responses
	Year 1 (2021 baseline)
Total number of irrigation methods and efficiency practices implemented by those applying pyrethroid pesticides.	604
Total number of <i>cultural practices for managing sediment and erosion</i> implemented by those applying pyrethroid pesticides.	521
Total number of management practices implemented by those applying pyrethroid pesticides.	3,052



**Figure 3: Pyrethroid Pesticides Monitoring Results in Lower Snake River at Nuestro Road: October 2020–September 2022**

### Pyrethroids in Pine Creek

A Management Plan for pyrethroid pesticides in Pine Creek was approved by the Central Valley Water Board on October 18, 2022. The Management Plan was triggered by an exceedance of the Pyrethroid Pesticide BPA acute Concentration Goal Unit (CGU) of 1 (unitless) on August 19, 2021. The prior exceedance observed in Pine Creek – water column toxicity to *Hyalella azteca* in the presence of bifenthrin detected above its reporting limit – occurred on July 22, 2021. The pyrethroid bifenthrin was detected in the water quality samples related to both exceedances. The pyrethroids esfenvalerate, lambda-cyhalothrin, and cyfluthrin were detected in the August 2021 water quality sample. A 2021 MPIR survey was sent to growers in the Pine Creek drainage

and its represented drainages to collect baseline 2021 crop year management practice implementation information upon which to compare future management practice implementation information collected through the MPIR process. However, due to Butte-Yuba-Sutter Water Quality Coalition staff being on maternity leave during the time that the Coalition was compiling all 2021 MPIR results for a November 30, 2022, submittal, the 2021 MPIR results for the Pine Creek Management Plan were not submitted. Both 2021 and 2022 crop year MPIR results for the Pine Creek Management Plan will be submitted to the Irrigated Lands Regulatory Program by November 30, 2023.

Outreach activities and water quality measurements related to the satisfaction of this Management Plan's Performance Goals that occurred during the 2021 and 2022 Monitoring Years are described below.

### ***Performance Goal Status***

**PG 1, 2, & 3:** (a) Increased education and awareness of pyrethroid pesticide application practices and irrigation and cultural practices to manage sediment and erosion that minimize the potential for impacts to surface waters, (b) maintain existing implementation of pyrethroid pesticide application practices and irrigation and cultural practices to manage sediment and erosion that minimize the potential for impacts to surface waters, and (c) avoid exceedances of Pyrethroid Pesticide BPA prohibition trigger limit caused by agricultural activities.

To support effective outreach and education to prevent continued exceedances of the Pyrethroid Pesticide BPA's prohibition trigger, a tiered approach to outreach and education efforts is recommended. The intent of the escalated outreach and education is to increase messaging about and exposure to BMPs that should be implemented when applying pyrethroid pesticides if prohibition trigger exceedances continue to be observed.

Information about the Pine Creek Pyrethroid Pesticides Management Plan and management practices that can be implemented to reduce the movement of pyrethroids from their point of application was presented at five years during the 2022 Monitoring year, which were collectively attended by 475 growers. A total of 1430 growers throughout the BYS Subwatershed were also contacted nine times via email during the 2022 Monitoring Year to inform them of pyrethroid pesticide exceedances. Additional information regarding these outreach events and materials is provided in **Appendix F** (SVWQC Outreach Material) of the Coalition's 2022 AMR.

**PG 4:** Tracking of management practices implemented to reduce or prevent the discharge of pyrethroid pesticides to surface waters in the Pine Creek drainage and represented drainages is accomplished through the MPIR process. MPIR completion statistics for the 2021 crop year are provided in **Table 9** and the management practice implementation results compiled for the 2021 crop year are shown in **Table 10**. A summary of the individual management practices implemented on acreage receiving pyrethroid applications during the 2021 crop year, as compared to the total acreage where pyrethroid pesticides were applied, is provided in **Appendix A, Table A-3**.

**PG 5:** Maintain pyrethroid pesticide concentrations in Pine Creek at Highway 32 (PNCHY) to below the Pyrethroid Pesticide BPA prohibition trigger limit.

