East San Joaquin
Water Quality Coalition

2016 SUMMARY ANNUAL REPORT

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Year in Review

Nitrogen Use Reporting Brings New Challenges

2016 marked the first year that growers in three Central Valley water quality coalitions turned in nitrogen fertilizer application information. In addition to members of the ESJWQC, growers who farm in the San Joaquin County and Delta Water Quality Coalition and the Westside San Joaquin River Watershed Coalition also submitted their Nitrogen Summary Reports to their coalition for analysis and compilation. After many reminders and much cajoling, 98% of those in ESJWQC who needed to submit the reports complied with the requirement. A remarkable response rate for a new program, especially since calculating the information in the report takes good record keeping and most growers have to report on multiple parcels.

A key number used for the broader analysis and comparison of members' data to growers of like crops is the A/Y "index." This number, applied nitrogen divided by crop yield, replaces the "Nitrogen Removed" number that the Regional Water Board initially required growers to report for each field or management unit. But because most crops do not have adequate information on how much nitrogen is removed from a field at harvest (or stored in the plant in the case of perennial crops such as trees and vines), the coalitions convinced the Regional Water Board that A/Y could be the interim reporting number.

When A/Y information for the same crop is compared, it reveals which growers could potentially be over-applying nitrogen fertilizer for the crop harvested, possibly leading to excess nitrate migrating to groundwater aquifers. While statistical analysis of the numbers do in fact reveal "outliers" from the median, we cannot yet say definitively that those outliers are actually using too much nitrogen fertilizer. What the A/Y index does do is begin the complicated process that Central Valley coalitions must undertake to prove to the public and regulators that growers are not, in fact, causing contamination of groundwater through their practices. But equally important, it does give an indication if the operator of an individual field is applying far more than most other growers of the same crop. Call those growers "extreme outliers."

The A/Y index, and even Nitrogen Removed numbers, if accurate information was available, tell only part of the story. Not captured in either index are important practices that in themselves, if done wrong, can cause nitrogen fertilizers to move past a crop root zone. Those practices include the timing of nitrogen applications and the amount of nitrogen in each application. Even more crucial to leaching of nitrates is the timing of irrigation events and total amount of water applied in each irrigation. Proper application of each of those management practices varies and depends on the crop, soils, temperatures and other factors too long to list here.

Our intent is to keep the use and timing of those specific practices off the coalition's data gathering responsibilities. Rather, we are committed to encouraging growers to develop and follow their own approaches for these practices that are specific to their cropping conditions. And just as the coalition did in its first ten years with promoting practices to protect surface water from pesticides, we will be putting considerable resources into encouraging members to use practices to minimize movement of nitrates into groundwater.

The efforts of ESJWQC members to solve surface water problems found through monitoring of coalition streams and sloughs continues to be evident as seen in waterways that have fulfilled Management Plan requirements (see page 10). That success is also apparent to the Regional Water Board who asked ESJWQC to prepare a short video to include in Board staff's annual report of programs to the Board. After viewing the video, many accolades were offered by individual Water Board members, in particular, recognizing the coalition's efforts in solving problems once they were discovered.

This "success story" video is one of several ways ESJWQC is using visual media to assist growers in completing forms and attending member meetings via watching the event on the internet (see videos at www.esjcoalition.org/videoNews.asp).

Part of our success can be credited to the continued involvement of the Farm Bureaus in Stanislaus, Merced and Madera counties. The Farm Bureaus provide meeting facilities and allow ESJWQC staff to be based in their offices so they are available to answer member questions.

Thank you for your continued support of the East San Joaquin Water Quality Coalition.

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Management Plan Update

Responsible Farm Management leads to Improved Water Quality

The East San Joaquin Water Quality Coalition began monitoring water quality in 2004. Each year since then, the number of waterways and represented acreage has increased. Under the Waste Discharge Requirements General Order (R5-2012-0116-R2), the Coalition monitors 31 sites across more than 5.6 million acres. When analysis results of samples are in exceedance of State standards more than once at a waterway within three years, for any constituent, a management plan is required.

The Coalition's Management Plan Strategy to address water quality impairments includes:

- Identify potential sources impairing water quality
- Work with growers to implement effective management practices
- Measure and track water quality results in the Coalition region
- Report results to the Regional Water Board
- Send a letter to the Regional Board requesting management plan completion after three years with no exceedances of the water quality standards of a constituent at a site

All of the 31 waterways scheduled for monitoring in the Coalition region, are in management plans for various constituents. Management plans in the Coalition region include pesticides, toxicity, nutrients, E. coli, and physical parameters (dissolved oxygen, pH, specific conductivity).

Member's Management Practices

Farm Evaluation Surveys have been collected annually from growers located in high vulnerability groundwater areas since 2014. The surveys collect information on practices including irrigation, pesticide application, sediment erosion and wellhead management. March 1st is the deadline for growers to return the surveys so the Coalition can analyze and report the aggregated results in the Annual Report submitted May 1st. In 2016, the Coalition received surveys from 83% of the required members, representing 85% of the required acreage. Summary results of members' management practices in the Coalition are provided on page four and five of this report. Those who have not completed the survey can expect to be contacted by the Regional Water Board in coming months. Failure to complete the survey can result in expulsion from the ESJWQC and the need to obtain individual regulatory coverage through the Regional Water Board.

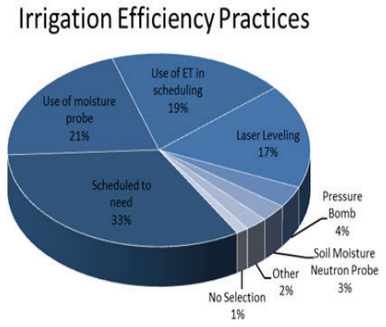
While completing a Farm Evaluation survey is a requirement to be an ESJWQC member in good standing, some members have not completed the survey as indicated by the following statistics:

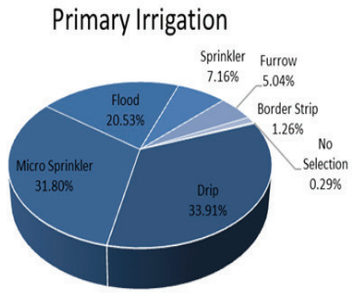
Members required to complete a Farm Evaluation in 2016: **3,412**
Those who completed Farm Evaluation surveys by March 1, 2016: **2,877**
Membership acreage: **683,328**
Acreage covered by completed Farm Evaluation surveys: **579,861**

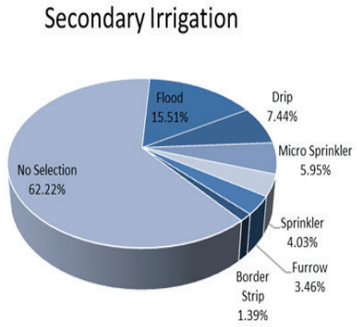
Focused Outreach Efforts

Since 2009, Coalition representatives have conducted focused outreach through individual meetings with nearly 365 members who farm along waterways with management plans. Management practices have been documented on fields totaling nearly 70,000 acres. As expected, individual outreach visits and Farm Evaluation results indicate most members are already using multiple practices for managing dormant sprays, sediment and erosion, storm drainage, irrigation runoff, and spray drift from pesticide applications. After focused outreach meetings, numerous growers have adopted additional farm management practices to reduce potential agricultural impacts on waterways. As a result of member cognizance, management practices across the Coalition region are being implemented and help reduce the potential for chemicals and sediment to drain into adjacent waterways. In the last eight years, water quality has improved in many of the waterways with management plans.

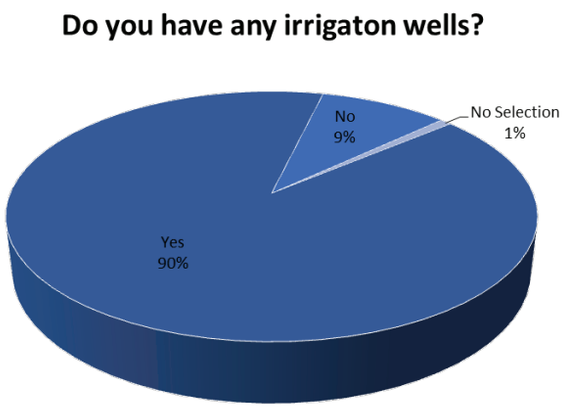
Percent of acreage for irrigation management practices.

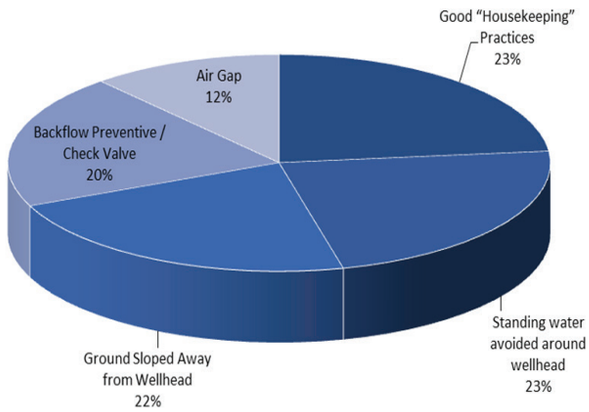




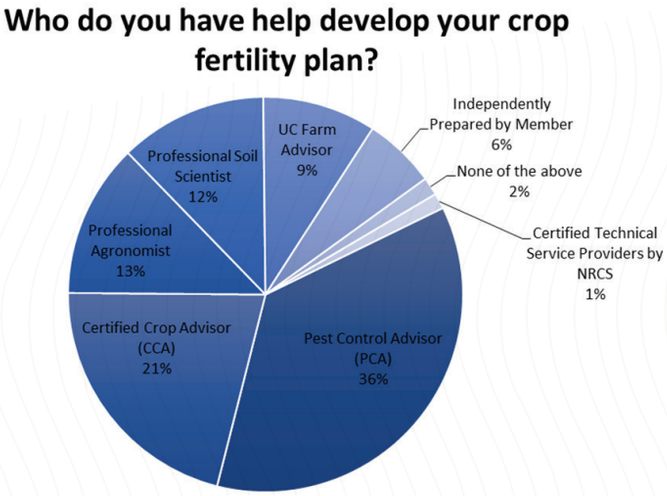


Percent acreage associated with members who have irrigation wells and percent acreage associated with members implementing wellhead protection practices.

