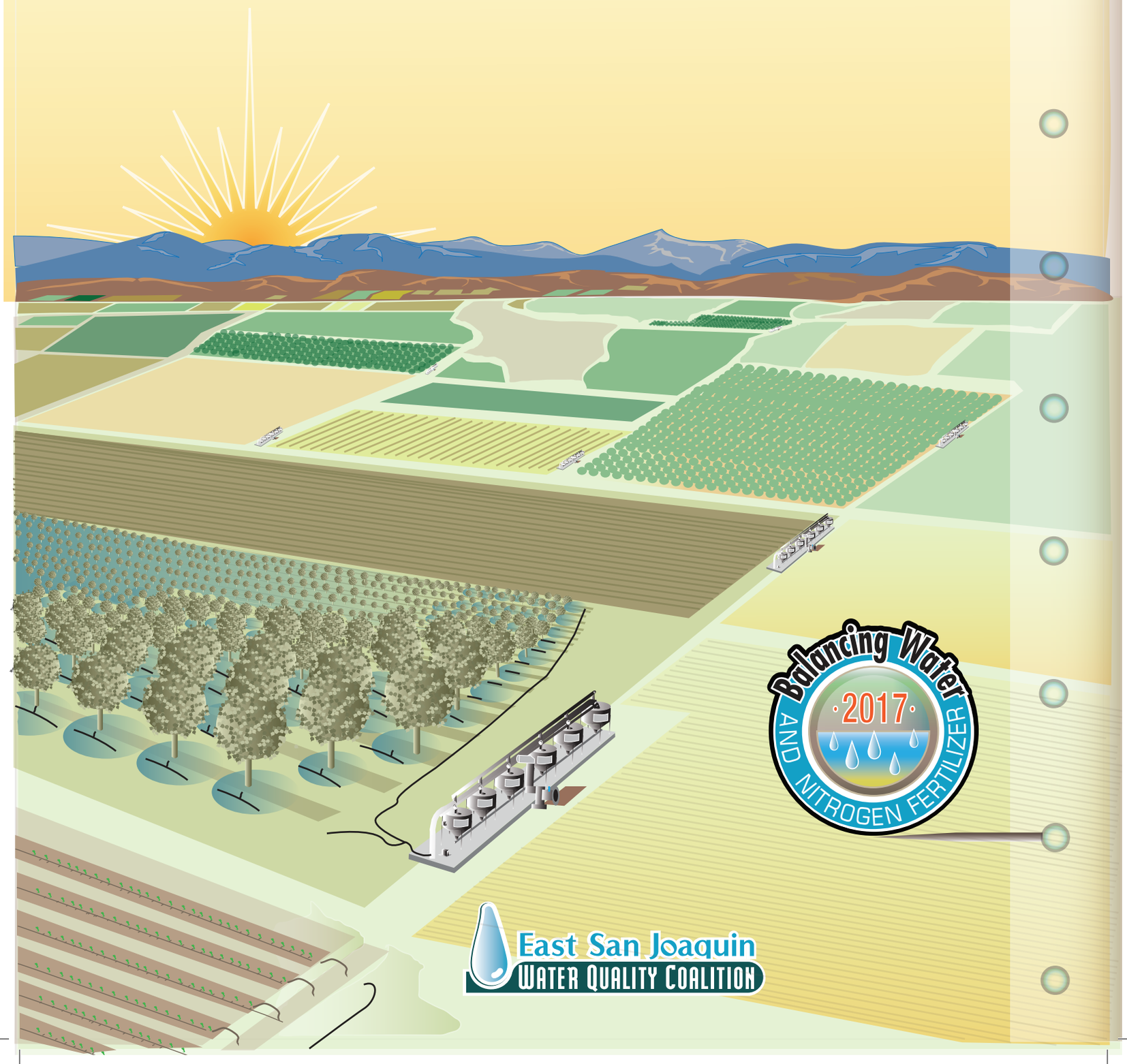
2017 ANNUAL REPORT



Balancing Water and Nitrogen Fertilizer

2017

East San Joaquin Water Quality Coalition

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2017 Year in Review

The Rules Are Changing Again

Since ESJWQC was formed in 2003, we've gone through two major program revisions in the Irrigated Lands Regulatory Program. In February 2018, the third version of our requirements will be put into law by the State Water Board. And like the last major program revision in 2012, our reporting deadlines are again going to be a year or more ahead of the other Central Valley coalitions. All because the ESJWQC Order was the first to be adopted in 2012 and the first to be petitioned to the State Water Board by both activists and ag interests.

After almost two years of debate over language with the "stakeholders" and regulators, it's fair to say that this new version could be worse. Changes to lookout for include: one new report required for a subset of our membership, an irrigation component was added to the Nitrogen Management Plan (NMP) and new coalition follow-up activities focused on members' nitrogen use in crops.

A significant shift in the coalition versus grower responsibilities is the new requirement to sample all domestic wells on member properties starting January 2019. The Order is written in a way that leaves all reporting and follow-up to the grower and the Regional Water Board. ESJWQC is only required to inform its members of the new rule. The grower is responsible for contacting a lab and making sure the results are posted on GeoTracker, the State-run data base on water quality information. Occupants must be notified if a drinking water well exceeds nitrate water standards. Central Coast growers were put under similar rules in 2013.

When the first draft of the new Order was released in February 2016, it proposed that all nitrogen fertilizer application information submitted to the Regional Water Board include the members name and field locations. Coalitions and farm groups made a strong push in hearings and meetings with State Water Board members that such a requirement would end the coalition structure in the Central Valley. The latest version drops that approach and instead allows grower names to be replaced with an anonymous identifier in the aggregated reports on nitrogen fertilizer applications. The Regional Water Board retains its authority to request information for follow-up.

At press time, the State Water Board had set February 7 as the adoption hearing date. If no modifications are made to the current draft, the most immediate change impacting members is the revised NMP, now called the "Irrigation and Nitrogen Management Plan (INMP)." The deadline for the first INMP summary report is March 1, 2019, for the 2018 crop and includes nitrogen applications and estimates of applied water. ESJWQC is already working on a draft INMP and hopes to have the final version in members' hands by April or May. And while ESJWQC staff and attorneys made a concerted effort to convince the State Water Board to align our deadlines with all other Central Valley Coalitions, the uneven implementation schedule remained in the final draft posted on January 19.

A significant program change in 2017 that came out of the existing Order is the expanded number of pesticides in our surface water monitoring program. In October 2017, ESJWQC began analyzing for a long list of new pesticides that are suspected of posing a risk to aquatic organisms. The products analyzed in a specific waterway are based on use in the watershed (according to the County Agriculture Commissioner) and, in general, are replacements for organophosphates that are now rarely found in water sampling (see list of new products on page 17).

In 2017, ESJWQC water sampling again showed few exceedances of pesticide standards even with above-average rainfall last winter and spring. Nitrogen fertilizer reporting for the 2016 crop was close to matching the 100% compliance for the 2015 reporting period; however, those who haven't complied can expect reminders from coalition staff members until we reach 100%. The Regional Water Board has proven they won't hesitate to fine growers who get behind on reporting. One member was fined more than $35,000 in 2017 for not turning in Farm Evaluation Reports.

Should you ever need assistance completing any new or existing reports, don't hesitate to contact coalition staff. Our full-time staff is based in Modesto at the Stanislaus County Farm Bureau office with coalition assistance also available at Farm Bureau offices in Madera and Merced.

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

Parry Klassen
Executive Director
209-846-6112 or director@esjcoalition.org

Coalition Overview

Membership

As of January 2018:

- 3,415 landowner/operators
- 705,683 irrigated acres

Boundaries

The Coalition area includes Madera County and portions of Stanislaus, Merced, Tuolumne, Mariposa, and Calaveras counties. The Coalition area is bordered by 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 Central Valley Regional Water Quality Control Board initiated the Irrigated Lands Regulatory Program (ILRP) in 2003 with the adoption of a Conditional Waiver of Waste Discharge Requirements (WDR) for discharges from Irrigated Lands. The Coalition was formed in 2003 to assist growers in the East San Joaquin watershed area with the compliance requirements of the WDR. 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.

Member Outreach and Best Management Practices

The Coalition is continuing its efforts to work with landowners in watersheds where surface water monitoring indicates problems. Central to this effort will be 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 constituent(s) identified.
- 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.

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 2018, the Coalition paid the 87 cents per acre fee for Coalition members to the State Water Resources Control Board to cover the cost of implementing the Irrigated Lands Regulatory Program, primarily for Regional Board staff. All members of agricultural coalitions throughout the state pay this annual fee. The per acre fee is included as part of Coalition membership dues.

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 2017 budget with the actual 2017 expenditures. The 2017 net income was higher than projected. As indicated in the footnote "*Balance Available," there was approximately $2.3 million in ESJWQC banking accounts at the end of the year (which includes dues paid early for the 2018). A complete financial statement of 2017 expenditures is available upon request.

ESJWQC has contracted the services of Grimbleby Coleman Certified Public Accountants, Inc., located in Modesto, to perform an annual audit of our financial statements. Last year, 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.

January 1, 2017 through December 31, 2017 vs. Budget

	Actual* 2017 $K, (Thousands)	Budget 2017 $K, (Thousands)	Description
INCOME			
Total Income	3,244	3,201	Membership dues plus interest on bank accounts in 2017
EXPENSES			
Organizational	783	858	Executive director, legal, accounting, State Ag Waiver fees, management of membership records and related communications, and miscellaneous business costs.
Program	2,186	2,609	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	12	15	Expenses for executive director, program manager and contractors doing work for the Coalition
Total Expenses	2,981	3,482	
Net Income	$263	($461)	Difference between Total Income and Total Expenses.

* At the end of December balances available in the checking and savings accounts totaled $2,300 K.

Member Reporting Requirements

The Coalition assists growers in attaining regulatory compliance with Waste Discharge Requirements (WDR) adopted by the Central Valley Regional Water Quality Control Board. To be a member in good standing, members must pay their annual dues, complete all surveys required by the WDR (Table 1), attend an annual grower meeting, and participate in focused outreach (if determined necessary).

Farm Evaluation Plans

Most members have been filling out a Farm Evaluation Plan (FEP) every year since 2013. The FEP tracks the types of irrigation, nitrogen, wellhead, and sediment and erosion control practices implemented on the farm for each crop type. These surveys were required to be submitted every March for members in high vulnerability groundwater areas; however, because practices change at a more gradual rate, the surveys will now be required once every 5 years.

