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VENTURA COUNTY AGRICULTURAL
IRRIGATED LANDS GROUP

Source Investigation Work Plan

submitted to:

LOS ANGELES REGIONAL WATER QUALITY CONTROL BOARD

prepared by:

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Introduction

The 2016 *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Agricultural Lands within the Los Angeles Region* (“Conditional Waiver”, Order No. R4-2016-0143) includes the requirement for discharger groups to develop a water quality management plan (WQMP) to address exceedances of water quality benchmarks. The WQMP is an iterative process which includes plans for additional or upgraded management practices to achieve water quality benchmarks. The Conditional Waiver has additional requirements for monitoring sites that “do not show decreasing trends in the concentrations of constituents that exceed Water Quality Benchmarks” (Appendix 3, Section 2.d). Specifically, Appendix 3 requires the following:

In addition to the iterative WQMP process for Discharger Group monitoring sites that exceed Water Quality Benchmarks, beginning with the second WQMP submitted under this Waiver term, there are additional requirements if these sites do not show decreasing trends in the concentrations of constituents that exceed Water Quality Benchmarks. If a Discharger Group monitoring site does not show a decreasing trend in concentrations of constituents that exceed Water Quality Benchmarks¹, then the Discharger Group shall investigate the source(s) of the constituents that exceed Water Quality Benchmarks. The Discharger Group shall submit a work plan for the investigation to the Executive Officer for approval by October 1, 2018. The work plan shall be noticed for public comment prior to Executive Officer approval. The Discharger Group shall begin implementation of the source investigation as soon as possible after Executive Officer approval of the work plan and no later than January 2019.

The work plan shall provide the justification for the proposed investigation, specifically identifying how the investigation will identify the source(s) of a Water Quality Benchmark exceedance and evaluate management practice effectiveness on member sites draining to the Discharger Group monitoring site. The investigation shall include some individual discharge monitoring of member sites that drain to the Discharger Group monitoring site based on an evaluation of relative locations, existing management practice implementation, pesticide application, and fertilizer application and irrigation practices of member sites. The specific investigation may include monitoring upstream of member sites to demonstrate that member sites that drain to the Discharger Group monitoring site are not causing or contributing to a Water Quality Benchmark exceedance at the Discharger Group monitoring site.

The purpose of this Source Investigation Work Plan (Work Plan) is to provide a framework for the source investigations to be completed as a follow-up to identified water quality benchmark exceedances with statistically significant increasing, dry weather trends. The Work Plan explains how the source investigation work will be carried out to discern patterns in discharge quality, evaluate management practice effectiveness, and identify specific crops and practices to be prioritized for outreach and management practice implementation. The ultimate result of the Source Investigation Work Plan implementation and Source Investigation Report is to inform the

¹ Discharger groups shall propose a method for trend analysis in the source investigation work plan.

update to the WQMP Outreach Plan; providing greater detail in how the VCAILG directs its members to address these particular water quality constituents.

In accordance with the Conditional Waiver timeline requirements, this Work Plan is being submitted by October 1, 2018. VCAILG will begin implementation of the source investigations as soon as possible after Executive Officer approval of the Work Plan, no later than January 2019. Lastly, a Source Investigation Report and updated WQMP Outreach Plan will be prepared based on the results of the source investigation(s) and will be submitted by September 1, 2019.

The Work Plan includes the elements noted in **Table 1**, as specified in Appendix 3 of the Conditional Waiver:

Table 1. Conditional Waiver Source Investigation Work Plan Requirements

Requirement (Appendix 3, Section 2.d)	Work Plan Section Headings	Page Number		
		South Revolon (LAS)	Mugu Lagoon (ARN-EDI)	Etting-Wood (ETT)
Justification for the proposed investigation	Background	3	3	3
	Trend Analysis Results and Actions Table	Appendix A		
Specifically identify how the investigation will identify the source(s) of a Water Quality Benchmark exceedance	Source Investigation Implementation Approach	11	21	30
Specifically identify how the investigation will evaluate management practice effectiveness on member sites draining to the Discharger Group monitoring site	Source Investigation Implementation Approach	11	21	30
Include some individual discharge monitoring of member sites that drain to the Discharger Group monitoring site based on an evaluation of relative locations, existing management practice implementation, pesticide application, and fertilizer application and irrigation practices of member sites	Static Monitoring Site Selection and Monitoring Approach	12	22	N/A
Include monitoring upstream of member sites to demonstrate that member sites that drain to the Discharger Group monitoring site are not causing or contributing to a Water Quality Benchmark exceedance at the Discharger Group monitoring site	Static Monitoring Site Selection and Monitoring Approach	12	22	N/A

BACKGROUND

One important component of the WQMP was the development of Responsibility Areas (RAs), which divide the entire County into geographic areas used for considering water quality monitoring results, TMDL requirements, and management practice implementation goals. The Conditional Waiver requires this geographic organization in Appendix 3, Section 2.a.i:

“The WQMP shall be organized by monitoring site. For each monitoring site provide:

i. A map showing the monitoring site, the land area draining to the monitoring site, the HUC-12 watershed in which the monitoring site is located, any adjacent HUC-12 watersheds that do not include a monitoring site⁶, and the enrolled and non-enrolled irrigated agricultural parcels with the HUC-12 watersheds....”

⁶Discharger groups shall propose a method for associating adjacent HUC-12 watersheds with monitoring sites in the WQMP. (emphasis added)

As described in the WQMP, HUC-12 watersheds (hereinafter “HUC12s”) with monitoring sites were associated with adjacent HUC12s by defining twenty RAs, covering all of Ventura County, which resulted in associations between HUC12s, VCAILG monitoring sites, TMDL compliance sites and TMDL Ag Land Use Sites (in the Calleguas Creek Watershed (CCW)), and TMDL assessment sites (for TMDLs outside of the CCW). RAs consist (with minor variations) of one or more HUC12s, or partial HUC12s—and were designed to be consistent with drainage patterns, regulatory reaches and TMDL responsibilities. In three cases, a HUC12 contained land that drains to different regulatory reaches. This meant that not all of the growers in those HUC12s are responsible for water quality outcomes at the same monitoring sites and the growers might also have different TMDL obligations. In these three cases, ArcGIS was used to divide the HUC12 into partial HUC12s to separate the land areas draining to different regulatory reaches. Most RAs include a nested VCAILG monitoring site drainage. In these cases, the VCAILG monitoring site at the base of the drainage was assigned as the Conditional Waiver benchmark “beacon site” for that RA, and exceedances of benchmarks at that VCAILG monitoring site were used, in part, together with monitoring data from TMDL-related monitoring sites and BMP survey results to inform selection of BMPs for increased future implementation. With regard to the Source Investigation Work Plan and Report, the RAs are important for understanding the monitoring sites, site drainages, and how the monitoring results at these locations trigger management practice implementation across the RA associated with a particular site.

The first step in preparing the Source Investigation was a trend analysis, conducted to determine what types of trends, if any, were evident for ten years of VCAILG monitoring data. Sampling data for constituents and monitoring locations that were determined to have exceeded applicable benchmarks, as sorted and evaluated in the 2017 VCAILG Water Quality Management Plan, were used as the initial dataset in the trend analysis process. The dataset and associated time series plots included in the 2017 VCAILG Water Quality Management Plan were updated to include data from the 2016-2017 monitoring year. The updated dataset, which includes samples from 2007-2017, was subjected to statistical trend analysis.²

² Data for the 2017-2018 monitoring year were not included in this analysis because these data have not been made public through submittal of the Annual Monitoring Report. Additionally, since data from the complete monitoring

Statistical trend analysis was performed on individual time series plots. Each time series consisted of a particular site, constituent, and sample condition (i.e., wet or dry weather) combination. Both the Mann Kendall test and least squares regression were performed on each time series. Non-detected samples were represented as half the method detection limit. Not sampled data points (when the monitoring site was dry) were removed from the statistical analysis.³ The Mann Kendall test required more than four samples, and a significant trend (either decreasing or increasing) required both a p value < 0.05 and an absolute value of Kendall's Tau > 0.3. Time series plots were used to assist with interpretation of statistical tests. Each plot was visually inspected while comparing the results of the Mann Kendall test and least squares regression (slope of trend line, p value and r², for the latter). Priority was given to the Mann Kendall test results. However, on rare occasions, visual inspection of time series plot called the Mann Kendall test result into question. For example, in a few cases, apparently spurious Mann Kendall test results were observed when a brief but very densely sampled period was nested within a longer time series with fewer samples. In questionable cases, the trend result from the Mann Kendall test was compared to the results of the least squares regression and professional judgement used to overrule or retain the Mann Kendall test result.

A meeting with Los Angeles Regional Water Quality Control Board (Regional Board) staff was held on June 28, 2018 to review the results of the trend analysis and make a determination as to next steps for each case. A summary of the trend analysis and agreements regarding prioritization resulting from the discussion with the Regional Board is presented in **Table 2**. **Appendix A** provides details pertaining to each site-constituent combination regarding the resulting trend, benchmark compliance deadlines, and any actions VCAILG will take to address the constituent in an RA by automatically requiring enhanced management practices.

year were not available at the time the trend analysis needed to be completed, it is premature to include them in the Source Investigation Work Plan.

³ In one instance, visual inspection of the time series plot strongly suggested a decreasing trend in recent years. In this case, the trend analysis was conducted under multiple scenarios. Using best professional judgment, the not sampled data points were included in the final statistical trend analysis and represented as 0.

Table 2. Summary of Trend Analysis Findings

Event Type	Dry Weather			Wet Weather		
	Trend Type	Increasing	Decreasing	No Trend	Increasing	Decreasing
No. of Sites	3	5	8	1	2	17
Constituents	Nitrate, copper, toxaphene	DDTs, nitrate, TDS, sulfate	Nitrogen, selenium, copper, toxaphene, DDT compounds, chloride	DDE	Nitrate, sulfate	DDTs, bifenthrin, chlordane, chlorpyrifos, copper, diazinon, toxaphene, nitrogen, TDS, sulfate, chloride
Details for Increasing Trends	04D_LAS (nitrate) 01T_ODD3_ARN-EDI (nitrate and copper) 04D_ETTG (toxaphene)			VRT_THACH (DDE)		
Prioritization	Implement source investigations for 04D_LAS and 01T_ODD3_ARN-EDI, and 04D_ETTG ⁴ . This Work Plan addresses these three sites with increasing dry weather trends.		No trends have been observed with existing data, but data points may consistently be above TMDL benchmarks. No source investigations will be conducted; however, the Work Plan Analysis will inform applicable revisions to the WQMP.	Legacy pesticide with few samples. No source investigation; amplify BMP implementation requirements in WQMP.		No trends have been observed with existing data, but data points may consistently be above TMDL benchmarks. No source investigations will be conducted; however, the Work Plan Analysis will inform applicable revisions to the WQMP.

⁴ The source investigation at 04D_ETTG will not include additional monitoring. Special studies have already been conducted in the Calleguas Creek Watershed that included monitoring for toxaphene. Additional monitoring is not required to complete the analysis for the source investigation required by the Conditional Waiver.

As discussed earlier, the Conditional Waiver requires source investigations for sites that do not show decreasing trends in the concentrations of constituents that exceed Water Quality Benchmarks. The purpose of a source investigation is to track down sources of persistent water quality benchmark exceedances, and the results are used to develop a new outreach plan. In some cases, other data and sources of information exist to inform management practice implementation, or it is more efficient to bypass the source investigation step and go straight to enhanced management practices. An example of enhanced management practices would be those defined in the WQMP as structural non-treatment BMPs. This category of practices includes ditch erosion protection, grassed waterways, and vegetated filter strips because they address multiple categories of pollutants moving with either irrigation water or storm water.