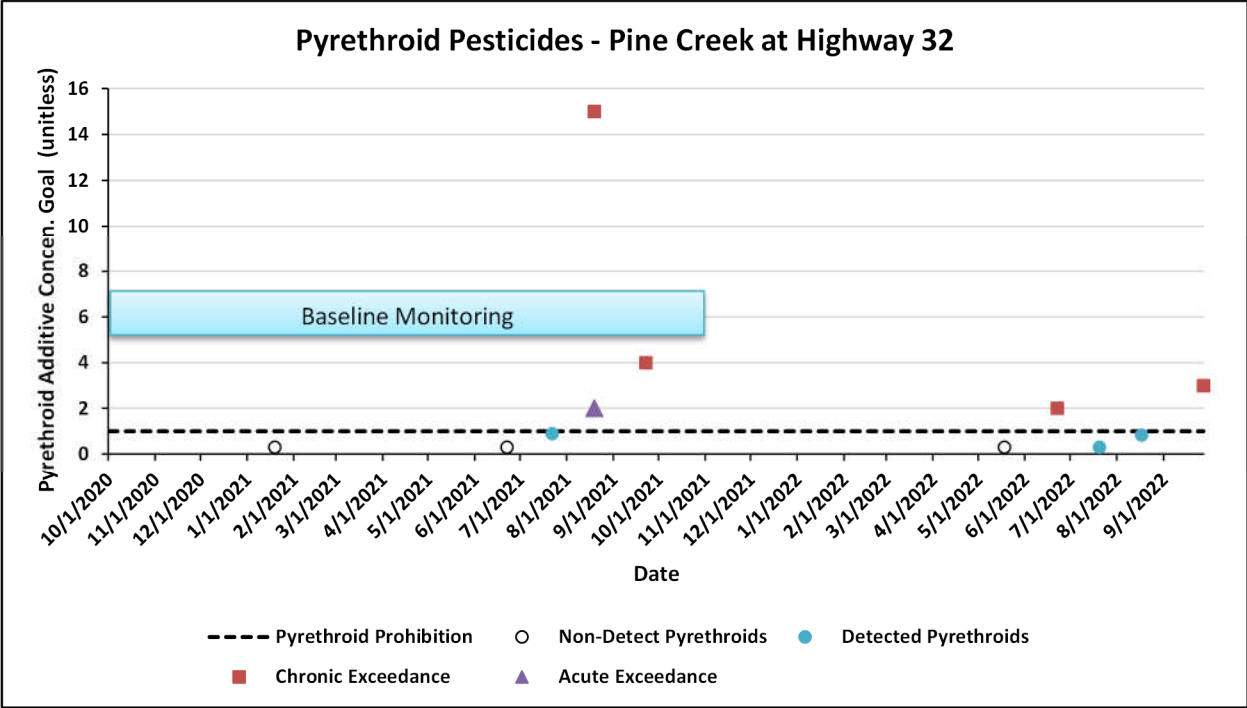
Pyrethroid pesticides monitoring performed at the PNCHY site since October 2020 is shown in **Figure 4**. The focus of the current Management Plan for Pyrethroid Pesticides in Pine Creek is the exceedances of the Pyrethroid Pesticide BPA chronic Concentration Goal Unit (CGU) of 1 (unitless) that were observed during the Pyrethroid Pesticide BPA Baseline Monitoring period (October 2020 through September 2021) and thereafter. Two exceedances of the pyrethroid pesticides prohibition trigger limit within a 3-year period beginning on October 1, 2020, are sufficient to trigger a Management Plan.

**Table 9: 2021 MPIR Completion Statistics for Pyrethroid Pesticide Applications in the Pine Creek Drainage and Represented Drainages**

Survey Year	Time Period Evaluated	# Surveys Sent	# Responses Received	% Received
Year 1 (2021 baseline)	1/1/2021 – 12/31/2021	244	228	93.4

**Table 10: Baseline 2021 MPIR Survey Management Practice Implementation Results for Pyrethroid Pesticide Applications in the Pine Creek Drainage and Represented Drainages**

Pesticide Application and Management Practice Implementation	MPIR Responses
	Year 1 (2021 baseline)
Did you apply pyrethroid pesticides during the period evaluated?	No = 146 Yes = 82
Did you apply pyrethroid pesticides as a dormant spray during the period evaluated?	No = 81 Yes = 1
Number of growers applying pyrethroid pesticides who implemented at least one management practice.	82
Total number of <i>pesticide application practices</i> implemented by those applying pyrethroid pesticides.	4,706
Total number of <i>dormant season practices</i> implemented by those applying pyrethroid pesticides during dormant season.	88
Total number of irrigation methods and efficiency practices implemented by those applying pyrethroid pesticides.	1,755
Total number of <i>cultural practices for managing sediment and erosion</i> implemented by those applying pyrethroid pesticides.	1,677
Total number of management practices implemented by those applying pyrethroid pesticides.	8,226



**Figure 4: Pyrethroid Pesticides Monitoring Results in Pine Creek at Highway 32: October 2020–September 2022**

**Pyrethroids in Lower Honcut Creek**

A Management Plan for pyrethroid pesticides in Lower Honcut Creek was approved by the Central Valley Water Board on November 16, 2022. The Management Plan was triggered by an exceedance of the Pyrethroid Pesticide BPA chronic Concentration Goal Unit (CGU) of 1 (unitless) on January 18, 2022. The prior pyrethroid pesticides exceedance observed in Lower Honcut Creek occurred on September 22, 2021. The pyrethroid bifenthrin was detected in the water quality sample collected in September 2021 and the pyrethroid esfenvalerate was detected in the water quality sample collected in January 2022. A 2022 MPIR survey was sent to growers in the Lower Honcut Creek drainage and its represented drainages and these results will be submitted to the Irrigated Lands Regulatory Program by November 30, 2023.

Outreach activities and water quality measurements related to the satisfaction of this Management Plan’s Performance Goals that occurred during the 2022 Monitoring Year are described below.

**Performance Goal Status**

**PG 1, 2, & 3:** (a) Increased education and awareness of pyrethroid pesticide application practices and irrigation and cultural practices to manage sediment and erosion that minimize the potential for impacts to surface waters, (b) maintain existing implementation of pyrethroid pesticide application practices and irrigation and cultural practices to manage sediment and erosion that minimize the potential for impacts to surface waters, and (c) avoid exceedances of Pyrethroid Pesticide BPA prohibition trigger limit caused by agricultural activities.