Nitrogen Management Plans and Self-Certification Courses

A Nitrogen Management Plan (NMP) is a worksheet designed to assist growers in planning their crop nitrogen applications in advance of the crop season. The NMP is kept on the farm for reference and can be updated throughout the year, if needed. Growers who farm parcels in high vulnerability groundwater areas are required to have their NMP 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. The course, developed by the California Department of Food and Agriculture and managed by the Coalition for Urban Rural Environmental Stewardship (CURES), schedules events throughout the year. Course dates are posted at https://www.curesworks.org/grower-training/

Nitrogen Management Plan Summary Reports

A Nitrogen Management Plan (NMP) Summary Report is a report filled out by growers and returned to the Coalition with information on irrigation, crop type, acres, pounds of nitrogen applied per acre and yield per acre. All the information on the NMP Summary Report is found on the Nitrogen Management Plan, filled out prior to growing season and updated as needed. The NMP Summary Report information is aggregated by crop, analyzed, and reported to the Regional Water Board. The purpose of collecting this data is to eventually determine how much nitrogen may be leaching to groundwater by comparing crop removal with pounds of nitrogen applied. This information is also used to inform growers of their nitrogen use compared to other growers of the same crop.

Sediment and Erosion Control Plans (SECP)

Members with parcels located within 200 yards of a creek, slough, or river (waterway) have the potential to discharge sediment into waterways. The Coalition used a model to determine parcels with the potential to discharge sediment at greater than 5 tons/acre/year during rainfall runoff events. A member is not required to complete an SECP if the land adjacent to a waterway is at a lower elevation; if berms/levees/elevated roadways are between the parcel and the waterway; or if there is riparian vegetation between the waterway and field that would prohibit sediment discharge or erosion. An SECP can be self-certified by attending a 4-hour class and passing an exam (sign up for the next class here: https://www.esjcoalition.org/secpTraining.asp). An SECP can also be certified by a professional engineer, geologist, landscape architect, or professional hydrologist. Table 2 lists qualified professionals in the area who can certify SECPs.

Table 1. Upcoming member requirements for members in low and high vulnerability areas based on farm operation size.

Member requirements could change upon approval of revised Waste Discharge Requirements (approval hearing on February 7, 2018).

Due Date	Member Requirement	WDR Reference	Small Farming Operations		All other Farming Operations		Submitted To
			Low Vulnerability	High Vulnerability	Low Vulnerability	High Vulnerability	
As needed	Notice of Confirmation	Pg 23	Once				Coalition
2/28/2017	Sediment & Erosion Control Plan[1]	Pg 25	Members with parcels in proximity to large tributaries must have SECP certified by due date.				Kept On Farm
2/28/2018	Sediment & Erosion Control Plan[1]	Pg 25	Members with parcels in proximity to secondary tributaries must have SECP certified by due date.				Kept On Farm
3/1/2018	Farm Evaluation Plans[2]	Pg 24	Every 5 Years	Annually		Annually	Coalition
3/1/2018	Nitrogen Management Plan[3] (2018 Crop Year)	Pg 26	Annually	Annually*	Annually	Annually*	Kept On Farm
3/1/2018	Nitrogen Management Plan Summary Report[3] (2017 Crop)	Pg 26		Annually		Annually	Coalition
2/28/2019	Sediment & Erosion Control Plan[1]	Pg 25	Members with parcels in proximity to remaining (tertiary) waterbodies must have SECP certified by due date.				Kept On Farm
3/1/2020	Farm Evaluation Plan[2]	Pg 24	Every 5 years	Every 5 years	Every 5 years		Coalition

*Certification required

[1]Update as farm conditions change.

[2] High Vulnerability for either surface or groundwater.

[3] High Vulnerability for groundwater only.

Table 2. Qualified Professionals to Certify Sediment and Erosion Control Plans

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.		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, 209-642-0181 (cell)	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

Annual Grower Meetings

Each year the ESJWQC schedules three grower meetings in Merced, Madera, and Modesto to inform members on surface water monitoring results from the previous water year, management practices, member requirements and groundwater protection. The Coalition focuses part of the Annual Grower Meetings on nitrogen application practices and the potential impact of nitrates on groundwater. The Coalition will also provide attendees with crop-specific handouts about recommended crop fertilization guidelines for the top five crops grown in the Coalition region. Any member who has 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 are usually posted by March 30, 2018. All members are required to attend one Annual Grower Meeting each year.

Member Reporting on Nitrogen Use

In 2017, members in high vulnerability groundwater areas received a Nitrogen Management Plan (NMP) Summary Report that is completed using information from the NMP Worksheet. The Coalition received 98% of the NMP Summary Reports back from members and completed a statistical analysis of the data. The analysis compared member nitrogen Applied/Yield (A/Y) information to other members who produce the same crop. This data, in aggregated format, was included in an analysis submitted to the Central Valley Regional Water Board in compliance with the Irrigated Lands Regulatory Program.

NMP Summary Reports Returned In 2017 For Top Six Crops		
CROP TYPE	COUNT OF MEMBERS	ACREAGE
ALMONDS	1275	170,000
GRAPES	191	34,000
PISTACHIOS	101	23,000
WALNUTS	275	16,000
ALFALFA	130	14,000
CORN	127	13,000

Average N Use And Yield For Top 6 Crops In 2016:

ALMONDS: In 2017, ESJ members farmed 170,000 acres of almond orchards, producing 365 million pounds of almonds. On average, members apply approximately 188 pounds of Nitrogen per acre for an average yield of 2,100 lbs per acre.

GRAPES (WINE): In 2017, ESJ members farmed 34,000 acres of wine grapes, producing 760 million pounds of grapes. On average, members apply approximately 70 pounds of Nitrogen per acre for an average yield of 11 tons per acre.

PISTACHIOS: In 2017, ESJ members farmed 23,000 acres of pistachios orchards, producing 63 million pounds of pistachios. On average, members apply approximately 160 pounds of Nitrogen per acre for an average yield of 2,700 lbs per acre.

WALNUTS: In 2017, ESJ members farmed 16,000 acres of walnut orchards, producing 68 million pounds of walnuts. On average, members apply approximately 200 pounds of Nitrogen per acre for an average yield of 4,250 lbs per acre.

ALFALFA: In 2017, ESJ members farmed 14,000 acres of alfalfa, producing 188 million pounds of alfalfa. On average, members apply approximately 40 pounds of Nitrogen per acre for an average yield of 7 tons per acre.

CORN, SILAGE: In 2017, ESJ members farmed 13,000 acres of silage corn, producing 337 thousand tons of silage corn. On average, members apply approximately 198 pounds of Nitrogen per acre for an average yield of 26 tons per acre.

Nitrogen Use Evaluation Packets

Growers who returned an NMP Summary Report in 2017 will be sent in February/March 2018 a summary of their nitrogen use information plus an evaluation of individual nitrogen use. Data reported on the amount of nitrogen fertilizer applied is compared to the recommended rates developed by the University of California (UC). The Regional Water Board requires that the Coalition indicate to members where nitrogen application rates to a field or management unit are above the average amount recommended by the UC. Fields that exceed those levels are considered a "statistical outlier." Members are then notified about additional follow up actions required for "outlier" fields.

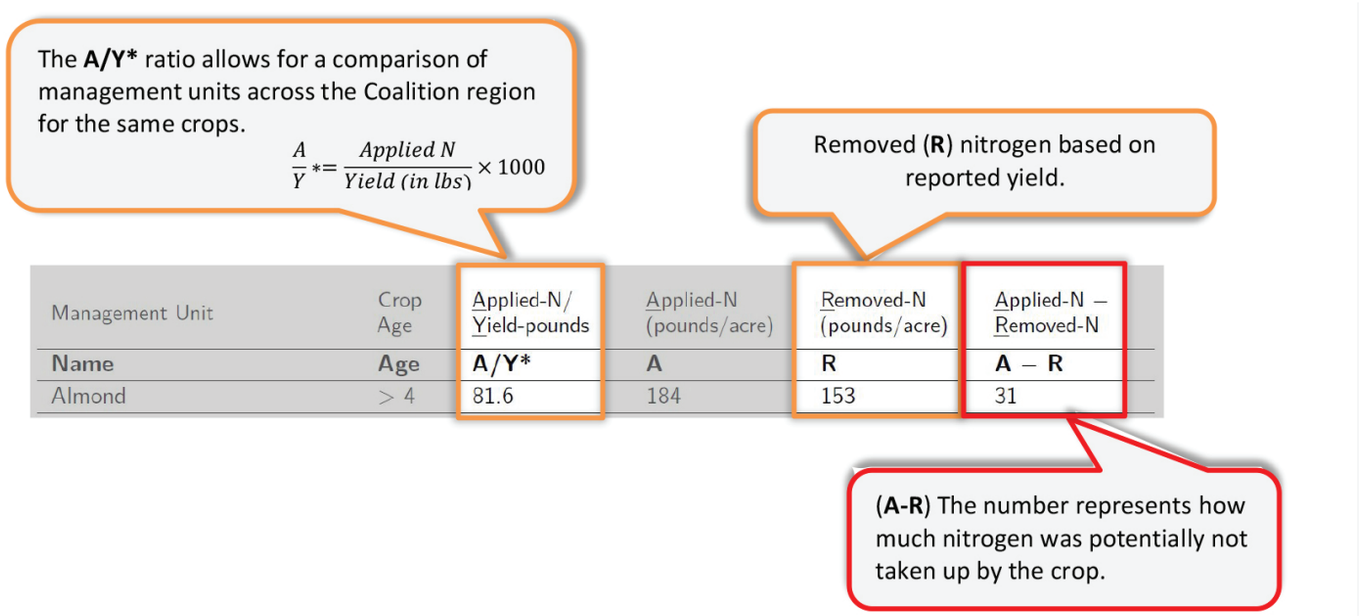
I Have A Field That Was Identified As An "Outlier," Now What?

Step 1: Attend an Annual Grower Meeting

Step 2: Have your 2018 Nitrogen Management Plan certified by a professional. If you self-certified your Nitrogen Management Plan in 2016 and would like to do so again for the 2018 crop year, you must take additional self-certification training. Designating a field as an "outlier" is based on a three-year "A/Y running average" which allows for compensating for normal seasonal variability of production and weather. However, if a field is consistently an outlier as a result of excessive nitrogen applications even after the additional follow-up steps are completed, the member can expect to be contacted by the Regional Water Board.

Understanding Your Nitrogen Use Evaluation
What It All Means

Members who submit a Nitrogen Summary Report receive a nitrogen use evaluation prepared by Coalition staff and its technical consultants. These are confidential reports that provide an analysis of how much nitrogen your crop uses compared to how much nitrogen was applied to the field or management unit. The intention of each analysis is to enable members to make an informed decision when planning upcoming crop nitrogen applications.



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

Where is the source of the Removed (R) values?