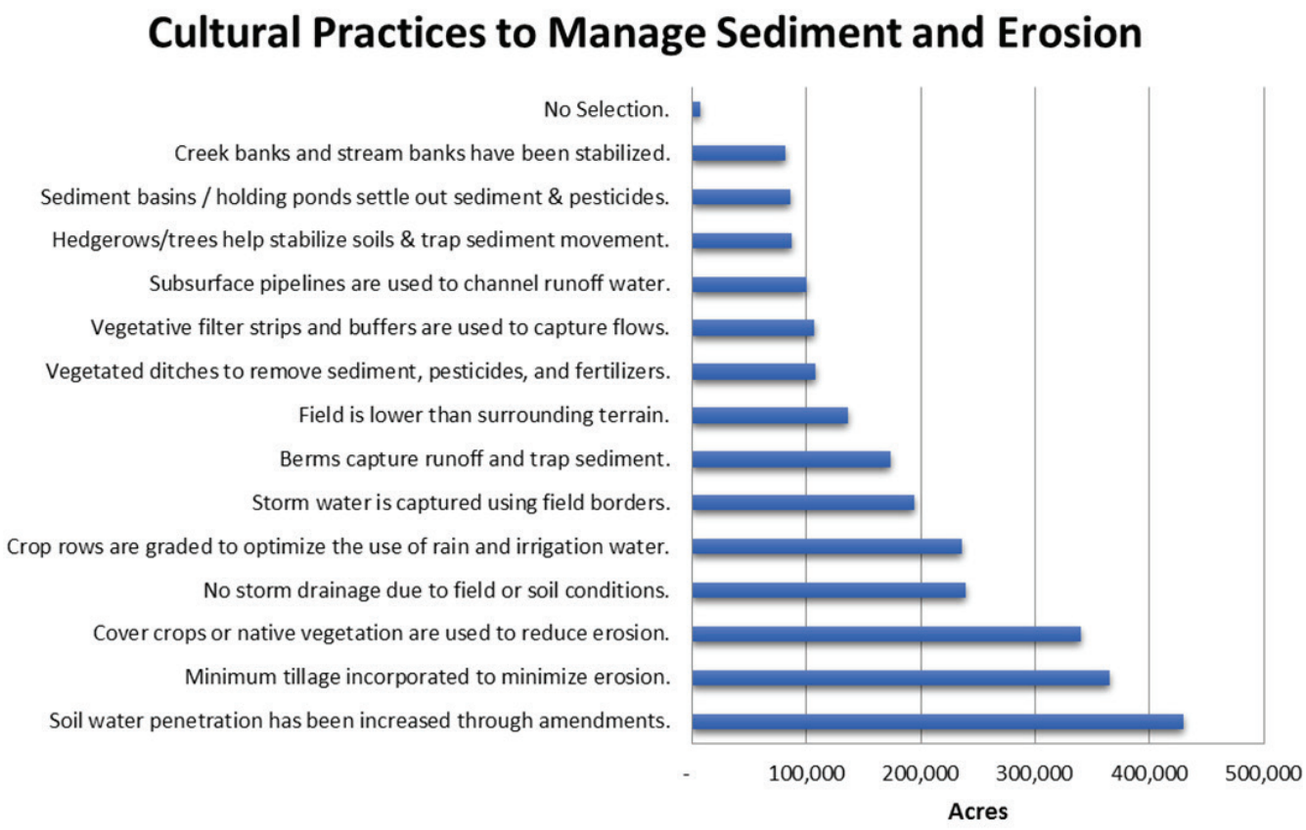




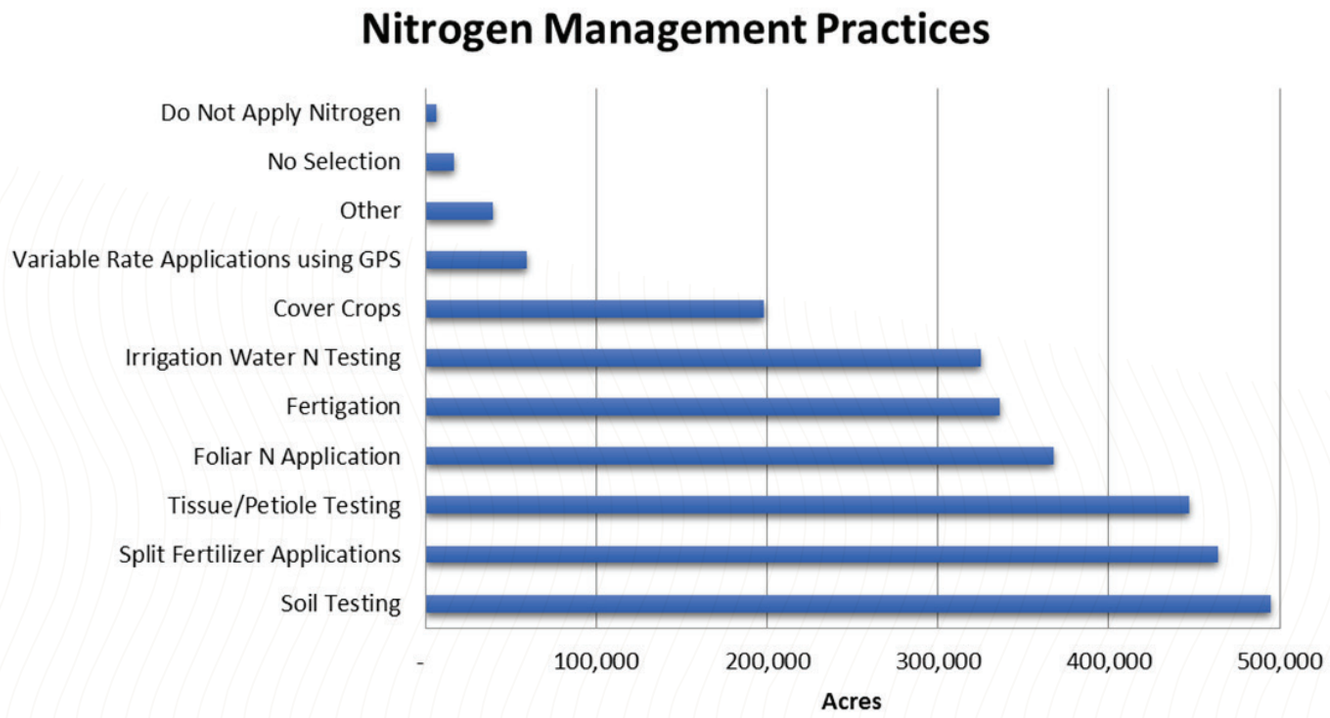
Percent acreage associated with different types of professionals qualified to develop crop fertility plans.



Acreage of cultural practices implemented to manage sediment and erosion.



Acreage associated with nitrogen management methods.



Documents required by the Waste Discharge Requirements (WDR; amended April 17, 2015):

Upcoming Due Date	Member Requirement	WDR Reference	Small Farming Operations (<60 acres)		All Other Members (≥60 acres)		Submitted To
			Low Vulnerability	High Vulnerability	Low Vulnerability	High Vulnerability	
As Needed	Notice of Confirmation	Pg 23	Once				ESJWQC
January 22, 2016	Sediment and Erosion Control Plan[1]	Pg 25				Required*	Kept on Farm
July 23, 2016	Sediment and Erosion Control Plan[1]	Pg 23		Required*			Kept on Farm
March 1, 2017	Farm Evaluation Plan[2]	Pg 24		Annually		Annually	ESJWQC
March 1, 2017	Nitrogen Management Plan (NMP) Worksheet[3]	Pg 26	Annually	Annually*	Annually	Annually*	Kept on Farm
March 1, 2017	NMP Summary Report[3]	Pg 26				Annually	ESJWQC
March 1, 2018	Farm Evaluation Plan	Pg 24	Every 5 yrs				ESJWQC
March 1, 2018	NMP Summary Report[3]	Pg 26		Annually			ESJWQC
March 1, 2020[4]	Farm Evaluation Plan	Pg 24			Every 5 yrs		ESJWQC

*Certification required.
[1]Updated as farm conditions change
[2]High Vulnerability- either surface or groundwater.
[3]High Vulnerability- groundwater only.
[4]Last due on March 1, 2015.

Sediment Discharge and Erosion Control Plans (SECP) are required to have on-farm for members identified as having high potential to discharge sediment that could impact waterways in the region. The SECP must be kept at the farming operation and updated as conditions change. The SECP must adhere to site-specific recommendations provided by a Regional Water Board-approved agency (NRCS, UC Cooperative Extension, Resource Conservation District or County Ordinance applicable to sediment and erosion). Otherwise, the SECP can be certified by a qualified professional or self-certified by taking a 4-hour class and passing a test at the end (test must be passed in order to be certified). The first SECP self-certification course was held on February 28, 2017 and seats filled up quickly. The Coalition will hold additional courses in the near future to assist growers in getting their SECPs certified as soon as possible. Additional information about the self-certification course can be found on the coalition website. (http://www.esjcoalition.org/home.asp).

Qualified professionals include: Professional Civil Engineer, Professional Geologist, Professional Engineering Geologist, Professional Landscape Architect, Professional Hydrologist, Certified Soil Scientist, Certified Professional in Erosion and Sediment Control, Certified Professional in Storm Water Quality, or Professional in Erosion and Sediment Control (see table below). The ESJWQC will continue to compile a list of other qualified professionals available to assist members in completing their SECP.

List of certified professionals for the SECP.

Name	Company	Qualification	Phone Number	Email
Robb Hertz	HERTZ Environmental, Inc	CPSWQ, QSD	209-676-0123	robb@hertzenvironmental.com
Donald Ikemiya Ryan Dodd	Provost & Pritchard	P.E., CPSS	559-636-1166	dikemiya@ppeng.com rdodd@ppeng.com
Micheline Doyle Kipf John Kramer Ron Skaggs	Condor Earth Technologies, Inc.	P.E., G.E., P.G., CHG, QSD/QSP	209-938-1050	mkipf@condorearth.com
John Mensonides Brian Jones Tony De Melo	NorthStar Engineering Group, Inc.	L.S., P.E., QSD/QSP	209-524-3525	jr@nseng.net Brianj@nseng.net tdemelo@nseng.net
John M. Teravskis	WGR Southwest, Inc.	QISP, ToR, CPESC, QSD/QSP	209-334-5363 ext. 110, 209-649-0877 (cell)	jteravskis@wgr-sw.com
Scott Thorne	Scott Thorne Environmental Consulting Inc.	QSD,CPESC,ToR	(916) 223-4751	scott@thorneonyourside.com
Chad Tienken	Tienken Engineering	LS, P.E., QSD	209-872-1214	Chad@tienkenfamily.com
Bret Smith	Compliance First, LLC	CPESC, CESSWI, ToR	209-642-0180,	bsmith.compliancefirst@gmail.com
Manny Sousa	Sousa Engineering	P.E., QSD/QSP	209-238-3151	manny@sousaeng.com
Earl Stephens	Applied Engineering and Geology, Inc. (AEG)	P.E., QSD/QSP	916-645-6014	earl@aegengineers.com; aeg@aegengineers.com

Nitrogen Management

Nitrogen Management Plan Worksheets

Nitrogen Management Plan Worksheets assist growers in planning their crop nitrogen needs for the upcoming year. Growers who farm parcels in areas designated as high vulnerability to groundwater contamination are required to have their NMP Worksheet certified by a Certified Crop Advisor (CCA). An alternative is for the grower to attend a course that enables them to certify their own NMP Worksheet. The course, developed by the California Department of Food and Agriculture and managed by the Coalition for Urban Rural Environmental Stewardship (CURES), are continuing courses in 2017. Course dates are posted at http://www.curesworks.org/growerTrainings.asp. A copy of the NMP Worksheet and NMP Summary Report can be found on page 29 and 30 of this report.

Nitrogen Management Plan Summary Reports

In 2016, members in high vulnerability groundwater areas received an NMP Summary Report packet. The report is filled out using information from the NMP Worksheet. A total of 98% of members required to submit the report turned it in, starting the process of performing numerous statistical analyses of the data. One analysis compares member nitrogen use and A/Y information to other members in high vulnerability areas who produce the same crop. This data, in aggregated format, was included in a summary report submitted to the Central Valley Regional Water Board in compliance with the Irrigated Lands Regulatory Program.

Early in 2017, members who returned an NMP Summary Report were sent an analysis of their nitrogen use information by field or management unit. Their reported amount of applied nitrogen was also compared to the recommended rates compiled by the University of California (UC). The Regional Board requires that the Coalition notify members where nitrogen application rates to a field or management unit are above the average amount recommended by the UC and are considered a "statistical outlier." The Coalition is required to perform additional follow-up with members whose fields are identified as being statistically different from others who grow the same crop.

The Coalition held crop-specific meetings in February and March and may hold additional meetings later in 2017; go to www.esjcoalition.org for dates, locations and times. Any member with a field or management unit that is a "statistical outlier" is required to attend one of these meetings or view a video recording of the meeting. Meeting videos will be posted by March 30, 2017. These meetings count toward your required one Coalition event per year. Meeting videos are posted on the coalition website.

Are Growers Applying Too Much Nitrogen?

Water quality regulators and the public are concerned that excess nitrogen applied to crops could leach into groundwater aquifers. If more nitrogen is applied than the crop can use, any excess has the potential to leach into groundwater aquifers and cause contamination. Groundwater aquifers in high vulnerability areas already have nitrates above state standards or are vulnerable to nitrate contamination due to geological characteristics.

Two factors must be known to determine if excess nitrogen is being applied to a crop.

1) **N Applied** - this is the pounds of nitrogen applied per acre to your crop throughout the year.
2) **Crop Yield** - this is calculated from the A/Y ratio (Applied divided by Yield) and converted to pounds of yield per acre.

Comparing how much nitrogen is applied to how much nitrogen is removed in yield gives an indication of excess nitrogen that could potentially leach into groundwater. The amount of nitrogen removed is determined using the Crop Yield multiplied by a nitrogen removed coefficient to determine an estimate of nitrogen removed (R). The coalition performs this analysis and returns the information to members.

To determine which fields received too much nitrogen, management units in the top 10% of the average reported A/Y values (higher A/Y than 90% of the coalition growers) are considered "outliers".

