TECHNICAL MEMO

DATE: April 3, 2020; revised July 22, 2020

SUBJECT: East Joaquin Water Quality Monitoring Program Expert Panel – Written Documentation Request

Introduction

The East San Joaquin Water Quality Monitoring Program Expert Panel requested additional information after the January 7th through 9th, 2020 panel meetings. The request is for supplemental information in two forms: verbal presentations and written documentation. The East San Joaquin Water Quality Coalition (ESJWQC or Coalition) is submitting this technical memorandum (Tech Memo) to provide the requested written documentation:

1. Trend Station: location and parameters collected at each Core site every year since the program's inception and
2. Problem Definition: what parameters have improved, and which have not improved, for each Core site.
3. Data Availability: list of data types available in CEDEN

Trend Station

The Expert Panel requested the documentation of the location and parameters collected at each Core site every year since the program's inception. **Attachment A** includes a count of environmental samples collected each year for each of the specific analytes: physical parameters, nutrients and *E. coli*, pesticides, metals, water column toxicity, sediment toxicity, and sediment chemistry from 2004 through the 2019 water year (WY).

The list of constituents the Coalition is required to monitor has changed over time based on the approval of the various Irrigated Lands Regulatory Program (ILRP) orders, which have included two Conditional Waivers (R5-2003-0105, R5-2006-0053), and the adoption of the Waste Discharge Requirements General Order for Growers within the Eastern San Joaquin River Watershed (WDR R5-2012-0116 (as amended)). **Table 1** and **Figure 1** were provided to the Expert Panel prior to the January 2020 presentations in the document titled "ESJWQC_MonitoringRegulatoryHistory_Timeline_082919". **Table 1** lists the ESJWQC ILRP Orders and associated Monitoring and Reporting Programs (MRP) in reverse chronological order. **Figure 1** illustrates the ESJWQC monitoring program history.

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Table 1. List of Waste Discharge Requirements, Monitoring and Reporting Programs, and Conditional Waivers pertaining to the ESJWQC monitoring program.

DATE	IRRIGATED LANDS WDRS, MRPS, AND CONDITIONAL WAIVERS	ORDER NUMBER	REVISIONS RELATED TO THE SURFACE WATER PROGRAM
4/5/2019	WDR R5-2012-0116_R8	R5-2019-0036	None
2/7/2018	WDR R5-2012-0116_R7	Order WQ 2018-0002	Created Surface Water Expert Panel process; added in additional management plan implementation reporting.[1]
5/5/2017	WDR R5-2012-0116_R6	R5-2012-0116	None
2/19/2016	WDR R5-2012-0116_R5	R5-2016-0015; MRP revision	None
10/2/2015	WDR R5-2012-0116_R4	R5-2015-0115	None
4/17/2015	WDR R5-2012-0116_R3	R5-2015-0054	Allow submittals for reduced monitoring for Delta Regional Monitoring Program contributions.
3/27/2014	WDR R5-2012-0116_R2	R5-2014-0031	None
10/3/2013	WDR R5-2012-0116_R1	R5-2013-0121	None
12/7/2012	WDR R5-2012-0116		The new MRP requires two years of monitoring/two years off at the "**Core" monitoring sites** (any monitoring triggered by management plans would continue even if a site had an "off" year for monitoring). This approach will ensure that each "zone" includes one or more sites in which comprehensive assessment monitoring is being conducted, which should allow the board to track and identify any significant changes, while not imposing an undue cost burden. The third-party will monitor two "Core" sites per zone with monitoring at additional sites ("**Represented" monitoring sites**) when "Core" site monitoring indicates that there is a water quality problem or as part of special studies and management plans. This change will facilitate a better process for targeted follow-up monitoring where there are water quality problems.
1/25/2008	MRP R5-2008-0005		**Assessment monitoring** shall be used primarily to address Program questions No. 1 and No. 2 to obtain a comprehensive characterization and evaluation of water quality conditions within the Coalition Group's boundaries. Sites shall be selected to represent varying sizes and flows of surface water bodies and land uses (e.g., agricultural activities, crops and pesticide use), focusing on diversity across the watershed, and must include water bodies that are carrying agricultural drainage into natural water bodies, whether directly or indirectly. Assessment monitoring shall be supported by a detailed discussion of the specific watershed characteristics that are essential to site selection. The number and location of sites selected within the framework of the Coalition Group's Monitoring Strategy must be sufficient to characterize water quality for all waters of the State within the Coalition Group's boundaries. **Core monitoring sites** shall be selected from Assessment Monitoring locations or other suitable locations and be used to track trends at selected representative sites over extended periods of time. Core monitoring shall occur at fixed stations, at probabilistic sites, or at some other combination of sites statistically appropriate for trend monitoring, and must include a

DATE	IRRIGATED LANDS WDRS, MRPS, AND CONDITIONAL WAIVERS	ORDER NUMBER	REVISIONS RELATED TO THE SURFACE WATER PROGRAM
			repetition of the Assessment Monitoring analytical regime at a minimum of every three years. The purpose of periodically repeating the Assessment Monitoring analytical regime is to evaluate the effects of changes in land-use and management practices and provide information about long-term trends and effectiveness of the management practices. Core monitoring shall not be limited to largest volume water bodies that would dilute waste constituents that may be in higher concentrations in tributary streams and drainages. **Special project monitoring** includes specific targeted studies that are incorporated into a Coalition Group's MRP Plan due to a Coalition Group's implementation of a TMDL, or for the implementation of a Coalition Group Management Plan that results from exceedances. Management Plans shall be required when more than one exceedance of the same constituent has occurred at a given site within a period of three years. **See pages 6-8 of R5-2008-0005 MRP for additional requirements*
6/22/2006	Conditional Waiver R5-2006-0053		None
8/15/2005	MRP R5-2005-0833		None
3/18/2004	MRP R5-2003-0826		The MRP Plan shall describe a **phased monitoring approach** and provide documentation to support the proposed monitoring program. The program shall not consist of more than three phases. Phase 1 monitoring shall, at a minimum, include analyses of physical parameters, drinking water constituents, pesticide use evaluation, and toxicity testing. Phase 2 monitoring includes chemical analyses of constituents that were identified in toxicity testing in phase one that may include pesticides, metals, inorganic constituents and nutrients and, additional monitoring site in the watershed. Phase 3 monitoring includes management practice effectiveness and implementation tracking and additional water quality monitoring sites in the upper portions of the watershed.
7/11/2003	Conditional Waiver R5-2003-0105		

[1]Updated since the original document created in August 2019.

ESJWQC CORE MONITORING LOCATIONS

The WDR Monitoring and Reporting Program (MRP) includes a representative monitoring program that requires surface water quality monitoring at three types of monitoring sites: 1) Core sites, 2) Represented sites, and 3) Special Project sites (i.e., Management Plan Monitoring). The primary Core sites included in Table 1 of the WDR MRP are listed in **Table 2**. Each zone in the Coalition region has one primary Core monitoring site. The secondary Core sites were approved on June 15, 2015 and rotate with the primary Core sites every two years, starting in the 2016 WY (**Table 2**).

Core sites monitored monthly track trends in surface water quality and identify water quality impairments of designated beneficial uses to surface waters of the State. The Coalition monitors at Represented sites to evaluate the potential risk for water quality impairments when an exceedance of a Water Quality Trigger Limit (WQTL) occurs at a Core site within the same zone. Management Plan Monitoring occurs at Core and Represented sites at a frequency that corresponds to the potential use of the constituent based on pesticide use report (PUR) application data and past exceedances, and continues for three years or until there are no longer exceedances. For example, one exceedance of the WQTL for chlorpyrifos occurred in samples collected at Duck Slough @ Gurr Rd in March 2014, initiating a chlorpyrifos management plan in 2015. Management Plan Monitoring occurred in March, July, and August from the 2015 WY through the 2018 WY, based on months of past exceedances and monthly chlorpyrifos use in the subwatershed. No exceedances of the WQTL occurred and the Coalition was approved to complete the chlorpyrifos management plan at Duck Slough @ Gurr Rd in 2019.

The current representative monitoring program began with the 2014 WY. Monitoring at Core sites occurs once a month and includes an assessment of field parameters, nutrients, pathogens, pesticides, metals, and acute toxicity to water column and sediment test species. **Attachment A** includes a tab for each of these parameter groups.