The nitrogen removed coefficients are specific to every crop and represent the amount of N used to produce a crop and not available for leaching to groundwater. In 2016, Dr. Daniel Geisseler prepared a report where he compiled and summarized all relevant literature on harvested nitrogen and/or the amount of protein (then converted to N) for many crops grown in the Central Valley. The Coalitions submitted to the Regional Water Board this summary of nitrogen removed estimates for all crops analyzed. Dr. Geisseler found that many of the values were poor or unreliable estimates based on variations between different studies of the same crop and the quality of the study (completeness and relevance). The Coalition performed a separate analysis of Geisseler's report and ranked nitrogen removed values as Good, Reasonable, and Poor. These rankings where noted in the NMP Summary Report Analysis submitted annually to the Regional Water Board. The Coalition ranked 13 of the N Removed values as good, 26 as reasonable, and 24 as poor.

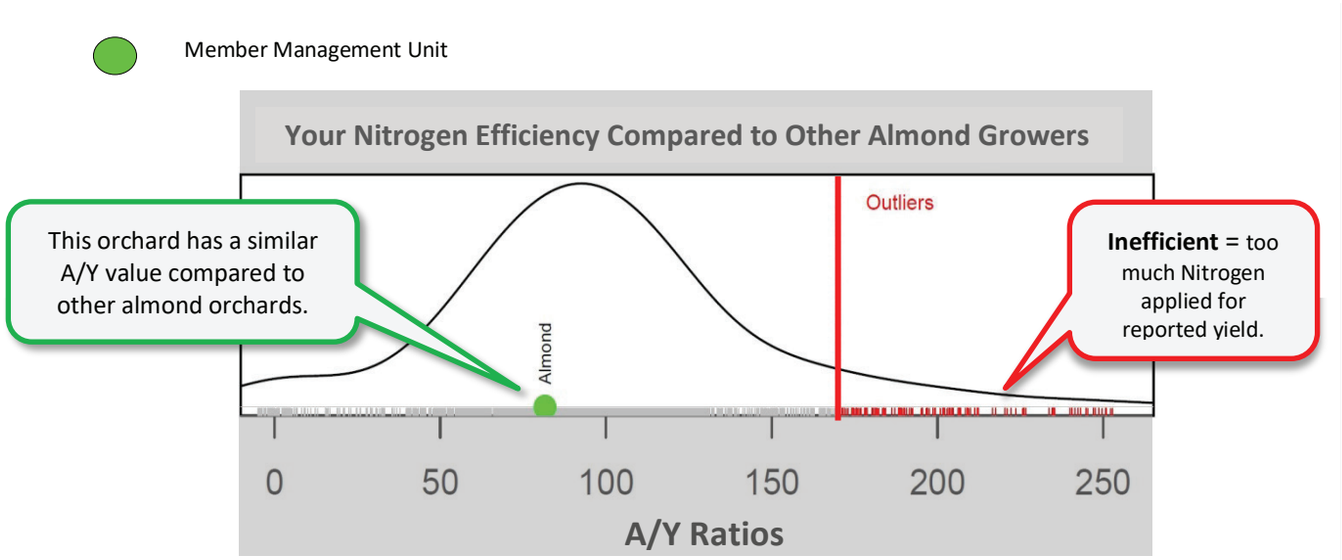
The Regional Water Board has agreed that as more studies are conducted and quality data collected, the nitrogen removed values can be updated. The crops with the highest confidence level are included below.

Table 3. List of Specific Crop Types with accurate nitrogen removed coefficients.

SPECIFIC CROP TYPE	
ALFALFA, HAY	OATS, HAY
ALFALFA, HAYLAGE	PISTACHIOS
ALMONDS	PRUNES
CORN, SILAGE	SWEET POTATOES
COTTON	TOMATOES, PROCESSING
COTTON, PIMA	WHEAT, GRAIN
COTTON, UPLAND	

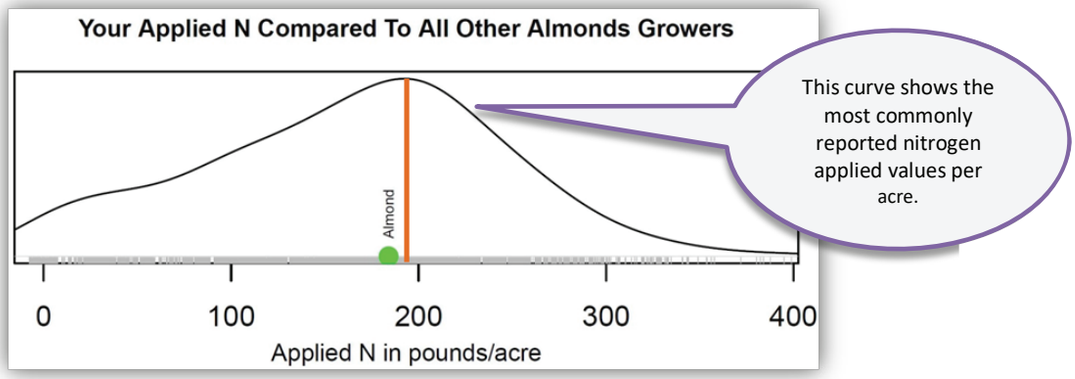
Understanding Bell Curves

A bell curve allows you to visually see the distribution of reported grower data. The peak of the bell curve represents the most commonly reported value (mode), as the curve slopes away from the mode, fewer growers reported those values. In the curve below, the ends signify growers that are either very efficient or inefficient.



Reported Nitrogen Applications

This bell curve compares a management unit to the most commonly reported values of nitrogen applied per acre during the 2016 growing season. Based on this curve, an average of about 200 pounds of nitrogen per acre is applied to almonds (as both applied nitrogen and nitrogen in irrigation water).



Crop Consumption Curves

Nitrogen Uptake for Almond Trees

FREP Application Rate Recommendations

Spring

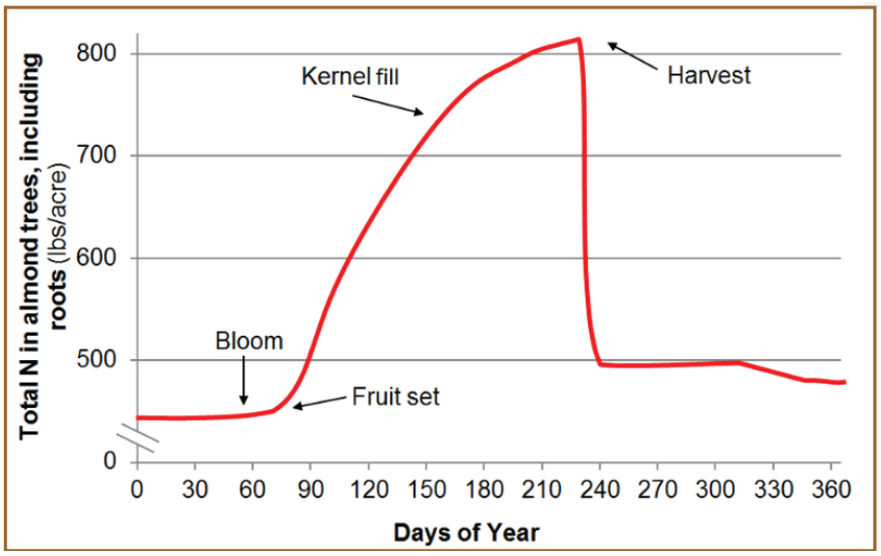
Apply 30% of the total N planned for the year in March/April.

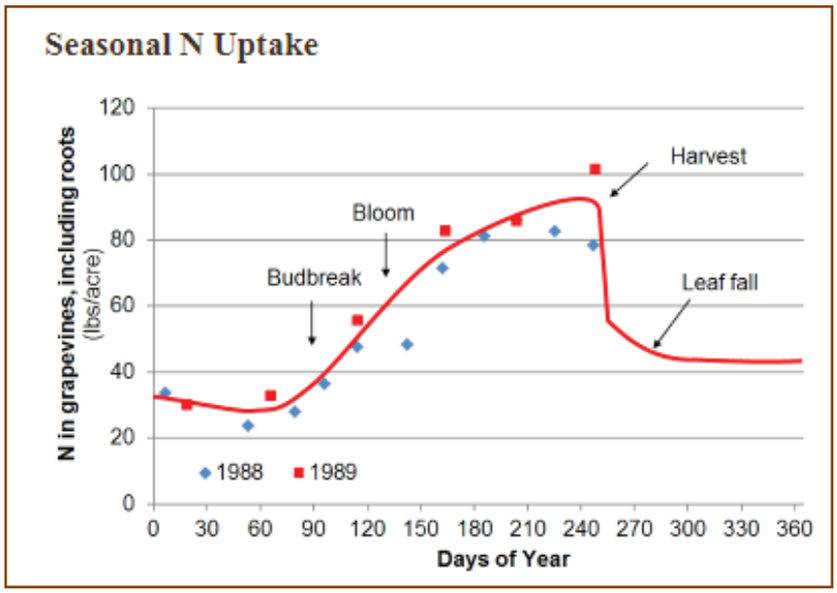
Summer

Apply 40% of the total N planned for the year in May/June and 30% in June/July.

Fall

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





Nitrogen Uptake for Grapevines

FREP Application Rate Recommendations

Dormancy and Budbreak: Nitrogen uptake is relatively slow between budbreak and bloom. Early applications before or at budbreak are susceptible to leaching from sprinkler frost protection, late rainfall or excessive spring irrigations and should be delayed until after the frost danger period.

When using drip irrigation, 2-5 lbs N/acre may be applied weekly in spring. With using furrow irrigation, urea and ammonia should be incorporated immediately since they are subject to volatilization.

Full Bloom: Nitrogen uptake is relatively high between bloom and veraison. During this period, about half of the annual N demand is taken up. Nitrogen is best applied in spring, during a period starting after budbreak until fruit set or post-harvest. Petiole nitrate-N concentrations of 500-1200 ppm are generally considered adequate.

Veraison and Harvest: Post-harvest N applications refill storage reserves in permanent structures; however, available N in late summer should not be high enough to encourage late-season shoot growth, delay maturity, or promote immature canes. Nitrogen applications in late fall after leaf fall are inefficient, because N may be leached below the root zone by winter rains.