Upon discussing the trend results and actions available to VCAILG to inform the WQMP Outreach Plan, the VCAILG and Regional Board have agreed to focus the Source Investigations on increasing, dry weather trends. For “no trend” results, the VCAILG will consider the benchmark compliance deadline for the constituent and whether data are consistently and significantly above the benchmark (**Appendix A**). Under the described conditions, VCAILG will include an increase in the required, constituent-appropriate BMPs within the WQMP—specifically, structural non-treatment BMPs, as defined in the WQMP. Exceptions to this approach involve cases where other data or information are available demonstrating natural sources (e.g., selenium in CCW Reach 5 is known to be due to natural sources in the irrigation source water) and for legacy pesticides, where the Natural Attenuation Study results for Organochlorine Pesticides and PCBs in the CCW⁵ have shown that degradation will allow the TMDL deadlines in the Conditional Waiver to be met.

⁵ LWA (2016). Evaluation of Natural Attenuation Rates of Organochlorine Pesticides and PCBs in Calleguas Creek Watershed (OCP/PCB TMDL Special Study #3). Submitted to the Los Angeles Regional Water Quality Control Board, March 2016.

WORK PLAN FRAMEWORK

This document, Source Investigation Work Plan, includes individual work plans for three sites with dry weather increasing constituent trends:

- South Revolon Slough RA (site 04D_LAS) – Nitrate
- Mugu Lagoon RA (site 01T_ODD3_ARN-EDI) – Nitrate and Copper
- Etting-Wood RA (site 04D_ETTG) – Toxaphene

The general timeline for the implementation of the source investigations and the development of the Source Investigation Report is as follows:

- Source Investigation Work Plan due October 1, 2018
- Implementation to begin after EO approval no later than January 2019, with sampling to occur after the start of the Conditional Waiver-defined dry season (May 15-October 15)
- Source Investigation Report due September 1, 2019

Source Investigation Work Plan: South Revolon Slough (04D_LAS) Nitrate

BACKGROUND

The South Revolon Slough RA drains 1,309 total acres (as total assessed acres from the Agricultural Parcel List). The monitoring location (04D_LAS) is located in the southwest portion of the CCW and discharges to Revolon Slough approximately 1.6 miles upstream of Revolon's confluence with Calleguas Creek (**Figure 1**). Land use is predominantly agricultural in the RA. This is one of the few RAs where the site drainage area incorporates the entire RA; no surrounding land outside of the site drainage is included. Principal crops grown in this area are rotational row crops.⁶ Specific information regarding the monitoring location is provided in **Table 3**.

Table 3. Monitoring Station Information (04D_LAS)

Site ID	04D_LAS
Drains to Reach:	CCW-4: Revolon Slough
Site Type	Agricultural Drain
Latitude	34.134208
Longitude	-119.079767
Site Description	Discharge to Revolon Slough at S. Las Posas Rd

As described previously in explaining the trend analysis, the existing monitoring data (through May 2017) for 04D_LAS were reviewed for trends. A dry weather increasing trend was evident for nitrate (**Figure 2**), triggering the requirement to develop a source investigation plan.

⁶ Source: Agricultural Commissioner's crops GIS database 2018

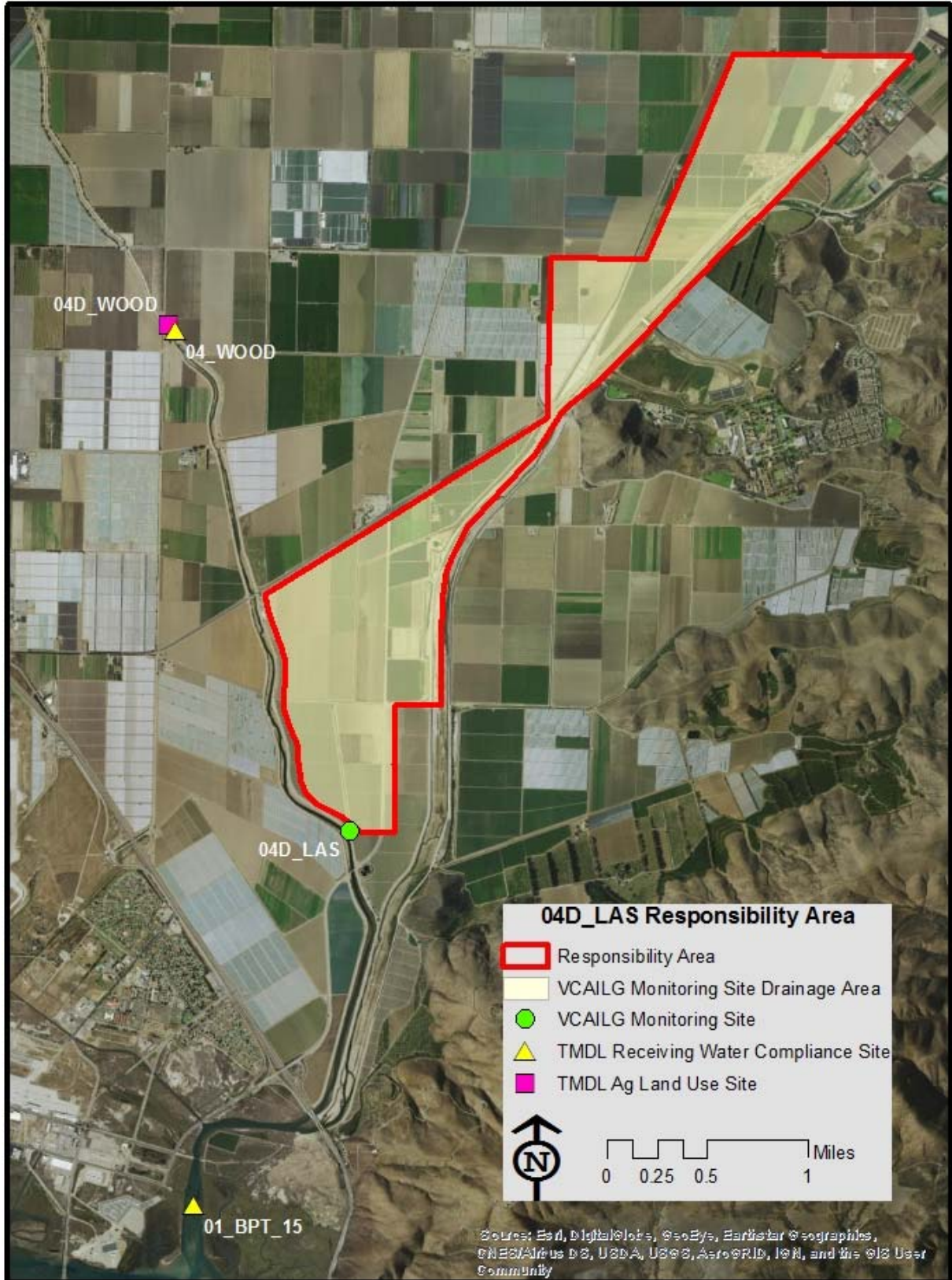


Figure 1. South Revolon Slough Responsibility Area and Monitoring Site 04D_LAS

04D_LAS (Sample Water) Dry Weather - Nitrate-N

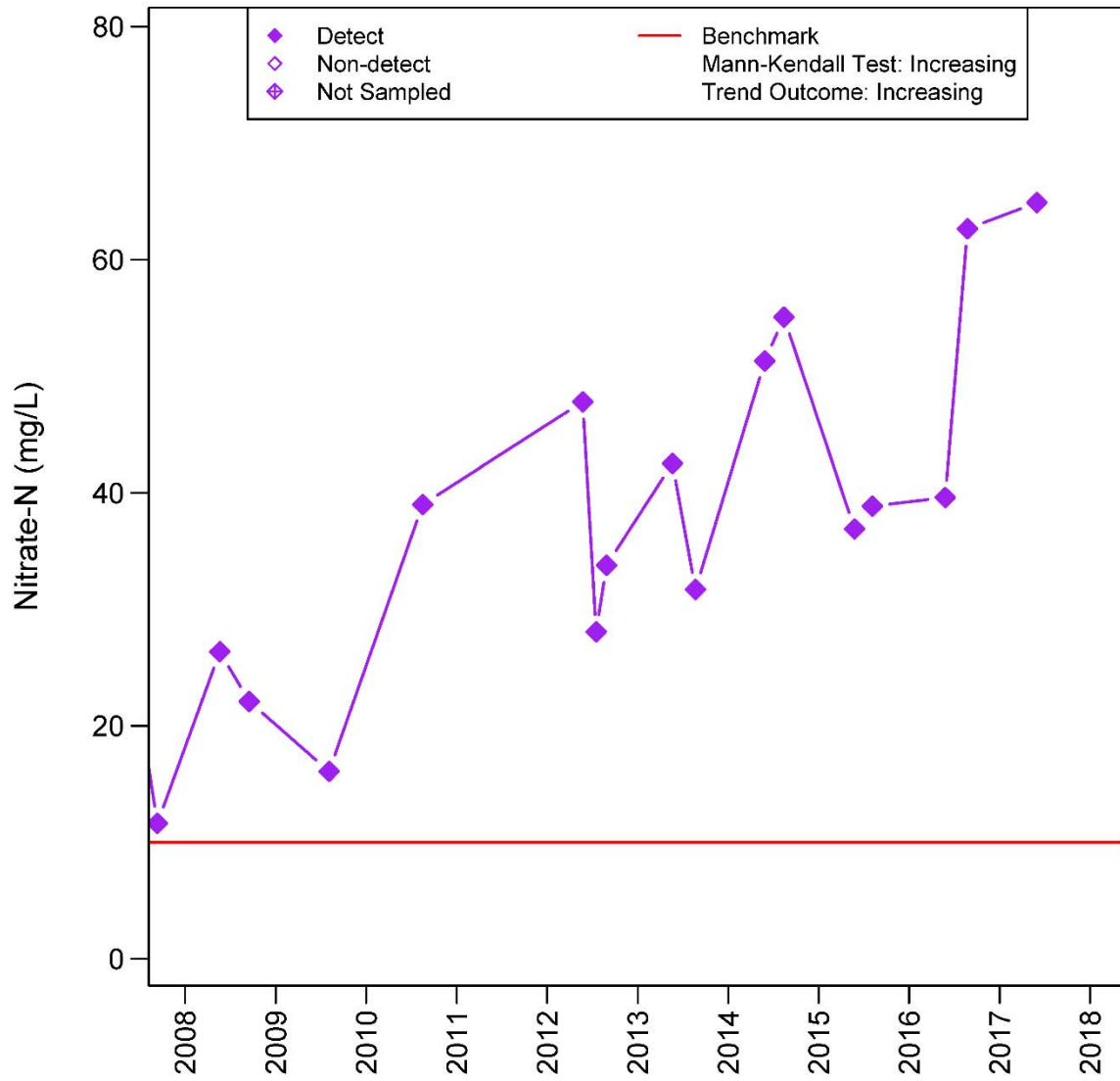


Figure 2. 04D_LAS Dry Weather Monitoring Results: Nitrate-N

04D_LAS SOURCE INVESTIGATION IMPLEMENTATION APPROACH

The source investigation for nitrate in the South Revolon Slough RA will involve both desktop evaluation and field work, which will be completed between January and June 2019. Following source investigation implementation, the Source Investigation Report will be produced for submittal by September 1, 2019.

Identification of Potential Sources

VCAILG monitoring sites were selected to represent discharges from irrigated agriculture; however, other land uses and potential dischargers may exist within a site drainage area that could contribute to elevated nitrate concentrations detected at VCAILG monitoring sites. Accordingly, a preliminary GIS/desktop evaluation was used to examine features in the RA that would indicate other potential discharge sources. The desktop evaluation considered non-agricultural land uses, area waterbodies, upstream or downstream influences, inflow from other branches or tributaries, specific drainages, and the variety of crops within a given drainage. Locations of VCAILG enrollees and non-enrollees relative to monitoring sites were also considered. This exercise was also used to identify key points within the drainage area that should be checked for discharges from agriculture.

Subsequently, field reconnaissance was used to ground-truth findings from the desktop analysis and identify areas to focus on during field monitoring. This process may be further revisited based on what is learned during the first few monitoring events.