Figure 1. ESJWQC History of ILRP Orders and Monitoring Requirements.

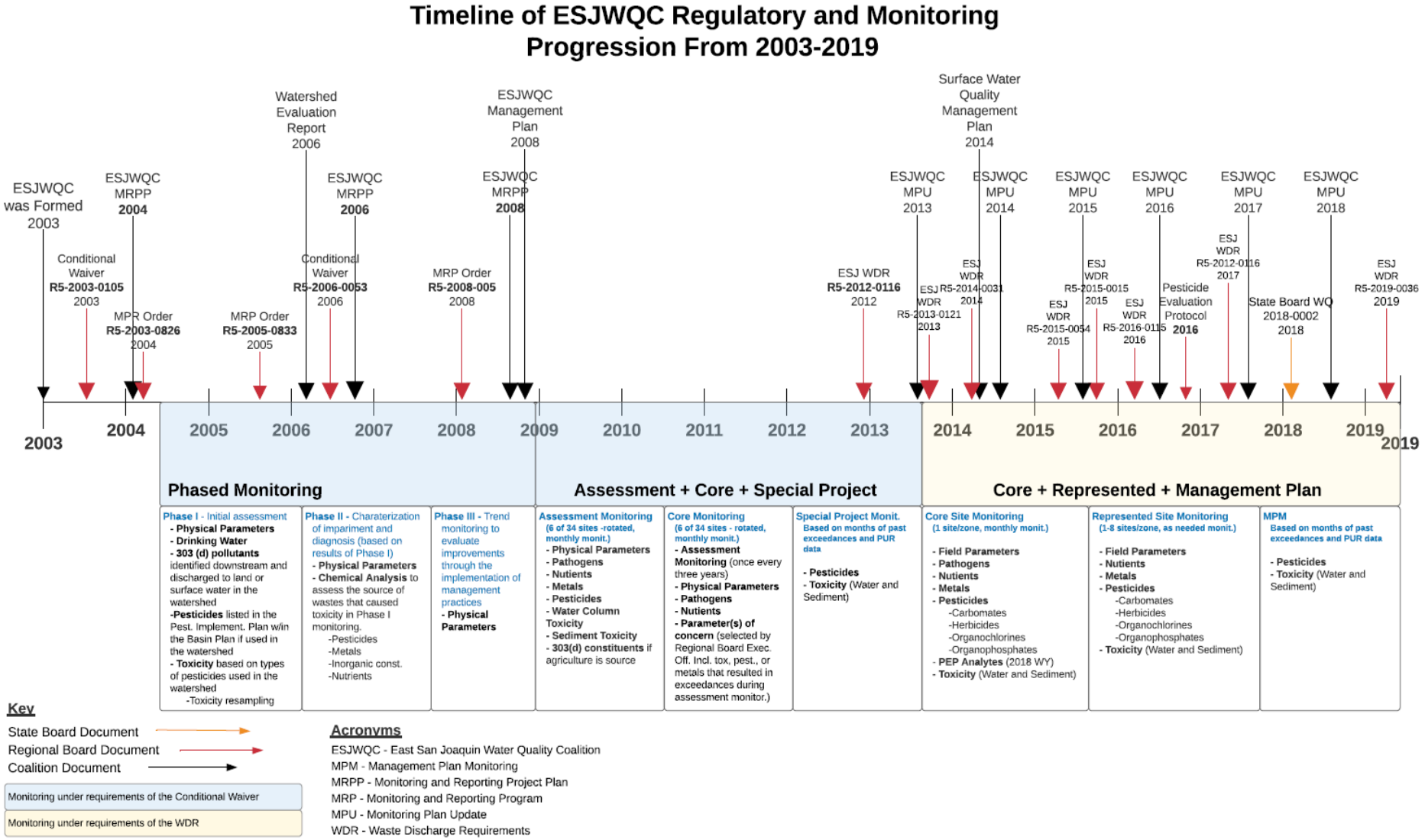

Table 2. ESJWQC Core monitoring locations.

Zone	Core Site Type	Site Name	Latitude	Longitude	Notes
1	Primary	Dry Creek @ Wellsford Rd	37.66000	-120.87526	Dry Creek @ Wellsford was removed from the monitoring schedule and replaced with Dry Creek @ Church St, beginning in the 2018 WY.
	Primary	Dry Creek @ Church St	37.66603	-120.89825	
2	Primary	Prairie Flower Drain @ Crows Landing Rd	37.44187	-121.00331	Westport Drain @ Vivian Rd replaced Prairie Flower Drain @ Crows Landing Rd as the Primary Core site for Zone 2 beginning in the 2019 WY; Prairie Flower Drain is monitored only as Represented site.
	Primary	Westport Drain @ Vivian Rd	37.45827	-120.96730	
	Secondary	Lateral 5 1/2 @ South Blaker Rd	37.53682	-121.04861	
3	Primary	Highline Canal @ Hwy 99	37.41254	-120.75941	Highline Canal @ Hwy 99 is the only Core site for Zone 3.
4	Primary	Merced River @ Santa Fe	37.42705	-120.67353	Merced River @ Oakdale Rd replaced Merced River @ Santa Fe as the Primary Core site beginning in the 2018 WY; Merced River @ Santa Fe was removed from the Coalition's monitoring schedule.
	Primary	Merced River @ Oakdale Rd	37.45417	-120.60778	
	Secondary	Canal Creek @ West Bellevue Rd	37.36090	-120.54940	
5	Primary	Duck Slough @ Gurr Rd	37.21408	-120.56126	
	Secondary	Miles Creek @ Reilly Rd	37.25830	-120.47524	
6	Primary	Cottonwood Creek @ Rd 20	36.86860	-120.18180	
	Secondary	Dry Creek @ Rd 18	36.98180	-120.22056	

PESTICIDES

Starting with the 2018 WY (October 2017 – September 2018), the Coalition uses the approved Pesticide Evaluation Protocol (PEP) to identify the pesticides to monitor each WY. The Coalition reviews the Relative Risk Ratios to exclude chemicals with low risk to aquatic life and human health. The Relative Risk is calculated by 1) the ratio of the total amount of chemical applied in the watershed each year divided by the aquatic life reference value for each chemical on the cumulative monthly average use list, and 2) the ratio of the total amount of chemical applied divided by the human health reference value. The amount of chemical applied in the watershed is based on the annual use averaged by month. Pesticides with a Relative Risk value below 1.0 are eliminated from monitoring. Those that are at or above 1.0 are evaluated to determine the months monitored, based on use.

METALS

Under the Coalition's current WDR, the selection of metals to monitor at Core sites is determined through a process that is similar to the PEP, and provides a rationale for including or excluding each metal. Metals not applied by agriculture (arsenic, cadmium, lead, molybdenum, nickel, and selenium) are evaluated each year using this process to determine the monitoring frequency at each Core site. The evaluation criteria used to identify which metals to monitor include:

1. Reach where site is located, or immediate downstream waterbody, is on the 2014 California 303(d) List of Water Quality Limited Segments 303(d) list for that metal.
2. Site is not adequately characterized (less than 3 years of monitoring data).

3. Exceedances of the WQTL of the metal at the site; or
4. Currently in an active management plan.

If monitoring for metals is necessary, the Coalition analyzes for the total fraction of arsenic, boron, molybdenum, and selenium and the dissolved fraction of cadmium, copper, lead, nickel, and zinc.

Problem Definition

The Expert Panel requested documentation of water quality parameters that have improved, and which have not improved, for each Core site. Improvements in water quality can be demonstrated by a reduction in the percentage of exceedances of WQTLs over time, concurrently with the completion of management plans due to Coalition outreach efforts and grower's implementing management practices.

Water Quality Results

The Coalition evaluated the number of exceedances of the WQTL for each analyte group (pathogens, pesticides, physical parameters, metals, nutrients, water toxicity, and sediment toxicity) to demonstrate which analyte group has improved since monitoring began in 2004. **Table 3** provides the annual counts of exceedances compared to the total number of samples collected and analyzed for each Core site, per zone. Overall, from 2004 through the 2019 WY, exceedances at Core sites occurred in 8.8% of samples collected.

On a zone basis, the percentage of samples resulting in exceedances has been small since the inception of the program. For all monitoring parameters, the total percent of exceedances per year ranged from 3.28% to 16.71% (**Table 3**).