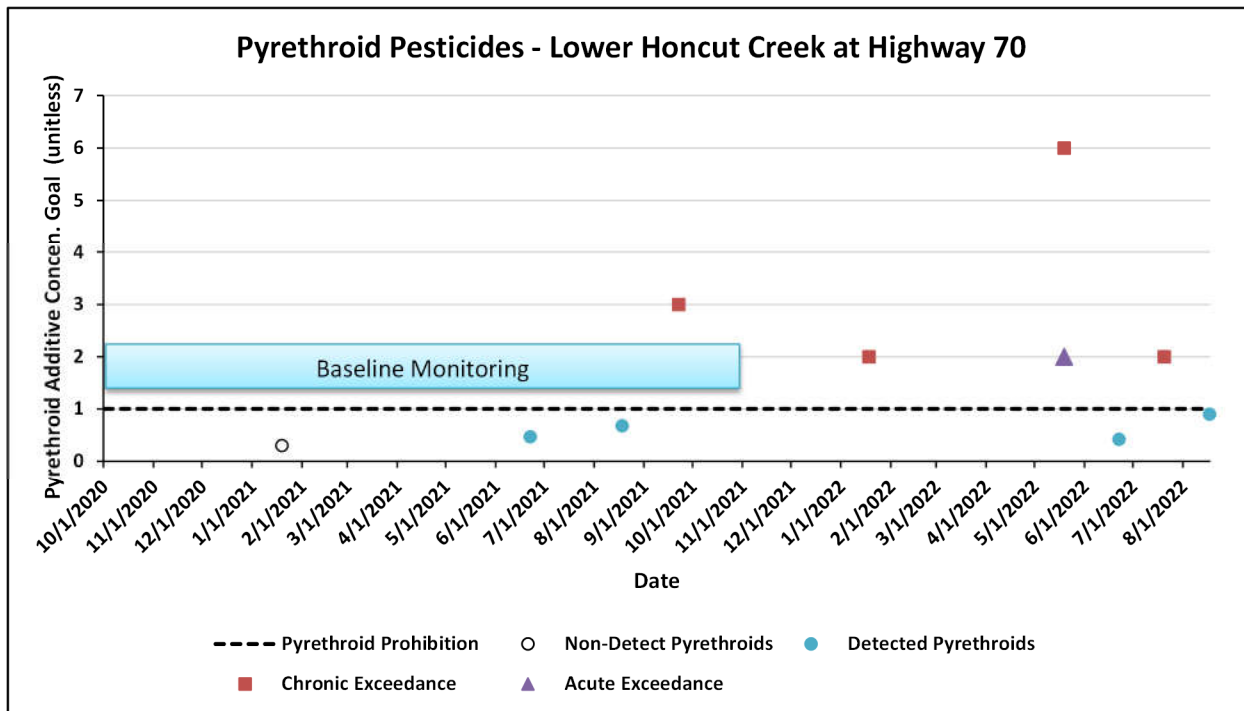
To support effective outreach and education to prevent continued exceedances of the Pyrethroid Pesticide BPA's prohibition trigger, a tiered approach to outreach and education efforts is recommended. The intent of the escalated outreach and education is to increase messaging about and exposure to BMPs that should be implemented when applying pyrethroid pesticides if prohibition trigger exceedances continue to be observed.

Information about the Lower Honcut Creek Pyrethroid Pesticides Management Plan and management practices that can be implemented to reduce the movement of pyrethroids from their point of application was presented at five years during the 2022 Monitoring year, which were collectively attended by 350 growers. A total of 1430 growers throughout the BYS Subwatershed were also contacted eight times via email during the 2022 Monitoring Year to inform them of pyrethroid pesticide exceedances. Additional information regarding these outreach events and materials is provided in **Appendix F** (SVWQC Outreach Material) of the Coalition's 2022 AMR.

**PG 4:** Tracking of management practices implemented to reduce or prevent the discharge of pyrethroid pesticides to surface waters in the Lower Honcut Creek drainage and represented drainages is accomplished through the MPIR process. Baseline MPIR results for the 2022 crop year will be submitted to the Irrigated Lands Regulatory Program by November 30, 2023, and summarized in the 2023 MPPR.

**PG 5:** Maintain pyrethroid pesticide concentrations in Lower Honcut Creek at Highway 70 (LHNCT) to below the Pyrethroid Pesticide BPA prohibition trigger limit.

Pyrethroid pesticides monitoring performed at the LHNCT site since October 2020 is shown in **Figure 5**. The focus of the current Management Plan for Pyrethroid Pesticides in Lower Honcut Creek is the exceedances of the Pyrethroid Pesticide BPA chronic Concentration Goal Unit (CGU) of 1 (unitless) that were observed during the Pyrethroid Pesticide BPA Baseline Monitoring period (October 2020 through September 2021) and thereafter. Two exceedances of the pyrethroid pesticides prohibition trigger limit within a 3-year period beginning on October 1, 2020, are sufficient to trigger a Management Plan.



**Figure 5: Pyrethroid Pesticides Monitoring Results in Lower Honcut Creek at Highway 70: October 2020–September 2022**

### Sediment Toxicity to *Hyaella azteca* in Ulatis Creek

Two sediment toxicity to amphipod (*Hyaella azteca*) events were observed in Ulatis Creek in April 2018 and April 2019. *Hyaella* 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 sediment 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 *Hyaella* sediment toxicity exceedances, no individual pyrethroid or collection of pyrethroids were identified as the potential cause of the *Hyaella* sediment toxicity observed in April 2018 when comparing detected pesticides concentrations to a relevant ecotoxicology benchmark for the freshwater amphipod (Amweg et al., 2005<sup>7</sup>). During the 2022 Monitoring Year, sediment toxicity to *Hyaella* was again observed in an Ulatis Creek sediment sample collected in April 2022.