In order to maximize the ability to characterize and understand runoff patterns and discharges within the monitoring site drainage area, two simultaneous approaches will be taken for field monitoring: opportunistic sampling and static site monitoring.

- **Opportunistic Sampling:** capturing edge-of field discharges and other flows that are observed by the monitoring team as it moves up the drainage area.
- **Static Site Monitoring:** visiting set site locations within or around the perimeter of a drainage area to ensure other sources that have been identified are checked for discharge and to ensure that set points within a drainage area are sampled (i.e., upper and mid-points of a main channel to see where higher or lower concentrations are observed; opportunistic sampling could then be used to further narrow down high concentration discharges).

This two-fold sampling approach was selected for a number of reasons, primarily that edge-of-field discharges are intermittent, unpredictable, and typically fleeting, as demonstrated in the VCAILG Bacteria Special Study. Therefore, multiple sampling events will be scheduled to occur during peak irrigation season in order to capture and sample irrigation runoff, if it occurs. For the 04D_LAS drainage area, the monitoring team will drive perimeter roads (i.e., Cawelti, Laguna, South Lewis, Las Posas, and Hueneme Roads) and along drainage ditches, as conditions allow, looking for discharges to sample, with the goal of maximizing the study area covered and the number of samples collected.

Static Monitoring Site Selection and Monitoring Approach

Static monitoring site locations selected for the 04D_LAS drainage area are identified below (Table 4, Figure 3).

Table 4. Static Monitoring Sites for Source Investigations (04D_LAS)

Site Name	Description	Lat	Long	Land Use
LAS-1	Head of channel south of Cawelti Rd	34.183500	-119.051661	Agriculture
LAS-2	Responsibility area mid-point at Laguna & Hueneme Roads	34.165439	-119.062275	Agriculture
04D_LAS	Existing VCAILG monitoring site	34.134208	-119.079767	Agriculture

Static monitoring sites will be sampled during each monitoring event and were selected because water is typically flowing at each site. Other considerations for site selection included the geography of the RA and the location of the main north-south drainage channel. Additional information regarding static sites includes the following:

- LAS-1, located at the north end of the RA, was selected to provide an indication of nitrate levels entering the RA from the north;
- LAS-2, located at the approximate midpoint of the RA, was selected to establish nitrate levels exiting the upper half of the RA and entering the lower half. If nitrate levels are higher at LAS-2 than at LAS-1, the increase may indicate nitrate inputs from sources located in between the two sites, warranting further investigation to narrow down the source(s).
- 04D_LAS, located at the south end of the RA, was selected to determine whether nitrate levels are increasing between LAS-2 and 04D_LAS. An increase in nitrate at 04D_LAS relative to nitrate levels detected at LAS-2 may indicate nitrate inputs from sources located in between the two sites, warranting further investigation to narrow down the source(s).

Static sites may be added and/or eliminated during the course of the source investigation based on monitoring results, site conditions, or other considerations.



Figure 3. Static Monitoring Sites for the 04D_LAS Drainage Area

At least five sampling events, each one day in duration, are scheduled to occur during peak irrigation season. Nitrate analysis will be performed in the field using test strips. This approach will allow for the collection and analysis of more samples in less time, as well as the ability to make in-the-field adjustments to the driving route as the monitoring team pursues discharge sources. Other anticipated benefits include the time and cost savings that will be realized through less time for preparation and clean-up (e.g., labels, chain-of-custody forms, coolers, ice, sample delivery to the laboratory), as well as lower analytical costs. Lastly, the field results, along with location information, will allow staff to immediately follow up with a GIS/desktop evaluation to make route adjustments or select priority locations prior to the next event.

The monitoring team will proceed with each event as follows:

1. Start at the north end of the RA and progressively work toward the south end.
2. Look for discharges along perimeter roads and agricultural roads throughout the event.
3. When discharges are observed, record observations in the field log, collect and analyze a sample of the discharge, and photo-document the discharge and its source. A GPS-enabled camera will be used to co-locate photographs with each discharge location. Information on field conditions (e.g., bare soil, crop type, stage of growth) will be recorded on the field log and photographed for reference, clearly linking the discharge to the activity producing the discharge.
4. The field log will include the applicable water quality benchmark to allow the monitoring team to assess each result and consider the feasibility of following the discharge further if warranted (e.g., to an upstream location or to a location just outside of the RA to capture run-on). This type of investigation will be documented on the field log by the monitoring team for later follow-up or desktop analysis.
5. Where the source of a discharge is not immediately apparent, the monitoring team will attempt to locate its source. If the team is unable to conclusively identify the source, it will describe on the field log possible sources based on the discharge location and surrounding conditions / land use.
6. Where wet agricultural roads prevent access, the monitoring team will attempt to drive an alternative route to access drainage ditches, channels, etc.
7. The monitoring team will analyze one field blank and one duplicate sample during each monitoring event to provide data quality indicators.

Protocol for Data Evaluation

The nitrate data collected by test strip measurements described above will be evaluated along with the site-specific location information to identify sources, evaluate management practice effectiveness, and inform the update to the WQMP outreach plan. The data evaluation protocol will proceed as follows:

- Nitrate data and associated location information recorded on field logs will be compiled, then mapped for internal use, to provide a visual representation of nitrate levels detected throughout the RA during the monitoring event.

- The data will be sorted for those points that exceed the water quality benchmark. The metadata associated with exceedance locations will be analyzed to determine whether there are site features or other variables in common (e.g., drainage area, crop type, irrigation method, irrigation water source, VCAILG-enrolled vs. non-enrolled parcels, implementation of management practices to control the transport of nitrate) that provide evidence of a probable causes of elevated nitrate.
- The same metadata analysis will be performed for monitoring results/sites that did not exceed the nitrate benchmark. This analysis may provide an indication of site features or other variables that reduce (or result in) lower nitrate concentrations in discharges. Variables that will be considered include those in the previous bullet, as well as best management practices (BMPs) and/or other variables obtained from grower surveys.
- Nitrate data will be analyzed to determine whether there are increasing trends from north to south. Where increasing trends are indicated, the monitoring team will work upstream, collecting in-channel samples and samples of discharges to locate the source.

Results of the data analysis will be used to plan follow-up reconnaissance and monitoring for subsequent monitoring events.

The data collected throughout the source investigation and the results of the data analyses will be grouped and summarized in a Source Investigation Report and, ultimately, will inform revisions to the WQMP Outreach Plan. Location-specific information will remain confidential.

Source Investigation Work Plan: Mugu Lagoon (01T_ODD3_ARN-EDI) Nitrate and Dissolved Copper

BACKGROUND

The Mugu Lagoon RA drains 10,109 total acres (as total assessed acres from the Agricultural Parcel List). The monitoring location itself (01T_ODD3_ARN-EDI)⁷ drains 711 acres (**Figure 4**), the flow from which ultimately discharges into the western arm of Mugu Lagoon. Although industrial land uses form the border at the northwest corner of the monitoring site drainage, the primary land use in the drainage area is irrigated agriculture. The principal crop grown in the monitoring site drainage is sod, and other crops in the RA may include strawberries and row crops (unknown type). Specific information regarding the monitoring location is provided in **Table 5**.

Table 5. Monitoring Station Information (01T_ODD3_ARN and 01T_ODD3_EDI)

Site ID	01T_ODD3_ARN (2007-Aug. 2016)	01T_ODD3_EDI (May 2016)
Drains to Reach:	CCW-1: Mugu Lagoon	CCW-1: Mugu Lagoon
Site Type	Agricultural Drain	Agricultural Drain
Latitude	34.123564	34.132675
Longitude	-119.156514	-119.160669
Site Description	Rio de Santa Clara/Oxnard Drain #3	Upstream of 01T_ODD3_ARN

As described previously in explaining the trend analysis, the existing monitoring data (through the May 2017) for 01T_ODD3_ARN-EDI were analyzed for trends. A dry weather increasing trend was evident for nitrate (**Figure 5**) and dissolved copper (**Figure 6**), triggering the requirement to develop a source investigation plan.

In spite of the dry weather increasing trend for copper at the monitoring site, TMDL numeric targets for copper are being met in the downstream receiving water, Mugu Lagoon.⁸ The copper benchmarks applicable to this VCAILG monitoring site and the associated source investigation are intended to ensure that irrigated agriculture and/or other potential sources in the drainage area

⁷ In January 2016, site 01T_ODD3_ARN was moved upstream near Edison Drive (01T_ODD3_EDI) for the following reasons: (1) during storm events, the road to the ARN site floods periodically and becomes inaccessible; (2) sediment sampling, required for the Oxnard Drain #3 Pesticides, PCBs, and Sediment Toxicity TMDL compliance, is extremely challenging due to the need for specialized equipment and limited access for deploying a boat in the channel; (3) sampling at the ARN site must be scheduled during low tide to minimize the tidal influence; and (4) flow cannot be measured. The Site ID “01T_ODD3_ARN-EDI” is used in this Work Plan to indicate that the monitoring data used for the trend analysis are from both sites. However, the data set consists of data from site 01T_ODD3_ARN for all but the final May 2016 data point.

⁸ The Calleguas Creek Watershed Metals TMDL (Resolution No. R16-007) was revised and the new version became effective on June 23, 2017. The TMDL reconsideration Staff Report includes a current condition and compliance assessment. This data evaluation stated that there were no exceedances of the copper target in dry weather for Mugu Lagoon.

continue not to cause or contribute to an exceedance of the copper water quality objectives in Mugu Lagoon.