Actions Taken by the Regional Board against "Outliers"

It is not anticipated that a single season A/Y number that is considered an "outlier" will mean that the field or management unit is "out of compliance" and subject to enforcement actions. The Regional Water Board has stated that coalitions can calculate a three-year "A/Y running average" for each field to compensate for normal seasonal variability of production and weather. However, if a field is consistently determined to be an outlier as a result of excessive nitrogen applications, it is expected that the Regional Water Board will contact that grower. In the meantime, the coalition plans to gather information from growers who have outlier fields to verify the information submitted is accurate and provide resources on nitrogen management specific to the crop.

How to Interpret Your Nitrogen Use Evaluation

The A/Y* ratio is your reported A/Y standardized to the following; this allows for a comparison of management units across the Coalition region:

$$\frac{A}{Y}^{*} = \frac{A}{Y(in\ lbs)} \times 1000$$

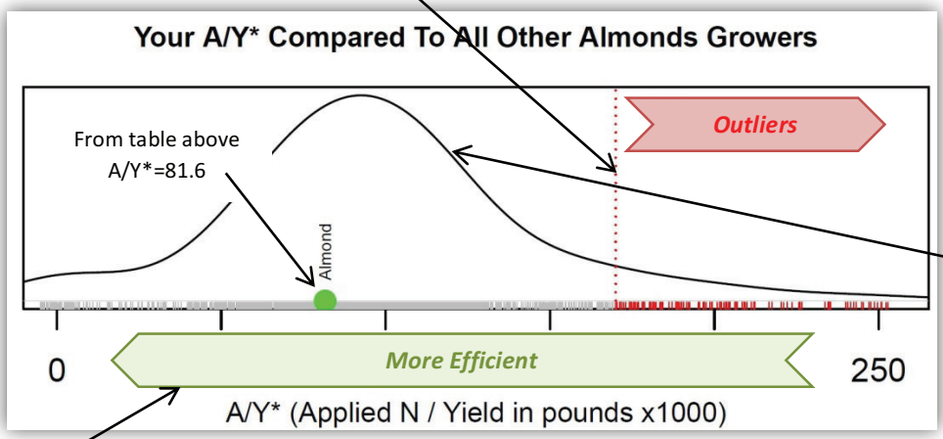
Removed-N (R) is an estimate of how much nitrogen your crop used. It is based on the Yield in pounds (Y), and the Crop Nitrogen Uptake values from the CDFA FREP site (http://apps.cdfa.ca.gov/frep/docs/N_Uptake.html).

$$R = Y \times N\ removed\ coefficeint$$

Management Unit	Crop Age	Applied-N/ Yield-pounds	Applied-N (pounds/acre)	Removed-N (pounds/acre)	Applied-N – Removed-N
Name	**Age**	**A/Y***	**A**	**R**	**A – R**
Almond	> 4	81.6	184	153	31

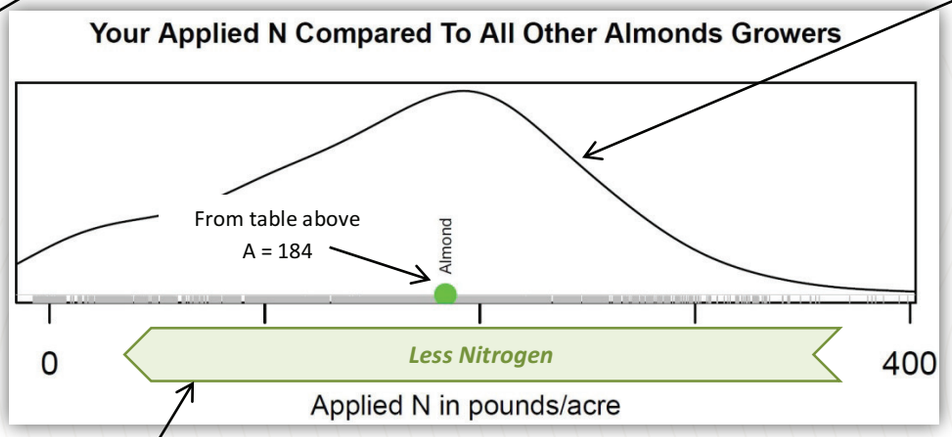
Outlier Range: A Management Unit in this range indicates inefficient nitrogen usage, and could mean that nitrogen is leaching below the root zone, and into the groundwater.

Applied minus Removed (A-R) is the difference between what was applied and what the crops used; the difference is the 'extra' N applied per acre (or under applied if the number is negative).



The "bell" curves represent all Coalition growers with the same crop who reported A/Y values. The peak of the "bell" is where most Management Units fall.

The further to the left on this curve a Management Unit falls, the more efficient the nitrogen usage—fields to the left are getting more yield per unit of nitrogen applied.



The further to the left on this curve a Management Unit falls, the less nitrogen was applied.

Crop Consumption Curves

Crop Consumption Curve Resources

The Fertilizer Research and Education Program (FREP) has compiled extensive research to create a website (https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Guidelines.html) that has fertilizer recommendation guidelines for most crops grown in the Central Valley. The site has fertilizer recommendations for perennials, annuals, young crops, mature crops, and recommendations for every season of the year (winter, spring, summer, fall). This website is very user friendly and the Coalition encourages all of its members to check it out.

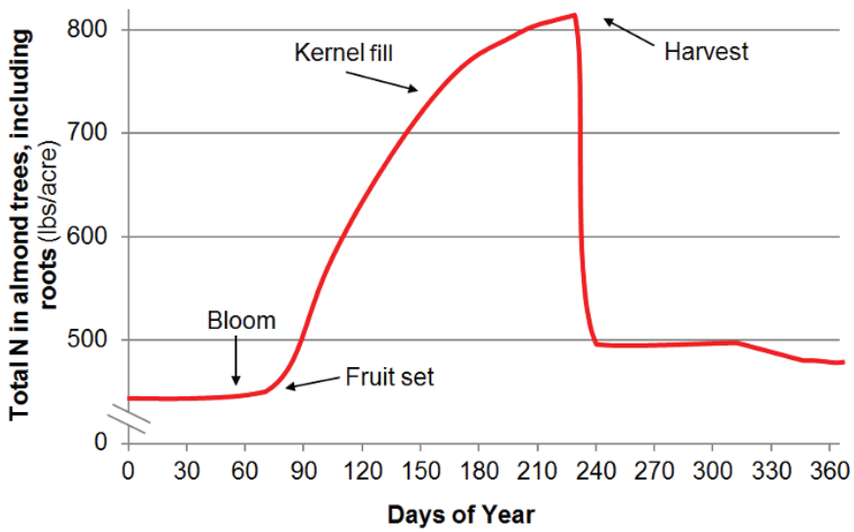
Nitrogen Uptake for Almond Trees

Application Rate Recommendations

Spring: It is recommended that 30% of the total N planned for the year is applied in March/April.

Summer: It is recommended that 40% of the total N planned for application during the year be applied in May/June and 30% in June/July.

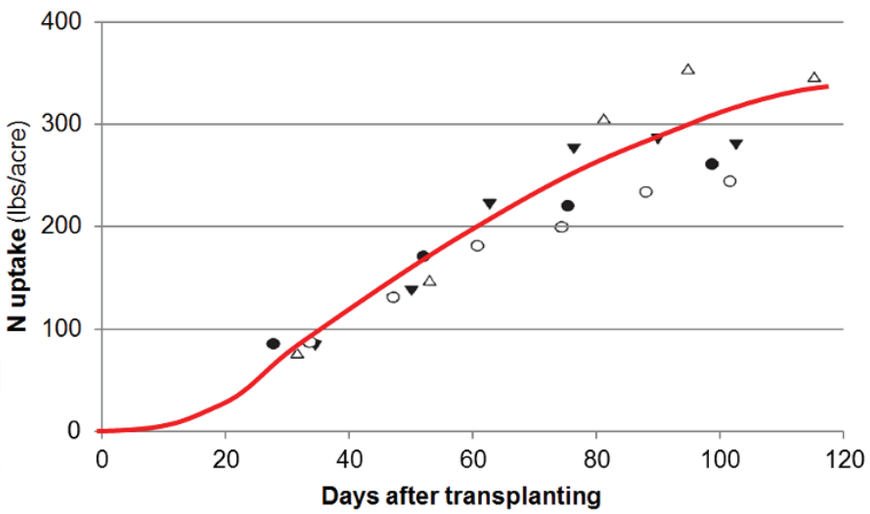
Fall: Generally, not more than 20% of the annual fertilize applied after hull split through early post-harvest.



Nitrogen Uptake for Processing Tomatoes

Application Rate Recommendations

Preplant or Transplanting: Tomato plants take up less than 30% of their N before fruit set. Starter N application rates in commercial fields generally range from 5-15 lbs/acre.



Vegetative Growth to First Red Fruits: Most of the tomato plant's seasonal growth and N uptake occurs between early fruit set and early red fruit stage. For drip-irrigated processing tomatoes, a seasonal rate of approximately 175 lbs N/acre is adequate to maximize fruit yields in most soils. Adjust application rate based on nitrate concentrations in soil and/or irrigation water.

After Early Red Fruit Set: The amount of N taken up after the early red fruit stage is minimal; therefore, N applied after the first fruits turn red likely remains in the soil and may be leached to groundwater. It is not recommended to apply N after early red fruit stage has occurred.

Water Quality Improvements

Three years of monitoring at a site with no exceedances of the water quality standard for a specific constituent indicates improved water quality due to implemented management practices by growers. Because pesticide exceedances have decreased dramatically in the last eight years, the Regional Water Board has approved 55 constituents (including pesticides and copper) be removed from Management Plan Monitoring requirements.

Status of Management Plan Constituents for all Monitoring Sites:

Management Plan Constituent	Total Removed 2012	Total Removed 2013	Total Removed 2014	Total Removed 2015	Requested to Remove 2016 (approval pending)
Field Parameters					
Dissolved Oxygen	2	0	2	0	0
pH	1	0	0	1	0
Specific Conductance	4	0	0	0	0
Metals					
Arsenic	0	0	0	0	0
Copper	2	1	1	1	0
Lead	1	1	2	6	0
Molybdenum	0	0	0	0	0
Physical Parameters					
Ammonia	1	0	0	0	0
E. coli	2	0	0	0	0
Nitrate	0	0	0	0	0
Total Dissolved Solids	2	0	0	0	0
Pesticides					
Chlorpyrifos	7	2	2	4	6
DDE	0	0	0	0	0
Diazinon	1	1	0	0	1
Dimethoate	0	0	0	0	1
Diuron	3	0	0	1	1
Simazine	1	0	0	0	0
Toxicity					
Invertebrate toxicity	1	1	3	2	0
Fish toxicity	0	0	0	1	0
Algae toxicity	2	2	0	1	4
Sediment toxicity	0	0	2	1	2
TOTAL	**30**	**8**	**12**	**18**	**15**

10 year Compliance Deadlines for Management Plan Constituents (Next 3 Years):

10 Year Compliance Deadline	Site	Focused Outreach Years	Management Plan Constituent	Requested to Remove in 2016
2017	Ash Slough @ Ave 21	2014-2016	Copper	
	Berenda Slough along Ave 18 1/2	2011-2013	Chlorpyrifos	X
	Cottonwood Creek @ Rd 20	2010-2012	Copper	
	Deadman Creek @ Gurr Rd	2012-2014	Chlorpyrifos	X
	Deadman Creek @ Hwy 59	2012-2014	Chlorpyrifos	X
	Dry Creek @ Rd 18	2011-2013; 2017-2019	Copper	
	Duck Slough @ Gurr Rd	2010-2012; 2016-2018	Water Flea toxicity	
2018	Deadman Creek @ Gurr Rd	2012-2014	Fish toxicity	
	Hatch Drain @ Tuolumne Rd	2013-2015	Sediment toxicity	
	Highline Canal @ Hwy 99/ Lombardy	2010-2012; 2016-2018	Copper	
	Hilmar Drain @ Central Ave	2012-2014	Algae toxicity	
	Livingston Drain @ Robin Ave	2011-2013; 2017-2019	Chlorpyrifos	X
	Livingston Drain @ Robin Ave	2011-2013; 2017-2019	Copper	
	Miles Creek @ Reilly Rd	2013-2015; 2017-2019	Copper	
	Prairie Flower Drain @ Crows Landing Rd	2008-2010; 2016-2018	Water Flea toxicity	
	Westport Drain @ Vivian Rd	2014-2016	Chlorpyrifos	X
2019	Dry Creek @ Rd 18	2011-2013; 2017-2019	Diuron	X
	Dry Creek @ Rd 18	2011-2013; 2017-2019	Algae toxicity	X
	Hatch Drain @ Tuolumne Rd	2013-2015	Algae toxicity	
	Hilmar Drain @ Central Ave	2012-2014	Sediment toxicity	X
	Livingston Drain @ Robin Ave	2011-2013; 2017-2019	Algae toxicity	X
	Miles Creek @ Reilly Rd	2013-2015; 2017-2019	Algae toxicity	X
	Prairie Flower Drain @ Crows Landing Rd	2008-2010; 2016-2018	Algae toxicity	
	Westport Drain @ Vivian Rd	2014-2016	Algae toxicity	X
	Highline Canal @ Hwy 99/ Lombardy	2010-2012; 2016-2018	Algae toxicity	

Watershed Success Stories

Dry Creek at Wellsford Rd

Description: Dry Creek originates to the east of Modesto, flows through Modesto to confluence with the Tuolumne River. The Dry Creek @ Wellsford Rd subwatershed includes 32,919 irrigated acres, and the primary crop types are deciduous orchards and field crops. The subwatershed extends into the foothills and is dominated in the east by wild vegetation with some rice, row crops, and irrigated pasture.