Nutrient Management Resources

Nitrogen Management Training For Self-Certification

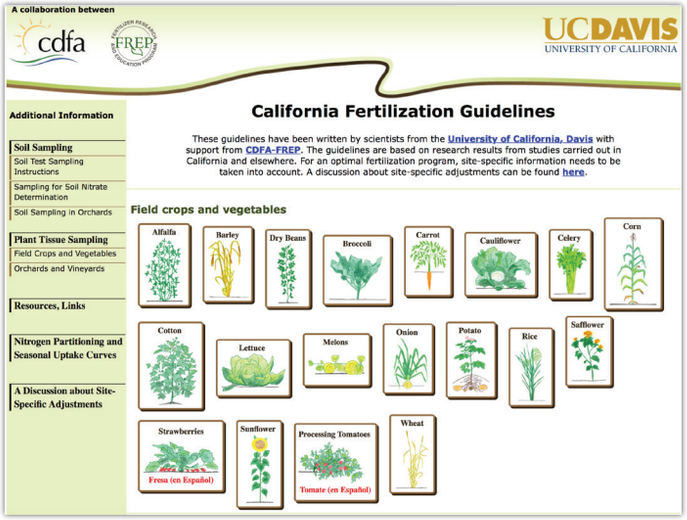
The training programs are put on by Certified Crop Advisors (CCAs) who have completed a curriculum training approved by the California Department of Food and Agriculture and University of California. The grower trainings are 4-hour classes and participants will need to take a test before they can sign off on their own Nitrogen Management Plan. Training schedules available at https://www.curesworks.org/grower-training/

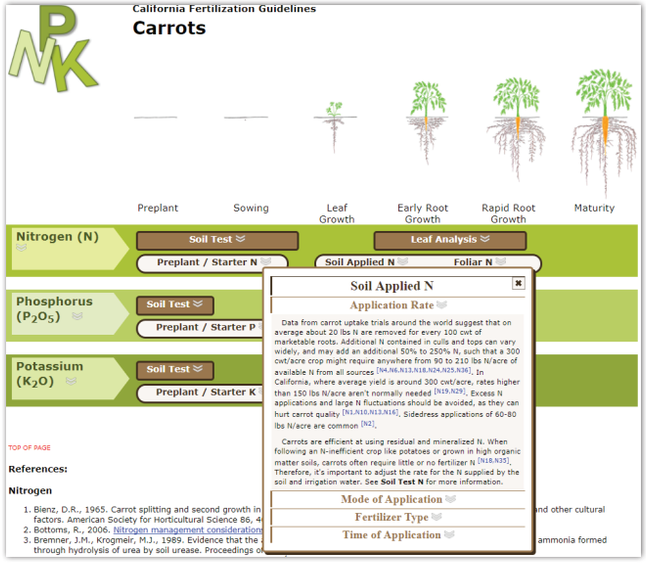
Visit The CDFA Fertilizer Research Education Program (FREP) Website

Website link: https://www.cdfa.ca.gov/is/ffldrs/frep/

This website provides specific crop fertilizer recommendations for all stages of plant maturity in a clean and simple format.

To view nutrient recommendations, click on the tile with your crop for information on nitrogen application rate, mode, type, and timing.



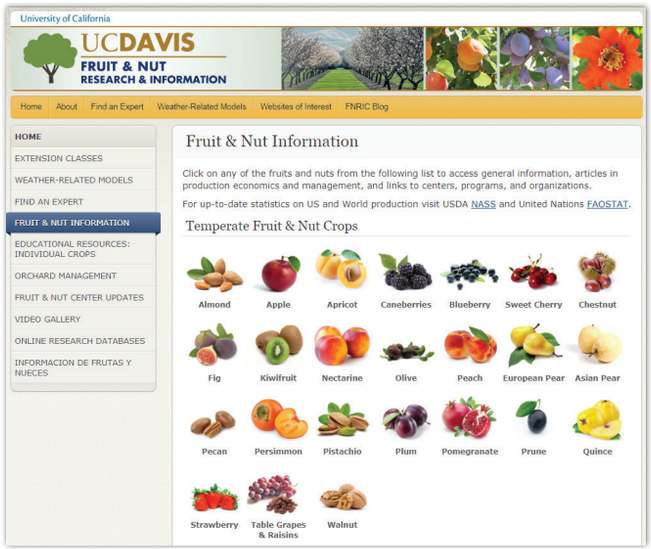


UC Davis Fruit & Nut Research & Information Center

Website link: : http://fruitsandnuts.ucdavis.edu/datastore/

From this website, you can select a fruit or nut type for:

- General information
- Models
- Newsletters & Blogs: Farm Advisors
- Articles in production economics and management
- Links to centers
- Programs
- Organizations



Groundwater Program

Progress Made with Groundwater Program

The WDRs for all Central Valley Coalitions require each Coalition to develop the following groundwater quality related documents for each region: Groundwater Assessment Report (GAR), the Management Practice Evaluation Program (MPEP), the Groundwater Quality Management Plans (GQMP) and the Groundwater Quality Trend Monitoring Workplan (GQTM Workplan).

The Coalition submitted to the Regional Water Board a Groundwater Assessment Report (GAR) about the Coalition region in 2014. The GAR compiled the water quality results from thousands of wells tested in the region over the last 20+ years. The GAR also included information from soil surveys and other 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 based on three factors; soil type, depth to groundwater and existing concentration of nitrates in the groundwater. High vulnerability areas are generally found in permeable soils with shallow groundwater. Any location where the concentration of nitrate exceeds the drinking water standard is automatically a high vulnerability area. More than 70% of the ESJWQC region has been designated high vulnerability for groundwater.

Groundwater Quality Trend Monitoring

The goals of the Groundwater Quality Trend Monitoring program are to 1) determine current water quality conditions relevant to irrigated agriculture and 2) use the trend monitoring data to evaluate the regional effects of farm practices on groundwater over time. The wells selected for monitoring draw water from the aquifer called the Upper Zone that is above the Corcoran Clay layer. Within the high vulnerability area, the depth to the bottom of the Upper Zone is between about 40 and 300 feet below ground surface.

In 2017, Luhdorff and Scalmanini (consulting firm hired by the Coalition) finalized a list of member wells to be included in the Groundwater Quality Trend Monitoring program. Twelve member wells (Principal wells) met the three criteria listed in the WDR: 1) well is equipped with a functional pump, 2) well is at least 200 feet away from septic or animal confines, and 3) the owner of the well will allow the Coalition to obtain a Well Completion Report (WCR) from DWR. In addition to member wells, the Coalition will utilize well monitoring data from 74 public supply wells (Complementary wells). The network of wells includes a combination of municipal drinking water wells, dedicated monitoring wells already in existence, and domestic or irrigation wells belonging to members. The high vulnerability groundwater area was divided into different priority levels as a way to represent different monitoring emphasis and objectives of the trend monitoring program. Sampling is scheduled to begin in fall 2018 and annually thereafter.

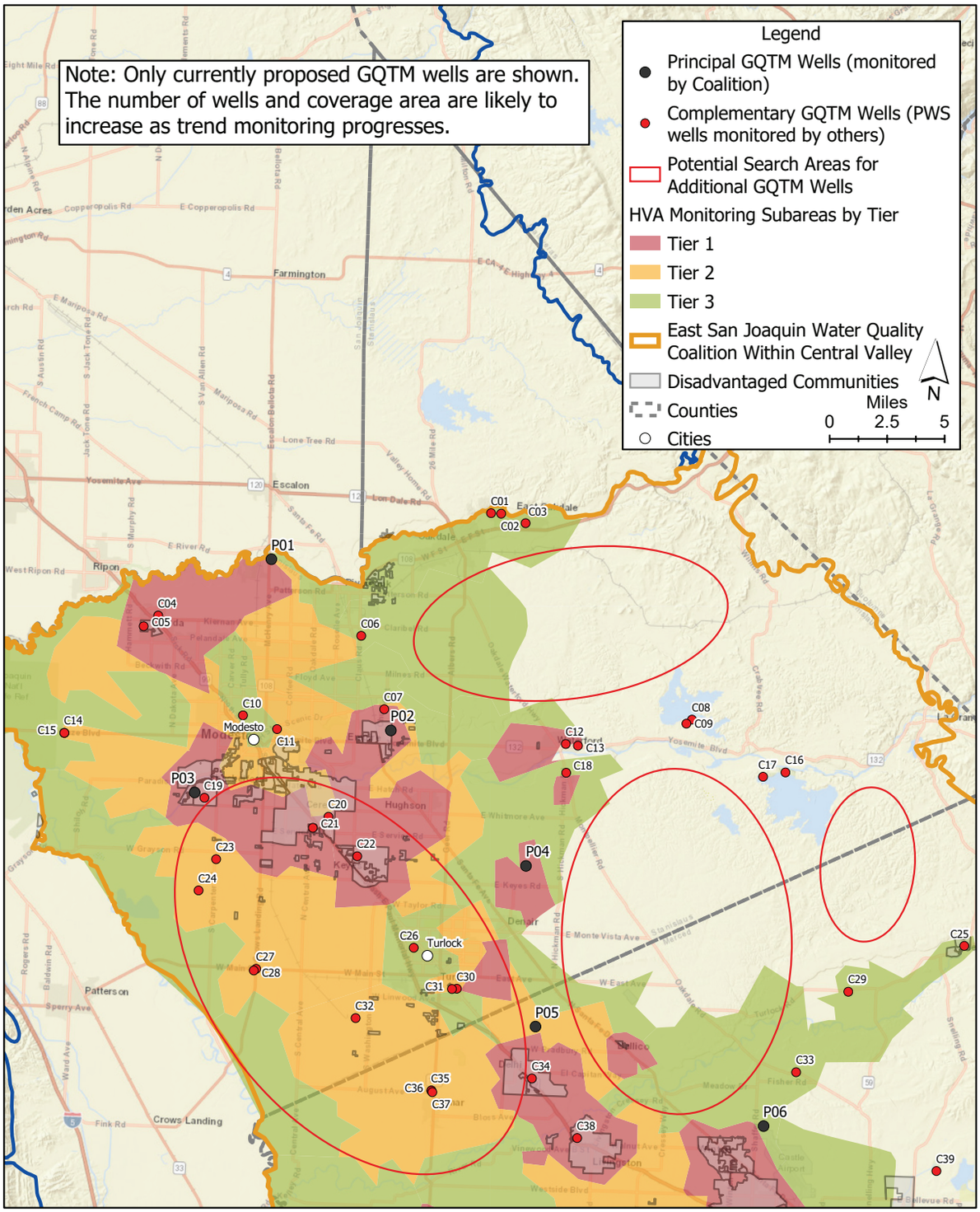
Wellhead Practices To Protect Groundwater From Contamination

The Coalition is encouraging all members to have at least two of the practices listed below implemented for 2018. Unprotected wellheads can be a pathway for nitrate and other pollutants in groundwater.

PRACTICE	PURPOSE
Air gap (for non-pressurized systems)	Air-gaps are non-mechanical means of backflow prevention. Air gaps must be twice the supply pipe diameter and never less than 1".
Backflow preventative/check valve	Check valves are designed to permit water to flow in one direction and are a requirement on all submersible pump installations.
Good "housekeeping" practices	Within 100 feet of a well, do no store any material that might contaminate your water supply (Examples: trash, fertilizers, pesticides, gasoline, paint, lawn-care products, automotive wastes).
Ground sloped away from wellhead	By having the ground sloped away from the wellhead, there is little chance of contamination.
Standing water avoided around wellhead	Soil profile can become saturated, speeding movement of contaminants through the soil.