Sediment pesticide analyses associated with the April 2019 *Hyaella* sediment toxicity exceedance did indicate that the pyrethroid pesticides bifenthrin and lambda-cyhalothrin were present in the sediment at concentrations sufficient to cause the observed toxicity to *Hyaella*.

<sup>7</sup> 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.

A Management Plan for Sediment Toxicity to *Hyalella azteca* in Ulatis Creek was submitted to the Central Valley 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. The April 2022 sediment toxicity exceedance was not associated with pyrethroid pesticides detected in the sediment sample at concentrations that could cause toxicity to *Hyalella*. However, the Management Plan was extended an additional three years because of the April 2022 exceedance.

Even though the Management Plan was not 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 education and outreach efforts. Activities and water quality measurements related to the satisfaction of this Management Plan's Performance Goals that occurred during the 2022 Monitoring Year are described below.

### **Performance Goal Status**

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

Due to COVID-19 restrictions in place during much of the 2020 and 2021 Monitoring Years, remote meetings were held to discuss (1) the *Hyalella* toxicity exceedances that triggered the Management Plan, (2) cultural practices for managing sediment and erosion, and (3) pesticide application practices to avoid/limit the movement of pesticides from where they are applied. This included the Annual General Member Information Meeting (held on November 5, 2020) and a Grower Meeting (held on October 19, 2021). In addition, 67 members were contacted via email to discuss pyrethroid BMPs, 345 reporters were notified about the June 23, 2021, water column exceedance and 77 growers, commercial applicators, and PCAs were notified of specific BMPs of pyrethroid use as stated in the *Hyalella* sediment toxicity Management Plan. Outreach and education activities conducted during the 2022 Monitoring Year included holding two online ((October and November 2021) and one in-person meeting (December 2021) that collectively reached 120 growers, as well as distributing information materials regarding pyrethroids and the use of BMPs during their application via email (987 emails sent) and U.S. Mail (575 newsletters sent). Additional information regarding these outreach events is provided in **Appendix F (SVWQC Outreach Material)** of the Coalition's 2022 AMR.

**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.

The tracking of management practices implemented to reduce or prevent the discharge of pyrethroid pesticides (bifenthrin and lambda-cyhalothrin) to surface waters in the Cache Slough drainage and represented drainages is accomplished through the MPIR process beginning with the 2020 crop year. A summary of the individual management practices implemented on tomato and alfalfa acreage receiving bifenthrin and/or lambda-cyhalothrin applications during

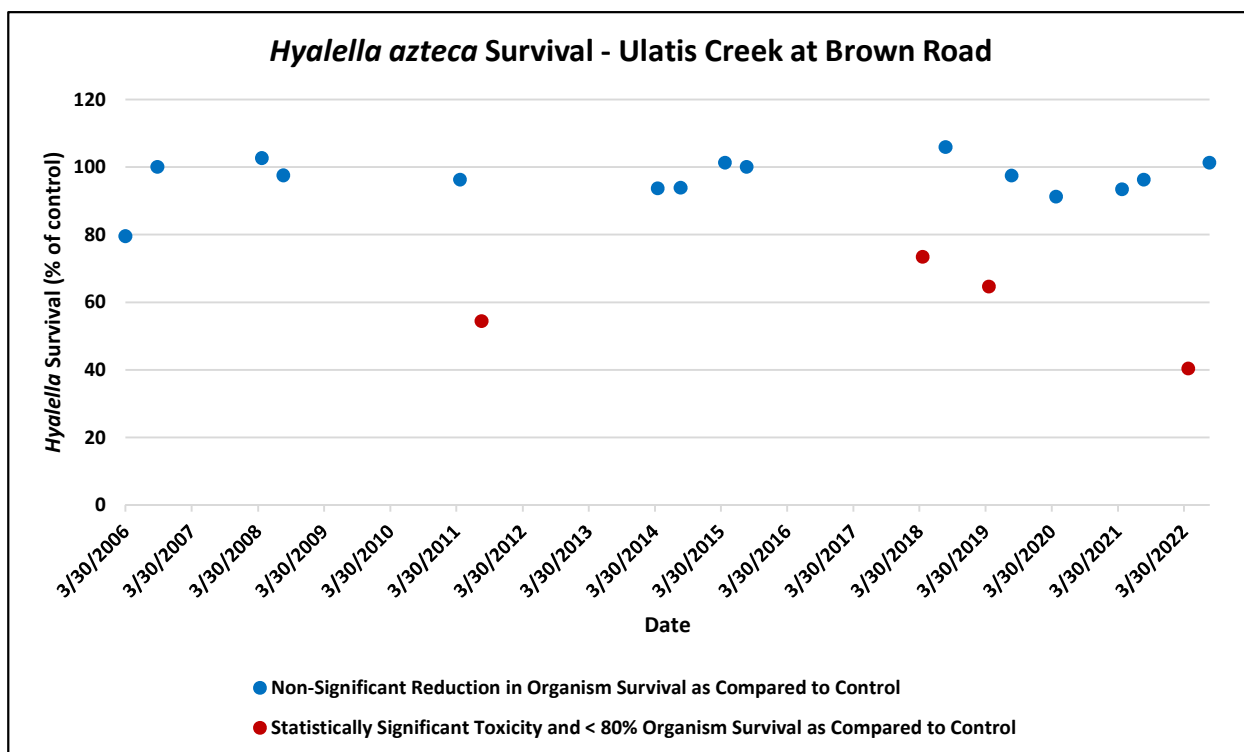


the 2021 crop year, as compared to the total acreage where the two pyrethroid pesticides were applied, is provided in **Appendix A, Table A-4**.