When grouping all analytes, there are no significant trends in the percent of exceedances over time (**Figure 2**). When evaluating pesticide and toxicity samples only, the data show a decreasing trend over time (**Figure 3**). This indicates that when considering constituents directly linked to agricultural sources, water quality is improving. The most significant decline in pesticide exceedances occurred after 2010, which corresponds with the Coalition implementing its current site subwatershed management plan strategy, including Focused Outreach which began in 2008. From 2008 through 2010, the Coalition conducted Focused Outreach for the first set of site subwatersheds with surface water quality management plans (Dry Creek @ Wellsford Rd, Highline Canal @ Hwy 99, and Prairie Flower Drain @ Crows Landing Rd). The Focused Outreach strategy tracks changes in management practices implemented by growers. A summary of targeted members and implemented management practices is included in the Completed Management Plans and Focused Outreach Management Practice Tracking sections below, and detailed in **Attachment B**.

In 2010, the combined percentage of pesticide and toxicity exceedances was 10.74%; after 2010, the percentage is below 5%. The percent exceedance of pesticide WQTLs and toxicity per year range from 0% to 10.74%, with an overall, combined percentage of 2.59% (**Table 3**). For pesticides, 2010 had the highest percent exceedance (8.85%), after which the percent exceedances remained below 1% until 2018. In the 2018 WY and 2019 WY, the percent exceedance of pesticides increases to 1.53% and 2.26%, respectively. In the 2018 WY, one exceedance of the WQTL for chlorpyrifos and malathion occurred in Zone 6. The only pesticides to exceed WQTLs during the 2019 WY were pyrethroids (9 exceedances of the pyrethroid Chronic Goal Unit; **Table 4**).

Table 4 includes the count and percent exceedances of pesticides by group and per year. The pesticides monitored by the Coalition from 2004 through the 2019 WY are grouped in seven categories. This

grouping is done generally based on the analytical method, chemical use, and chemical composition. **Table 5** lists the pesticides grouped in each of these categories:

- carbamates (pesticides derived from carbamic acid),
- herbicides (pesticides used to control plant growth/reproduction),
- organochlorines (pesticides with a chlorinated function group),
- organophosphates (pesticides with a phosphate functional group),
- pyrethroids (includes pyrethroids and pyrethrins) and other (volatile and semi-volatile pesticides).

Table 6 includes the count of water column and sediment toxicity per year for each test species: *Ceriodaphnia dubia*, *Selenastrum capricornutum*, *Pimephales promelas*, and sediment toxicity to *Hyalella azteca*. Comparing the overall percent of toxic samples per year, there is a decreasing trend for *C. dubia*, *P. promelas*, and sediment toxicity. *S. capricornutum* percent toxicity has fluctuated over the years, ranging from 24% to 0%, with an average of 10% toxicity from 2004 through the 2019 WY.

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Figure 2. Exceedances of WQTLs for all monitoring parameters from 2004 - 2019 WY at Core sites.
From 2004 through September 2013 monitoring occurred during a calendar year. Starting in October 2013, the monitoring year shifted to a water year (October- September). The list of monitoring parameters is included in Attachment A.

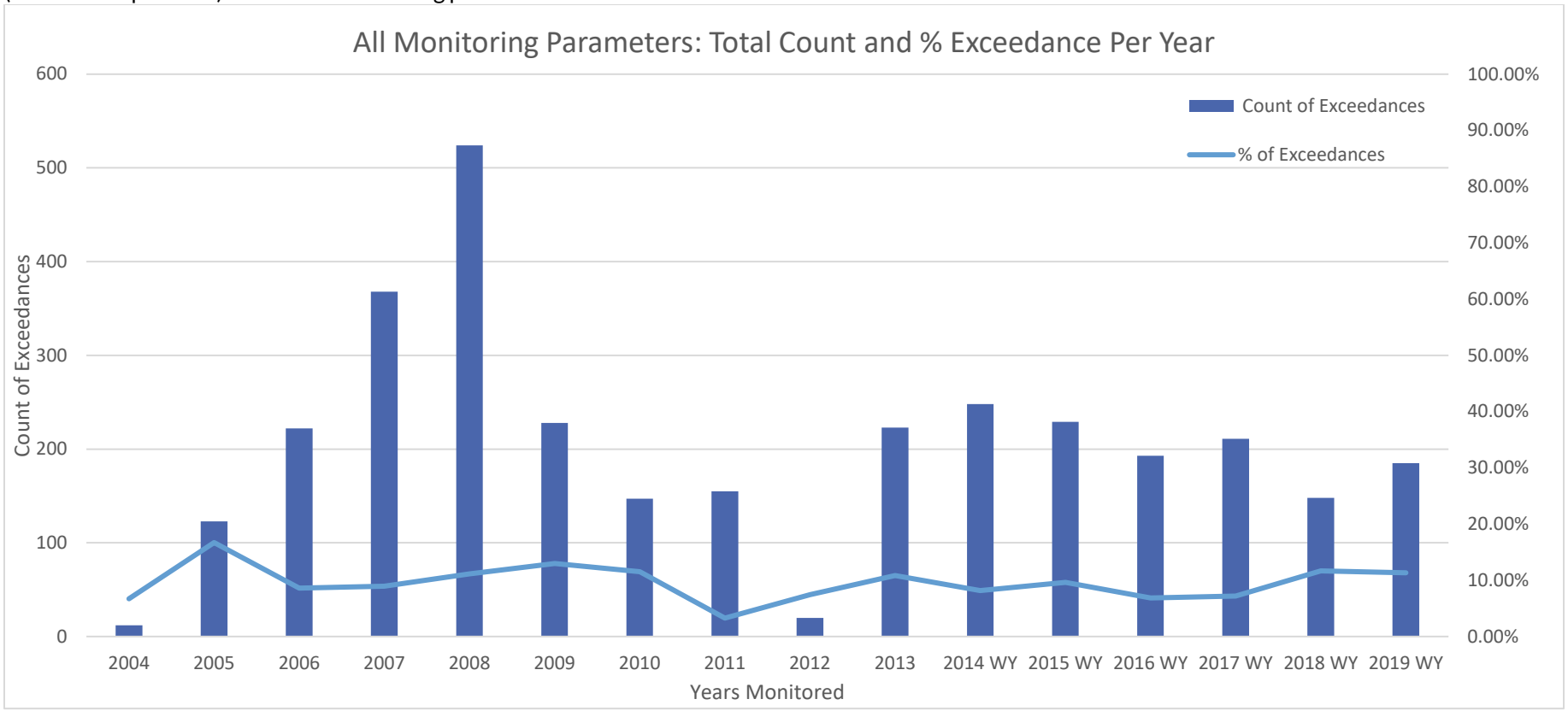

Figure 3. Exceedances of the WQTL for pesticide and toxicity from 2004 - 2019 WY at Core sites.

From 2004 through September 2013 monitoring occurred during a calendar year. Starting in October 2013, the monitoring year shifted to a WY (October-September). The precipitation data includes total inches per month (2004-2013 data is from NOAA, 2014 WY- 2018 WY data is from Weather Underground).