Northern Groundwater Trend Monitoring Wells

Red circles indicate areas where additional domestic wells are needed for trend monitoring



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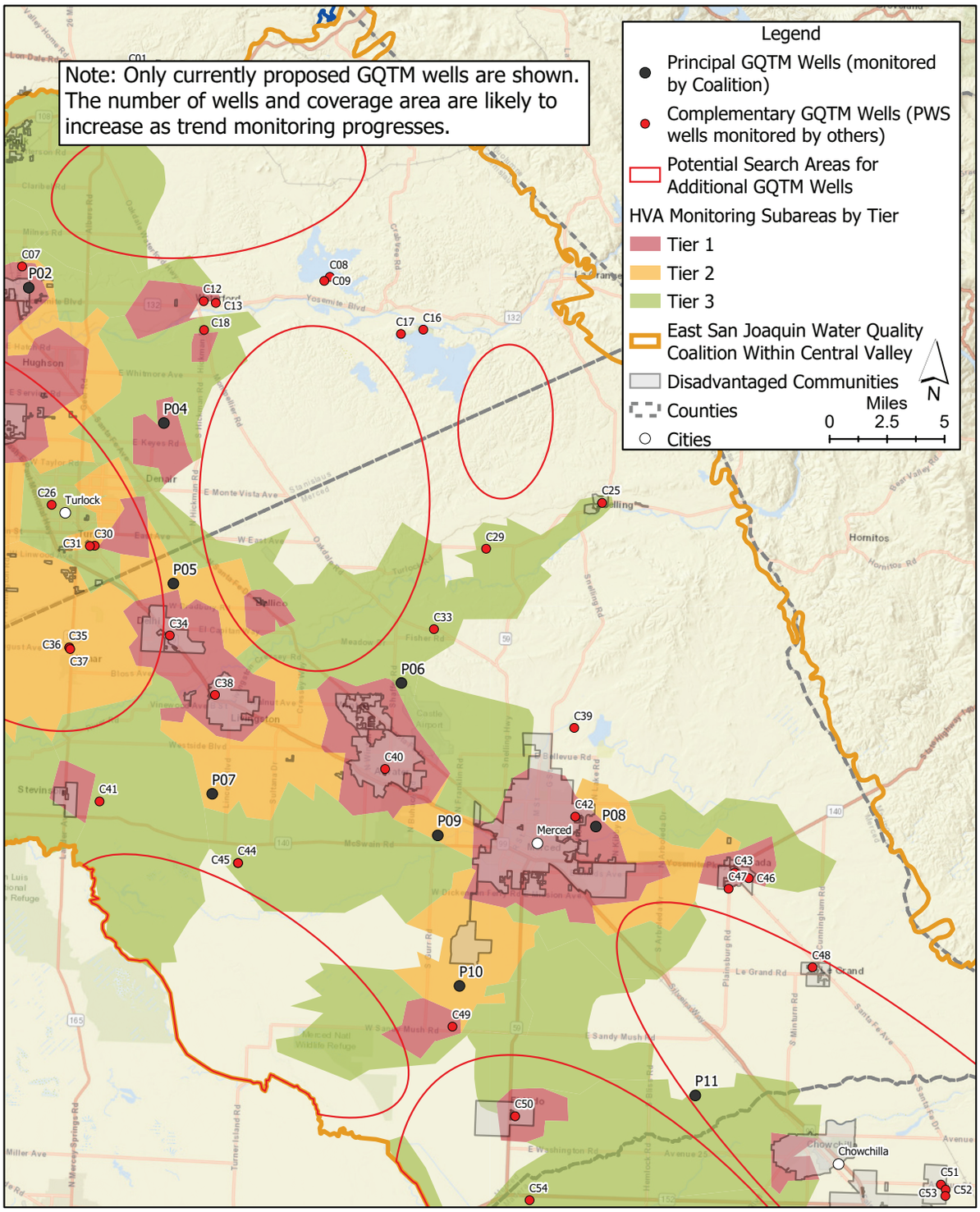
LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 17A
All Proposed Groundwater Quality Trend Monitoring Wells
Northern ESJWQC

East San Joaquin Water Quality Coalition
Groundwater Quality Trend Monitoring Workplan Phase III

Central Groundwater Trend Monitoring Wells

Red circles indicate areas where additional domestic wells are needed for trend monitoring



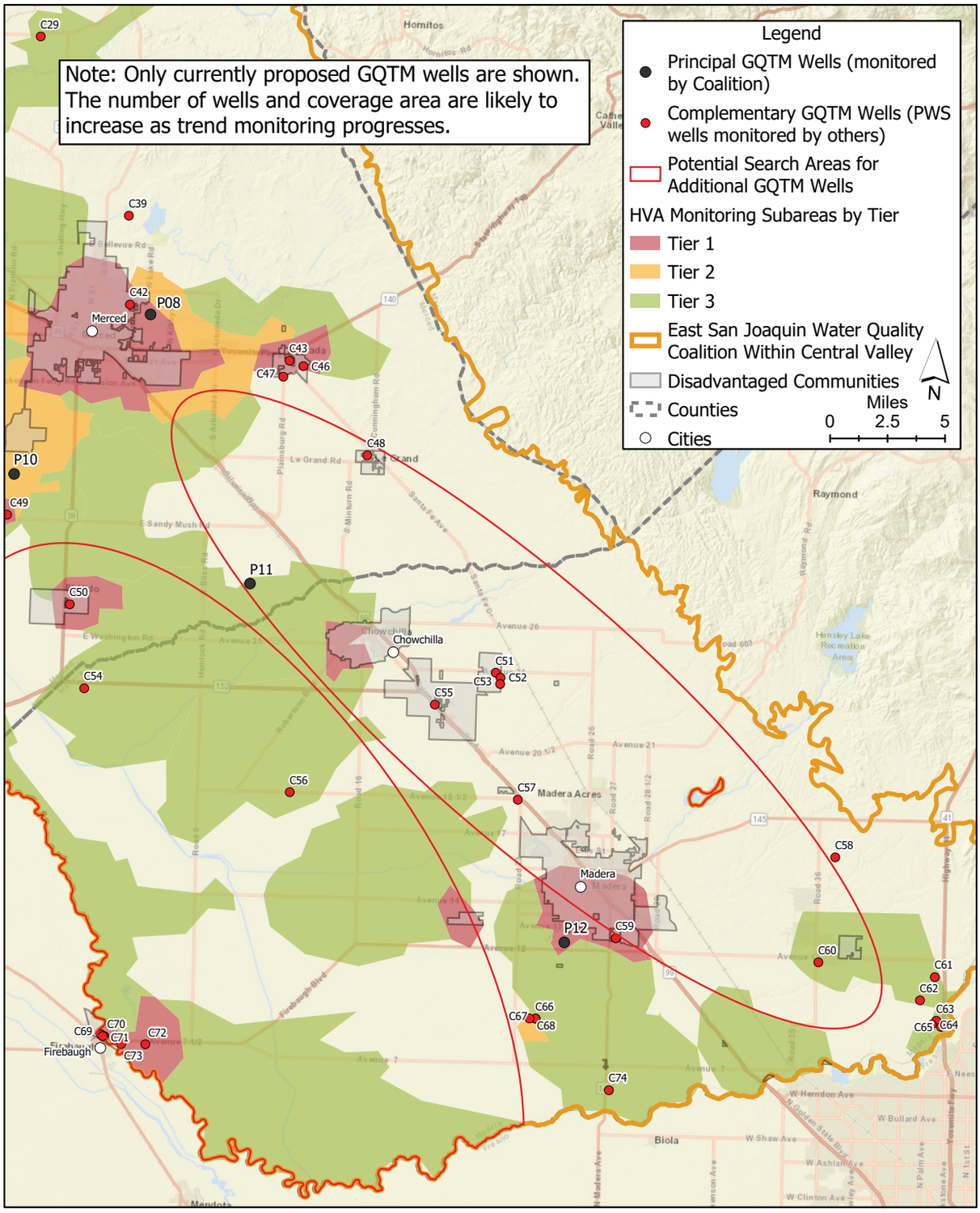
LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 17B
All Proposed Groundwater Quality Trend Monitoring Wells
Central ESJWQC

East San Joaquin Water Quality Coalition
Groundwater Quality Trend Monitoring Workplan Phase III

Southern Groundwater Trend Monitoring Wells

Red circles indicate areas where additional domestic wells are needed for trend monitoring



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LUHDORFF & SCALMANINI CONSULTING ENGINEERS

FIGURE 17C
All Proposed Groundwater Quality Trend Monitoring Wells
Southern ESJWQC

East San Joaquin Water Quality Coalition
Groundwater Quality Trend Monitoring Workplan Phase III