**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 6**. Four additional sediment toxicity tests were performed subsequent to the April 2019 exceedance that triggered the Management Plan and none showed toxicity to *Hyaella*.



**Figure 6. *Hyaella* Sediment Toxicity Monitoring Results in Ulatis Creek at Brown Road: 2006 – 2022**

## 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 WQOs at a number of monitoring sites. The development of



DO and pH Management Plans has been given a low priority by the Central Valley 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.

Central Valley 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 had been triggered and asked the SVWQC to develop a Management Plan approach/methodology for these two parameters.

The Coalition 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 Central Valley 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 a summary report of these two statistical analyses to the Central Valley Water Board's Executive Officer 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 Central Valley 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 Central Valley Water Board, the Coalition 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, Larry Walker Associates 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

Central Valley 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 Central Valley 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 revising its Work Plan in Spring 2019 when Central Valley 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.

In January 2021, Central Valley Water Board staff released irrigated pasture regulatory recommendations for the Goose Lake Subwatershed. The recommendations included the finding that *E. coli* within this specific watershed did not appear to be a significant issue associated with irrigated pasture and likely can be addressed through an alternative regulatory pathway. On 13 August 2021, the Central Valley Water Board approved for exemption the ILRP 7,000 irrigated acres of pasture and hay operations in the Goose Lake area.

The Central Valley Water Board still must consider how best to address potential *E. coli* contributions from irrigated pasture and other irrigated lands in the other subwatersheds that comprise the Sacramento Valley Coalition. Until the Central Valley 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 2023 for existing Management Plans are listed in **Table 11**. The specific tasks for these existing Management Plans have been provided earlier in this document, as well as presented in detail in previously submitted site-specific Management Plans.

**Table 11. 2021 Deliverables for Active Management Plans**

Analyte Category	Analytes	Subwatershed	Water Body	Status	Next Deliverable
Registered Pesticides	Diazinon	Butte-Yuba-Sutter	Gilsizer Slough	Management Plan approved November 6, 2020; RTC submitted on March 27, 2023; Continue monitoring and implementation of Management Plan until RTC approval.	RTC submitted on March 27, 2023, and approved on April 12, 2023.
	Pyrethroid Pesticides	Butte-Yuba-Sutter	Lower Honcut Creek	Management Plan approved November 16, 2022; Continue monitoring and implementation of Management Plan	2021 and 2022 MPIR by November 30, 2023
	Pyrethroid Pesticides	Butte-Yuba-Sutter	Lower Snake River	Management Plan approved November 16, 2022; Continue monitoring and implementation of Management Plan	2021 and 2022 MPIR by November 30, 2023
	Pyrethroid Pesticides	Butte-Yuba-Sutter	Pine Creek	Management Plan approved October 18, 2022; Continue monitoring and implementation of Management Plan	2021 and 2022 MPIR by November 30, 2023
Toxicity	<i>Hyaella</i> (Sediment Toxicity)	Solano	Ulati Creek	Management Plan approved January 30, 2020; continue monitoring and implementation of Management Plan	2022 MPIR submitted by November 30, 2023
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
Nutrients	Ammonia as N	Yolo	Willow Slough	Management Plan triggered during 2021 Monitoring Year	Continue investigation of potential source(s) of ammonia along Willow Slough

Analyte Category	Analytes	Subwatershed	Water Body	Status	Next Deliverable
Pathogen Indicators	E. coli	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 Central Valley Water Board	No deliverable requirements established
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 Central Valley Water Board regarding implementation of Central Valley Salt and Nitrate Control Program	No deliverable requirements established
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 occasionally are observed, the overall trend from 2005 through September 2022 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 has one active Management Plan 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. It should be noted that the agricultural use of chlorpyrifos was essentially<sup>8</sup> eliminated as of December 31, 2020, after which it became illegal for growers to possess or use chlorpyrifos products in California. This cancellation of the use of chlorpyrifos by agriculture should act to further reduce concentrations of the OP pesticide in receiving waters of the Sacramento Valley and Delta. No applications of chlorpyrifos were reported in 2021 in the six Coalition subwatersheds within the TMDL compliance region (Butte-Yuba-Sutter; Glenn-Colusa; Placer-Nevada-South Sutter-North Sacramento (PNSSNS); Sacramento-Amador; Solano; Yolo). These combined efforts are expected to result in a continuation of the decreasing trend in the number of exceedances for both pesticides, especially chlorpyrifos.

### ***Clear Lake Nutrient TMDL***

In 2006, the Central Valley 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 memorandum<sup>9</sup> to support Central Valley Water Board staff in its 2016 update of the Clear Lake Nutrient TMDL. The 2016 memorandum provides follow-up responses to a set of

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<sup>8</sup> A few products that apply chlorpyrifos in granular form, representing less than one percent of agricultural use of chlorpyrifos, will be allowed to remain on the market. These products are not associated with detrimental health effects (<https://www.cdpr.ca.gov/docs/pressrls/2019/100919.htm>)

<sup>9</sup> 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.

questions originally asked by Central Valley 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 September 2016 and approved by the Central Valley Water Board in November 2016. The site-specific Management Plans developed since September 2016 are included as addenda to the CSQMP. The CSQMP complies with the requirements set forth in the Coalition's Waste Discharge Requirements (WDR), Order No. R5-2014-0030-11 (most recently amended by Order No. R5-2023-0001), and associated Monitoring and Reporting Program (MRP) adopted by the Central Valley Water Board in March 2014.