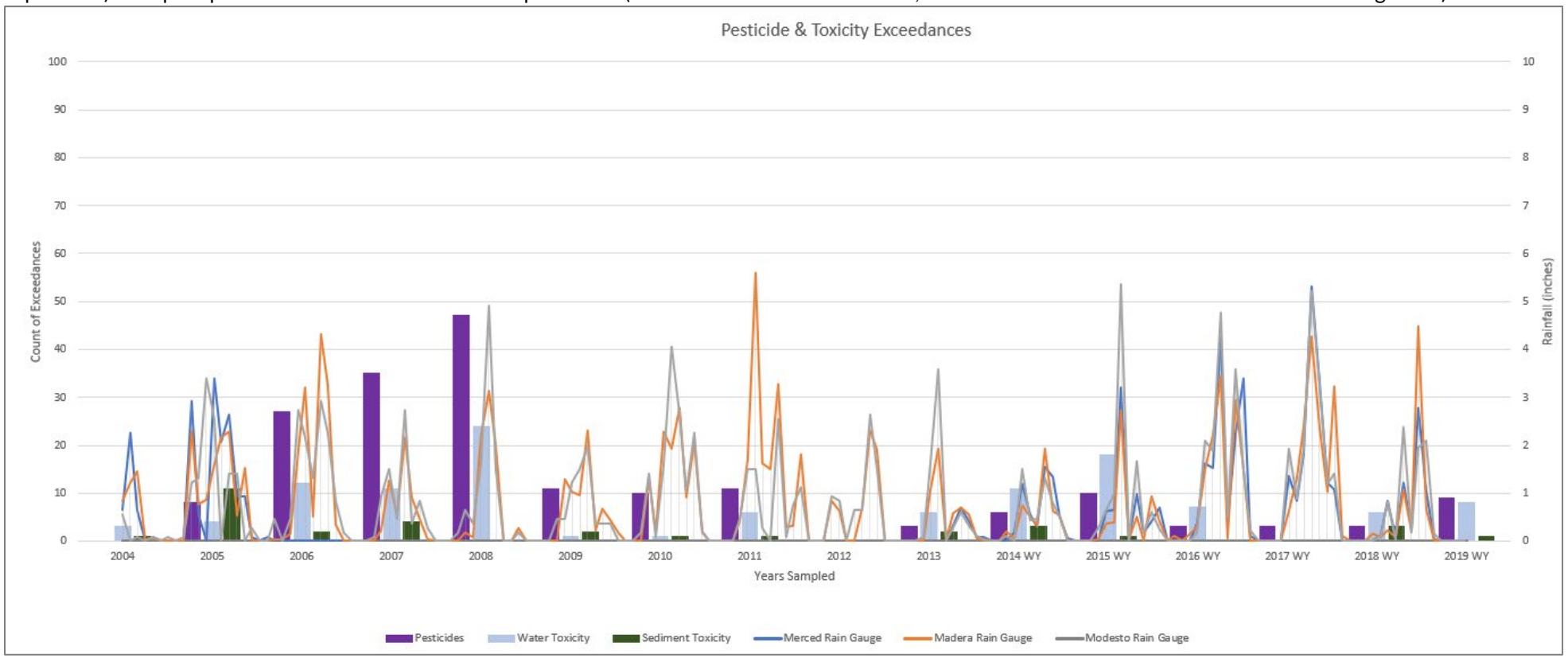

Table 3. Core site exceedance counts per zone for all constituents and pesticides and toxicity only.
Exceedance counts do not include field duplicate results. Total sample counts do not include if the site was dry or non-contiguous and could not be sampled. Percent exceedances are calculated from the number of exceedances per zone compared to the total samples collected.

Year	% Exceedance Compared to Total Sampled						Count of Exceedances						Total Exceedances	Total Sampled	Total % Exceedance
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6			
2004	0.00%	0.00%	0.00%	1.12%	5.59%	0.00%	0	0	0	2	10	0	**12**	**179**	**6.70%**
2005	1.63%	6.93%	1.22%	2.31%	1.77%	2.85%	12	51	9	17	13	21	**123**	**736**	**16.71%**
2006	0.39%	2.44%	1.04%	1.70%	1.70%	1.32%	10	63	27	44	44	34	**222**	**2,585**	**8.59%**
2007	0.49%	3.22%	0.90%	1.90%	1.71%	0.76%	20	132	37	78	70	31	**368**	**4,104**	**8.97%**
2008	0.45%	4.78%	1.06%	1.87%	1.93%	1.04%	21	225	50	88	91	49	**524**	**4,709**	**11.13%**
2009	2.79%	4.56%	1.42%	1.03%	3.02%	0.17%	49	80	25	18	53	3	**228**	**1,756**	**12.98%**
2010	2.67%	3.84%	1.18%	0.71%	2.59%	0.55%	34	49	15	9	33	7	**147**	**1,275**	**11.53%**
2011	0.38%	1.50%	0.15%	0.19%	0.34%	0.72%	18	71	7	9	16	34	**155**	**4,731**	**3.28%**
2012	0.75%	4.48%	1.12%	0.00%	0.75%	0.37%	2	12	3	0	2	1	**20**	**268**	**7.46%**
2013	1.51%	5.26%	0.44%	1.51%	1.36%	0.78%	31	108	9	31	28	16	**223**	**2,055**	**10.85%**
2014 WY	0.69%	5.43%	0.59%	0.20%	1.15%	0.10%	21	165	18	6	35	3	**248**	**3,039**	**8.16%**
2015 WY	1.01%	6.41%	0.80%	0.63%	0.76%	0.04%	24	152	19	15	18	1	**229**	**2,372**	**9.65%**
2016 WY	0.64%	3.44%	0.78%	0.67%	0.67%	0.64%	18	97	22	19	19	18	**193**	**2,818**	**6.85%**
2017 WY	0.51%	4.06%	0.61%	0.68%	0.65%	0.68%	15	119	18	20	19	20	**211**	**2,928**	**7.21%**
2018 WY	1.10%	7.96%	0.39%	1.02%	0.79%	0.39%	14	101	5	13	10	5	**148**	**1,269**	**11.66%**
2019 WY	1.29%	6.74%	1.10%	0.86%	0.67%	0.67%	21	110	18	14	11	11	**185**	**1,632**	**11.34%**
TOTAL	**0.85%**	**4.21%**	**0.77%**	**1.05%**	**1.29%**	**0.70%**	**310**	**1535**	**282**	**383**	**472**	**254**	**3236**	**36456**	**8.88%**
Pesticide and Toxicity Exceedances Only															
2004	0.00%	0.00%	0.00%	1.80%	1.80%	0.00%	0	0	0	2	2	0	**4**	**111**	**3.60%**
2005	0.69%	2.06%	2.06%	1.37%	1.72%	2.75%	2	6	6	4	5	8	**31**	**291**	**10.65%**
2006	0.28%	0.42%	0.69%	0.69%	0.90%	0.56%	4	6	10	10	13	8	**51**	**1,439**	**3.54%**
2007	0.34%	0.56%	0.43%	0.73%	0.34%	0.34%	8	13	10	17	8	8	**64**	**2,336**	**2.74%**
2008	0.15%	1.18%	0.76%	0.76%	0.80%	0.64%	4	31	20	20	21	17	**113**	**2,637**	**4.29%**
2009	1.36%	1.63%	0.54%	0.82%	1.90%	0.00%	5	6	2	3	7	0	**23**	**368**	**6.25%**
2010	1.34%	2.01%	0.67%	0.67%	5.37%	0.67%	2	3	1	1	8	1	**16**	**149**	**10.74%**
2011	0.11%	0.41%	0.08%	0.04%	0.11%	0.04%	3	11	2	1	3	1	**21**	**2,661**	**0.79%**
2012	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0	0	0	0	0	0	**0**	**22**	**0.00%**

Year	% Exceedance Compared to Total Sampled						Count of Exceedances						Total Exceedances	Total Sampled	Total % Exceedance
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6			
2013	1.51%	5.26%	0.44%	1.51%	1.36%	0.78%	31	108	9	31	28	16	**223**	**2,055**	**10.85%**
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2019 WY	1.29%	6.74%	1.10%	0.86%	0.67%	0.67%	21	110	18	14	11	11	**185**	**1,632**	**11.34%**
Total	**0.19%**	**0.96%**	**0.36%**	**0.37%**	**0.48%**	**0.26%**	**35**	**175**	**65**	**67**	**87**	**48**	**475**	**18,306**	**2.59%**

Table 4. Core site exceedance counts per year for pesticide group.
Exceedance counts do not include field duplicate results. Total sample counts do not include if the sites were dry or non-contiguous and could not be sampled. See **Table 5** for a list of pesticides in each group.