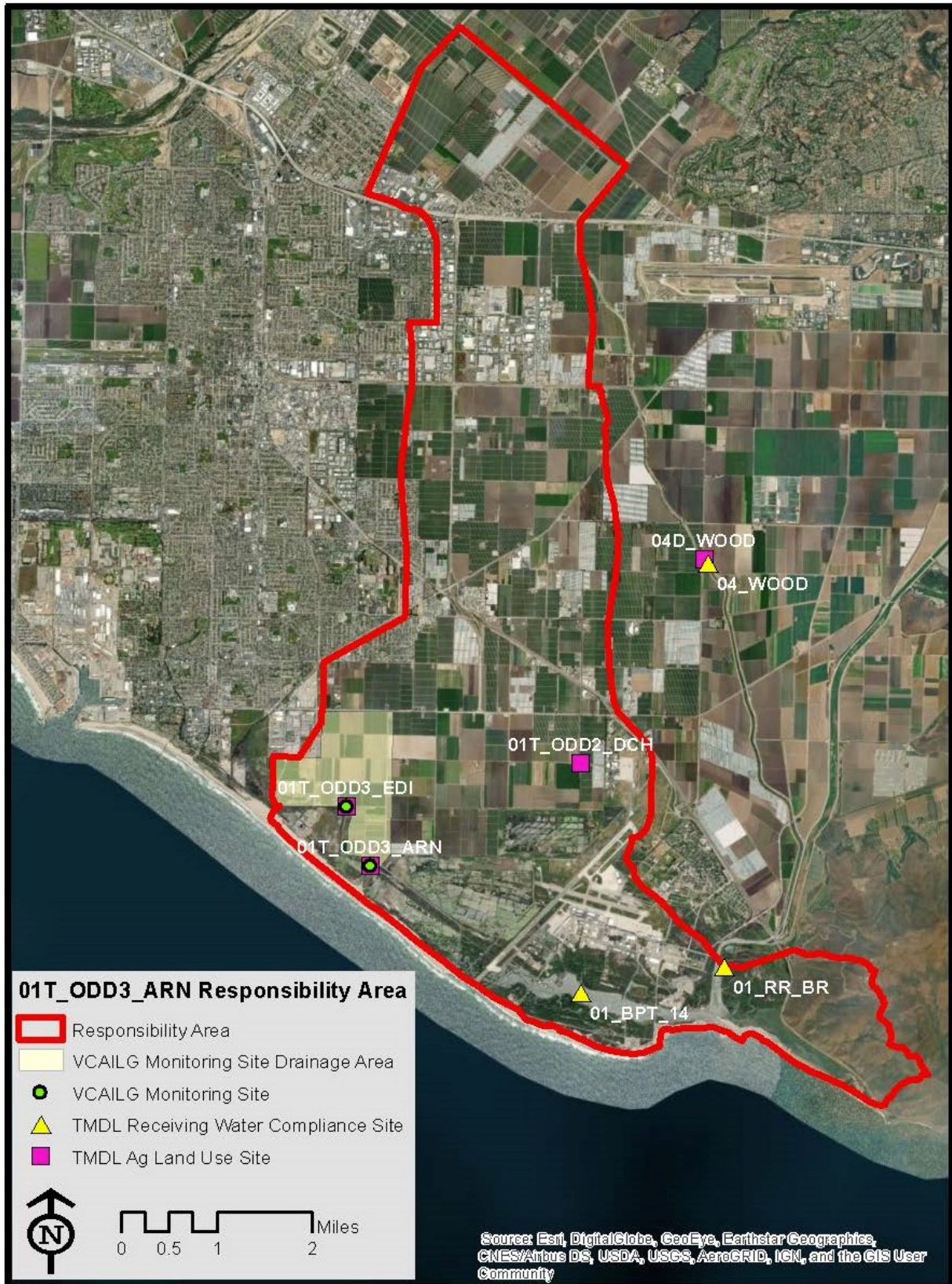


Figure 4. Mugu Lagoon Responsibility Area and Monitoring Sites 01T_ODD3_ARN-ED1

**01T_ODD3_ARN/01T_ODD3_EDI (Sample Water)
Dry Weather - Nitrate-N**

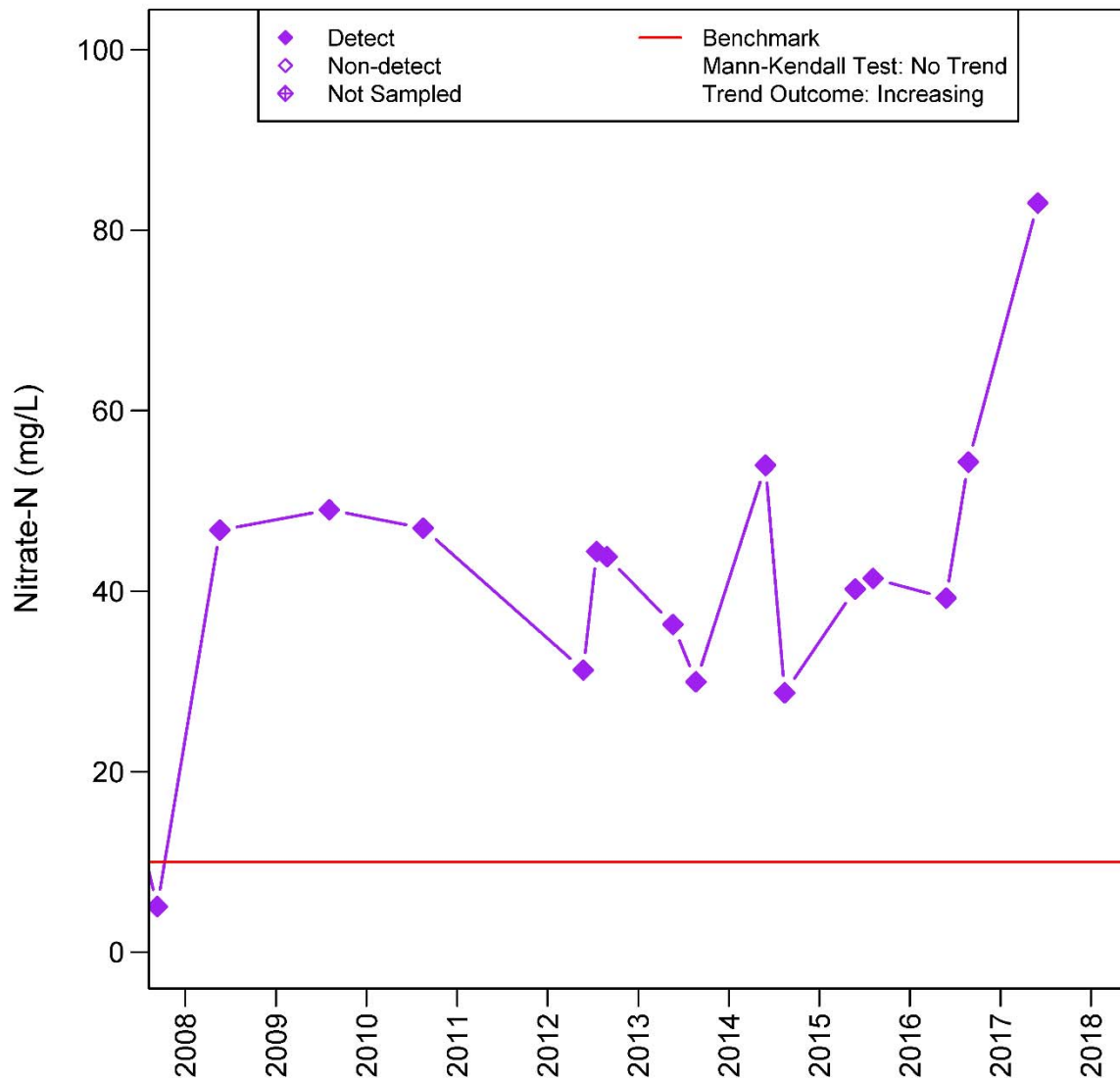


Figure 5. 01T_ODD3_ARN-EDI Dry Weather Monitoring Results: Nitrate-N

**01T_ODD3_ARN/01T_ODD3_EDI (Sample Water)
Dry Weather - Dissolved Copper**

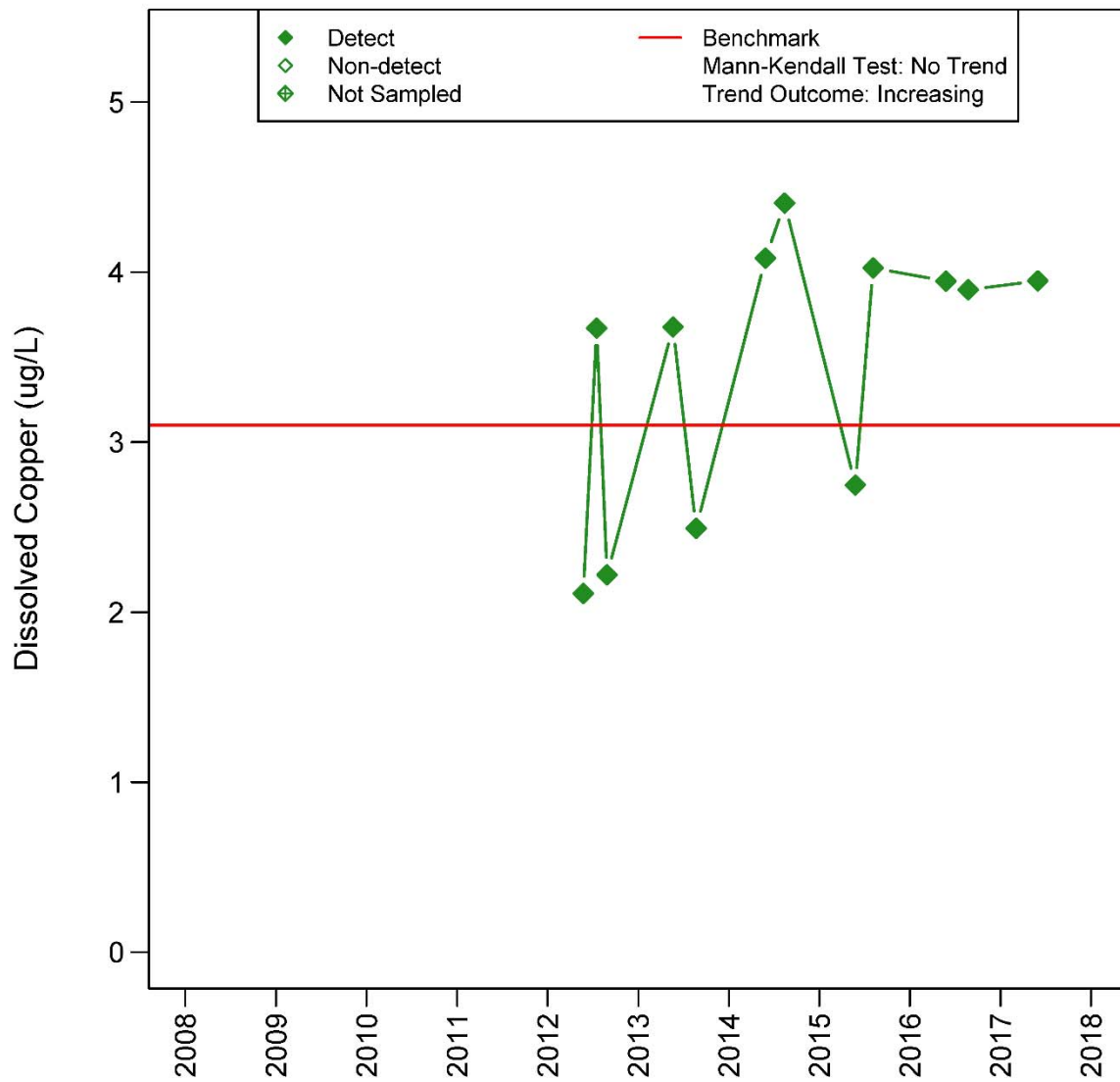


Figure 6. 01T_ODD3_ARN-EDI Dry Weather Monitoring Results: Dissolved Copper

01T_ODD3_ARN-EDI SOURCE INVESTIGATION IMPLEMENTATION APPROACH

The source investigation for nitrate and dissolved copper in the 01T_ODD3_ARN-EDI monitoring site drainage area will involve both desktop evaluation and field work. This work will be completed between January and June 2019. Following source investigation implementation, the Source Investigation Report will be produced for submittal by September 1, 2019.

Identification of Other Potential Sources

VCAILG monitoring sites were selected to represent discharges from irrigated agriculture; however, other land uses and potential dischargers may exist within a site drainage area that could contribute to elevated nitrate and dissolved copper concentrations detected at VCAILG monitoring sites. A preliminary GIS/desktop evaluation was used to examine features in the drainage area that would indicate other potential discharge sources. The desktop evaluation considered non-agricultural land uses, area waterbodies, upstream or downstream influences, inflow from other branches or tributaries, specific drainages, and the crop types within a given drainage. Locations of VCAILG enrollees and non-enrollees relative to monitoring sites were also considered. This exercise was also used to identify key points within the drainage area that should be checked for discharges from agriculture.

Subsequently, field reconnaissance was used to ground-truth findings from the desktop analysis and identify areas to focus on during field monitoring. This process may be further revisited based on what is learned during the first few monitoring events.

In order to maximize the ability to characterize and understand runoff patterns and discharges within the monitoring site drainage area, two simultaneous approaches will be taken for field monitoring: opportunistic sampling and static site monitoring.

- **Opportunistic Sampling:** capturing edge-of field discharges and other flows that are observed by the monitoring team as it moves up the drainage area.
- **Static Site Monitoring:** visiting set site locations within or around the perimeter of a drainage area to ensure other sources that have been identified are checked for discharge and to ensure that set points within a drainage area are sampled (i.e., upper and mid-points of a main channel to see where higher or lower concentrations are observed; opportunistic sampling could then be used to further narrow down high concentration discharges).

This two-fold sampling approach was selected for a number of reasons, primarily because edge-of-field discharges are intermittent, unpredictable, and typically fleeting, as demonstrated in the VCAILG Bacteria Special Study. Therefore, multiple sampling events will be scheduled to occur during peak irrigation season in order to capture and sample irrigation runoff, if it occurs. The monitoring team will drive perimeter roads (i.e., McWane Blvd, Edison Dr, Hueneme and Arnold Roads) and along drainage ditches, as conditions allow, looking for discharges to sample, with the goal of maximizing the study area covered, land use representation and the number of samples collected.