In general terms, the processes to meet the requirements of the Management Plan can be distilled to the following 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 Central Valley Water Board for a 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 (originally 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 Central Valley 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 Central Valley Water Board approval.

With regard to new Management Plans developed pursuant to the WDR and CSQMP and submitted to the Central Valley Water Board beginning in 2016, assessment of progress toward completion of the Management Plan is based on the tracking of actions focused on reducing the risk of exceedances of the target constituent above its 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 Central Valley 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 specific 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 (via baseline management practices assessment – formerly using Farm Evaluation or Focused Outreach Survey data) and over time (via the MPIR process) as growers and applicators are exposed to continued outreach and education and as subsequent water quality monitoring data are collected. Management practices implementation will typically be reassessed on an annual basis. Finally, the Coalition, subwatersheds, and Central Valley 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 WQOs 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 46 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. R5-2014-0030-11 (most recently amended by Order No. R5-2023-0001), and associated Monitoring and Reporting Program (MRP) adopted by the Central Valley Water Board in March 2014. The Coalition's approved CSQMP was most recently updated in September 2016 and approved by the Central Valley Water Board in November 2016. The site-specific Management Plans developed since September 2016 are included as addenda to the CSQMP. The Coalition currently proposes no changes to the 2016 CSQMP.



# APPENDIX

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## List of Appendices

**Appendix A: Individual Management Practice  
Implementation Acreage as Compared to Total Acres  
Reported Receiving Applications of a Pesticide for which  
there Exists a Management Plan**

## APPENDIX A

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**Individual Management Practice Implementation  
Acreage as Compared to Total Acres Reported  
Receiving Applications of a Pesticide for which  
there Exists a Management Plan**

## APPENDIX A

### INDIVIDUAL MANAGEMENT PRACTICE IMPLEMENTATION ACREAGE AS COMPARED TO TOTAL ACRES REPORTED RECEIVING APPLICATIONS OF A PESTICIDE FOR WHICH THERE EXISTS A MANAGEMENT PLAN

**Table A-1: Individual Management Practices Implemented by Year for the Diazinon Management Plan in Gilsizer Slough**

	2019 FOS	2020 MPIR	2021 MPIR	2022 MPIR
<b>Total Acres Receiving Diazinon (as reported in FOS or MPIR responses)</b>	<b>382</b>	<b>17</b>	<b>0</b>	<b>0</b>
<b><i>Pesticide Application Practices Implemented When Applying Diazinon (Total Acres Implemented per Year)</i></b>				
Avoid surface water when spraying	382	17	---	---
County Permit followed	382	17	---	---
End of row shutoff when spraying	382	---	---	---
Follow label restrictions	382	17	---	---
Monitor wind conditions	382	17	---	---
Use appropriate buffer zones	382	17	---	---
Use PCA recommendations	382	17	---	---
Monitor rain forecasts	354	17	---	---
Attend pesticide application trainings	275	17	---	---
Reapply rinsate to treated field	247	---	---	---
Use drift control agents	247	---	---	---
Use vegetated drainage ditches	247	---	---	---
Target sensing sprayer used	108	---	---	---

	2019 FOS	2020 MPIR	2021 MPIR	2022 MPIR
<b>Total Acres Receiving Diazinon (as reported in FOS or MPIR responses)</b>	<b>382</b>	<b>17</b>	<b>0</b>	<b>0</b>
Sensitive areas mapped	---	17	---	---
<b><i>Cultural Practices for Managing Sediment and Erosion Where Diazinon Applied (Total Acres Implemented per Year)</i></b>				
Minimum tillage incorporated to minimize erosion.	335	17	---	---
Cover crops or native vegetation are used to reduce erosion.	307	---	---	---
Soil water penetration has been increased through the use of amendments, deep ripping and/or aeration.	307	---	---	---
Vegetated ditches are used to remove sediment as well as water soluble pesticides, phosphate fertilizers and some forms of nitrogen.	307	---	---	---
Creek banks and stream banks have been stabilized.	247	---	---	---
Crop rows are graded, directed and at a length that will optimize the use of rain and irrigation water.	247	17	---	---
No storm drainage due to field soil conditions.	247	---	---	---
Storm water is captured using field borders.	247	---	---	---
Vegetative filter strips and buffers are used to capture flows.	247	---	---	---
Berms are constructed at low ends of fields to capture runoff and trap sediment.	139	---	---	---
Field is lower than surrounding terrain.	139	17	---	---
Sediment basins/holding ponds are used to settle out sediment and hydrophobic pesticides from irrigation and storm runoff.	139	---	---	---

**Table A-2: Individual Management Practices Implemented by Year for the Pyrethroid Pesticides Management Plan in Lower Snake River Drainage and Represented Drainages**