WQ Problem: Monitoring results from 2006 through 2010 identified multiple exceedances for chlorpyrifos, diuron, and toxicity to algae and water fleas, initiating management plans.

Coalition Actions to Address WQ Problems:

1) Inform growers of monitoring results at meetings
2) Identify sources of exceedances using pesticide use data
3) Conduct Focused Outreach to members most likely to affect downstream water quality.

Focused Outreach occurred within the subwatershed from 2008-2010 and again from 2016-2018. Focused outreach consists of contacting a list of targeted growers to discuss and document current management practices, track the implementation of new management practices, and conduct water quality monitoring to evaluate the effectiveness of those practices. In the Dry Creek watershed, the Coalition identified 34 growers with the potential to influence downstream water quality. After meeting with the growers, Coalition staff recommended additional practices designed to manage spray drift.

Water Quality Restored: Targeted growers implemented additional practices to reduce spray drift and irrigation runoff. The efforts made by growers to protect water quality have led to the completion of the management plans for chlorpyrifos, diuron, and toxicty to algae and water fleas. In order to complete a management plan, three years of monitoring with no exceedances must occur.

No exceedances in 3 years, led to the completion of all Dry Creek Management Plans

Livingston Drain at Robin Avenue

Description: The Livingston Drain @ Robin Ave subwatershed contains 11,670 irrigated acres and is located in the west, central portion of the Coalition region in Merced County, west of the towns Atwater and Livingston. The primary crop types are almost entirely orchards, with a small amount of field crops; several dairies are also present.

WQ Problem: Monitoring results from 2008 and 2009 identified multiple exceedances of chlorpyrifos and toxicity to algae, initiating management plans.

Coalition identifies sources: The Coalition uses pesticide use data, farm evaluation response information, and GIS to identify growers with the greatest likelihood of contributing to water quality impairments downstream. The growers identified from this analysis were contacted during Focused Outreach.

Focused Outreach was conducted in the subwatershed from 2011-2013. In the Livingston Drain watershed, the Coalition identified 11 growers farming 335 acres. Targeted growers irrigated using sprinkler, micro spray, or drip irrigation and reported no irrigation discharge. The Coalition recommended additional management practices designed to reduce spray drift and stormwater runoff to three growers.

No exceedances of chlorpyrifos or toxicity have occurred since Focused Outreach ended in 2013.

Water Quality Restored: Growers were contacted a year after their initial meetings with Coalition staff to see if additional practices were implemented. Growers reported implementing spray drift management practices, which has resulted in improved water quality for the past three years.

Groundwater Program

Progress Made with New Groundwater Program

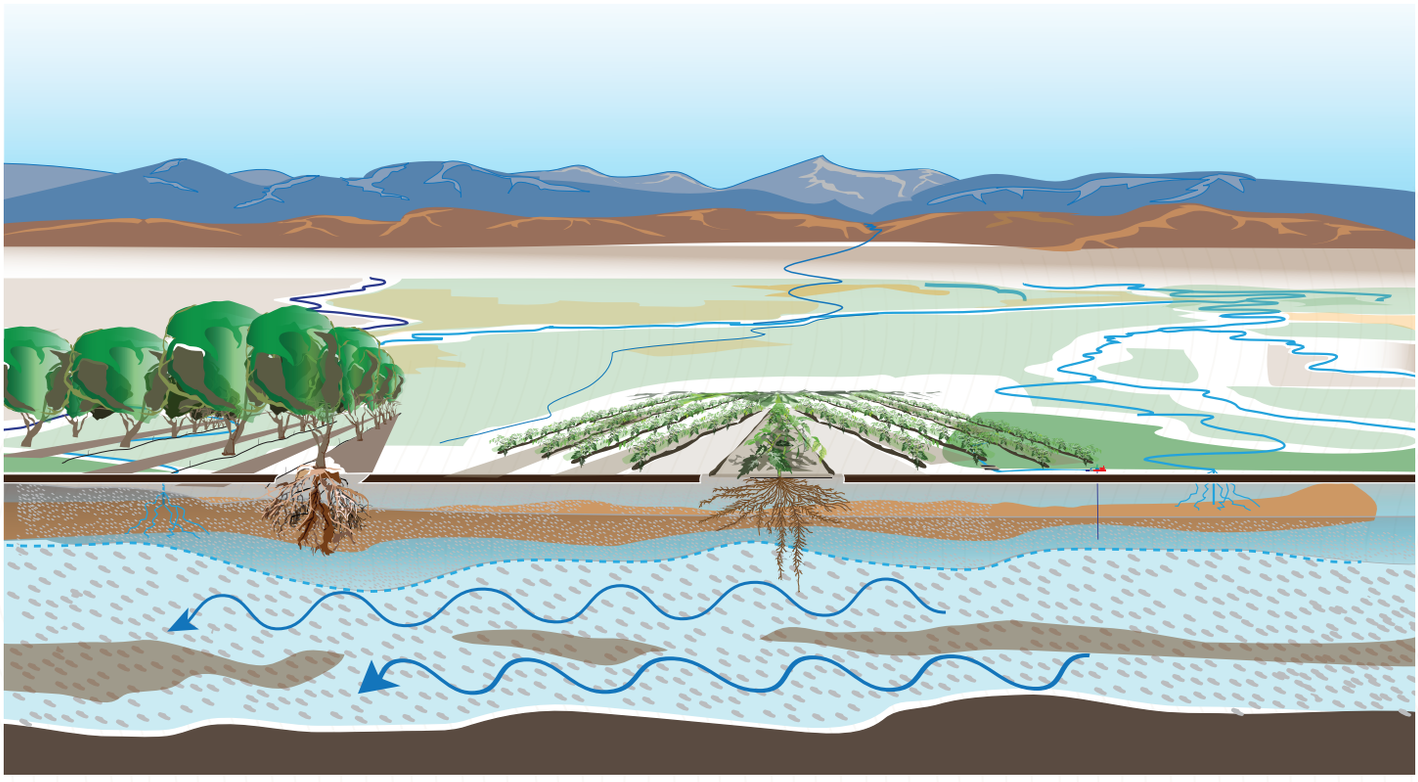
The WDRs for all Central Valley Coalitions require the following documents to be developed to address groundwater quality: Groundwater Assessment Report (GAR), the Management Practice Evaluation Program (MPEP), the Groundwater Quality Management Plan (GQMP) and the Groundwater Quality Trend Monitoring Workplan (GQTM Workplan).

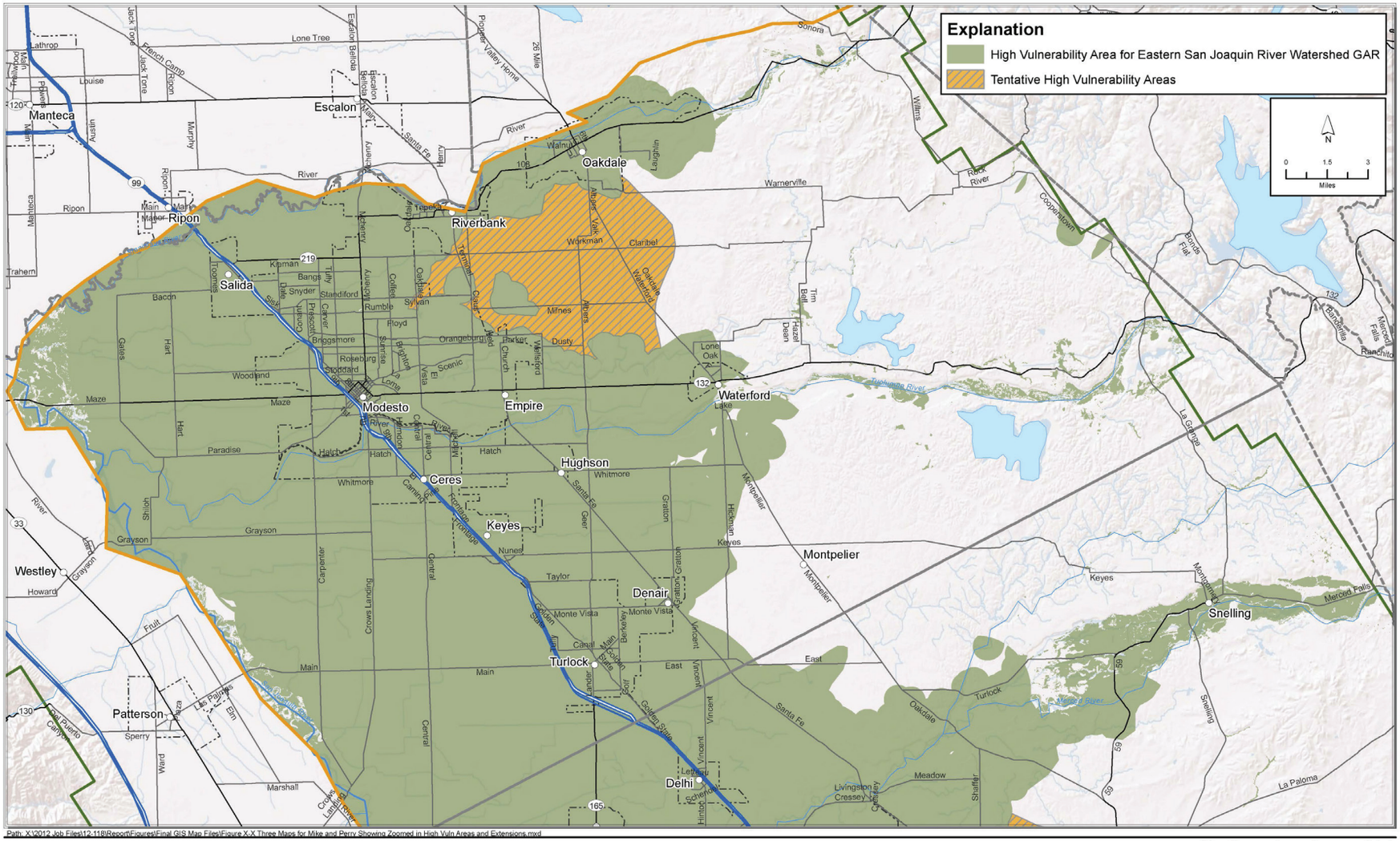
The Coalition submitted to the Regional Water Board a Groundwater Assessment Report (GAR) for the Coalition region in January 2014. The GAR accumulated the water quality results from the thousands of wells that have been tested over the last three decades. The GAR also included information from soil surveys and existing groundwater data in the region. All of the information was used to designate areas within the Coalition region that are at risk for leaching of nitrate to groundwater (high vulnerability) and areas with a low risk of nitrate leaching (low vulnerability). The vulnerability areas were defined based on three primary factors; soil type, depth to groundwater, and existing concentration of nitrates in the groundwater. Characteristics typical of high vulnerability areas include permeable soils, shallow depth to groundwater and locations where nitrate exceeds the drinking water standard. More than 70% of the ESJWQC region has been designated high vulnerability for groundwater.