Pesticide Group	Year	Exceedance Count	Total Samples Collected	% Exceedance
Carbamates	2006	0	210	0.00%
	2007	2	359	0.56%
	2008	1	419	0.24%
	2009	0	7	0.00%
	2010	0	11	0.00%
	2011	1	395	0.25%
	2013	0	114	0.00%
	2014 WY	0	324	0.00%
	2015 WY	0	306	0.00%
	2016 WY	0	354	0.00%
	2017 WY	1	371	0.27%
	2018 WY	0	1	0.00%
	2019 WY	0	5	0.00%
Herbicides	2004	0	2	0.00%
	2006	0	245	0.00%
	2007	3	417	0.72%
	2008	7	483	1.45%
	2009	0	10	0.00%
	2010	0	20	0.00%
	2011	0	468	0.00%
	2012	0	5	0.00%
	2013	1	119	0.84%
	2014 WY	2	343	0.58%
	2015 WY	0	332	0.00%
	2016 WY	0	377	0.00%
	2017 WY	0	396	0.00%
	2018 WY	0	29	0.00%
	2019 WY	0	31	0.00%
Organochlorines	2006	0	245	0.00%
	2007	0	420	0.00%
	2008	0	490	0.00%
	2009	0	49	0.00%
	2011	3	277	1.08%
	2013	0	21	0.00%
	2014 WY	0	63	0.00%
Organophosphates	2004	1	26	3.85%

Pesticide Group	Year	Exceedance Count	Total Samples Collected	% Exceedance
	2005	4	81	4.94%
	2006	4	405	0.99%
	2007	9	674	1.34%
	2008	17	755	2.25%
	2009	4	186	2.15%
	2010	2	14	14.29%
	2011	2	860	0.23%
	2012	0	4	0.00%
	2013	3	254	1.18%
	2014 WY	3	720	0.42%
	2015 WY	9	670	1.34%
	2016 WY	3	791	0.38%
	2017 WY	2	819	0.24%
	2018 WY	3	19	15.79%
	2019 WY	0	30	0.00%
Other	2004	0	46	0.00%
	2005	0	49	0.00%
	2006	3	164	1.83%
	2007	0	248	0.00%
	2008	0	218	0.00%
	2009	1	88	1.14%
	2010	0	66	0.00%
	2011	0	440	0.00%
	2013	0	33	0.00%
	2014 WY	1	99	1.01%
	2018 WY	0	144	0.00%
	2019 WY	0	190	0.00%
Pyrethroids	2004	0	18	0.00%
	2005	0	133	0.00%
	2006	0	188	0.00%
	2007	0	246	0.00%
	2008	0	156	0.00%
	2018 WY	0	63	0.00%
	2019 WY	9	141	6.38%

Table 5. List of pesticides in each group sampled by the Coalition.

Pesticides are assigned groups generally based on analytical methods, chemical use, and chemical composition.

Pesticide Group	Pesticide Group Description	Analyte
Carbamates	Pesticides derived from carbamic acid	Aldicarb
		Carbaryl
		Carbofuran
		Methiocarb
		Methomyl
		Oxamyl
Herbicides	Pesticides used to control plant growth and/or reproduction	Atrazine
		Cyanazine
		Diuron
		Glyphosate
		Linuron
		Paraquat
		Simazine
		Trifluralin
Organochlorines	Pesticides with a chlorinated function group	DDD(p,p')
		DDE(p,p')
		DDT(p,p')
		Dicofol
		Dieldrin
		Endrin
		Methoxychlor
Organophosphates	Pesticides with a phosphate functional group	Azinphos Methyl
		Chlorpyrifos
		Demeton-s
		Diazinon
		Dichlorvos
		Dimethoate
		Disulfoton

Pesticide Group	Pesticide Group Description	Analyte
		Malathion
		Methamidophos
		Methidathion
		Parathion, Methyl
		Phorate
		Phosmet
Other	Volatile and semi-volatile pesticides	Acetamiprid
		Aldrin
		Azinphos Ethyl
		Bolstar
		Bromacil
		Chlordane
		Chloropicrin
		Chlorothalonil
		Cinerin-1
		Cinerin-2
		Clothianidin
		Coumaphos
		Cyprodinil
		Dichlorophenoxyacetic Acid, 2,4-
		Dichlorophenoxybutyric Acid, 2,4-
		Dodine
		Endosulfan I
		Endosulfan II
		EPN
		EPTC
		Ethalfluralin
		Ethion
		Ethoprop

Pesticide Group	Pesticide Group Description	Analyte
		Fenamiphos
		Fenchlorphos
		Fensulfothion
		Fenthion
		Flumioxazin
		HCH, alpha-
		HCH, beta-
		HCH, delta-
		HCH, gamma-
		Heptachlor
		Heptachlor Epoxide
		Imidacloprid
		Iprodione
		Isoxaben
		Jasmolin-1
		Jasmolin-2
		Merphos
		Mevinphos
		Molinate
		Naled
		Oryzalin
		Oxyfluorfen
		Parathion, Ethyl
		Pendimethalin
		Propiconazole
		Pyraclostrobin
		Tetrachlorvinphos
		Thiamethoxam
		Thiobencarb

Pesticide Group	Pesticide Group Description	Analyte
		Tokuthion
		Toxaphene
		Tributyl Phosphorotrithioate, S,S,S-
		Trichloronate
		Ziram
Pyrethroids	Grouping includes both pyrethroids and pyrethrins which have similar biological actions	Bifenthrin
		Cyfluthrin, Total
		Cyhalothrin, Total lambda-
		Cypermethrin, Total
		Esfenvalerate/Fenvalerate, Total
		Pyrethrin-1
		Pyrethrin-2
		Fenpropathrin
		Permethrin, Total

Table 6. Core site toxicity counts per year for water column and sediment toxicity.
Exceedance counts do not include field duplicate results. Total sample counts do not include if the sites were dry or non-contiguous and could not be sampled.

Test Species	Year	Toxic Count	Total Samples Collected	% Toxic
Water Column Toxicity				
Ceriodaphnia dubia	2004	2	7	28.57%
	2005	3	43	6.98%
	2006	9	55	16.36%
	2007	2	64	3.13%
	2008	4	76	5.26%
	2010	0	4	0.00%
	2011	1	66	1.52%
	2012	0	3	0.00%
	2013	2	30	6.67%
	2014 WY	1	63	1.59%
	2015 WY	8	56	14.29%
	2016 WY	0	70	0.00%
	2017 WY	4	72	5.56%
	2018 WY	2	54	3.70%
	2019 WY	0	52	0.00%
Pimephales promelas	2004	0	6	0.00%
	2005	0	42	0.00%
	2006	2	48	4.17%
	2007	0	61	0.00%
	2008	1	71	1.41%
	2009	0	6	0.00%
	2010	0	8	0.00%
	2011	2	66	3.03%
	2013	0	21	0.00%
	2014 WY	1	57	1.75%
	2015 WY	0	54	0.00%
	2016 WY	0	60	0.00%
	2017 WY	1	64	1.56%
	2018 WY	0	3	0.00%
Selenastrum capricornutum	2004	1	6	16.67%
	2005	1	42	2.38%
	2006	1	48	2.08%
	2007	9	67	13.43%
	2008	20	82	24.39%
	2009	1	11	9.09%
	2010	1	19	5.26%
	2011	3	69	4.35%
	2012	0	7	0.00%
	2013	4	27	14.81%
	2014 WY	9	70	12.86%
	2015 WY	10	59	16.95%
	2016 WY	7	74	9.46%
	2017 WY	7	76	9.21%
	2018 WY	4	54	7.41%
	2019 WY	8	63	12.70%
Sediment Toxicity				
Hyalella azteca	2004	1	18	5.56%
	2005	11	31	35.48%
	2006	2	15	13.33%

Test Species	Year	Toxic Count	Total Samples Collected	% Toxic
	2007	4	13	30.77%
	2008	0	19	0.00%
	2009	2	7	28.57%
	2010	1	5	20.00%
	2011	1	14	7.14%
	2012	0	3	0.00%
	2013	2	11	18.18%
	2014 WY	3	17	17.65%
	2015 WY	1	12	8.33%
	2016 WY	0	14	0.00%
	2017 WY	0	15	0.00%
	2018 WY	3	10	30.00%
	2019 WY	1	13	7.69%

Completed Management Plans

A second measure of improvement of water quality is evaluating the number of newly triggered and completed management plans. One of the requirements to complete management plans is the demonstration of improvements in water quality. Site subwatershed-specific management plans were initiated in 2008, after two exceedances of WQTLs (or one exceedance of TMDL WQTLs) occurred within three years. From 2008 through 2019 WY, 112 management plans have been initiated, with the majority of management plans beginning in 2008 and 2009 (73 management plans). From 2009 through the 2019 WY, 39 management plans were either newly implemented or reinstated.