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

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

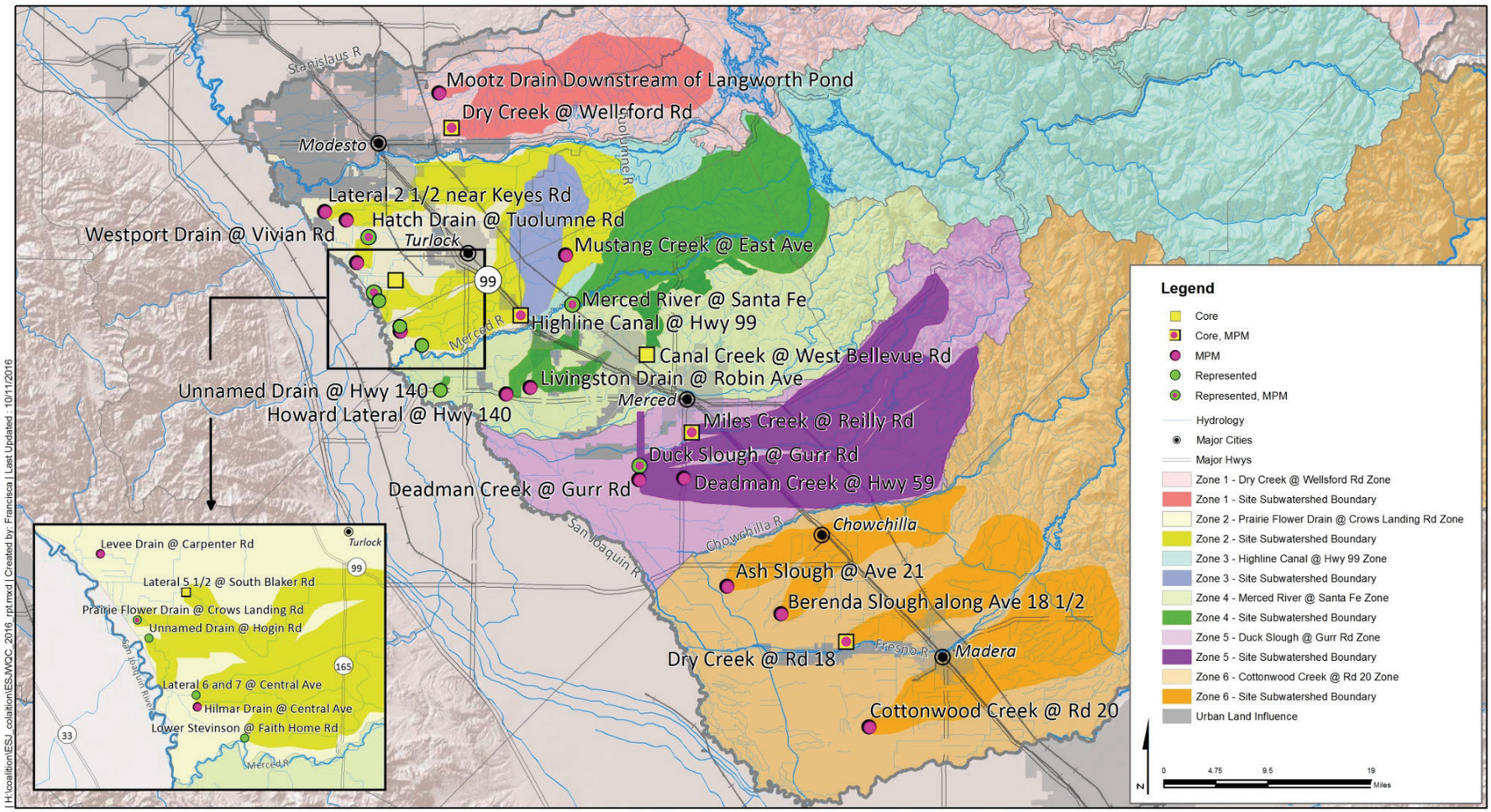
Pesticides Selected for Monitoring

During the 2018 Water Year or WY (October 2017 – September 2018), the Coalition began monitoring 19 new pesticides (blue cells). The list was based on a more comprehensive list of 379 products released on November 29, 2016 by the Regional Water Board. Pesticide selection is based on an Evaluation Protocol that takes several factors into consideration. Pesticides analyzed in each Core site watershed are based on Pesticide Use Report information over the past three years for that particular area. This new way of selecting pesticides to analyze is meant to make surface water monitoring more current and flexible based on changes in pesticide use over time. Table 4 lists all pesticides selected for monitoring (common name) and commercial product names (not all commercially available products are listed).

Table 4. List of new chemicals selected for monitoring during the 2018 WY and associated products.

2018 Water Year Pesticides	Product Names
ACETAMIPRID	ASSAIL INSECTICIDE
BIFENTHRIN	ACETO BIFENTHRIN 2EC
	ATHENA INSECTICIDE/MITICIDE
	BIFEN 2 AG GOLD
	BIFENTHRIN 2EC
	BIFENTURE EC AGRICULTURAL INSECTICIDE
	BRIGADE WSB INSECTICIDE/MITICIDE
	FANFARE ES
	SNIPER
CARBARYL	SEVIN 5 BAIT
	SEVIN XLR
	SEVIN XLR PLUS
CHLOROPICRIN	CHLOROPICRIN 100 FUMIGANT
	MBC-33
	PIC-CLOR 60
	TELONE C-35
	TERR-O-GAS 67
	TRI-CLOR FUMIGANT
	TRI-CON 50/50
	TRI-CON 57/43
	TRI-CON 80/20
CHLOROTHALONIL	BRAVO WEATHER STIK
	CHLORONIL 720
	ECHO 720 AGRICULTURAL FUNGICIDE
	EQUUS 720 SST
	INITIATE 720 FLOWABLE FUNGICIDE
CHLORPYRIFOS	DREXEL CHLORPYRIFOS 4E-AG
	LOCK-ON INSECTICIDE
	LORSBAN 15G GRANULAR INSECTICIDE
	LORSBAN ADVANCED
	VULCAN
	WARHAWK
	WARHAWK CLEARFORM
	WHIRLWIND
CLOTHIANIDIN	BELAY INSECTICIDE
CYPRODINIL	INSPIRE SUPER
	SWITCH 62.5WG
	VANGARD WG
DIMETHOATE	CHEMINOVA DIMETHOATE 4E
	DIMETHOATE 400
	DREXEL DIMETHOATE 4EC
DIURON	DIURON 4L HERBICIDE
	KARMEX DF
	PARROT 4L
ESFENVALERATE	ASANA XL INSECTICIDE
	DU PONT ASANA XL INSECTICIDE
FENPROPATHRIN	DANITOL 2.4 EC SPRAY
FLUMIOXAZIN	CHATEAU HERBICIDE SW
HEXAZINONE	DU PONT VELPAR L HERBICIDE
IMIDACLOPRID	ADMIRE PRO SYSTEMIC PROTECTANT
	MACHO 2.0 FL
	MACHO 4.0
	MONTANA 4F INSECTICIDE
LAMBDA-CYHALOTHRIN	LAMBDA-CY AG
	LAMBDA-CY EC INSECTICIDE-RUP
	WARRIOR II WITH ZEON TECHNOLOGY
LINURON	LOROX DF
MALATHION	DREXEL MALATHION 5EC
	FYFANON 8 LB. EMULSION
	FYFANON ULV AG
	GOWAN MALATHION 8
	MALATHION 8 AQUAMUL
MANCOZEB	DITHANE F-45 RAINSHIELD
	DUPONT MANZATE PRO-STICK FUNGICIDE
	MANZATE PRO-STICK FUNGICIDE
	PENNCOZEB 75DF
	ROPER DF RAINSHIELD
ORYZALIN	FUGITIVE
	SURFLAN A.S. AGRICULTURAL HERBICIDE
OXYFLUORFEN	GALIGAN 2E
	GALIGAN 2E HERBICIDE
	GALIGAN 2E OXYFLUORFEN HERBICIDE
	GOAL 2XL
	GOALTENDER
	OXYSTAR 2E
	PINDAR GT
PARAQUAT	DREXEL QUIK-QUAT
	GRAMOXONE INTEON
	GRAMOXONE SL 2.0
	HELMQUAT 3SL
	PARAQUAT CONCENTRATE
	PARAZONE 3SL
	WILLOWOOD PARAQUAT 3SL
PENDIMETHALIN	PROWL 3.3 EC HERBICIDE
	PROWL H2O HERBICIDE
	SATELLITE HYDROCAP HERBICIDE
PERMETHRIN	PERMETHRIN
	PERM-UP 3.2 EC INSECTICIDE
PROPICONAZOLE	AMTIDE PROPICONAZOLE 41.8% EC FUNGICIDE
	FITNESS FUNGICIDE
	PROPICON 3.6EC
	PROPICURE 3.6F
	PROPI-STAR EC
	PROTOCOL
	TILT
	WILLOWOOD PROPICON 3.6EC
PYRACLOSTROBIN	MERIVON XEMIUM BRAND FUNGICIDE
	PRISTINE FUNGICIDE
SIMAZINE	PRINCEP 4L
	PRINCEP CALIBER 90 HERBICIDE
	SIMAZINE 90DF
	SIM-TROL 4L
TRIFLURALIN	TREFLAN HFP
	TREFLAN TR-10
	TRIFLUREX HFP

Surface Water Monitoring Sites Map



MICHAEL L. JOHNSON LLC
ECOSYSTEMS • CONSULTING

ESJWQC 2017 WY Monitoring Sites Zone Boundaries & Urban Land Influence

ESJWQC

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

"X" indicates sampling occurred during the years specified (2013 – September 2017)

Zone	Site Type	Site Name	County	2013[1]	2014 WY	2015 WY	2016 WY	2017 WY
6	Represented	Ash Slough @ Ave 21	Madera		X	X	X	X
4	Represented	Bear Creek @ Kibby Rd	Merced	X	X			
6	Represented	Berenda Slough along Ave 18 1/2	Madera	X	X	X	X	X
4	Represented	Black Rascal Creek @ Yosemite Rd	Merced	X	X	X	X	X
4	Represented	Canal Creek @ West Bellevue Rd	Merced		X	X	X	X
6	**Core**	**Cottonwood Creek @ Rd 20**	**Madera**	X	X	X	X	X
5	Represented	Deadman Creek @ Gurr Rd	Merced	X	X	X	X	X
5	Represented	Deadman Creek @ Hwy 59	Merced	X	X	X	X	X
1	**Core**	**Dry Creek @ Wellsford Rd**	**Stanislaus**	X	X	X	X	X
6	Represented	Dry Creek @ Rd 18	Madera	X	X	X	X	X
5	**Core**	**Duck Slough @ Gurr Rd**	**Merced**	X	X	X	X	X
2	Represented	Hatch Drain @ Tuolumne Rd	Stanislaus	X	X	X	X	X
3	**Core**	**Highline Canal @ Hwy 99**	**Merced**	X	X	X	X	X
3	Represented	Highline Canal @ Lombardy Rd	Merced	X	X	X		
2	Represented	Hilmar Drain @ Central Ave	Merced	X	X	X	X	X
4	Represented	Howard Lateral @ Hwy 140	Merced	X	X	X	X	X
2	Represented	Lateral 2 1/2 near Keyes Rd	Stanislaus	X	X	X	X	X
2	Represented	Lateral 5 1/2 @ South Blaker Rd	Stanislaus		X	X	X	X
2	Represented	Lateral 6 and 7 @ Central Ave	Merced		X	X	X	X
2	Represented	Levee Drain @ Carpenter Rd	Stanislaus	X	X	X	X	X
4	Represented	Livingston Drain @ Robin Ave	Merced	X	X	X	X	X
2	Represented	Lower Stevinson @ Faith Home Rd	Merced		X	X	X	X
4	Represented	McCoy Lateral @ Hwy 140	Merced	X				
4	**Core**	**Merced River @ Oakdale Rd**	**Merced**	X	X	X	X	X
5	Represented	Miles Creek @ Reilly Rd	Merced	X	X	X	X	X
1	Represented	Mootz Drain Downstream of Langworth Pond	Stanislaus	X	X	X	X	X
3	Represented	Mustang Creek @ East Ave	Merced	X	X	X	X	X
2	**Core**	**Prairie Flower Drain @ Crows Landing Rd**	**Stanislaus**	X	X	X	X	X
2	Represented	Unnamed Drain @ Hogin Rd	Stanislaus		X	X	X	X
4	Represented	Unnamed Drain @ Hwy 140	Merced	X	X	X	X	X
2	Represented	Westport Drain @ Vivian Rd	Stanislaus		X	X	X	X