Static Monitoring Site Selection and Monitoring Approach

Static monitoring sites selected for the 01T_ODD3_ARN-EDI monitoring site drainage area are listed below (Table 6, Figure 7).

Table 6. Static Monitoring Sites for Source Investigations (01T_ODD3_ARN-EDI)

Site Name	Description	Lat	Long	Land Use
ARN-1	Drainage ditch at west end of McWane Blvd	34.140050	-119.174925	Agriculture
ARN-2	Drainage ditch at midpoint of McWane Blvd	34.140003	-119.171559	Agriculture
ARN-3	Outfall – discharge from industrial area	34.140200	-119.169445	Industrial
ARN-4	Catch Basin 1 – Edison Dr at McWane Blvd	34.140279	-119.166799	Industrial
ARN-5	Catch Basin 2 – Edison Dr	34.144277	-119.166720	Industrial
ARN-6	South end of Edison Dr on main channel	34.132710	-119.166620	Agriculture
01T_ODD3_EDI	Existing VCAILG monitoring site	34.132675	-119.160669	Agriculture
ARN-7	Tributary to main channel	34.125375	-119.162206	Urban Runoff
01T_ODD3_ARN	Former VCAILG monitoring site	34.123564	-119.156514	Various
ARN-8	Roadside ditch adjacent to Agromin	34.12516	-119.154086	Industrial
ARN-9	Drainage ditch on east side of Edison Dr	34.133214	-119.166614	Agriculture

Static monitoring sites will be visited during each monitoring event and will be sampled if water is present. Static sites were selected to capture discharges representing each of the land uses within the drainage area and along the boundary at its northwest corner. Other considerations for site selection included the geography of the drainage area, the location of waterbodies within the drainage area, and the different crop types within the drainage area. Additional details regarding each static site include the following:

- ARN-1, located in an agricultural drainage ditch at the west end of McWane Blvd, was selected to capture runoff from crop irrigation. The majority of the agricultural area to the south of McWane Blvd was not planted at the time this Work Plan was written.
- ARN-2 is located on the agricultural drainage ditch that begins at the approximate midpoint of McWane Blvd and extends southwest across the agricultural fields.
- ARN-3, located at the end of an industrial discharge outfall on the north side of McWane Blvd, was selected to represent the industrial land use and potentially capture run-on to the drainage area.

- ARN-4 is a catch basin located on Edison Dr at McWane Blvd and was selected to potentially capture dry weather runoff from the adjacent industrial land use that ultimately flows through the VCAILG monitoring site.
- ARN-5 is another catch basin located on Edison Drive, located north of ARN-4. This site was also selected to capture potential industrial dry weather runoff that ultimately flows through the VCAILG monitoring site.
- ARN-6 is located at the south end of Edison Drive, on the upstream side of the Edison Drive bridge. This site is intended to measure potential contributions from the irrigated agricultural parcel(s) located south of McWane Blvd.
- 01T_ODD3_EDI is the existing VCAILG monitoring site that includes contributions from industrial and irrigated agricultural land uses.
- ARN-7, located on the tributary to the west of the main channel, was selected to represent contributions from urban runoff.
- 01T_ODD3_ARN is the former VCAILG monitoring site for the drainage area. This monitoring site represents contributions from all land uses in the monitoring site drainage area.
- ARN-8, located on a drainage ditch adjacent to an industrial site, was selected to capture potential runoff from the industrial land use.
- ARN-9 is located on the drainage ditch along the east side of Edison Drive, on the upstream side of the small bridge. This site was selected to represent agricultural discharges from the parcel(s) to the east of the channel.

Static sites may be added and/or eliminated during the course of the source investigation based on monitoring results, site conditions, or other considerations.

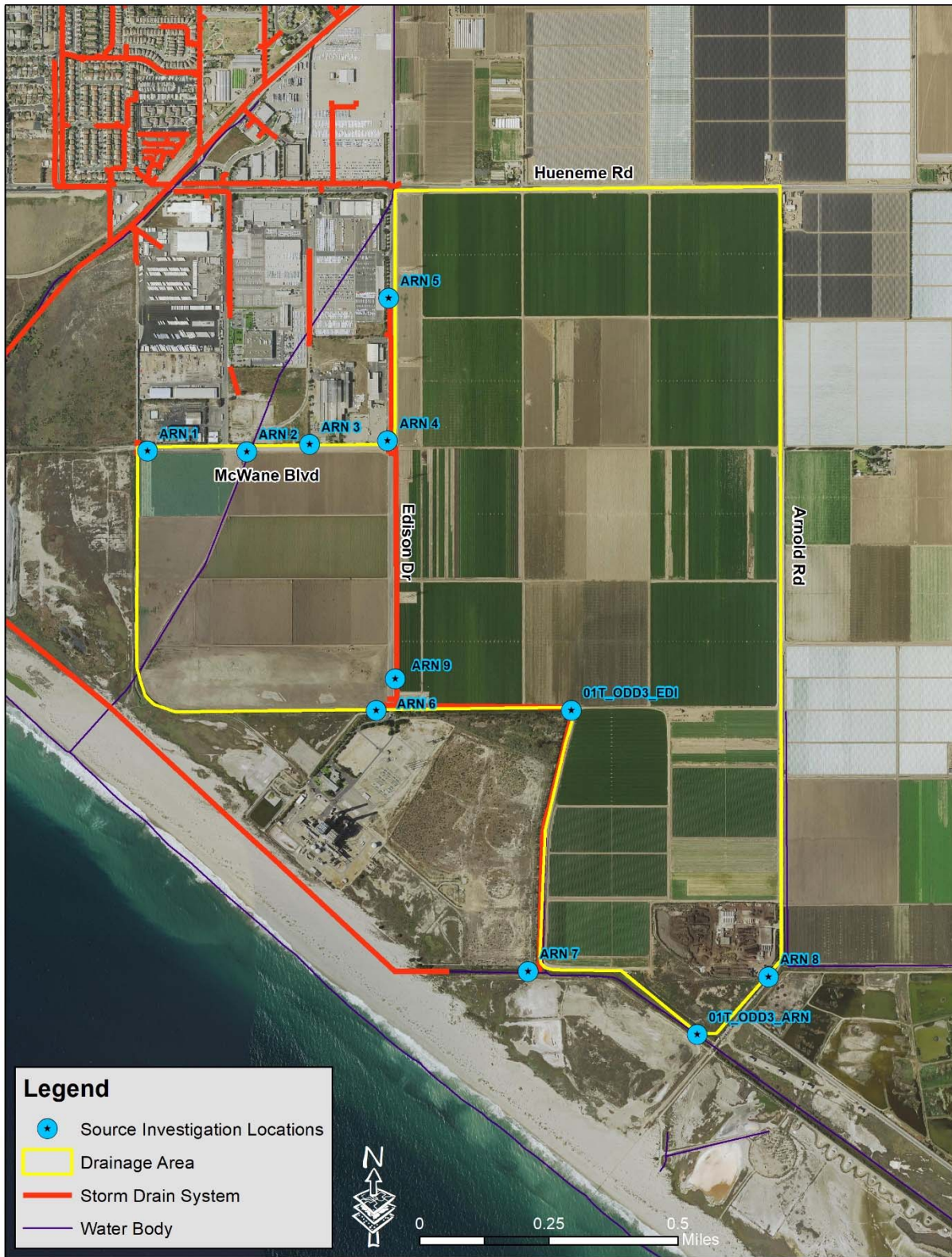


Figure 7. 01T_ODD3_ARN-EDI Drainage Area and Proposed Static Monitoring Sites

At least five sampling events, each one day in duration, are scheduled to occur during peak irrigation season. Nitrate and dissolved copper analyses will be performed in the field using test strips/kits. This approach will allow for the collection and analysis of more samples in less time, as well as the ability to make in-the-field adjustments to the driving route as the monitoring team pursues discharge sources. Other anticipated benefits include the time and cost savings that will be realized through less time for preparation and clean-up (e.g., labels, chain-of-custody forms, coolers, ice, sample delivery to the laboratory), as well as lower analytical costs. Lastly, the field results, along with location information, will allow staff to immediately follow up with a GIS/desktop evaluation to make route adjustments or select priority locations prior to the next event.

The monitoring team will proceed with each event as follows:

1. Each event will be scheduled to occur during low tide to avoid the tidal influence.
2. Start at the north end of the drainage area (along Hueneme Rd) and progressively work toward the south end (i.e., visit 01T_ODD3_ARN last).
3. Look for discharges along perimeter roads (including run-on from industrial sources) and agricultural roads throughout the event.
4. When discharges are observed, record the required information on the field log, collect and analyze a sample of the discharge, and photo-document the discharge and its source. The GPS-enabled camera will be used to co-locate photographs with each discharge location. Information on surface conditions (e.g., soiled concrete, bare soil, crop type, stage of growth) will be recorded on the field log and photographed for reference, clearly linking the discharge to the activity producing the discharge.
5. The field log will include the applicable water quality benchmark to allow the monitoring team to assess each result and consider the feasibility of following the discharge further if warranted (e.g., to an upstream location or to a location just outside of the RA to capture run-on). This type of investigation will be documented on the field log by the monitoring team for later follow-up, desktop analysis, etc.
6. Where the source of a discharge is not immediately apparent, the monitoring team will attempt to locate its source. If the team is unable to conclusively identify the source, it will describe on the field log possible sources based on the discharge location and surrounding conditions / land use.
7. Where wet agricultural roads prevent access, the monitoring team will attempt to drive alternative route to access drainage ditches, channels, etc.
8. The monitoring team will analyze one field blank and one duplicate sample for copper and nitrate during each monitoring event to provide data quality indicators.

Protocol for Data Evaluation

The nitrate and copper data collected by test strip/kit measurements described above will be evaluated along with the site-specific location information to identify sources, evaluate management practice effectiveness, where applicable, and inform the update to the WQMP outreach plan. The data evaluation protocol will proceed as follows:

- Nitrate and dissolved copper data and associated location information recorded on field logs will be compiled, then mapped for internal use, to provide a visual representation of nitrate and dissolved copper levels detected throughout the discharge area during the monitoring event.
- The data will be sorted for those points that exceed the water quality benchmark. The metadata associated with exceedance locations will be analyzed to determine whether there are site features or other variables in common (e.g., drainage area, crop type, irrigation method, irrigation water source, VCAILG-enrolled vs. non-enrolled parcels, nutrient or other application practices) that provide evidence of a probable source of elevated nitrate and copper.
- The same metadata analysis will be performed for monitoring results/sites that did not exceed the nitrate and/or copper benchmark. This analysis may provide an indication of site features or other variables that reduce (or result in) lower nitrate and copper concentrations in discharges. Variables that will be considered include those in the previous bullet, as well as best management practices (BMPs) and/or other variables obtained from grower surveys and monitoring team observations.
- Nitrate and/or dissolved copper data will be analyzed to determine whether there are increasing trends from upstream to downstream locations. Where increasing trends are indicated, the monitoring team will work upstream, collecting in-channel samples and samples of discharges to locate the source.

Results of the data analysis will be used to plan follow-up reconnaissance and monitoring for subsequent monitoring events.

The data collected throughout the source investigation and the results of the data analyses will be tabulated and described in a Source Investigation Report and, ultimately, will inform revisions to the WQMP Outreach Plan. Location specific information will remain confidential.

Work Plan: Revolon Slough (04D_ETTG) Toxaphene

BACKGROUND

The Etting-Wood RA drains 9,182 total acres (as total assessed acres from the Agricultural Parcel List). The monitoring location itself (04D_ETTG) drains 3,251 acres (**Figure 8**). The monitoring location is located in the ag drainage channel at Etting Road that discharges to Revolon Slough in the southwest portion of the CCW, approximately 3.75 miles upstream of its confluence with Calleguas Creek. Principal crops grown in this area include Row Crops (unknown type), as well as Strawberry, Orchard, and Nursery. Specific information regarding the monitoring location is provided in **Table 7**.