Groundwater Quality Trend Monitoring Workplan

In 2016, the Coalition began identifying wells to include in the Groundwater Trend Monitoring Network which is due to the Regional Water Board in 2017. The Coalition WDR requires that the trend monitoring network track water quality in the upper aquifer so any well used must be drawing water from that level. The wells used in the trend monitoring network are expected to include a combination of municipal drinking water wells, existing and dedicated monitoring wells, and where needed, member's domestic or irrigation wells. Well construction information for thousands of wells in the ESJWQC region has been analyzed to identify wells that are best suited for the trend monitoring network. The ESJWQC also contacted members seeking domestic wells for use in the network. These volunteer wells need to meet the following criteria 1) owner is willing to be included in the network, 2) well is equipped with a functional pump, 3) well is at least 200 feet away from septic or animal confines, and 4) the owner of the well allows the Coalition to obtain a Well Completion Report (WCR) from the Department of Water Resources (DWR).

In August 2016, the Coalition asked its membership to volunteer domestic wells to be part of the trend monitoring network (at no cost). To date, more than 700 members have offered their wells for monitoring. Actual sampling of a small subset of qualified member wells is expected to begin by mid to late 2017.





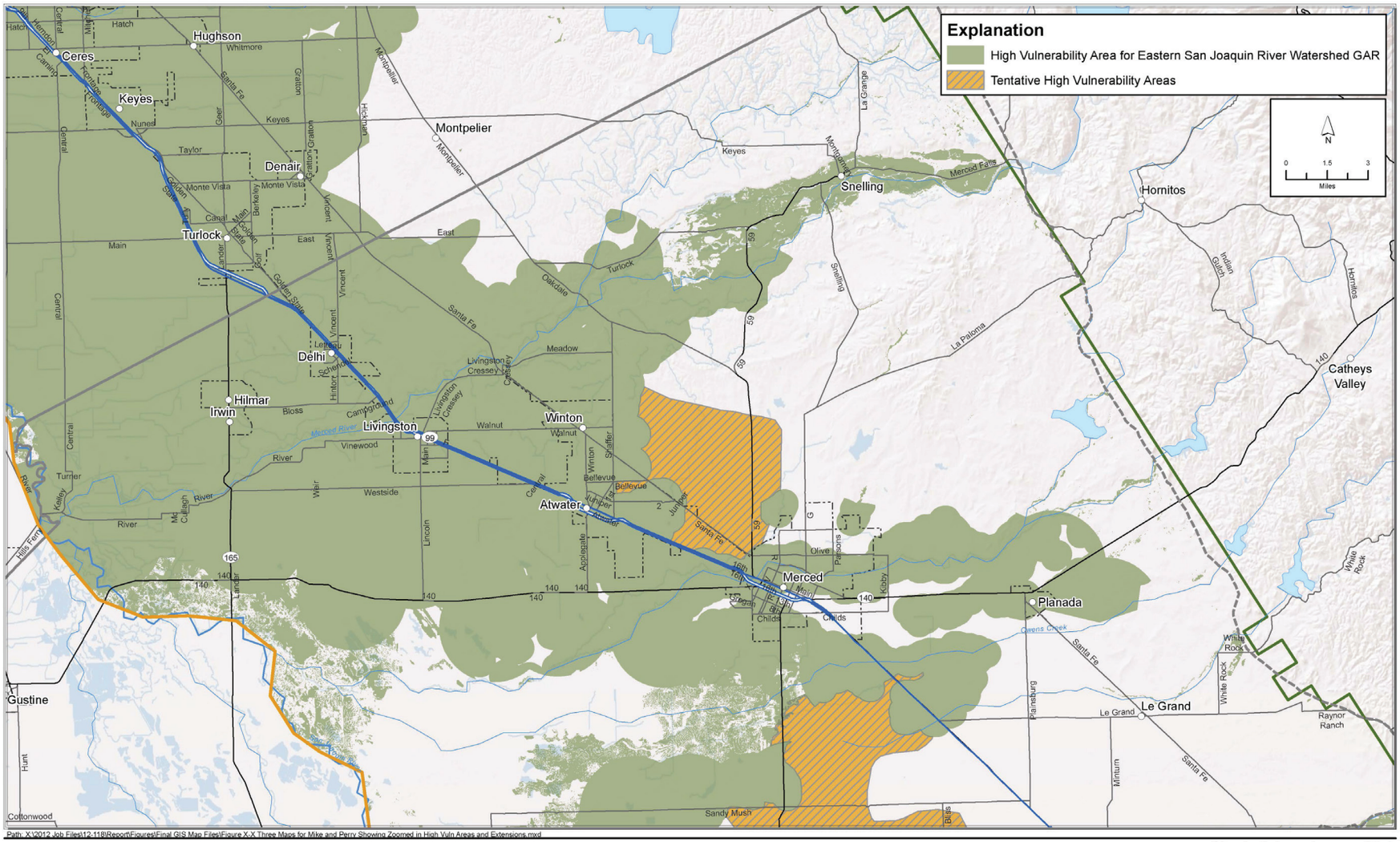
Path: X:\2012 Job Files\12-118\Report\Figures\Final GIS Map Files\Figure X-X Three Maps for Mike and Perry Showing Zoomed in High Vuln Areas and Extensions.mxd

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Northern Area (zoomed in)
High Vulnerability Area for the East San Joaquin Water Quality Coalition
With Additional Extensions for Well Nitrate Exceedances

Northern Groundwater Vulnerability Area

Approved Groundwater High Vulnerability Area for the East San Joaquin Water Quality Coalition with Additional Extensions for Well Nitrate Exceedances.

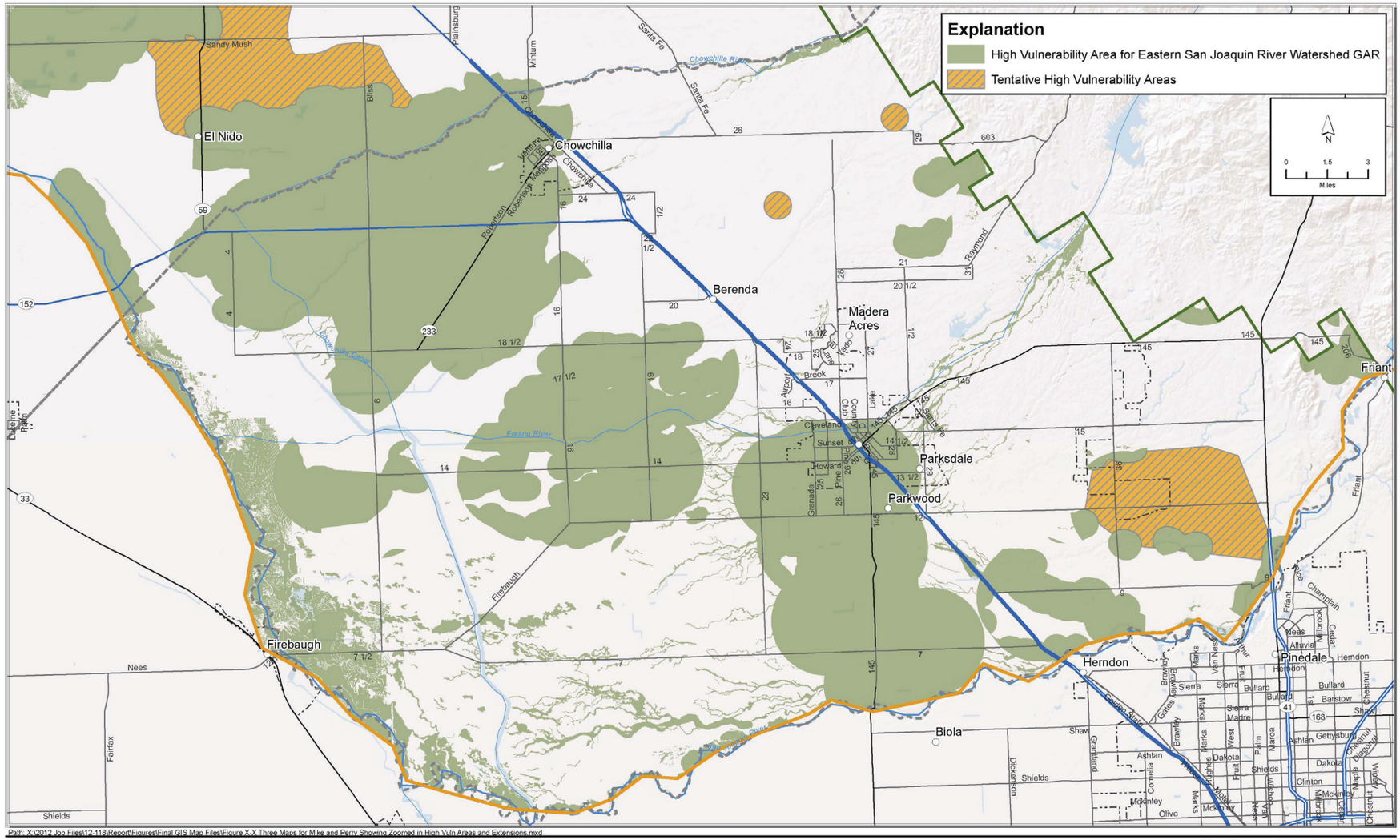


LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Central Area (zoomed in)
High Vulnerability Area for the East San Joaquin Water Quality Coalition
With Additional Extensions for Well Nitrate Exceedances

Central Groundwater Vulnerability Area

Approved Groundwater High Vulnerability Area for the East San Joaquin Water Quality Coalition with Additional Extensions for Well Nitrate Exceedances.



LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Southern Area (zoomed in)
High Vulnerability Area for the East San Joaquin Water Quality Coalition
With Additional Extensions for Well Nitrate Exceedances

Southern Groundwater Vulnerability Area

Approved Groundwater High Vulnerability Area for the East San Joaquin Water Quality Coalition with Additional Extensions for Well Nitrate Exceedances.

Coalition Overview

Membership

As of January 2017:

- 3,502 landowner/operators
- 705,295 irrigated acres

Boundaries:

The Coalition includes Madera County and portions of Stanislaus, Merced, Tuolumne, Mariposa, and Calaveras counties. Coalition borders are the crest of the Sierra Nevada on the east, the San Joaquin River on the west and south, and the Stanislaus River on the north. There are four major tributaries in the watershed: Chowchilla River, Merced River, Tuolumne River and Stanislaus River.

Structure:

The Coalition was formed in 2003 in compliance with the Irrigated Lands Regulatory Program (ILRP) adopted by the Central Valley Regional Water Quality Control Board. A volunteer board of Directors oversees this organization, which is structured as a public benefit, non-profit entity to perform tasks required under the ILRP. In November 2005, the Coalition was granted non-profit status as a 501c5 organization by the Internal Revenue Service. The Coalition is managed by a Board of Directors and administered by an Executive Director. Water quality monitoring, membership management, and outreach are performed by entities contracted to ESJWQC.

Board Officers:

- Alan Reynolds, (Chairman) Gallo Vineyards, Inc.
- Breanne Ramos, (Secretary) Merced County Farm Bureau
- Bill McKinney, (Treasurer); almond grower

Board Members:

- Bill Bush, B&B Consulting, grower
- Mike Niemi, Turlock Irrigation District
- Christina Beckstead, Madera County Farm Bureau
- Al Rossini, Albertoni Land Co Ltd., grape grower
- Tom Roduner, Roduner Farm/WP Roduner Cattle & Farming
- Lonnie Slaton, Simplot Soil Builders

Non-voting Board Members:

- Milton O'Haire, Stanislaus County Agricultural Commissioner
- Diana Waller, District Conservationist, USDA-NRCS – Modesto Field Office
- David Robinson, Merced County Agricultural Commissioner
- Stephanie McNeil, Madera County Agricultural Commissioner

Coalition Staff:

- Parry Klassen (Executive Director); also Executive Director for Urban/Rural Environmental Stewardship (CURES)
- Wayne Zipser, Grower Relations Manager
- Caitie Campodonico, Grower Relations
- Jennifer Sanchez, Membership Manager

Member Outreach and Best Management Practices:

The Coalition is continuing its efforts to work with landowners in watersheds where surface water monitoring indicates problems. In 2017, this outreach will expand by providing nitrogen management information for protecting groundwater. Central to the surface water effort is promoting Best Management Practices (BMPs) with the best potential for solving the problem. When a problem is identified, the Coalition will:

- Contact landowners upstream of the monitoring site and inform them of the exceedance.
- Distribute BMP information through mailings, individual visits, and local grower and crop advisor meetings.
- Give educational presentations on monitoring results and potential BMPs at commodity and farm group meetings in the Coalition region.