At the end of the 2019 WY, 60 analytes were in active management plans at Core sites (**Table 7).** Of those 60 analytes, seven are pesticides (chlorpyrifos and pyrethroids) and three are water column toxicity (*Ceriodaphnia dubia* and *Selenastrum capricornutum*) **(Table 7).** The remaining 50 management plans (83%) are parameters that are not easily controlled using or changing farm management practices (DO, pH), have multiple sources (ammonia, nitrate, *E. coli*), or are legacy issues (arsenic, lead, and molybdenum). Although copper is applied by agriculture, there are other non-agricultural sources of copper found in waterways. For these reasons, the Coalition has shown the most success completing management plans for pesticide exceedances and toxicity (**Table 8**).

After the Coalition began implementing grower outreach, water quality improved and 16 management plans were approved for completion in 2012 (**Figure 4)**. To date, 39 management plans have been completed at Core sites (**Figure 4**). Of the 39 completed plans, 24 are for pesticide exceedances or toxicity (61.5% of the completed management plans)(**Table 8).**

Table 7. Counts of ESJWQC management plans that are active, removed and reinstated at Core sites from 2004 through 2019 WY.

		Field Parameters				Nutrients		Metals				Pesticides							Toxicity					
Zone	Site Subwatershed	Dissolved Oxygen	pH	Specific Conductance	E. coli	Ammonia	Nitrate/Nitrite	Arsenic	Copper (Total & Dissolved)	Lead (Total & Dissolved)	Molybdenum	Chlorpyrifos	Diazinon	Dimethoate	Diuron	Simazine	Malathion	Pyrethroids	C. dubia toxicity	P. promelas toxicity	S. capricornutum toxicity	H. azteca toxicity	TOTAL Active	Total Removed
1	Dry Creek @ Wellsford Rd/Church St	X	X	C	X	X			C			C			C			X	C		C		**5**	**6**
2	Lateral 5 ½ @ South Blaker Rd		X	X	X		X														X		**5**	**0**
2	Prairie Flower Drain @ Crows Landing Rd	X	R	X	X	X	X				X	R		C					X	C	X	C	**10**	**3**
2	Westport Drain @ Vivian Rd	X	X	X	X		X					C									C		**5**	**2**
3	Highline Canal @ Hwy 99	X	X	R	X	R			X	C		R			C			X	C		C	C	**8**	**5**
4	Canal Creek @ West Bellevue Rd	X	X	X	X				X														**5**	**0**
4	Merced River @ Santa Fe/Oakdale Rd	R			X					C		R							C				**3**	**2**
5	Duck Slough @ Gurr Rd**	X	X	R	X	X		X	C	C		C					C		C	C	C	C	**6**	**8**
5	Miles Creek @ Reilly Rd	X	C		X				X	C		R	C						C		C		**4**	**5**
6	Cottonwood Creek @ Rd 20	R			X				X	C		R	C		C								**4**	**3**
6	Dry Creek @ Rd 18	R	X	X	X				X	C		C	C		C						C		**5**	**5**
	Total Active (includes reinstated)	**10**	**8**	**7**	**11**	**4**	**3**	**1**	**5**	**0**	**1**	**5**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**0**	**3**	**0**	**60**	**39**
	Total Removed	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**2**	**6**	**0**	**4**	**3**	**1**	**4**	**0**	**1**	**0**	**5**	**2**	**6**	**3**		

X= Active; C= Completed; R = Reinstated

Table 8. Core site management plan counts.

Zone	Site Subwatershed	Initially Completed	Total Active	Total Removed[1]	Total Pesticide & Toxicity Active	Total Pesticide & Toxicity Removed
1	Dry Creek @ Wellsford Rd/Church St	6	5	6	1	4
2	Lateral 5 ½ @ South Blaker Rd	0	5	0	1	0
	Prairie Flower Drain @ Crows Landing Rd	5	10	3	3	3
	Westport Drain @ Vivian Rd	2	5	2	0	2
3	Highline Canal @ Hwy 99	8	8	5	2	4
4	Canal Creek @ West Bellevue Rd	0	5	0	0	0
	Merced River @ Santa Fe/Oakdale Rd	4	3	2	1	1
5	Duck Slough @ Gurr Rd**	9	6	8	0	6
	Miles Creek @ Reilly Rd	6	4	5	1	3
6	Cottonwood Creek @ Rd 20	5	4	3	1	2
	Dry Creek @ Rd 18	6	5	5	0	4
	TOTAL	**51**	**60**	**39**	**10**	**24**

[1]'Total Removed' is calculated by the number of completed management plans (51), minus the reinstated management plans (12).

Figure 4. Core site management plan history: 2004- 2019 WY.

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Focused Outreach Management Practice Tracking

Water quality improvements demonstrated by the number of management plans successfully completed in the Coalition site subwatersheds is largely due to grower outreach and tracking management practices over time. The Coalition conducts Focused Outreach by prioritizing members with the highest likelihood of contributing to management plan constituent exceedances. For example, if the management plan constituent is chlorpyrifos, the Coalition may prioritize members with parcels adjacent to the waterway or members with parcels who have drains leading to the waterway and who have used chlorpyrifos in the past. During the first year of outreach (2008), Coalition representatives met with growers for an initial field visit to complete a survey used to track management practices implemented by growers before the field visit and management practices recommended during the field visit. During the second year, Coalition representatives follow up with targeted growers to track if new management practices were implemented after the initial field visit.

Since 2008, the Coalition has worked with 394 members, covering 73,024 irrigated acres, tracking implemented management practices and recommending new management practices to improve water quality (**Table 9**). Included with this Tech Memo are the management practice results from the Focused Outreach surveys completed by the first set of targeted members (**Attachment B**). This gives an example of the management practices implemented by growers on the higher risk fields, working to improve water quality in the individual site subwatersheds. Prior to 2008 growers were implementing a variation of management practices that the Coalition grouped into categories including storm drainage, irrigation, sediment, and spray drift management . The top management practices recommended by the Coalition and implemented by targeted members were for storm drainage and irrigation drainage management, although growers implemented a variety of management practices in each category depending on the circumstances in each field (**Attachment B**). These grower actions taken to address water quality resulted in completed management plans in 2012 for diuron and *S. capricornutum* toxicity at Dry Creek @ Wellsford Rd, chlorpyrifos and diuron at Highline Canal @ Hwy 99, and for chlorpyrifos at Prairie Flower Drain @ Crows Landing Rd.

Table 9. Coalition Focused Outreach member counts targeted for Focused Outreach: 2008-2019.
Targeted member counts are listed for each priority year, separated by site subwatershed, beginning with the first Focused Outreach in 2008 through the most recent Focused Outreach in 2019. To meet the required 10-year management plan deadlines and to address recent management plan exceedances, Focused Outreach was conducted in some subwatersheds more than once. Core sites are highlighted.

Priority Years	Site Subwatershed	Irrigated Acreage	Total Targeted Contacts	Follow Up Contacts	Total Targets
1st Priority Subwatersheds (2008-2010)	Dry Creek @ Wellsford Rd	6,391.4	28	23	63
	Duck Slough @ Hwy 99	4,016.2	24	22	
	Prairie Flower Drain @ Crows Landing Rd	864.9	11	10	
2nd Priority Subwatersheds (2010-2012)	Bear Creek @ Kibby Rd	1,292.0	14	14	55
	Cottonwood Creek @ Ave 20	5,768.0	25	24	
	Duck Slough @ Gurr Rd	2,656.0	6	6	
	Highline Canal @ Hwy 99	367.8	10	8	
3rd Priority Subwatersheds (2011-2013)	Berenda Slough along Ave 18 1/2	4,102.5	19	3	72
	Dry Creek @ Rd 18	4,709.7	17	3	
	Lateral 2 1/2 near Keyes Rd	1,825.6	25	3	
	Livingston Drain @ Robin Ave	334.8	11	3	