Table 7. Monitoring Station Information (04D_ETTG)

Site ID	04D_ETTG
Drains to Reach:	CCW-4: Revolon Slough
Site Type	Agricultural Drain
Latitude	34.162430
Longitude	-119.090947
Site Description	Discharge to Revolon Slough at Etting Rd.

As described previously in explaining the trends analysis, the existing monitoring data (through the May 2017 AMR) for 04D_ETTG were reviewed for trends. A dry weather increasing trend was evident for toxaphene (**Figure 9**), triggering the requirement to develop a source investigation plan.

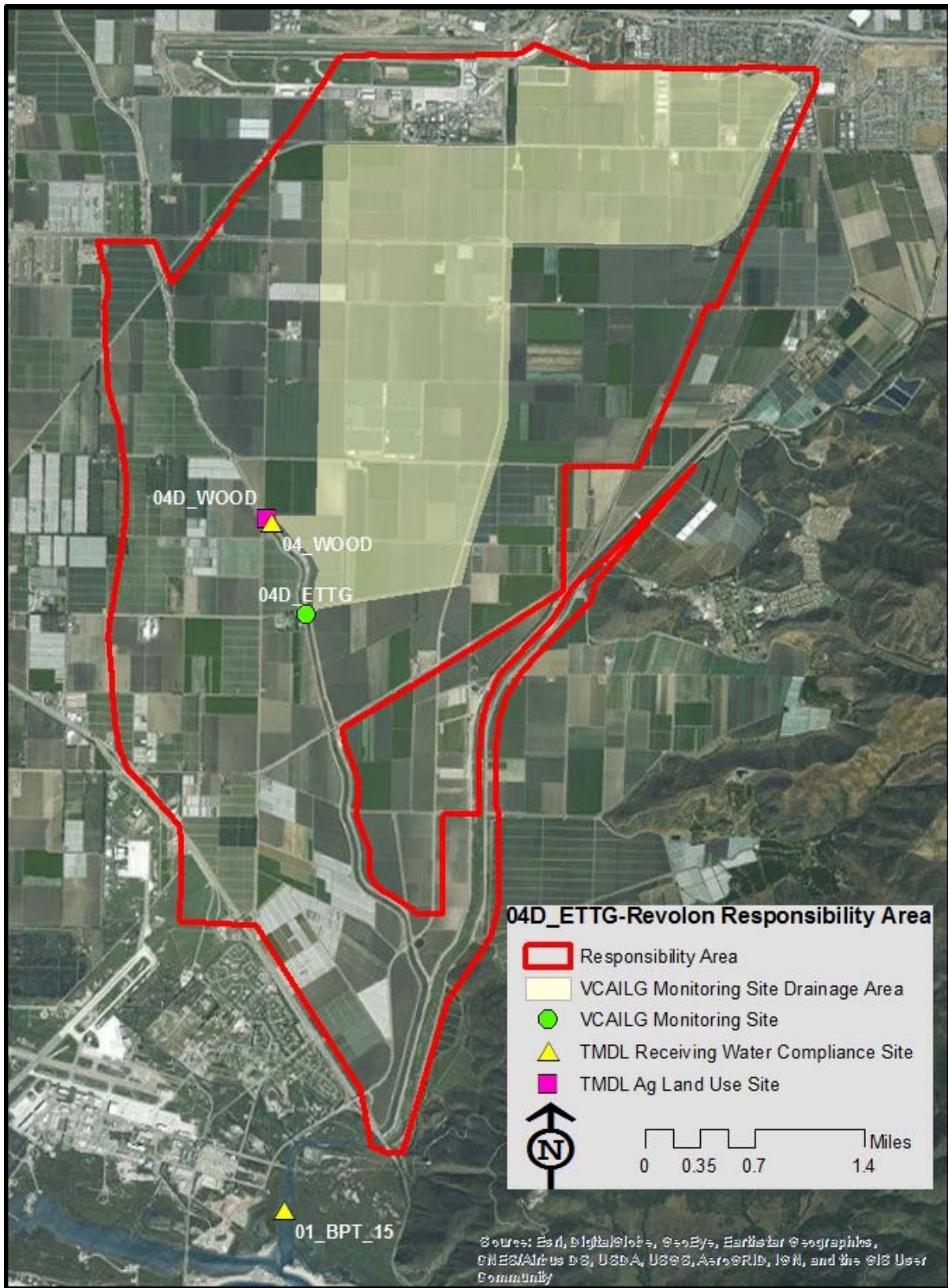


Figure 8. Etting-Wood Drainage Area and Monitoring Site 04D_ETTG

04D_ETT (Sample Water) Dry Weather - Toxaphene (Total)

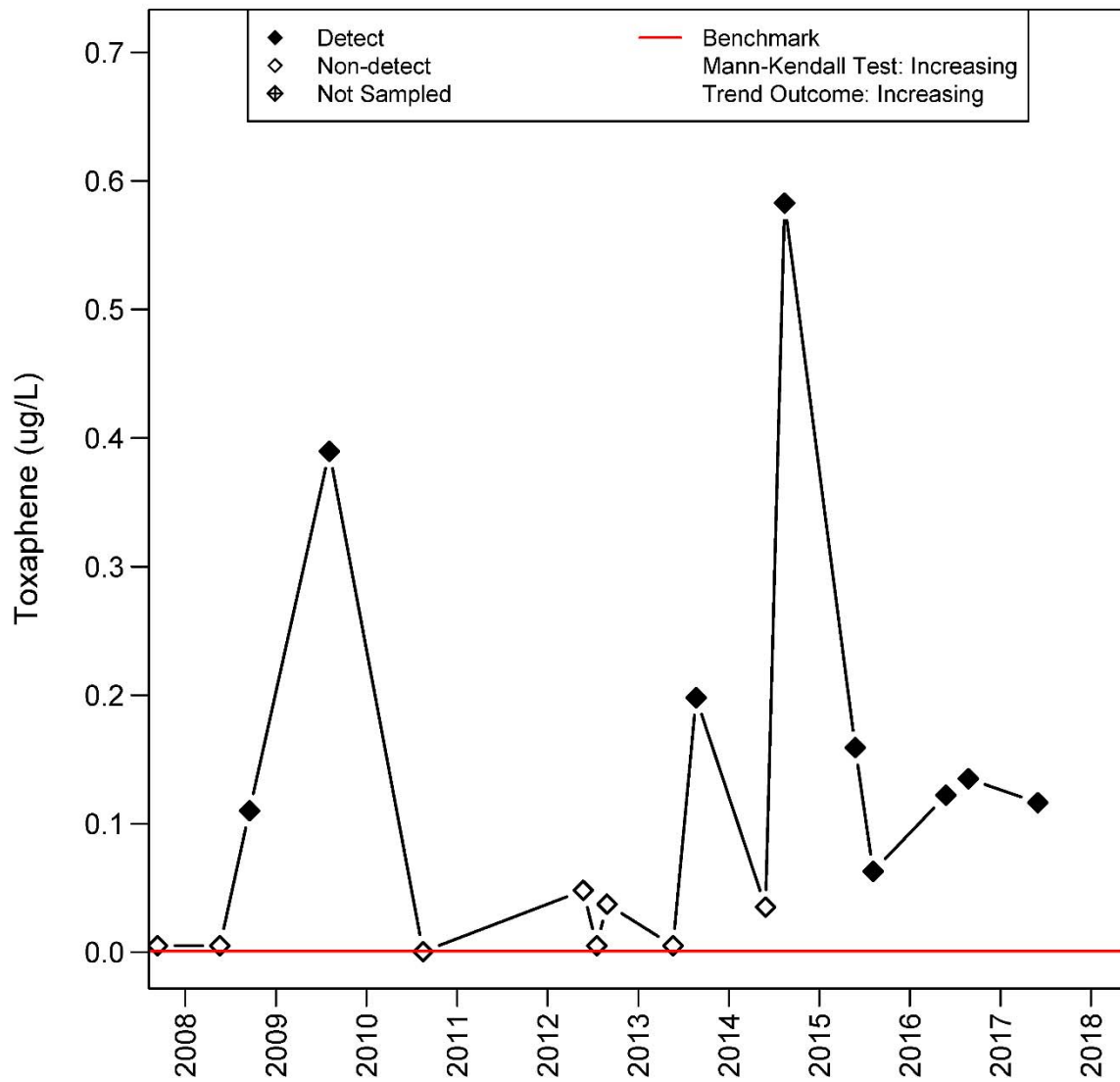


Figure 9. 04D_ETT Dry Weather Monitoring Results: Toxaphene

04D_ETTG SOURCE INVESTIGATION IMPLEMENTATION APPROACH

Source investigation for toxaphene in the Etting-Wood RA will involve review of available resources (i.e., special studies), coupled with GIS/Desktop evaluation. This work will be completed between January and June 2019. Following source investigation implementation, the Source Investigation Report will be produced for submittal by September 1, 2019.

The source investigation approach for toxaphene is unique because toxaphene is a legacy pesticide, the U.S. Environmental Protection Agency cancelled most of the pesticide registrations for toxaphene in 1982, and all uses were banned in 1990. Previous studies have been conducted in the RA that inform the potential sources of toxaphene. With no current uses or applications of toxaphene allowed, current toxaphene use is not a driver determining the source of the pesticide. Additionally, as shown in the trend graph, toxaphene results are variable and are not detected on a frequent basis. Finally, the previous studies in the watershed included monitoring that effectively guides the identification of potential sources of toxaphene. As a result, additional monitoring was determined to be unlikely to provide additional information that would substantially inform the location of sources or implementation of BMPs that will correct the increasing trend.

Since there are no new sources of toxaphene, the only control available is to manage sediment transport and wait for natural degradation in the environment. Based on identified exceedances, additional BMP implementation for sediment management will be required in the RA. This study will inform where the implementation of sediment BMPs will be most likely to improve water quality. In addition, because growers are not applying toxaphene, outreach regarding specific pesticide application (i.e., not using toxaphene or using alternatives) is unnecessary.

Review of Special Studies

As part of this source investigation approach, two special studies will be reviewed in more depth and utilized for identifying potential sources and for updating the VCAILG WQMP Outreach Plan and specific BMP implementation requirements. These studies that included an evaluation of potential high concentration areas and degradation are as follows:

- Calleguas Creek Watershed OC Pesticides and PCBs TMDL Special Study #2: High Concentration Areas (HCAs) and Management Practices (HCA Study)⁹
- Evaluation of Natural Attenuation Rates of Organochlorine Pesticides and PCBs in Calleguas Creek Watershed (OCP/PCB TMDL Special Study #3) (Natural Attenuation Special Study)¹⁰

The overarching methodologies and major findings of each of these studies informing the source investigation approach for Etting-Wood are summarized below.

⁹ Parties Implementing TMDLs in the Calleguas Creek Watershed. 2012. Calleguas Creek Watershed OC Pesticides and PCBs TMDL Special Study #2: HCAs and Management Practices, prepared by Larry Walker Associates. Submitted to Los Angeles Regional Water Quality Control Board, June.

¹⁰ Larry Walker Associates. 2016. Evaluation of Natural Attenuation Rates of Organochlorine Pesticides and PCBs in Calleguas Creek Watershed (OCP/PCB TMDL Special Study #3). Technical Memorandum to Stakeholders Implementing TMDLs in the Calleguas Creek Watershed, March 24.

Methodology and Key Findings of HCA Study

The HCA Study focused on identifying land areas with high organochlorine pesticides and polychlorinated biphenyls concentrations, or high concentration areas (HCA). HCAs have sediment that contains historic pesticide concentrations greater than interim sediment waste load allocations (WLAs) or load allocations (LAs).