[1] Monitoring during 2013 was from January through September 2013
WY – Water Year (October through September)

Coalition Actions Successful in Improving Surface Water Quality in the East San Joaquin Region

Surface Water Quality Monitoring Program

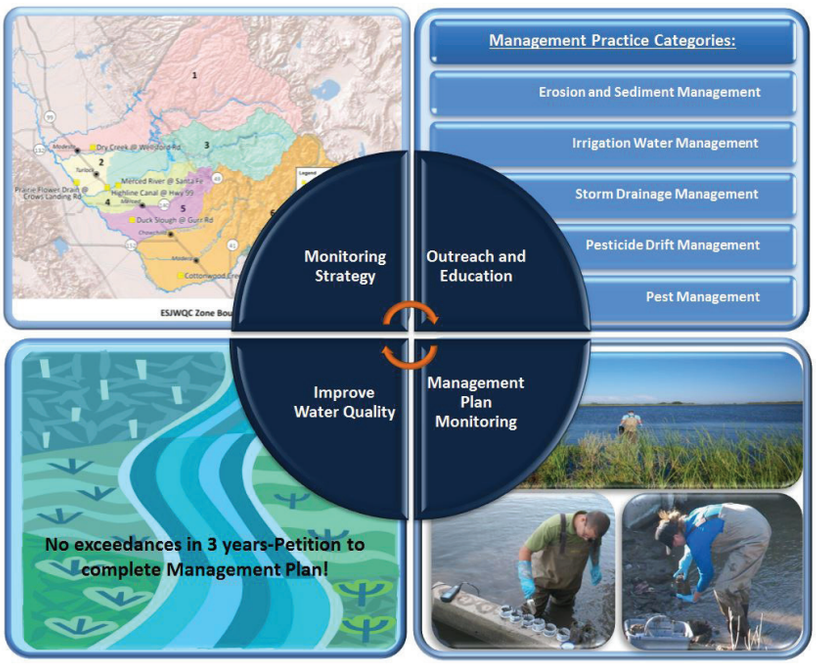
The ESJWQC region encompasses irrigated lands east of the San Joaquin River within Madera, Merced, Stanislaus, Tuolumne, Mariposa, and portions of Alpine Counties. Since initiating monitoring in 2004, the Coalition identified water quality impairments traced back to farm inputs, developed and implemented a surface water management plan strategy and worked directly with growers to improve water quality throughout the region.

A key component of the Coalition's surface water monitoring strategy is dividing its geographic region into six zones based on hydrology, climate, soils and land use. Currently, the Coalition monitors 31 sites, including:

- Core sites (monthly assessment of field parameters, nutrients, pathogens, pesticides, metals, and toxicity);
- Represented sites (where there are potential water/sediment quality impairments) and;
- Management Plan sites to track water/sediment quality improvements as a result of implemented management practices.

Approach to Solving Water Quality Impairments

The Coalition works closely with its members to achieve the goal of reducing the impact of agricultural discharge on water quality and protecting beneficial uses.



- Work with members to maintain compliance with state water quality regulations:
  - Maintains a member database that tracks acreage and crops on a parcel level.
  - Monitors water/sediment quality to evaluate trends and impairments.
  - Assesses long term changes in water/sediment quality relative to implemented management practices.
  - Reports annually to the Regional Water Board on member compliance, monitoring results and trends in water/sediment quality.
- Provides education and outreach:
  - Informs members of monitoring results through meetings, newsletters, and annual reports.
  - Tracks members and parcel changes to provide education and outreach to all members.
  - Conducts additional, focused outreach to members most likely to affect downstream water quality.
- Collaborates with other coalitions and agricultural groups:
  - Collaborates with the County Agricultural Commissioners, UC Cooperative Extension, PCAs, and pesticide registrants to provide growers with information on management practices.
  - Works with commodity groups to combine resources to provide education and outreach, and document management practice effectiveness.
  - Inform members of funding resources such as the Agricultural Water Enhancement Program and the Environmental Quality Incentives Program to assist with implementing additional management practices.

Improvement Highlights Of 2017

Subwatershed	Management Plans (Year Complete)	Focused Outreach	Waterway
Deadman Creek @ Gurr Rd	Copper (2012) Chlorpyrifos (2017) Water Flea toxicity (2017) Fathead Minnow toxicity (2017) Algae toxicity (2016)	Growers Contacted: 2 Acreage Covered: 240 New Practices Implemented: None Practices Implemented: - No sprays during the dormant season - No irrigation runoff	
Black Rascal Creek @ Yosemite Rd	Lead (2016) Chlorpyrifos (2016) Water Flea toxicity (2016)	Growers Contacted: 1 Acreage Covered: 301 Practices Implemented: - Sediment pond - Grass rows - Filter strips around field - No dormant sprays - Laser levels field	

Table 5. All Completed Management Plans within the East San Joaquin Coalition.

Site Subwatershed	Copper	Lead	Molybdenum	Chlorpyrifos	Diazinon	Dimethoate	Diuron	Simazine	Water Flea Toxicity	Fathead Minnow Toxicity	Algae Toxicity	Sediment toxicity
Ash Slough @ Ave 21		■		■								
Bear Creek @ Kibby Rd	■			■					■			
Berenda Slough along Ave 18 1/2											■	
Black Rascal Creek @ Yosemite Rd		■		■					■			
Canal Creek @ West Bellevue Rd												
Cottonwood Creek @ Rd 20		■		■	■		■					
Deadman Creek @ Gurr Rd	■			■							■	
Deadman Creek @ Hwy 59											■	
Dry Creek @ Rd 18		■		■	■		■				■	
Dry Creek @ Wellsford Rd	■			■			■		■		■	
Duck Slough @ Gurr Rd	■	■									■	
Hatch Drain @ Tuolumne Rd												
Highline Canal @ Hwy 99		■					■		■			■
Highline Canal @ Lombardy Rd		■		■					■			■
Hilmar Drain @ Central Ave	■			■			■					■
Howard Lateral @ Hwy 140				■								
Lateral 2 ½ near Keyes Rd												
Lateral 5 ½ @ South Blaker Rd												
Lateral 6 and 7 @ Central Ave												
Levee Drain @ Carpenter Rd												
Livingston Drain @ Robin Ave		■		■								
Lower Stevinson @ Faith Home Rd												
McCoy Lateral @ Hwy 140												
Merced River @Oakdale Rd		■							■			
Miles Creek @ Reilly Rd		■			■				■		■	
Mootz Drain downstream of Langworth Pond				■								
Mustang Creek @ East Ave				■				■				
Prairie Flower Drain @ Crows Landing Rd						■				■		
Unnamed Drain @ Hogin Rd												
Unnamed Drain @ Hwy 140												
Westport Drain @ Vivian Rd				■								

Exceedances of Water Quality Trigger Limits within the ESJWQC from October 2016 through September 2017.

Monitoring Location	Constituent	DO+	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Copper	Chlorpyrifos	Diuron	Malathion	Methomyl	Water Flea	Fathead Minnow	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	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	0.52 µg/L	Toxicity	Toxicity	Toxicity	
	Sample Date															
Ash Slough @ Ave 21	1/10/2017			1048				3.9 (2.06)								53.42
Berenda Slough along Ave 18 1/2	1/10/2017															Dry
	2/14/2017															NM
	3/14/2017							5.7 (2.83)								NM
	4/11/2017							4.3 (2.1)								NM
	7/11/2017															3.29
	8/15/2017															NM
	9/12/2017															NM
Black Rascal Creek @ Yosemite Rd	4/11/2017	5.65														0
	5/9/2017	3.9														0
Canal Creek @ West Bellevue Rd	10/18/2016															87.13
	10/29/2016															0
	12/9/2016		8.63	794		22 (1.02)		34 (16.9)					Toxic	Toxic	Toxic	0*
	1/10/2017				>2419.6			4.1 (3.38)								142.83
	2/14/2017				344.8											105.38
	3/14/2017															NM
	4/11/2017															NM
	5/9/2017															NM
	6/13/2017															NM
	7/11/2017															256.22
	8/15/2017															334.28
	9/12/2017															186.06
Cottonwood Creek @ Rd 20	1/10/2017															Dry
	4/11/2017							4.5 (2.3)								8.27
	7/11/2017															5.45
Deadman Creek (Dutchman) @ Gurr Rd	10/29/2016															0
	12/9/2016															Dry
	1/10/2017	6.19						6.7 (4.95)								NM
	2/14/2017															NM

Exceedances of Water Quality Trigger Limits within the ESJWQC from October 2016 through September 2017.

Monitoring Location	Constituent	DO†	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Copper	Chlorpyrifos	Diuron	Malathion	Methomyl	Water Flea	Fathead Minnow	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	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	0.52 µg/L	Toxicity	Toxicity	Toxicity	
	Sample Date															
	3/14/2017		9.34													5.73
	5/9/2017	5.35														NM
	6/13/2017	5.12														NM
Deadman Creek @ Hwy 59	1/10/2017							7.1 (4.61)								NM
	3/14/2017		8.83													0.37
	4/11/2017															Dry
	8/15/2017	6.69														3.67
	9/12/2017	6.84														0
Dry Creek @ Rd 18	12/9/2016															Dry
	1/10/2017				1203.3			11 (3.02)								4.14
	2/14/2017				248.9			13 (10.46)								58.73
	3/14/2017			2270				8.4 (6.92)								17.51
	4/11/2017							9.1 (2.8)								NM
	5/9/2017							5.0 (1.7)								NM
	6/13/2017							2.9 (1.0)								NM
	7/11/2017							2.4 (1.0)								NM
	8/15/2017	4.01						2.7 (1.0)								2.03
	9/12/2017	2.83	5.93					2.2 (1.0)								0.79
Dry Creek @ Wellsford Rd	10/18/2016				260.3											2.47
	12/9/2016															0*
	1/10/2017		9.58		1986.3											NM
	2/14/2017															NM
	3/14/2017															2.5
	4/11/2017															43.6
	5/9/2017				248.1											14.57
	6/13/2017	6.63			410.6											22.2
	7/11/2017	5.29														12.74
Dry Creek @ Church St	8/15/2017	4.02			>2419.6	4.5 (3.5)										29.95
	9/12/2017	4.57			547.5											12.95
Duck Slough @ Gurr Rd	10/18/2016															NM
	1/10/2017															NM
	2/14/2017															NM

Exceedances of Water Quality Trigger Limits within the ESJWQC from October 2016 through September 2017.