Priority Years	Site Subwatershed	Irrigated Acreage	Total Targeted Contacts	Follow Up Contacts	Total Targets
4th Priority Subwatersheds (2012-2014)	Black Rascal Creek @ Yosemite Rd	301.0	1	1	14
	Deadman Creek @ Gurr Rd	240.0	2	2	
	Deadman Creek @ Hwy 59	3,413.7	8	8	
	Hilmar Drain @ Central Ave	455.0	3	3	
5th Priority Subwatersheds (2013-2015)	Hatch Drain @ Tuolumne Rd	36.0	1	1	42
	Highline Canal @ Lombardy Rd	4,226.3	20	8	
	Merced River @ Santa Fe	4,151.8	12	7	
	Miles Creek @ Reilly Rd	1,533.4	9	5	
6th Priority Subwatersheds (2014-2016)	Ash Slough @ Ave 21	5,915.3	18	0	28
	Mustang Creek @ East Ave	3,471.6	6	1	
	Westport Drain @ Vivian Rd	450.8	4	1	
7th Priority Subwatersheds (2015-2017)	Howard Lateral @ Hwy 140	933.9	12	1	21
	Levee Drain @ Carpenter Rd	542.0	3	1	
	Mootz Drain downstream of Langworth Pond	482.2	6	2	
2016 Focused Outreach (2016-2018)	Dry Creek @ Wellsford Rd	1,010.5	6	0	32
	Duck Slough @ Gurr Rd	5,391.2	8	0	
	Highline Canal @ Hwy 99	177.0	7	1	
	Prairie Flower Drain @ Crows Landing Rd	700.0	11	1	
2017 Focused Outreach (2017-2019)	Dry Creek @ Rd 18	220.0	2	0	36
	Lateral 2 1/2 near Keyes Rd	1,065.0	15	2	
	Livingston Drain @ Robin Ave	211.9	6	0	
	Miles Creek @ Reilly Rd	665.7	13	0	
2018 Focused Outreach (2018-2020)	Lateral 5 1/2 @ South Blaker Rd	444.4	16	0	16
2019 Focused Outreach (2019-2021)	Cottonwood Creek @ Rd 20	4,655.8	15	12	15
	TOTAL	**73,023.4**	**394**	**176**	**394**

Storm Event Evaluation and Rainfall Records

The Coalition monitors waterways monthly across the Coalition region and designates sampling events in four categories: Fall (October-December), Winter (January-March), Irrigation (April-September), and Storm (at least twice a year during storm events, typically November-March). These sampling event categories help the Coalition evaluate what time of year water quality impairments are occurring including any association with factors such as stormwater runoff, irrigation events or pesticide applications. The only sampling event category that is contingent on discharge is a 'Storm Event'. Any event may be considered a Storm Event based on the trigger of 0.25 inches of rainfall in the preceding 24 hours. Therefore, any sampling event can be designated as a Storm Event if the rainfall trigger is met.

The majority of exceedances tend to occur during the storm season and irrigation season with fewer exceedances associated with the fall and non-storm winter samples. Consequently, an analysis was conducted to determine if a greater proportion of the exceedances occurred during storm events or irrigation season (**Table 10 and Table 11**).

Evaluating the impact of precipitation/rainfall on exceedances was determined by testing the difference in the proportions of exceedances in the storm samples and irrigation season samples. A two proportion Z-test was used to test for the differences between proportions of exceedances in the storm and irrigation seasons. All parameters were combined for the initial analysis which found that the storm season had a significantly larger proportion of exceedances than the irrigation season **(Table 12**). Individual analyses were performed on pesticides, water column toxicity, metals, and physical parameters. Only for physical parameters were there no significant differences between storm season samples and irrigation season samples with the differences in the proportions ranging from almost 8% for water column toxicity to 0.7% for physical parameters.

The Coalition evaluated rainfall data from Weather Underground from 2013 through the 2018 WY and included the precipitation graph in the first submittal of this document (**Figure 5**). Precipitation amounts in Zone 1 are best represented by the rain gauge in Modesto, precipitation amounts in Zone 2, Zone 3, and Zone 4 are represented by the rain gauges in Merced and Modesto, precipitations amounts in Zone 5 are best represented by the rain gauge in Merced, and precipitation amounts in Zone 6 are best represented by the rain gauge in Madera. Rainfall typically occurs in the Coalition region from October through March, with a few years of higher rainfall extending through April.

Core sites monitored by the Coalition do not have gauge stations to obtain continuous flow data (except for the Merced River). The Coalition measures flows when sampling in the field when flow is present and it is safe to do so; some locations are too deep, or the water is moving too fast to safely measure discharge across the width of the waterbody. Due to these factors, flow is a discrete variable that is not available for all sampling events and may not match up well with precipitation obtained from the rainfall stations. To help better understand the variability of precipitation amounts across the Coalition region and also the variability of how the same amount of rain may or may not impact flows, the Coalition has plotted precipitation and the number of dry sites (**Figure 5**). There is wide variation in rainfall amounts and number of dry Core sites during the same months. For example, precipitation recorded from November through December 2014 totaled almost six inches in Modesto and three inches in Merced and Madera, respectively. During the Coalition sampling events in those months, Core sites in Madera (Zone 6), and in Merced (Zones 3 and 5) were dry. This pattern of high rainfall and dry sites recorded in each county has occurred multiple times from 2013 through the 2018 WY, demonstrating that high rainfall may not have a direct impact on flow in the waterways within the Coalition region.

Despite the potential for dry sites during storm events, storm events tend to generate a greater proportion of exceedances of all parameters (storm sample exceedances relative to total storm samples) than during the irrigation season, although the differences are small. Physical parameters reverse the trend, most likely because dissolved oxygen and pH exceedances are linked to low flow which is common in the irrigation season and are not common during storm events (**Table 12**).

Table 10. Exceedance counts by sample event type.

Bold cells indicate the highest number of exceedances per year, comparing each event type. Total sample counts do not include if a site was dry or non-contiguous and could not be sampled.

Water Year	Count of Exceedances				Count Samples Collected				% Exceedances			
	Fall	Storm	Irrigation	Winter	Fall	Storm	Irrigation	Winter	% Fall	% Storm	% Irrigation	% Winter
2004	0	0	7	0	0	0	165	0	0.00%	0.00%	**4.24%**	0.00%
2005	0	14	42	0	0	160	576	0	0.00%	**8.75%**	7.29%	0.00%
2006	0	26	64	0	0	306	2,279	0	0.00%	**8.50%**	2.81%	0.00%
2007	0	32	120	0	0	691	3,413	0	0.00%	**4.63%**	3.52%	0.00%
2008	0	80	123	0	0	1242	3,467	0	0.00%	**6.44%**	3.55%	0.00%
2009	28	20	50	11	365	415	701	275	7.67%	4.82%	**7.13%**	4.00%
2010	19	22	30	4	287	323	600	74	6.62%	**6.81%**	5.00%	5.41%
2011	21	7	59	17	742	398	2,671	929	2.83%	1.76%	**2.21%**	1.83%
2012	0	0	0	20	0	0	0	268	0.00%	0.00%	0.00%	**7.46%**
2013	0	17	53	35	0	354	1,114	596	0.00%	**4.80%**	4.76%	5.87%
2014	28	21	56	15	635	581	1,597	226	4.41%	3.61%	3.51%	**6.64%**
2015	7	17	73	32	308	394	1,292	388	2.27%	4.31%	5.65%	**8.25%**
2016	11	40	65	10	219	660	1,662	277	5.02%	**6.06%**	3.91%	3.61%
2017	4	31	52	19	144	550	1,679	555	2.78%	**5.64%**	3.10%	3.42%
2018	17	20	48	7	318	268	657	75	5.35%	7.46%	7.31%	**9.33%**
2019	10	44	63	0	168	500	964	0	5.95%	**8.80%**	6.54%	0.00%
Total	**145**	**391**	**905**	**170**	**3,186**	**6,842**	**22,837**	**3,663**	**4.55%**	**5.71%**	**3.96%**	**4.64%**

Table 11. Pesticide exceedances and toxicity counts by sample event type.

Bold cells indicate the highest number of exceedances per year, comparing each event type. Total sample counts do not include if a site was dry or non-contiguous and could not be sampled.