Surface Water Monitoring Program Objectives:

- Characterize discharge from irrigated agriculture in the Coalition region
- Identify locations where water quality objectives are not being met (exceedances)
- Identify potential source(s) of the exceedances
- Promote to landowners the implementation of management practices to eliminate water quality problems

Fees Assessed by the State Water Resources Control Board:

In 2016, the Coalition paid the 75 cents per acre fee for its members to cover State Water Resources Control Board costs for implementing the ILRP, primarily to

support the cost of Regional Water Board staff. All members of agricultural coalitions throughout the state pay the same per acre annual fee. The per acre fee is included as part of Coalition membership dues.

Surface and Groundwater Program Management:

Michael L. Johnson LLC, Davis, CA Staff:
Mike Johnson – President
Francisca Johnson – Vice President
Melissa Turner – Vice President

Luhdorff & Scalmanini Consulting Engineers, Woodland, CA Groundwater consulting firm

Analytical Laboratories:

- AQUA-Science, Davis, CA (water column toxicity)
- APPL Inc., Fresno, CA (pesticide analysis)
- North Coast Laboratories Ltd., Arcata, CA (glyphosate and paraquat analysis)
- Caltest Analytical Laboratory, Napa, CA (sediment chemistry analysis, physical parameters, metals and nutrient analysis)
- Nautilus Environmental, San Diego, CA (sediment toxicity)

Questions, Comments, Changes in Membership:

Members are welcome to contact the Coalition Board of Directors or management with questions or to update membership information. The most efficient way to contact us is through the Coalition's website www.esjcoalition.org. Go to "Contact Us." Outreach meeting dates and locations will be posted on the Coalition website and periodic announcements will be mailed to members.

NEW Member Portal

Members can now view their membership information, pay invoices, and complete all reporting requirements online through the member portal. To access the member portal go to https://esjmemberlogin.com/ and log in with the email address and password on file for your membership account. If you need to set up your account or need help signing in, email us at contactesj@esjcoalition.org.

Changes to membership information can be submitted to:

ESJWQC

1201 L Street

Modesto, CA 95354

Or call: 209-846-6112

Be sure to use your membership ID number in any correspondence

ESJWQC Goals:

- To operate an efficient, economical program that enables members to comply with the Irrigated Lands Regulatory Program
- File required reports with the Central Valley Regional Water Quality Control Board to maintain ILRP coverage for Coalition members.
- Implement an economical and scientifically valid water monitoring program for rivers and agricultural drains (as required by the ILRP).
- Spread costs equitably among owners/operators who are Coalition members.
- Communicate to landowners where water monitoring indicates problems and work to solve those issues.

Financial Overview

Financial Overview

Reported below is a financial overview comparing the ESJWQC 2016 budget with the actual 2016 expenditures. The 2016 net loss was less than projected. As indicated in the footnote "*Balance Available," there was approximately $1.9 million in ESJWQC banking accounts. A complete financial statement of 2016 expenditures is available upon request.

ESJWQC has contracted the services of Grimbleby Coleman Certified Public Accountants, Inc., located in Modesto, to perform an audit of our financial statement for calendar year 2015. The CPA firm reported that the ESJWQC financial statements were "fairly presented in conformity with U.S. general accepted accounting principles." The full text of the audit report is available upon request.

Statement of Financial Activities - January 1, 2016 thru December 31, 2016 vs. Budget

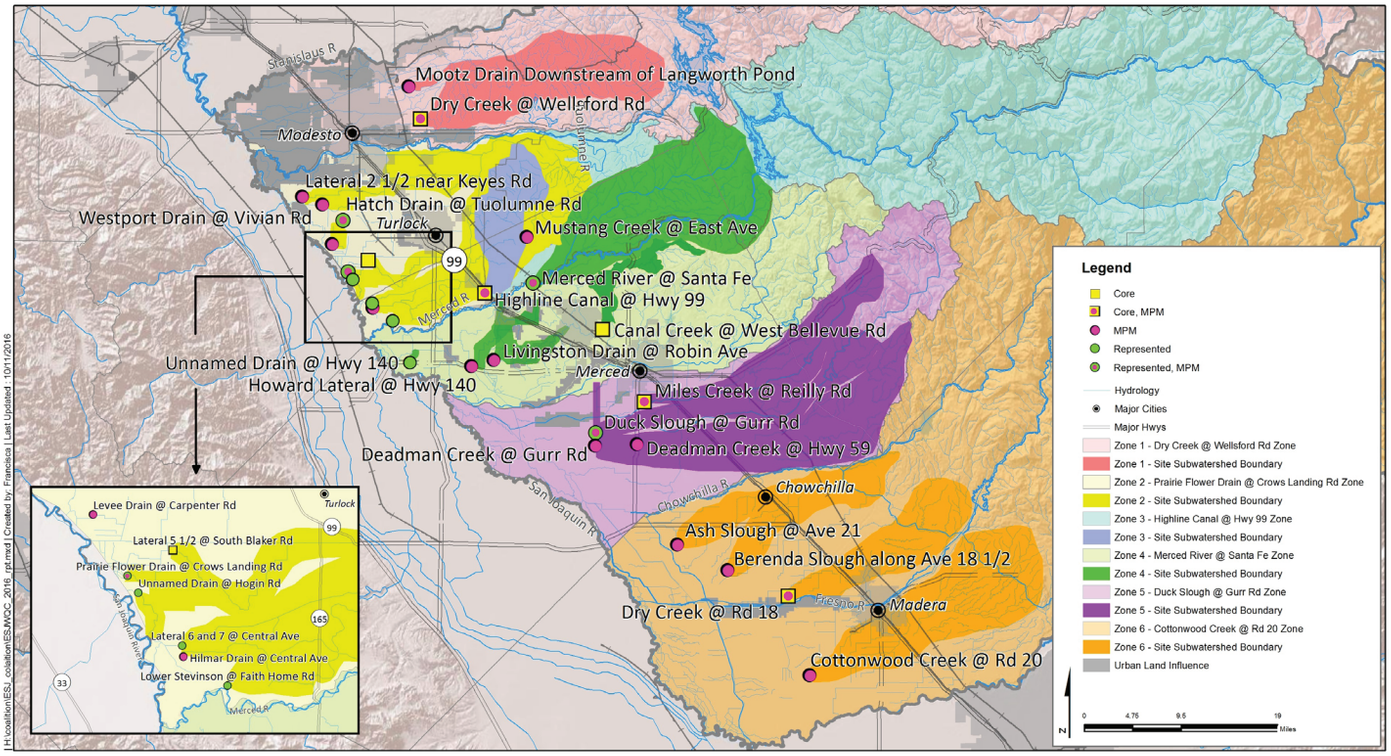
	Actual* 2016 $K, (Thousands)	Budget 2016 $K, (Thousands)	Description
INCOME			
Total Income	2,938	2,858	Membership dues plus sales of membership software, interest on bank accounts in 2016.
EXPENSES			
Organizational **	847	895	Executive director, legal, accounting, State Ag Waiver fees, management of membership records and related communications, and miscellaneous business costs.
Program	2,246	2,340	Program manager, site monitoring/special studies, quality control/assurance, data management, BMP assessment, communications with Coalition members regarding monitoring results, and reports to RWQCB.
Travel & Meeting	23	15	Expenses for executive director, program manager and contractors doing work for the Coalition.
Total Expenses	3,116	3,250	
Net Income	(178)	(392)	Difference between Total Income and Total Expenses.

* At the end of December balances available in the checking and savings accounts totaled $1,891 K.

** Includes anticipated State Water Board Waiver fees attributed to 2015 acreage.

Surface Water Program

ESJWQC October 2015 through September 2016 Monitoring Sites (Core, Represented, and Management Plan Monitoring).



ESJWQC

ESJWQC 2016 WY Monitoring Sites Zone Boundaries & Urban Land Influence

Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet
Projection: property=Lambert Conformal Conic
Units: Foot US

Service Layer Credits: Shaded Relief: Copyright © 2014 Esri
Hydrology - NHD hydrodata, 1:24,000-scale, http://nhd.usgs.gov/
Roads, highways, railroads - ESRI

Coalition Monitoring Sites

(2004 – September 2016). 'X' indicates sampling occurred during the years specified.

Monitoring Site	County	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013[2]	2014 WY	2015 WY	2016 WY
Ash Slough @ Ave 21	Madera		X	X	X	X	X	X				X	X	X
Bear Creek @ Kibby Rd	Merced		X	X	X	X		X	X	X	X	X		
Berenda Slough along Ave 18 1/2	Madera			X	X	X			X	X	X	X	X	X
Black Rascal Creek @ Yosemite Rd	Merced			X	X						X	X	X	X
Canal Creek @ West Bellevue Rd	Merced											X	X	X
Cottonwood Creek @ Rd 20	Madera		X	X	X	X	X	X	X	X	X	X	X	X
Deadman Creek @ Gurr Rd	Merced	X		X	X	X	X	X		X	X	X	X	X
Deadman Creek @ Hwy 59	Merced			X	X	X			X	X	X	X	X	X
Dry Creek @ Rd 18	Madera		X	X	X	X			X	X	X	X	X	X
Dry Creek @ Wellsford Rd	Stanislaus		X	X	X	X	X	X	X	X	X	X	X	X
Duck Slough @ Gurr Rd	Merced	X	X	X	X	X	X	X	X	X	X	X	X	X
Duck Slough @ Hwy 99	Merced		X	X	X	X	X	X	X	X				
Hatch Drain @ Tuolumne Rd	Stanislaus				X	X					X	X	X	X
Highline Canal @ Hwy 99	Merced		X	X	X	X	X	X	X	X	X	X	X	X
Highline Canal @ Lombardy Rd	Merced		X	X	X	X	X	X	X	X	X	X	X	
Hilmar Drain @ Central Ave	Merced		X	X	X	X	X			X	X	X	X	X
Howard Lateral @ Hwy 140	Merced						X	X	X		X	X	X	X
Lateral 2 ½ near Keyes Rd	Stanislaus					X	X	X	X		X	X	X	X
Lateral 5 ½ @ South Blaker Rd	Stanislaus											X	X	X
Lateral 6 and 7 @ Central Ave	Stanislaus											X	X	X
Levee Drain @ Carpenter Rd	Stanislaus									X	X	X	X	X
Livingston Drain @ Robin Ave	Merced				X	X			X	X	X	X	X	X
Lower Stevenson @ Faith Home Rd	Stanislaus											X	X	X
McCoy Lateral @ Hwy 140	Merced								X	X	X			
Merced River @ Santa Fe Rd	Merced	X	X	X	X	X	X	X	X	X	X	X	X	X
Miles Creek @ Reilly Rd	Merced				X	X	X	X			X	X	X	X
Mootz Drain[1]	Stanislaus						X	X			X	X	X	X
Mustang Creek @ East Ave	Merced			X	X	X	X	X			X	X	X	X
Prairie Flower Drain @ Crows Landing Rd	Stanislaus		X	X	X	X	X	X	X	X	X	X	X	X
Silva Drain @ Meadow Drive	Merced			X	X	X								
Unnamed Drain @ Hogin Rd	Stanislaus											X	X	X
Unnamed Drain @ Hwy 140	Merced										X	X	X	X
Westport Drain @ Vivian Rd	Stanislaus				X	X						X	X	X

[1] Years associated with monitoring combine sampling years for both Mootz Drain @ Langworth Rd and Mootz Drain downstream of Langworth Pond locations.
[2] Monitoring during 2013 was from January through September 2013.
WY = Water Year (October through September)

Coalition Monitoring Results October 2015 through September 2016

Exceedances of Water Quality Trigger Limits within the ESJWQC (October 2015 through September 2016)