Monitoring Location	Constituent	DO[†]	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Copper	Chlorpyrifos	Diuron	Malathion	Methomyl	Water Flea	Fathead Minnow	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	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	0.52 µg/L	Toxicity	Toxicity	Toxicity	
	Sample Date															
	3/14/2017															NM
	4/11/2017															NM
	6/13/2017															NM
	7/11/2017															1.09
	8/15/2017															12.34
	9/12/2017															NM
Hatch Drain @ Tuolumne Rd	1/10/2017	2.53		1159											Toxic	NM
	2/14/2017	3.86		957												NM
	3/14/2017			1595												NM
	4/11/2017	1.3		1060												NM
	5/9/2017	0.09		1396											Toxic	
	7/11/2017	2.16		1603											Toxic	NM
	8/15/2017	3.4		1298												0
	9/12/2017	0.12		1599												0
Highline Canal @ Hwy 99	12/9/2016															Dry
	1/10/2017				>2419.6	7.2 (5.41)		10 (8.64)								41.14
	2/14/2017				>2419.6	8.1 (3.40)		18 (11.20)				0.69				13.71
	3/14/2017		9.04					8.2 (6.92)								0
	4/11/2017															13.01
	5/9/2017		8.68													0.61
	6/13/2017															65.97
	7/11/2017															86.7
	8/15/2017															55.7
	9/12/2017	6.99														21.81
Hilmar Drain @ Central Ave	3/14/2017	2.43														NM
	4/11/2017	5.96		870											Toxic	NM
	7/11/2017			1337											Toxic	NM
	9/12/2017			813												NM
Howard Lateral @ Hwy 140	10/18/2016		8.87					2.2 (1.7)								4.74
	1/10/2017	6.64						4.4 (3.74)								0*
	2/14/2017							4.1 (4.09)								0
	4/13/2017															8.01

Exceedances of Water Quality Trigger Limits within the ESJWQC from October 2016 through September 2017.

Monitoring Location	Constituent	DO[†]	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Copper	Chlorpyrifos	Diuron	Malathion	Methomyl	Water Flea	Fathead Minnow	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	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	0.52 µg/L	Toxicity	Toxicity	Toxicity	
	Sample Date															
Lateral 2 1/2 near Keyes Rd	5/9/2017															25.02
	6/13/2017															16.32
	7/11/2017															33.4
	8/15/2017															40.26
Lateral 5 1/2 @ South Blaker Rd	10/18/2016						14									0
	10/29/2016						16									41.98
	12/9/2016			1028			27								Toxic	2.4
	1/10/2017			1249			30								Toxic	5.67
	2/14/2017															48.29
	3/14/2017			815			21									2.29
	4/11/2017			1100			30								Toxic	18.43
	5/9/2017															80.17
	6/13/2017				686.7											NM
	7/11/2017						15									50.91
	8/15/2017														Toxic	37.09
	9/12/2017				488.4		13									19.29
Lateral 6 and 7 @ Central Ave	10/18/2016						14									3.71
	10/29/2016	6.78														20.92
	12/9/2016	6.66		1492												19.36
	1/10/2017			912		8.4 (2.51)										NM
	2/14/2017	4.64		1056			32									NM
	3/14/2017						11									NM
	5/9/2017			729			23									NM
	6/13/2017		9.12													0
	7/11/2017															NM
Levee Drain @ Carpenter Rd	12/9/2016	4.08		1990												NM
	2/14/2017	1.48		2224												NM
	3/14/2017	3.99		2059												NM
	6/13/2017	0.25		1476											Toxic	0
	7/11/2017	1.64														NM
Livingston Drain @ Robin Ave	12/9/2016							5.1 (3.6)								0
	1/10/2017							4 (1.87)								6.72
	2/14/2017															Dry[1]

Exceedances of Water Quality Trigger Limits within the ESJWQC from October 2016 through September 2017.

Monitoring Location	Constituent	DO†	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Copper	Chlorpyrifos	Diuron	Malathion	Methomyl	Water Flea	Fathead Minnow	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	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	0.52 µg/L	Toxicity	Toxicity	Toxicity	
	Sample Date															
	3/14/2017		8.67					2.5 (2.26)								10.55
	4/11/2017															6.53
	5/9/2017															NM
Lower Stevinson @ Faith Home Rd	10/18/2016		8.89													0
	10/29/2016		9.15				12									4.61
	1/10/2017			1028												0
	2/14/2017		8.78	1179			19									2.57
	3/14/2017		9.25													NM
	5/9/2017		8.54	948			11									0
	6/13/2017															NM
	7/11/2017															4.24
Merced River @ Santa Fe	10/18/2016															384
	10/29/2016															166
	12/9/2016															230
Miles Creek @ Reilly Rd	12/9/2016															Dry
	1/10/2017				>2419.6			5.2 (4.44)								NM
	2/14/2017				461.1											NM
	3/14/2017															4.86
	4/11/2017															2.36
	5/9/2017	6.94			579.4				0.87				Toxic			0.82
	6/13/2017															1.74
	7/11/2017	6.85			816.4											21.61
	8/15/2017															21.43
	9/12/2017	6.54														16.94
Mootz Drain downstream of Langworth Pond	12/9/2016	2.4														0*
	2/14/2017	0.18		787												2.35
Mustang Creek @ East Ave	10/29/2016	0.66						23 (9.7)								6.19
	12/9/2016	3.6														0*
	1/10/2017	5.12						13 (8.64)								NM
	2/14/2017															0.76
	3/14/2017	6.25		1354												0

Exceedances of Water Quality Trigger Limits within the ESJWQC from October 2016 through September 2017.

Monitoring Location	Constituent	DO†	pH	SC	*E. coli*	Ammonia	Nitrate + Nitrite	Copper	Chlorpyrifos	Diuron	Malathion	Methomyl	Water Flea	Fathead Minnow	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	µg/L (variable)	0.015µg/L	2.0 µg/L	>0 µg/L	0.52 µg/L	Toxicity	Toxicity	Toxicity	
	Sample Date															
Prairie Flower Drain @ Crows Landing Rd	10/18/2016	0.91		2424												0
	12/9/2016	3.91		2524											Toxic	0
	1/10/2017	0.53		2361											Toxic	NM
	2/14/2017	1.31		2033												0
	3/14/2017	1.79		1963												0.82
	4/11/2017	0.2		2699												0
	5/9/2017	0.35		2710									Toxic			0
	6/13/2017	1.15		1898												0
	7/11/2017	2.83		1345												0
	8/15/2017	0.93		2717					0.045				Toxic			0
	9/12/2017	0.19		1378												0
Unnamed Drain @ Hogin Rd	10/18/2016	1.17		2763												0
	10/29/2016	3.54		1484												1.47
	1/10/2017	5.39		2209												NM
	2/14/2017															NM
	3/14/2017	1.47		2263												0
	5/9/2017	3.52		2666												0
	6/13/2017	5.38		780												0
	7/11/2017			2603												0
Unnamed Drain @ Hwy 140	1/10/2017															NM
Westport Drain @ Vivian Rd	2/14/2017	5.93														0
	4/11/2017															NM
	5/9/2017			879												NM

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).

Methomyl: Methomyl is an oxime carbamate insecticide that controls a broad spectrum of arthropods often applied to sweet corn, lettuce, onions, and tomatoes. Methomyl is a restricted-use pesticide.

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.

East San Joaquin
WATER QUALITY COALITION

1201 L Street Modesto California 95354
Phone: (209) 846-6112 Fax: (209) 521-9938
eMail: contactesj@esjcoalition.org

Registration is optional and completely free for all ESJWQC growers.

WEB PORTAL

http://www.esjmemberlogin.com/

FEATURES:

- ✔ Convenient 24/7 access to your membership information including enrolled parcels, invoice, and upcoming events.
- ✔ Complete and instantly submit your:
  - ✔ Farm Evaluation (FE) survey
  - ✔ Nitrogen Management Plan (NMP) Summary Report to the Coalition.
- ✔ Assign parcels to a secondary contact so they can login and fill out any necessary surveys.

QUESTIONS?

- ✔ Call (209) 846-6112 or email contactesj@esjcoalition.org

Online Access to Member Info

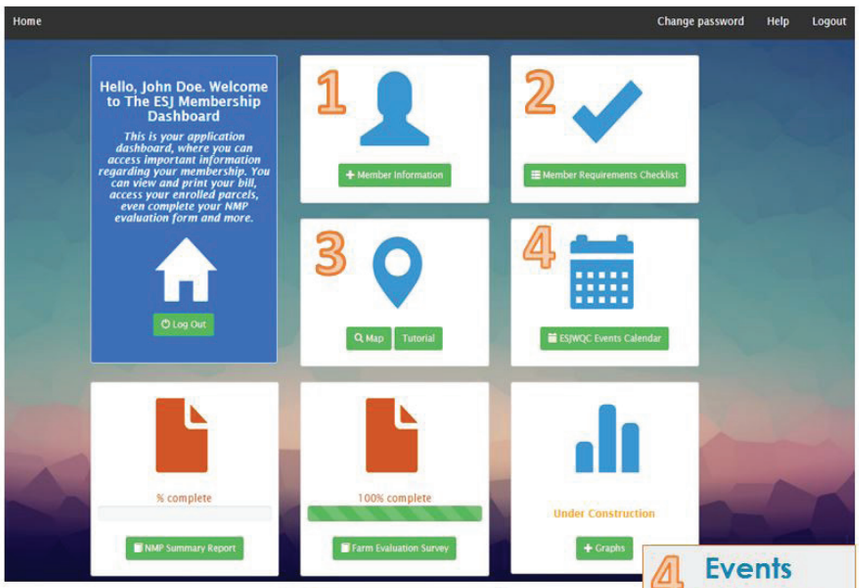
The portal is accessible using any computer, laptop, tablet or phone with internet capabilities and a web browser. If you are interested in using the portal, the first step is emailing ESJWQC staff at contactesj@esjcoalition.org and requesting a passcode. You can also request a passcode by calling 209-846-6112. Then you can log in at www.esjmemberlogin.com. All your existing member information will be prepopulated.

Use of the secure ESJWQC member portal is a convenient way for members to access membership information or make updates and changes. A feature recently added to the password-protected portal is the option of naming a secondary contact such as a farm manager or crop advisor who is then allowed access to the Farm Evaluations and Nitrogen Summary Reports. Also added is the option to have all coalition materials sent via email.

Member Dashboard

1 Member Information
View your invoice, parcels, and contact information

2 Member Requirements Checklist
Printable snapshot of your membership requirements.



3 Map
View and search the Coalition area and parcels.

4 Events Calendar
View upcoming meetings, classes, and workshops.

5 NMP Summary Report
Complete and submit your 2017 NMP SR.

6 Farm Evaluation Survey
Complete and submit your 2017 FE.

7 Document Repository
View and print submitted paperwork and invoices.

East San Joaquin Water Quality Coalition

1201 L Street, Modesto, CA 95354
www.esjcoalition.org

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Balancing Water 2017 Nitrogen Fertilizer