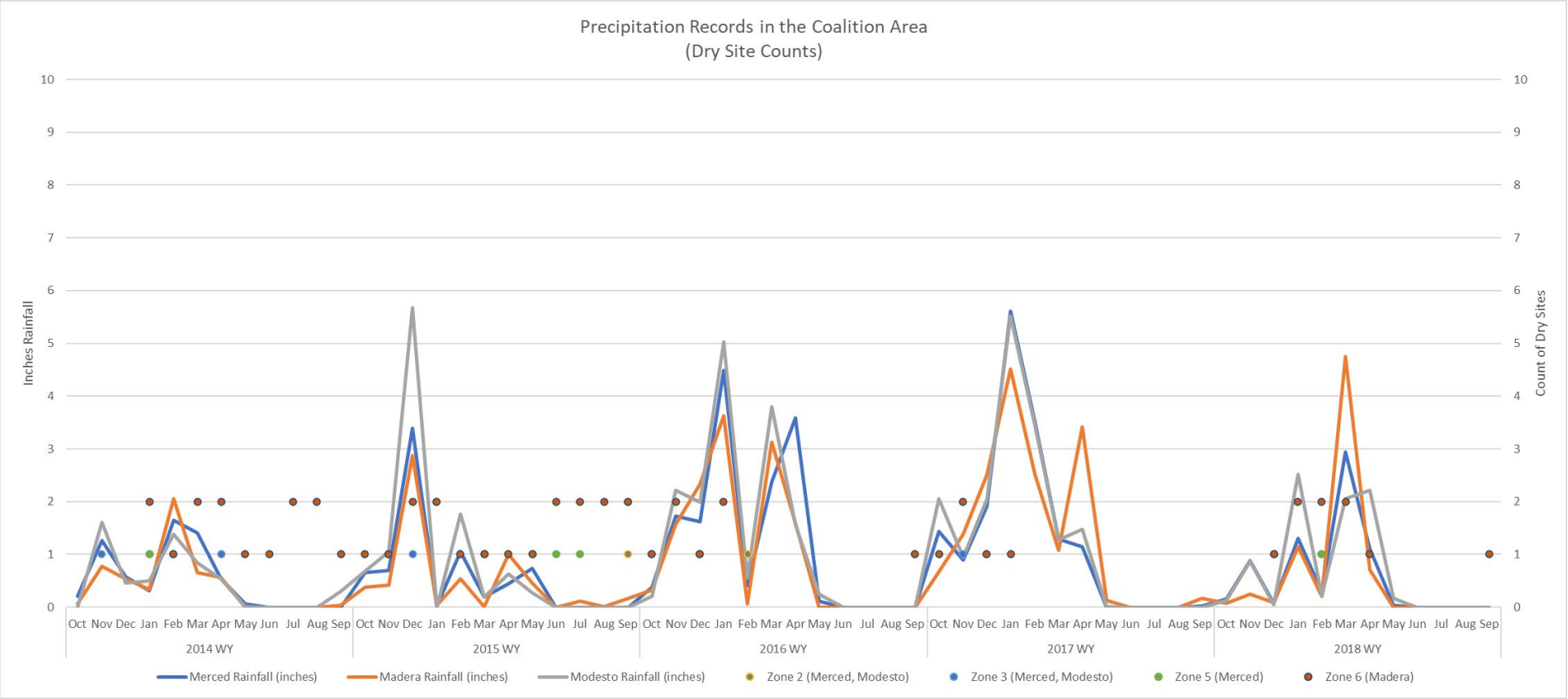
Water Year	Count of Exceedances				Count Samples Collected				% Exceedances			
	Fall	Storm	Irrigation	Winter	Fall	Storm	Irrigation	Winter	% Fall	% Storm	% Irrigation	% Winter
2004	0	0	4	0	0	0	97	0	0.00%	0.00%	**4.12%**	0.00%
2005	0	2	9	0	0	60	231	0	0.00%	3.33%	**3.90%**	0.00%

Water Year	Count of Exceedances				Count Samples Collected				% Exceedances			
	FALL	STORM	IRRIGATION	WINTER	FALL	STORM	IRRIGATION	WINTER	% FALL	% STORM	% IRRIGATION	% WINTER
2006	0	8	11	0	0	97	1,342	0	0.00%	**8.25%**	0.82%	0.00%
2007	0	8	17	0	0	385	1,951	0	0.00%	**2.08%**	0.87%	0.00%
2008	0	28	23	0	0	686	1,951	0	0.00%	**4.08%**	1.18%	0.00%
2009	2	0	4	0	73	105	103	87	2.74%	0.00%	**3.88%**	0.00%
2010	0	2	2	0	39	34	75	1	0.00%	**5.88%**	2.67%	0.00%
2011	3	1	9	0	392	234	1,498	537	**0.77%**	0.43%	0.60%	0.00%
2012	0	0	0	0	0	0	0	22	0.00%	0.00%	0.00%	0.00%
2013	0	1	3	6	0	107	342	184	0.00%	0.93%	0.88%	**3.26%**
2014	5	6	4	1	369	339	949	103	1.36%	**1.77%**	0.42%	0.97%
2015	1	1	19	7	199	244	817	238	0.50%	0.41%	2.33%	**2.94%**
2016	0	4	4	1	142	392	1,035	173	0.00%	**1.02%**	0.39%	0.58%
2017	0	7	7	1	87	323	1,051	355	0.00%	**2.17%**	0.67%	0.28%
2018	2	2	7	1	76	83	203	18	2.63%	2.41%	3.45%	**5.56%**
2019	7	24	40	0	31	148	347	0	**22.58%**	16.22%	11.53%	0.00%
Total	**20**	**94**	**163**	**17**	**1,408**	**3,237**	**11,992**	**1,718**	**1.42%**	**2.90%**	**1.36%**	**0.99%**

Table 12. Evaluating the differences in the proportions of exceedances between storm sampling events and irrigation season sampling events.
All analyses include the years 2005 – 2019 except metals which were not analyzed until 2006.

Parameters	Storm	Irrigation	Z-score	p
All	0.0571	0.0393	6.357	0.0001
Pesticides	0.029	0.013	6.18	0.0001
Water Column Toxicity	0.1232	0.045	5.844	0.0001
Metals	0.0755	0.0483	2.608	0.005
Physical parameters	0.0544	0.0621	1.3	ns

Figure 5. Precipitation records in the Coalition area using Weather Underground data from the Madera, Merced, and Modesto gauge stations (2014 WY- 2018 WY). The precipitation data is recorded daily; this graph summed the days into total inches per month. The Coalition samples during the designated Storm Event based on the trigger of 0.25 inches of rainfall in the preceding 24 hour. The secondary axis shows the number of Core sites that were dry at the time of sampling, grouped by zone.



Data Availability

All surface water quality data are available through the California Environmental Data Exchange Network (CEDEN) website (https://ceden.waterboards.ca.gov/AdvancedQueryTool) including the data used in this analysis. Data types available on CEDEN include station latitude and longitude, field parameters, water and sediment chemistry, and water and sediment toxicity.

Conclusion

The Coalition evaluated all monitoring results from Core sites in Zone 1 through Zone 6 from 2004 through the 2019 WY to provide the East San Joaquin Water Quality Monitoring Program Expert Panel with the requested information and answer their questions as to the improvements of water quality or not at Core sites within the Coalition region (Zone 1 through Zone 6). The Coalition used this data to determine the percent of exceedances over time, the number of completed management plans, demonstrating if agricultural practices are reducing the number of exceedances, and the impact of precipitation/rainfall on exceedances if hydrology or precipitation are effecting the water quality trends.

Grouping all analytes together (pathogens, pesticides, physical parameters, metals, nutrients, water toxicity, and sediment toxicity) and calculating the percent of exceedances at Core sites shows a range of total percent exceedances from 0.17% through 7.96%, compared to samples collected, with the highest percentages from exceedances of the WQTLs for metals, *E. coil*, and physical parameters. Grouping only pesticides and toxicity samples and calculating the percent of exceedances shows smaller total percentages, ranging from 0% through 5.37% per zone. With such small percentages, it is difficult to show an improvement in water quality results. For example, in Zone 3, 0.43% of samples exceeded the WQTLs for pesticides and toxicity in 2007, compared to 0.32% of samples in the 2018 WY.

After the Coalition implemented the surface water management plan strategy, growers began adopting agricultural management practices to reduce exceedances and toxicity caused by applied pesticides. The most significant decline in pesticide exceedances occurred after 2010. To date, 24 pesticide and toxicity management plans have been completed. In the 2019 WY, the only pesticides to exceed the WQTL were pyrethroids. The Coalition continues to provide targeted outreach and education for members in subwatersheds with management plans. Overall, monitoring results do indicate that outreach and the implementation of management practices is resulting in improved water quality. Furthermore, the core and represented monitoring strategy allows the Coalition to identify and follow up on water quality issues in a timely and cost-effective manner.

Submitted respectfully,

Parry Klassen
Executive Director
East San Joaquin Water Quality Coalition

Attachments:
Attachment A- Trend Station Excel Workbook (attached in original submittal)
Attachment B- 2008-2010 Focused Outreach Management Practice Results