Monitoring Location	Constituent	DO[†]	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Arsenic	Copper	Lead	Chlorpyrifos	Diuron	Malathion	Algae	Discharge Cubic Feet Per Second
	Water Quality Goal	5 or 7 mg/L	<6.5 or >8.5	>700 µmhos/cm	235 MPN/ 100 ml	1.5 mg/L (variable)	10 mg/L	10 ug/L	µg/L (variable)	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	Toxicity	
	Sample Date														
Ash Slough @ Ave 21	12/15/2015														Dry
	1/7/2016														Dry
	2/9/2016														Dry
	3/8/2016														0*
	4/12/2016														Dry
Berenda Slough along Ave 18 1/2	12/15/2015														Dry
	1/7/2016		8.52						7.6 (6.12)						0*
	2/9/2016														Dry
	3/8/2016														Dry[1]
	4/12/2016	0.33	6.46						4.7 (3.56)						-0.9
	5/10/2016														Dry
	6/14/2016	3.7													0*
	7/12/2016														0*
Canal Creek @ West Bellevue Rd	10/13/2015	6.00													0.85
	11/10/2015		8.82												0.64
	12/15/2015		8.77												0.31
	1/7/2016				829.6				2.9 (2.83)						66.46
	2/9/2016														0.23
	3/8/2016				1553.0										73.80
	4/12/2016														59.72
	5/10/2016														133.06
	6/14/2016														273.51
	7/12/2016														NM
	8/9/2016														NM
	9/13/2016														152.16
Cottonwood Creek @ Rd 20	10/13/2015														Dry
	11/10/2015														Dry
	1/7/2016														Dry
	9/13/2016														Dry
Deadman Creek @ Gurr Rd	11/10/2015														Dry
	12/15/2015														Dry
	1/7/2016														Dry
	2/9/2016	1.14													0*

Coalition Monitoring Results October 2015 through September 2016

Monitoring Location	Constituent	DO[†]	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Arsenic	Copper	Lead	Chlorpyrifos	Diuron	Malathion	Algae	Discharge Cubic Feet Per Second
	Water Quality Goal	5 or 7 mg/L	<6.5 or >8.5	>700 µmhos/cm	235 MPN/ 100 ml	1.5 mg/L (variable)	10 mg/L	10 ug/L	µg/L (variable)	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	Toxicity	
	Sample Date														
	3/8/2016														NM
	4/12/2016	6.62													0*
	5/10/2016														NM
	6/14/2016														0*
	8/9/2016														0*
	9/13/2016	6.54													NM
Deadman Creek @ Hwy 59	10/13/2015														Dry
	2/9/2016														Dry
	4/12/2016	4.78													0*
	8/9/2016														Dry
	9/13/2016														Dry
Dry Creek @ Rd 18	11/10/2015														Dry
	12/15/2015														Dry
	1/7/2016														Dry
	2/9/2016								19 (9.72)						0*
	3/8/2016				>2419.6				25 (4.95)						NM
	4/12/2016								24 (6.92)						NM
	5/10/2016		8.82						5.6 (2.07)						NM
	6/14/2016								3 (1.67)						NM
	7/12/2016								3 (1.25)						24.82
	8/9/2016								2.9 (1.03)						NM
	9/13/2016	4.91			517.2				4 (3.0)						1.42
Dry Creek @ Wellsford Rd	10/13/2015	5.81			920.8										1.78
	12/15/2015	1.13													0*
	1/7/2016		9.01		>2419.6										NM
	2/9/2016		9.05												23.30
	3/8/2016				>2419.6										NM
	4/12/2016														37.30
	5/10/2016	5.88			488.4										8.41
	6/14/2016	6.14			365.4										11.42
	7/12/2016	4.60			488.4										17.87
	8/9/2016	6.09			488.4										22.14
	9/13/2016	4.73			344.8	2.4									16.85

Coalition Monitoring Results October 2015 through September 2016

Monitoring Location	Constituent	DO[†]	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Arsenic	Copper	Lead	Chlorpyrifos	Diuron	Malathion	Algae	Discharge Cubic Feet Per Second
	Water Quality Goal	5 or 7 mg/L	<6.5 or >8.5	>700 µmhos/cm	235 MPN/ 100 ml	1.5 mg/L (variable)	10 mg/L	10 ug/L	µg/L (variable)	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	Toxicity	
	Sample Date														
Duck Slough @ Gurr Rd	10/13/2015														Dry
	11/10/2015	4.71						20							0*
	1/7/2016									4.8 (3.9)					NM
	2/9/2016														0*
	3/8/2016														NM
	4/12/2016														2.89
	6/14/2016														NM
	7/12/2016	5.20													0.40
	8/9/2016														0*
	9/13/2016														0*
Hatch Drain @ Tuolumne Rd	1/7/2016														Dry
	2/9/2016														Dry
	3/8/2016	3.19													0*
	4/12/2016														Dry
	5/10/2016														Dry
	7/12/2016	1.27													0*
	8/9/2016	2.78		909											0*
	9/13/2016	1.16		761											0
Highline Canal @ Hwy 99	12/15/2015														Dry
	1/7/2016			775	>2419.6	12			19(13.38)		0.018				4.89
	2/9/2016			1075		11.00									0*
	3/8/2016				>2419.6	3.7			21(10.47)						44.13
	4/12/2016	5.50			275.5										18.99
	5/10/2016		9.41		2419.6								0.031		16.52
	6/14/2016		8.93												83.52
	7/12/2016														106.7
	8/9/2016		9.15												101.48
	9/13/2016		8.59												19.28
Hilmar Drain @ Central Ave	2/9/2016			1315											0*
	3/8/2016														Dry
	4/12/2016			1112											0*
	7/12/2016	2.65		1586											0*
	9/13/2016	3.93		1189										Toxic	NM-SED

Coalition Monitoring Results October 2015 through September 2016

Monitoring Location	Constituent	DO[†]	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Arsenic	Copper	Lead	Chlorpyrifos	Diuron	Malathion	Algae	Discharge Cubic Feet Per Second
	Water Quality Goal	5 or 7 mg/L	<6.5 or >8.5	>700 µmhos/cm	235 MPN/ 100 ml	1.5 mg/L (variable)	10 mg/L	10 ug/L	µg/L (variable)	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	Toxicity	
	Sample Date														
Howard Lateral @ Hwy 140	10/13/2015	3.84													0*
	12/15/2015														Dry
	1/7/2016		6.09												0.60
	2/9/2016														Dry
	3/8/2016														Dry
	4/12/2016		8.60						3.9 (3.56)						2.00
	7/12/2016														13.99
Lateral 2 1/2 near Keyes Rd	4/12/2016		8.53												5.95
	5/10/2016			702										Toxic	2.14
	6/14/2016														10.36
	7/12/2016			725										Toxic	24.46
	8/9/2016			751										Toxic	7.71
Lateral 5 1/2 @ South Blaker Rd	10/13/2015		8.94	968	770.1		37								0.44
	11/10/2015		9.45				16								0.38
	12/15/2015														Dry[1]
	1/7/2016		8.94		866.4	1.3 (0.76)									0.33
	2/9/2016			1156			29							Toxic	4.48
	3/8/2016			1029	>2419.6		23							Toxic	3.36
	4/12/2016														0*
	5/10/2016						14							Toxic	17.77
	6/14/2016			875			15							Toxic	21.65
	7/12/2016						13								50.17
	8/9/2016														39.21
	9/13/2016			920			24							Toxic	25.96
Lateral 6 and 7 @ Central Ave	12/15/2015		8.67	1187											1.60
	1/7/2016														3.99
	2/9/2016														1.51
	3/8/2016			787								22			17.92
	4/12/2016														8.00
	5/10/2016														8.71
	10/12/2016														NM
Levee Drain @ Carpenter Rd	12/15/2015			2011											0*
	2/9/2016	4.71		2287											NM
	3/8/2016	6.33		1698											NM

Coalition Monitoring Results October 2015 through September 2016

Monitoring Location	Constituent	DO†	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Arsenic	Copper	Lead	Chlorpyrifos	Diuron	Malathion	Algae	Discharge Cubic Feet Per Second
	Water Quality Goal	5 or 7 mg/L	<6.5 or >8.5	>700 µmhos/cm	235 MPN/ 100 ml	1.5 mg/L (variable)	10 mg/L	10 ug/L	µg/L (variable)	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	Toxicity	
	Sample Date														
	6/14/2016	1.74		1288											0*
	7/12/2016	3.52		2072											NM
Livingston Drain @ Robin Ave	12/15/2015														Dry
	1/7/2016								5.5 (3.2)						6.60
	2/9/2016														Dry
	3/8/2016	6.45							3.2 (2.83)						0*
	4/12/2016														Dry
	5/10/2016		8.61												NM
	6/14/2016														11.84
	7/12/2016		8.63												12.62
	8/9/2016														10.61
Lower Stevinson @ Faith Home Rd	12/15/2015	4.48		864											0*
	1/7/2016		8.58												0*
	2/9/2016			1340											0*
	3/8/2016														0.07
	4/12/2016		8.69												NM
	5/10/2016		8.53	887											0*
Merced River @ Santa Fe	10/13/2015														58
	11/10/2015		9.00								0.028				294
	7/12/2016	6.62													34
	8/9/2016														95
	9/13/2016	6.98													50
Miles Creek @ Reilly Rd	12/15/2015														Dry
	1/7/2016				>2419.6				6.1 (4.44)						NM
	2/9/2016				261.30										0*
	3/8/2016				>2419.6										NM
	4/12/2016	6.90			613.1										0.52
	5/10/2016	5.97			2419.6										2.57
	6/14/2016														Dry[1]
	7/12/2016	5.47			387.3										0*
	8/9/2016														0*
	9/13/2016				1011.2										2.82
Mootz Drain downstream of Langworth Pond	12/15/2015														0*
	2/9/2016														0*

Coalition Monitoring Results October 2015 through September 2016

Monitoring Location	Constituent	DO†	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Arsenic	Copper	Lead	Chlorpyrifos	Diuron	Malathion	Algae	Discharge Cubic Feet Per Second
	Water Quality Goal	5 or 7 mg/L	<6.5 or >8.5	>700 µmhos/cm	235 MPN/ 100 ml	1.5 mg/L (variable)	10 mg/L	10 ug/L	µg/L (variable)	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	Toxicity	
	Sample Date														
Mustang Creek @ East Ave	12/15/2015								11(10.47)						0*
	1/7/2016								13 (6.12)						5.69
	2/9/2016			891											0*
	3/8/2016	6.9							14 (8.03)						6.92
Prairie Flower Drain @ Crows Landing Rd	10/13/2015	3.51		2530											NM
	12/15/2015														Dry
	1/7/2016	6.14													0.24
	2/9/2016	2.66		3149											0.55
	3/8/2016	1.99		2327										Toxic	0.68
	4/12/2016	1.34		1671											0*
	5/10/2016	3.69		1408											0*
	6/14/2016	3.07	6.16	1236											0*
	7/12/2016	1.06		2050										Toxic	0*
	8/9/2016	1.66		2304											0*
	9/13/2016	3.04		2041											0*
Unnamed Drain @ Hogin Rd	2/9/2016			1086											NM
	3/8/2016	4.71		1453											0*
Unnamed Drain @ Hwy 140	1/7/2016														-0.19
	2/9/2016														0*
Westport Drain @ Vivian Rd	1/7/2016	6.52	9.56												0*
	2/9/2016														Dry
	4/12/2016	3.65													0*
	5/10/2016			765											0*
	7/12/2016	2.30	8.76												0*
	8/9/2016	6.94													0*
Total Exceedances		**52**	**27**	**39**	**26**	**5**	**8**	**1**	**23**	**1**	**2**	**1**	**1**	**11**	

DO† - The WQTL for DO is <5 mg/L for Ash Slough @ Ave 21, Berenda Slough @ Ave 2 1/2, Cottonwood Creek @ Rd 20, and Dry Creek @ Rd 18.
0*-Discharge recorded as zero due to non-contiguous waterbody.
Dry-No water at site; no samples collected.
Dry[1]-Water too shallow to sample; no samples collected.
NM-No measurement: Too deep to measure flow or water column toxicity monitoring only.
NM-SED-No measurement: Discharge not measured due to sediment monitoring only.