Total Acres Receiving Pyrethroid Pesticides (as reported in MPIR responses)	2021 MPIR
	8,482
<b><i>Pesticide Application Practices Implemented When Applying Pyrethroid Pesticides (Total Acres per Year)</i></b>	
County Permit Followed	8,338
Follow Label Restrictions	8,338
Monitor Wind Conditions	8,237
Monitor Rain Forecasts	8,226
End of Row Shutoff When Spraying	7,959
Attend Trainings	7,679
Reapply Rinsate to Treated Field	6,127
Sensitive Areas Mapped	6,004
Use Drift Control Agents	5,104
Avoid Surface Water When Spraying	4,953
Use PCA Recommendations	2,205
Use Appropriate Buffer Zones	1,623
Use Vegetated Drain Ditches	964
Target Sensing Sprayer Used	632
Chemigation	0
Other	0
<b><i>Dormant Spray Management (Total Acres per Year)</i></b>	
Acres Sprayed with Pyrethroids as a Dormant Season Spray	1,754
<b><i>Condition of Orchard Floor When Applying Dormant Season Pesticide</i></b>	
Vegetative Cover with Sprayed Berms	1,071
Vegetative Cover	254
Some Vegetation	24

Total Acres Receiving Pyrethroid Pesticides (as reported in MPIR responses)	2021 MPIR
	8,482
Condition Not Reported	405
<b>Dormant Season Pesticide Management Practices</b>	
Check Weather Conditions Prior to Spraying	1,349
Maintain Setbacks	1,225
Practice Not Reported	405
<b><i>Irrigation Methods and Efficiency Practices Implemented When Applying Pyrethroid Pesticides (Total Acres per Year)</i></b>	
<b>Primary Irrigation Method Employed</b>	
Microsprinkler	2,571
Drip	2,349
Flood	2,101
Sprinkler	1,357
Border Strip	97
Not Reported	8
<b>Secondary Irrigation Method Employed</b>	
No Secondary Irrigate Method Employed	6,740
Flood	801
Microsprinkler	785
Sprinkler	156
<b>Irrigation Efficiency Practices</b>	
Use of moisture probe	7,484
Water application schedules to need	7,197
Laser leveling	7,054
Use of ET in scheduling irrigation	4,007
Use of soil moisture neutron probe	1,773

Total Acres Receiving Pyrethroid Pesticides (as reported in MPIR responses)	2021 MPIR
Use of pressure bomb	1,164
<b><i>Sediment and Erosion Management Practices Implemented When Applying Pyrethroid Pesticides (Total Acres per Year)</i></b>	
Cover crops or native vegetation are used to reduce erosion.	5,973
Vegetated ditches are used to remove sediment as well as pesticides, phosphate fertilizers and some forms of nitrogen.	4,053
Vegetative filter strips and buffers are used to capture flows.	3,504
Storm water is captured using field borders.	3,406
Soil water penetration has been increased through the use of amendments, deep ripping and/or aeration.	1,609
Crop rows are graded, directed and at length that will optimize the use of rain and irrigation water.	1,428
Hedgerows or trees are used to help stabilize soils and trap sediment movement.	1,013
Sediment basins/holding ponds are used to settle out sediment and hydrophobic pesticides such as pyrethroids from irrigation and storm runoff.	717
Minimum tillage incorporated to minimize erosion.	697
Other cultural practices.	164
Creek banks and streams have been stabilized.	146
Berms are constructed at low ends to capture runoff and trap sediment.	140
Field is lower than surrounding terrain.	78
No storm drainage due to field or soil conditions.	0
Subsurface pipelines are used to channel runoff water.	0

**Table A-3: Individual Management Practices Implemented by Year for the Pyrethroid Pesticides Management Plan in Pine Creek Drainage and Represented Drainages**

Total Acres Receiving Pyrethroid Pesticides (as reported in MPIR responses)	2021 MPIR
	35,483
<b><i>Pesticide Application Practices Implemented When Applying Pyrethroid Pesticides (Total Acres per Year)</i></b>	
County Permit Followed	35,483
End of Row Shutoff When Spraying	35,483
Monitor Rain Forecasts	35,483
Follow Label Restrictions	35,471
Monitor Wind Conditions	35,105
Avoid Surface Water When Spraying	33,936
Use Appropriate Buffer Zones	31,512
Reapply Rinsate to Treated Field	29,261
Attend Trainings	21,650
Use PCA Recommendations	13,932
Use Drift Control Agents	8,587
Target Sensing Sprayer Used	7,388
Use Vegetated Drain Ditches	5,817
Sensitive Areas Mapped	5,705
Chemigation	0
Other	0
<b><i>Dormant Spray Management (Total Acres per Year)</i></b>	
Acres Sprayed with Pyrethroids as a Dormant Season Spray	883
<b>Condition of Orchard Floor When Applying Dormant Season Pesticide</b>	
Vegetative Cover with Sprayed Berms	883
<b>Dormant Season Pesticide Management Practices</b>	
Check Weather Conditions Prior to Spraying	883



Total Acres Receiving Pyrethroid Pesticides (as reported in MPIR responses)	2021 MPIR
	35,483
Maintain Setbacks	883
<b><i>Irrigation Methods and Efficiency Practices Implemented When Applying Pyrethroid Pesticides (Total Acres per Year)</i></b>	
<b>Primary Irrigation Method Employed</b>	
Sprinkler	15,467
Drip	12,992
Microsprinkler	7,024
<b>Secondary Irrigation Method Employed</b>	
No Secondary Irrigate Method Employed	19,595
Sprinkler	7,185
Microsprinkler	4,482
Drip	3,698
Flood	523
<b>Irrigation Efficiency Practices</b>	
Water application schedules to need	33,233
Use of pressure bomb	28,103
Use of ET in scheduling irrigation	26,044
Laser leveling	17,302
Use of moisture probe	13,138
Use of soil moisture neutron probe	3,580
<b><i>Sediment and Erosion Management Practices Implemented When Applying Pyrethroid Pesticides (Total Acres per Year)</i></b>	
Cover crops or native vegetation are used to reduce erosion.	33,875
Vegetative filter strips and buffers are used to capture flows.	25,189
Vegetated ditches are used to remove sediment as well as pesticides, phosphate fertilizers and some forms of nitrogen.	16,934
Hedgerows or trees are used to help stabilize soils and trap sediment movement.	14,712