Monitoring Constituents Definitions

Dissolved Oxygen (DO): DO criterion is protective of aquatic life: (min. of 7 mg/L). DO levels are affected by water temperature, photosynthesis & respiration. Added nutrients can stimulate algae production which dies and breaks down by microbial activity. The activity requires oxygen, depleting DO and resulting in an inability to support aquatic communities.

pH: Power of Hydrogen (pH) measures acidic or basic levels in a solution. Acceptable range = 6.5-8.5. Water temperature, photosynthesis & respiration can affect levels. Fertilizers & pesticides can affect pH of water/ soil.

Specific Conductance (SC): A measure of salt and is measured in µS/cm. SC is an indirect measure of the presence of ions such as chloride, nitrate, sulfate, phosphate, sodium, magnesium, calcium and iron. The SC standard (700 µS/cm) is protective of sensitive agricultural crops such as beans.

Ammonia: Total ammonia consists of the unionized (NH3) form plus the ionized (NH4+) form also called ammonium. Ammonium can enter a water body through direct discharge from agricultural fertilizers or animal waste, discharges from waste water treatment plants, or from the breakdown of organic matter in the stream. In soils, ammonium from fertilizers is typically converted to nitrite and then to nitrate over a short period of time. Exceedances of the ammonia standard are based on water temperature and pH which affect the level at which ammonia is toxic to aquatic life. Regardless of the water temperature or pH, all ammonia concentrations above 1.5 mg/L are exceedances of the drinking water standard.

Nitrate + Nitrite: Potential sources include runoff of fertilizers or organic matter from irrigated pasture, leaking septic systems, waste water treatment plant effluent and animal waste. Nitrate and nitrite are very soluble and can enter surface or groundwater with irrigation and/or storm water. Animal waste can be converted to nitrate by nitrifying bacteria. Sources of animal waste include dairies, poultry, pasture and/or wildlife.

E. coli: Common bacterium in intestinal tracts and voided in fecal matter. E. coli in water is compared to the water quality standard protective of recreational activities (235 MPN/100mL). E. coli may persist in presence of oxygen for periods of time after being voided. Any feces voiding species of vertebrate can contribute E. coli to surface waters. Potential sources: leaky septic systems or sewer lines, waste water treatment plant discharge, application of biosolids to ag land, defecation in or near waterbodies, dairies, manure or poultry operations.

Arsenic: Arsenic is found in sodium cacodylate which is applied by agriculture for broadleaf weed control and as a cotton defoliant. California Department of Pesticide Regulation records indicate no agricultural use of sodium cacodylate across the Coalition region between 1998 and 2010. Exceedances of the Arsenic WQTL can be attributed to legacy pesticide use.

Copper: Dissolved or sediment bound in water. Measurement of dissolved copper=dissolved form only measurement of total copper= both dissolved & bound. Dissolved copper is adjusted for the hardness (CaCO3) in water to determine concentrations that would be toxic to aquatic species. Total copper is also evaluated based on the criteria protective of the drinking water beneficial use.

Molybdenum: Products containing molybdenum are rarely if ever used in the Coalition area. Molybdenum can be a byproduct in copper and tungsten mining and is used in alloys due to its ability to withstand high temperatures, resistance to corrosion, and weldability. The westside region is naturally elevated in molybdenum and tends to be flushed into surface waters during periods of high rainfall. Drains such as Prairie Flower Drain which were constructed to drain shallow ground water and allow agriculture can develop elevated concentrations of molybdenum when the ground water is driven into the channel. In living organisms, molybdenum acts as a metal heteroatom and is present in various enzymes including aldehyde oxidase, sulfite oxidase and xanthine oxidase. Molybdenum can also be found in green beans, eggs, sunflower seeds, wheat flour, lentils and cereal grains. In animal studies chronic ingestion of 10 mg/kg of molybdenum can cause diarrhea, growth retardation, sterility, low birth weight, and gout.

Chlorpyrifos: An organophosphate insecticide used in alfalfa, grapes & orchards (among other crops). Trademarked names include: Govern™, Lock-On™, Lorsban™, NuPhos™, etc. Chlorpyrifos can bind to sediment or remain in water column. The 0.015 µg/L objective is protective of aquatic life.

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

Malathion: Malathion is an organophosphate insecticide applied to over 100 crops in the United States including alfalfa, rice, cotton, sorghum, wheat, and walnuts. It is also used for structural pest control (mosquito and fruit fly eradication, and home settings). Malathion is easily mixed with water and can be found in both urban and agricultural runoff. Malathion is a prohibited discharge pesticide except under the Rice Coalition Management Plan and any detection of the constituent is considered an exceedance. Malathion is known to be toxic to C. dubia (LC50 = 3.35 µg/L).

Algae toxicity: algae (aquatic plants) are sensitive to herbicides and fungicides. Algae toxicity is measured as percent growth in the sample water compared to the growth in a control treatment.

Fathead minnow toxicity: fathead minnows (fish) are sensitive to ammonia toxicity. At high concentrations pesticides and metals can also cause fish mortality. Fathead minnow toxicity is measured as percent survival within the sample water compared to survival in a control treatment.

Water flea toxicity: water fleas (invertebrates) are especially sensitive to water soluble pesticides such as chlorpyrifos & diazinon. Toxicity is measured as % survival in sample compared to survival in control treatment.

Sediment Toxicity: One species (Hyalella azteca – amphipod) is used in sediment analysis to determine toxicity that may occur to pelagic organisms. Amphipods are sensitive to pyrethroids and other pesticides that are not highly water soluble including some herbicides, fungicides and insecticides. Amphipod toxicity is measured as percent survival within the sediment sample as compared to the survival in a control treatment.

LIST OF UNITS

mg/L	milligrams per liter
MPN/100 mL	Most Probable Number per 100 milliliters (measure of bacteria)
µg/L	micrograms per liter (same as parts per billion or ppb)
µS/cm	microsiemens per centimeter (measure of conductivity)

Companies Providing Services to Test Wells for Nitrates

The information below is a compilation provided by ESJWQC. The list of companies is not exhaustive and will be updated periodically. The companies offer water analysis services in the Central Valley.

Types of companies who provide this service:

- Specialize in agricultural consulting and nitrogen budgeting; plant tissue testing and soil nutrient management
- Specialize in geology or engineering; also offer groundwater mapping services
- Specialize in water quality analysis (laboratory only)

Lab	Ag Specialist	Sampling	Lab Name	Street	City	Zip	Phone	Website
X	X		A & L Western Agricultural Laboratories, Inc.	1311 Woodland Ave., Ste. 1	Modesto	95351	(209) 529-4080	al-labs-west.com
X		X	Apex Envirotech, Inc.	11244 Pyrites Way	Gold River	95670	(559) 275-2175	
X			APPL	N. Temperance Ave.	Clovis	93611	(559) 275-2175	applinc.com
X			Argon Analytical Services, Inc., DBA Argon Laboratories	2905 Railroad Ave.	Ceres	95307	(209) 581-9280	argonlabs.com
X		X	Blaine Tech Services Inc.	4731 Pell Dr., Ste. 5	Sacramento	95838	(916) 925-2913	blainetech.com
X		X	BSK Associates	550 W. Locust Ave.	Fresno	93650	(559) 497-2880	bskassociates.com
X	X	X	California AgQuest Consulting, Inc.	4545 N. Brawley Ave., Ste.	Fresno	93722	(559) 275-8095	calagquest.com
X	X		California Growers Laboratory, Inc.	4630 W. Jennifer, Ste. 104	Fresno	93722	(559) 275-3377	cagrowlab.com
X	X	X	California Laboratory Rancho Services	3249 Fitzgerald Rd.	Cordova	95742	(916) 638-7301	californialab.com
X	X		Denele Analytical, Inc.	1232 South Ave	Turlock	95380	(209) 634-9055	Denelelabs.com
X	X	X	Dellavalle Laboratory, Inc.	1910 W. McKinley Ave., Ste. 110	Fresno	93728	(559) 351-2741	dellavallelab.com
X		X	Dudek	980 9th Street, Ste. 1750	Sacramento	95814	(760) 479-4127	dudek.com
X	X		Fruit Grower Laboratory	853 Corporation St.	Santa Paula	93060	(805) 392-2032	fglinc.com
X		X	Geoanalytical Laboratories, Inc.	2300 Maryann Dr.	Turlock	95380	(209) 669-0100	
X			IEH-JL Analytical Services	217 Primo Way	Modesto	95358	(209) 538-8111	iehinc.com
X	X	X	JM Lord, Inc.	267 N. Fulton St.	Fresno	93701	(559) 268-9755	jmlordinc.com
		X	MLJ-LLC	1480 Drew Ave., Ste. 130	Davis	95618	(530) 756-5200	mlj-llc.com
X	X	X	Pacific Agronomics	3402 W. Holland Ave., Ste. 101	Fresno	93722	(559) 276-0401	pacificagronomics.com
	X	X	Perry Laboratory	424 Airport Blvd.	Watsonville	95076	(831) 722-7606	perrylaboratory.com
X		X	Precision Enviro-Tech	3935 Coronado Ave.	Stockton	95204	(209) 477-8105	
X	X	X	Soil and Plant Laboratory	1101 S. Winchester Blvd. Ste. G-173	San Jose	95128	(408) 727-0330	soilandplantlaboratory.com
X	X		Soil Control Laboratory	42 Hangar Way	Watsonville	95076	(831) 724-5422	biocharlab.com
X			VPN Laboratory	3402 W. Holland Ave., Ste. 101	Fresno	93711	(559) 276-0403	pacificagronomics.com

ADDITIONAL RESOURCES:

California Department of Health – Certified Laboratories: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Nitrate.aspx

NITROGEN MANAGEMENT PLAN WORKSHEET

NMP Management Unit: _____

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

CROP NITROGEN MANAGEMENT PLANNING		N APPLICATIONS/CREDITS	15. Recommended/ Planned N	16. Actual N
6. Crop		**17. NITROGEN FERTILIZERS APPLIED**		
7. Production Unit		18. Dry/Liquid N (lbs/ac)		
8. Projected Yield		19. Foliar N (lbs/ac)		
9. N Recommended		**20. ORGANIC MATERIAL N**		
10. Acres		21. Available N in Manure/Compost (lbs/ac estimate)		
POST PRODUCTION ACTUALS		**22. Total N Applied + Available** (lbs per ac) (Box 18+19+21)		
11. Actual Yield (Units/ac)		**23. NITROGEN CREDITS (EST)**		
12. Total N Applied (lbs/ac)		24. * Available N carryover in soil; (annualized lbs/ac)		
13. ** N Removed (lbs N/ac)		25. *N in Irrigation water (annualized, lbs/ac)		
14. ***Notes:		**26. Total N Credits** (lbs per ac) (Box 24+25)		
		27. Total N Applied + Available + Credits (Box 22+26)	Transfer to Box 9	Transfer to Box 12

PLAN CERTIFICATION

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

* 24. and 25. Recommended Not Required

** 13. Your Coalition will provide the method to be used to estimate N Removed.

*** 14. Anything that might change what you apply.

Fill out at the beginning of year with projected N application and projected yeild.

Fill out after final N application and harvest with actuals, keep on farm

3.2016

NMP Summary Report – 2016 Crop Year

Refer to your Nitrogen Management Plan for information to complete this form[1]

Year Crop Harvested (Box 1): _____ **Member ID (Box 2):** _____

Submittal Date: _____ **Forms Completed By:** _____

*All calculations should be on a **per acre** basis.*

Management Unit	Crop	Total Irrigated Acres	(A) Total Available N Applied Lbs/acre	(Y) Actual Yield Lbs/acre	A/Y Total Available N / Gross Yield	Production Unit Pounds or Tons	Gross Weight Reported?
Refer to Form #3	Form #5	Box 10	Box 22 + Box 25	Box 11	(Box 22+25)/Box 11	Box 7	
	See Crop Specifics Form		No N Applied = 0	Not Required[2] Gross Weight [3]	No Yield = NY Non Bearing = NB	See Production Unit Conversion Sheet	Circle Yes or No No = Net Weight
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No
							Yes / No

[1] Box number refers to the 4-page nitrogen management plan distributed by ESJWQC (copy for 2016 enclosed).
[2] Reporting Actual Yield is not required; this column was added to assist you with required A/Y calculations.
[3] Gross weight includes all part of the crop that is removed from the field including culls, shells/hulls, etc.

East San Joaquin
Water Quality Coalition

2016 SUMMARY ANNUAL REPORT