Total Acres Receiving Pyrethroid Pesticides (as reported in MPIR responses)	2021 MPIR
	35,483
Storm water is captured using field borders.	12,932
Other cultural practices.	5,661
Soil water penetration has been increased through the use of amendments, deep ripping and/or aeration.	2,748
Minimum tillage incorporated to minimize erosion.	1,552
No storm drainage due to field or soil conditions.	523
Field is lower than surrounding terrain.	510
Sediment basins/holding ponds are used to settle out sediment and hydrophobic pesticides such as pyrethroids from irrigation and storm runoff.	510
Creek banks and streams have been stabilized.	227
Subsurface pipelines are used to channel runoff water.	192
Berms are constructed at low ends to capture runoff and trap sediment.	169
Crop rows are graded, directed and at length that will optimize the use of rain and irrigation water.	0

**Table A-4: Individual Management Practices Implemented by Year for the *Hyalella* Sediment Toxicity Management Plan in Ulatis Creek (Cache Slough Drainage) and Represented Drainages**

	2020 MPIR	2021 MPIR
<b>Total Acres Receiving Bifenthrin and/or Lambda-Cyhalothrin Applications</b>	<b>15,047</b>	<b>16,090</b>
<b><i>Pesticide Application Practices Implemented When Applying Bifenthrin and/or Lambda-Cyhalothrin (Total Acres per Year)</i></b>		
County Permit Followed	14,776	16,075
End of Row Shutoff When Spraying	14,776	16,028
Monitor Rain Forecasts	14,776	15,680
Monitor Wind Conditions	14,776	15,984
Use PCA Recommendations	14,776	16,068
Attend Trainings	14,662	15,961
Use Appropriate Buffer Zones	14,634	15,564
Follow Label Restrictions	14,541	15,961
Avoid Surface Water When Spraying	14,413	15,530
Use Drift Control Agents	14,270	15,641
Sensitive Areas Mapped	12,242	13,009
Reapply Rinsate to Treated Field	5,642	7,958
Use Vegetated Drain Ditches	4,293	2,089
Chemigation	2,375	1,713
Target Sensing Sprayer Used	825	802
Other	0	0
<b><i>Dormant Spray Management</i></b>		
Neither bifenthrin nor lambda-cyhalothrin applied as dormant sprays	N/A	N/A
<b><i>Irrigation Methods and Efficiency Practices Implemented When Applying Bifenthrin and/or Lambda-Cyhalothrin (Total Acres per Year)</i></b>		
<b>Primary Irrigation Method Employed</b>		
Flood	6,012	5,596

Total Acres Receiving Bifenthrin and/or Lambda-Cyhalothrin Applications	2020 MPIR	2021 MPIR
	15,047	16,090
Furrow	4,478	3,866
Drip	3,136	5,807
Sprinkler	1,114	600
Border Strip	0	221
Dry-land (alfalfa)	27	0
Microsprinkler	36	0
<b>Secondary Irrigation Method Employed</b>		
Flood	338	312
Sprinkler	291	102
<b>Irrigation Efficiency Practices</b>		
Water application schedules to need	14,743	16,010
Laser leveling	11,061	13,150
Use of ET in scheduling irrigation	4,382	3,713
Use of soil moisture neutron probe	1,536	176
Use of moisture probe	1,258	4,588
Use of pressure bomb	0	0
<b><i>Sediment and Erosion Management Practices Implemented When Applying Bifenthrin and/or Lambda-Cyhalothrin (Total Acres per Year)</i></b>		
Crop rows are graded, directed and at length that will optimize the use of rain and irrigation water.	12,815	14,326
Soil water penetration has been increased through the use of amendments, deep ripping and/or aeration.	12,207	13,035
Storm water is captured using field borders.	8,523	8,719
Minimum tillage incorporated to minimize erosion.	6,863	5,490
Vegetated ditches are used to remove sediment as well as pesticides, phosphate fertilizers and some forms of nitrogen.	6,076	5,521
Berms are constructed at low ends to capture runoff and trap sediment.	5,984	5,179

Total Acres Receiving Bifenthrin and/or Lambda-Cyhalothrin Applications	2020 MPIR	2021 MPIR
	15,047	16,090
Sediment basins/holding ponds are used to settle out sediment and hydrophobic pesticides such as pyrethroids from irrigation and storm runoff.	4,521	4,067
Subsurface pipelines are used to channel runoff water.	3,154	3,859
Cover crops or native vegetation are used to reduce erosion.	2,441	1,442
No storm drainage due to field or soil conditions.	2,421	3,565
Vegetative filter strips and buffers are used to capture flows.	1,058	394
Field is lower than surrounding terrain.	475	242
Hedgerows or trees are used to help stabilize soils and trap sediment movement.	475	281
Creek banks and streams have been stabilized.	416	386
Other	36	0