The key components of this study were as follows:

- **This study was designed to obtain information from a variety of agricultural drains, sediment basins, and streams throughout the CCW.**
 - During Phase I of the HCA Study, sediment was sampled at seven sites, including 04D_ETTG, as well as a background (control) site, representing six different reaches within the CCW.
 - During Phase II of the HCA Study, sediment was sampled at seven sites, including 04D_ETTG, representing five different reaches.
- **This study specifically focused on locations where OC pesticides were more likely to have been historically applied and the identification of conditions that are more likely to result in the historic applications being mobilized and discharged to receiving waters.**
 - Etting-Wood was considered to be a site with high mobility potential (i.e., active agricultural areas with tilled and exposed soils were considered to have high capacity for historic pesticides in the sediment to be mobilized), as well as medium concentration potential (i.e., presence of OC pesticides in sediment based on the location and timing of historic DDT use).

The key study findings were as follows:

- **Sites with higher sediment mobility potential classifications had higher median sediment concentrations of historically applied OC pesticides.**
 - As shown in **Table 8**, which provides a summary of both Phase I and Phase II monitoring results, all sites with high mobility potential had detected sediment concentrations of historically applied OC pesticides, regardless of the concentration potential. Etting-Wood was identified in the CCW study as one of the highest observed concentration areas for OC pesticides due at least in part to the high mobility potential of sediments in the drainage area. All constituents were non-detect at the low mobility potential sites with the exception of 4,4'-DDE, which was detected, but at very low levels.
- **The information developed through the HCA Study may support BMP implementation and prioritization in the CCW.**
 - The study noted that the information in the report may be used to focus BMP efforts in areas of high mobility potential where OC pesticides were historically applied. The study specifically identified that the sites located in subwatersheds with comparatively higher concentrations, such as Mugu Lagoon and Revolon Slough (which includes the 04D-ETTGR RA), will be considered for BMP implementation. Implementation of BMPs at upstream locations, where OC

pesticides were historically applied and sediment mobility is possible, can mitigate downstream transport and prevent OC-laden sediments from accumulating and contributing to downstream concentrations.

Table 8. Median OC Pesticides Concentrations for All Monitoring Sites

Site	Classification		Median Concentrations (ng/g) ^{1, 2}						
	Mobility	Concentration	Total Chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT	Dieldrin	Total PCBs	Toxaphene
DB3-14	High	High	1.4	14.1	92.4	15.2	ND	10.0	159.8
01T_ODD3_ARN_UP	High	Medium/High	14.4	43.1	175.4	92.0	ND	ND	980.0
02D_BROOM	High	Medium/High	12.9	10.1	101.8	41.1	ND	ND	196.4
05D_D_AVI	High	Medium/High	2.7	2.6	21.2	5.1	ND	ND	174.4
05D_SANT_VCWPD	High	Medium/High	2.1	7.0	48.6	15.5	ND	ND	110.3
04D_ETTG	High	Medium	5.9	36.0	267.2	33.0	ND	ND	359.1
01T_ODD2_DCH	High	Low	9.4	24.8	89.1	14.8	ND	ND	242.7
DB3-22	Low	High	ND	ND	5.0	ND	ND	ND	ND
07T_DC_H	Low	Medium	ND	ND	3.8	ND	ND	ND	ND
DB3-01	Low	Low	ND	ND	8.2	ND	ND	ND	ND
DB3-17		Background	ND	ND	ND	ND	ND	ND	ND

1. Median calculations do not include the duplicate concentrations.

2. For sites with both reported concentrations and NDs for a particular constituent, the method detection limit (MDL) was used in place of the ND to calculate the median.

Methodology and Key Findings of Natural Attenuation Special Study

The Natural Attenuation Study focused on evaluating natural attenuation rates, evaluating methods to accelerate OC pesticide and polychlorinated biphenyl (PCB) attenuation, and examining the attainability of WLAs and LAs in the CCW.

The key components of this study were as follows:

- **As part of the special study, TMDL compliance monitoring data was examined to determine the degree to which final WLAs and LAs, and TMDL fish tissue targets have already been attained in the watershed.**
 - Once this was determined, subsequent steps included:
 - Performing time series analyses to estimate dates by which allocations and fish tissue targets were likely to be met;
 - Identifying waterbody/constituent combinations for which attainment of allocations and/or fish tissue targets may occur after the TMDL deadline; and
 - Evaluation of methods for accelerating attenuation in the latter cases.

The key study findings were as follows:

- **In most cases, it is predicted that attenuation of OC pesticides and PCBs is proceeding fast enough to lead to attainment of fish tissue targets (in freshwater reaches) and final sediment allocations by the TMDL deadline in 2026. However, additional time may be needed to meet pertinent limits for toxaphene in fish tissue and sediment in Revolon Slough.**
 - Increased implementation of agricultural sediment management BMPs by growers in the Revolon Slough watershed may be the best route for accelerating attenuation of toxaphene in the receiving water sediment.
 - Control of sediment in agricultural discharges is more likely to enhance attenuation toxaphene than detention basins for urban runoff.

GIS/Desktop Evaluation

GIS/desktop evaluation will be an important component of this source investigation, allowing a closer look at the RA to support the findings from the special study review. The primary focus of the desktop analysis will be to identify specific areas where increased sediment BMP implementation will be required.

This analysis will include the following steps:

- **Identify Areas of High Mobility Potential**
 - To identify areas that are more likely to have higher sediment movement, factors that could influence sediment movement will be considered. Such data and information to be mapped and cross-referenced, includes, but is not limited to:
 - Slope
 - Crop Type and Frequency of Crop Rotation
 - Irrigation Type
 - Sediment BMPs Implemented by Growers
 - Sediment Mobility Potential
 - Historic OC (DDT) Pesticide Use/Concentration Potential
 - Other Identified Factors that Could Influence Sediment Movement Based on Special Study Review and Grower Information
- **Identify Areas with High Mobility and Concentration Potential**
 - If possible or needed, the results of the sediment sampling completed for the HCA Study will be extrapolated to determine areas most likely to have higher toxaphene concentrations and sediment movement. Such areas will be considered potential locations for outreach regarding sediment BMP implementation.
- **Develop Source Investigation Report and Update Outreach Plan**
 - The information obtained through the GIS/desktop analysis will be used to develop a Source Investigation Report and, ultimately, inform revisions to the WQMP Outreach Plan, which will be updated to target the specific areas identified for implementing enhanced agricultural sediment management BMPs.

Appendix A. Trend Analysis Results and Actions Table

Appendix A. Trend Analysis Results and Actions Table

Responsibility Area (RA)	Site	Constituent	Weather	Trend Determination (up, down, no trend)	Data Consistently and Significantly Above Benchmark for "No Trends"?	Benchmark Source	Compliance Deadline	Enhanced BMPs in WQMP?
Arroyo Conejo & Arroyo Simi & Las Posas	06T_LONG2	DDT	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Arroyo Conejo & Arroyo Simi & Las Posas	06T_LONG2	DDD	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Arroyo Conejo & Arroyo Simi & Las Posas	06T_LONG2	DDE	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Arroyo Conejo & Arroyo Simi & Las Posas	06T_LONG2	Bifenthrin	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Arroyo Conejo & Arroyo Simi & Las Posas	06T_LONG2	Total Chlordane	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Arroyo Conejo & Arroyo Simi & Las Posas	06T_LONG2	Chlorpyrifos	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Arroyo Simi	07D_HITCH_LEVEE_2	Nitrate-N + Nitrite-N	Dry	No Trend	No	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2025	No
Arroyo Simi	07D_HITCH_LEVEE_2	Nitrate-N	Dry	No Trend	No	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2022	No
Bardsdale	S03D_BARDS	DDD	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Bardsdale	S03D_BARDS	DDE	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Bardsdale	S03D_BARDS	Bifenthrin	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
Bardsdale	S03D_BARDS	Total Chlordane	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Bardsdale	S03D_BARDS	Chlorpyrifos	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
Beardsley Wash & Malibu	05T_HONDO	DDT	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions

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Responsibility Area (RA)	Site	Constituent	Weather	Trend Determination (up, down, no trend)	Data Consistently and Significantly Above Benchmark for "No Trends"?	Benchmark Source	Compliance Deadline	Enhanced BMPs in WQMP?
Beardsley Wash & Malibu	05T_HONDO	DDD	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Beardsley Wash & Malibu	05T_HONDO	DDE	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Beardsley Wash & Malibu	05T_HONDO	Bifenthrin	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Beardsley Wash & Malibu	05T_HONDO	Total Chlordane	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Beardsley Wash & Malibu	05T_HONDO	Chlorpyrifos	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
Boulder Creek	S03T_BOULD	DDT	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Boulder Creek	S03T_BOULD	DDE	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Boulder Creek	S03T_BOULD	Nitrate-N	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
Boulder Creek	S03T_BOULD	Bifenthrin	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Boulder Creek	S03T_BOULD	Total Chlordane	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Boulder Creek	S03T_BOULD	Nitrogen Compounds	Wet	No Trend	Yes	Santa Clara River Nitrogen Compounds TMDL	October 14, 2022	Yes
Ellsworth Barranca	S02T_ELLS	DDE	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Ellsworth Barranca	S02T_ELLS	Chloride	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
Ellsworth Barranca	S02T_ELLS	Bifenthrin	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Ellsworth Barranca	S02T_ELLS	Total Chlordane	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions

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Responsibility Area (RA)	Site	Constituent	Weather	Trend Determination (up, down, no trend)	Data Consistently and Significantly Above Benchmark for "No Trends"?	Benchmark Source	Compliance Deadline	Enhanced BMPs in WQMP?
Ellsworth Barranca	S02T_ELLS	Chlorpyrifos	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Etting-Wood & Lower Calleguas Creek	04D_ETTG	DDT	Dry	Decreasing	-	Waiver Benchmark	April 14, 2026	No
Etting-Wood & Lower Calleguas Creek	04D_ETTG	DDD	Dry	Decreasing	-	Waiver Benchmark	April 14, 2026	No
Etting-Wood & Lower Calleguas Creek	04D_ETTG	DDE	Dry	Decreasing	-	Waiver Benchmark	April 14, 2026	No
Etting-Wood & Lower Calleguas Creek	04D_ETTG	Nitrate	Dry	Decreasing	-	Waiver Benchmark	April 14, 2026	No
Etting-Wood & Lower Calleguas Creek	04D_ETTG	Dissolved Copper	Dry	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from ARN-EDI copper Source Investigation Report for future BMP instructions
Etting-Wood & Lower Calleguas Creek	04D_ETTG	Toxaphene	Dry	Increasing	-	Waiver Benchmark	April 14, 2026	Source Investigation
Etting-Wood & Lower Calleguas Creek	04D_ETTG	DDT	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Etting-Wood & Lower Calleguas Creek	04D_ETTG	DDD	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Etting-Wood & Lower Calleguas Creek	04D_ETTG	DDE	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Etting-Wood & Lower Calleguas Creek	04D_ETTG	Dissolved Copper	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from ARN-EDI copper Source Investigation Report for future BMP instructions
Etting-Wood & Lower Calleguas Creek	04D_ETTG	Bifenthrin	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes

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Responsibility Area (RA)	Site	Constituent	Weather	Trend Determination (up, down, no trend)	Data Consistently and Significantly Above Benchmark for "No Trends"?	Benchmark Source	Compliance Deadline	Enhanced BMPs in WQMP?
Etting-Wood & Lower Calleguas Creek	04D_ETTG	Total Chlordane	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Etting-Wood & Lower Calleguas Creek	04D_ETTG	Chlorpyrifos	Wet	Decreasing	-	Waiver Benchmark	April 14, 2026	No
Etting-Wood & Lower Calleguas Creek	04D_ETTG	Diazinon	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Etting-Wood & Lower Calleguas Creek	04D_ETTG	Toxaphene	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Etting-Wood & Lower Calleguas Creek	04D_ETTG	Nitrate	Wet	Decreasing	-	Waiver Benchmark	April 14, 2026	No
Etting-Wood & South Revolon	04D_WOOD	Nitrate	Dry	No Trend	Dramatic decrease in recent years	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2025	No
Etting-Wood & South Revolon	04D_WOOD	Nitrate-N + Nitrite-N	Dry	No Trend	Dramatic decrease in recent years	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2025	No
Etting-Wood & South Revolon	04D_WOOD	Chlorpyrifos	Wet	No Trend	No	Calleguas Creek and Mugu Toxicity, Chlorpyrifos, & Diazinon TMDL	March 24, 2022	No
LaVista Drain	05D_LAVD	DDT	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
LaVista Drain	05D_LAVD	DDD	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
LaVista Drain	05D_LAVD	DDE	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions

Appendix A. Trend Analysis Results and Actions Table

Responsibility Area (RA)	Site	Constituent	Weather	Trend Determination (up, down, no trend)	Data Consistently and Significantly Above Benchmark for "No Trends"?	Benchmark Source	Compliance Deadline	Enhanced BMPs in WQMP?
LaVista Drain	05D_LAVD	Dissolved Copper	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
LaVista Drain	05D_LAVD	Bifenthrin	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
LaVista Drain	05D_LAVD	Total Chlordane	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
LaVista Drain	05D_LAVD	Chlorpyrifos	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
LaVista Drain	05D_LAVD	Diazinon	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
LaVista Drain & Beardsley Wash	05D_SANT_VCWPD	Nitrate	Dry	No Trend	Yes	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2025	Yes
LaVista Drain & Beardsley Wash	05D_SANT_VCWPD	Nitrate-N + Nitrite-N	Dry	No Trend	Yes	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2025	Yes
LaVista Drain & Beardsley Wash	05D_SANT_VCWPD	Nitrate	Wet	No Trend	No	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2025	No
LaVista Drain & Beardsley Wash	05D_SANT_VCWPD	Nitrate-N + Nitrite-N	Wet	No Trend	No	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2025	No
LaVista Drain & Beardsley Wash	05D_SANT_VCWPD	Total Selenium	Dry	No Trend	Natural Source	Calleguas Creek and Mugu Metals and Selenium TMDL	March 26, 2022	No
LaVista Drain & Beardsley Wash	05D_SANT_VCWPD	Chlorpyrifos	Wet	No Trend	Dramatic decrease in recent years	Calleguas Creek and Mugu Toxicity, Chlorpyrifos, & Diazinon TMDL	March 24, 2022	No
Lower Calleguas Creek	02D_BROOM	Chlorpyrifos	Wet	No Trend	No	Calleguas Creek and Mugu Toxicity, Chlorpyrifos, & Diazinon TMDL	March 24, 2022	No
McGrath Lake Coastal	OXD_CENTR	Nitrate-N	Dry	Decreasing	-	Waiver Benchmark	April 14, 2026	No
McGrath Lake Coastal	OXD_CENTR	Nitrate-N	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
McGrath Lake Coastal	OXD_CENTR	Dissolved Copper	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
McGrath Lake Coastal	OXD_CENTR	Bifenthrin	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
McGrath Lake Coastal	OXD_CENTR	Chlorpyrifos	Wet	Decreasing	-	Waiver Benchmark	April 14, 2026	No

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Responsibility Area (RA)	Site	Constituent	Weather	Trend Determination (up, down, no trend)	Data Consistently and Significantly Above Benchmark for "No Trends"?	Benchmark Source	Compliance Deadline	Enhanced BMPs in WQMP?
McGrath Lake Coastal	OXD_CENTR	Toxaphene	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
McGrath Lake Coastal	OXD_CENTR	DDT	Wet	No Trend	Yes	McGrath Lake PCBs, Pesticides, and Sediment Toxicity TMDL Waiver Benchmark	June 30, 2021	Use info from Etting-Wood Source Investigation Report for future BMP instructions
McGrath Lake Coastal	OXD_CENTR	DDD	Wet	No Trend	Yes	McGrath Lake PCBs, Pesticides, and Sediment Toxicity TMDL Waiver Benchmark	June 30, 2021	Use info from Etting-Wood Source Investigation Report for future BMP instructions
McGrath Lake Coastal	OXD_CENTR	DDE	Wet	No Trend	Yes	McGrath Lake PCBs, Pesticides, and Sediment Toxicity TMDL Waiver Benchmark	June 30, 2021	Use info from Etting-Wood Source Investigation Report for future BMP instructions
McGrath Lake Coastal	OXD_CENTR	Total Chlordane	Wet	No Trend	Yes	McGrath Lake PCBs, Pesticides, and Sediment Toxicity TMDL Waiver Benchmark	June 30, 2021	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Mugu Lagoon	01T_ODD2_DCH	Nitrate-N	Dry	No Trend	Yes	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2025	Same RA as ARN-EDI, so nitrate-N Source Investigation will inform how to proceed for the entire RA.
Mugu Lagoon	01T_ODD2_DCH	Nitrate-N + Nitrite-N	Dry	No Trend	Yes	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2025	Same RA as ARN-EDI, so nitrate-N Source Investigation will inform how to proceed for the entire RA.

Appendix A. Trend Analysis Results and Actions Table

Responsibility Area (RA)	Site	Constituent	Weather	Trend Determination (up, down, no trend)	Data Consistently and Significantly Above Benchmark for "No Trends"?	Benchmark Source	Compliance Deadline	Enhanced BMPs in WQMP?
Mugu Lagoon	01T_ODD2_DCH	Nitrate-N	Wet	No Trend	Yes	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2025	Same RA as ARN-EDI, so nitrate-N Source Investigation will inform how to proceed for the entire RA.
Mugu Lagoon	01T_ODD2_DCH	Nitrate-N + Nitrite-N	Wet	No Trend	Yes	Calleguas Creek Nitrogen Compounds TMDL	October 14, 2025	Same RA as ARN-EDI, so nitrate-N Source Investigation will inform how to proceed for the entire RA.
Mugu Lagoon	01T_ODD2_DCH	Toxaphene	Dry	No Trend	Yes	Calleguas Creek and Mugu OC Pesticides & PCBs TMDL	March 24, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Mugu Lagoon	01T_ODD2_DCH	Chlorpyrifos	Wet	No Trend	Yes	Calleguas Creek and Mugu Toxicity, Chlorpyrifos, & Diazinon TMDL	March 24, 2022	Yes
Mugu Lagoon	01T_ODD3_ARN/ 01T_ODD3_EDI	DDT	Dry	No Trend	Yes	Oxnard Drain #3 Pesticides, PCBs, and Sediment Toxicity TMDL Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Mugu Lagoon	01T_ODD3_ARN/ 01T_ODD3_EDI	Toxaphene	Dry	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Mugu Lagoon	01T_ODD3_ARN/ 01T_ODD3_EDI	DDD	Dry	Decreasing	-	Oxnard Drain #3 Pesticides, PCBs, and Sediment Toxicity TMDL Waiver Benchmark	April 14, 2026	No

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Responsibility Area (RA)	Site	Constituent	Weather	Trend Determination (up, down, no trend)	Data Consistently and Significantly Above Benchmark for "No Trends"?	Benchmark Source	Compliance Deadline	Enhanced BMPs in WQMP?
Mugu Lagoon	01T_ODD3_ARN/ 01T_ODD3 EDI	DDE	Dry	Decreasing	-	Oxnard Drain #3 Pesticides, PCBs, and Sediment Toxicity TMDL Waiver Benchmark	April 14, 2026	No
Mugu Lagoon	01T_ODD3_ARN/ 01T_ODD3 EDI	Nitrate-N	Dry	Increasing	-	Waiver Benchmark	April 14, 2026	Source Investigation
Mugu Lagoon	01T_ODD3_ARN/ 01T_ODD3 EDI	Dissolved Copper	Dry	Increasing	-	Waiver Benchmark	April 14, 2026	Source Investigation
Santa Paula Creek	S03T_TIMB	DDT	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Santa Paula Creek	S03T_TIMB	TDS	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Santa Paula Creek	S03T_TIMB	Sulfate	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
South Revolon Slough	04D_LAS	DDE	Dry	Decreasing	-	Waiver Benchmark	April 14, 2026	No
South Revolon Slough	04D_LAS	Nitrate	Dry	Increasing	-	Waiver Benchmark	April 14, 2026	Source Investigation
South Revolon Slough	04D_LAS	Dissolved Copper	Dry	No Trend	No	Waiver Benchmark	April 14, 2026	No
South Revolon Slough	04D_LAS	Toxaphene	Dry	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
South Revolon Slough	04D_LAS	DDT	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
South Revolon Slough	04D_LAS	DDD	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
South Revolon Slough	04D_LAS	DDE	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions

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Responsibility Area (RA)	Site	Constituent	Weather	Trend Determination (up, down, no trend)	Data Consistently and Significantly Above Benchmark for "No Trends"?	Benchmark Source	Compliance Deadline	Enhanced BMPs in WQMP?
South Revolon Slough	04D_LAS	Nitrate	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from 04D_LAS dry weather nitrate Source Investigation to inform BMPs
South Revolon Slough	04D_LAS	Dissolved Copper	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
South Revolon Slough	04D_LAS	Bifenthrin	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
South Revolon Slough	04D_LAS	Total Chlordane	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
South Revolon Slough	04D_LAS	Chlorpyrifos	Wet	No Trend	Dramatic decrease in recent years	Waiver Benchmark	April 14, 2026	No
South Revolon Slough	04D_LAS	Toxaphene	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Tapo Canyon	S04T_TAPO	DDT	Dry	No Trend	No	Waiver Benchmark	April 14, 2026	No
Tapo Canyon	S04T_TAPO	DDE	Dry	No Trend	No	Waiver Benchmark	April 14, 2026	No
Tapo Canyon	S04T_TAPO	TDS	Dry	Decreasing	-	Waiver Benchmark	April 14, 2026	No
Tapo Canyon	S04T_TAPO	Sulfate	Dry	Decreasing	-	Waiver Benchmark	April 14, 2026	No
Tapo Canyon	S04T_TAPO	Nitrate-N	Dry	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
Tapo Canyon	S04T_TAPO	Nitrogen Compounds	Dry	No Trend	Yes	Santa Clara River Nitrogen Compounds TMDL	October 14, 2022	Yes
Tapo Canyon	S04T_TAPO	Chloride	Dry	No Trend	Yes	Upper Santa Clara River Chloride TMDL Revisions Waiver Benchmarks	October 14, 2020	Yes
Tapo Canyon	S04T_TAPO	DDT	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Tapo Canyon	S04T_TAPO	DDD	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Tapo Canyon	S04T_TAPO	DDE	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Tapo Canyon	S04T_TAPO	Bifenthrin	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes

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Responsibility Area (RA)	Site	Constituent	Weather	Trend Determination (up, down, no trend)	Data Consistently and Significantly Above Benchmark for "No Trends"?	Benchmark Source	Compliance Deadline	Enhanced BMPs in WQMP?
Tapo Canyon	S04T_TAPO	Total Chlordane	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Tapo Canyon	S04T_TAPO	Sulfate	Wet	Decreasing	-	Waiver Benchmark	April 14, 2026	No
Todd Barranca	S02T_TODD	DDT	Wet	No Trend	No	Waiver Benchmark	April 14, 2026	No
Todd Barranca	S02T_TODD	DDD	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Todd Barranca	S02T_TODD	DDE	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Todd Barranca	S02T_TODD	Bifenthrin	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
Todd Barranca	S02T_TODD	Total Chlordane	Wet	No Trend	Yes	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions
Todd Barranca	S02T_TODD	TDS	Dry	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
Todd Barranca	S02T_TODD	Sulfate	Dry	No Trend	Yes	Waiver Benchmark	April 14, 2026	Yes
Ventura River Inland & Ventura River Coastal	VRT_THACH	DDE	Wet	Increasing	-	Waiver Benchmark	April 14, 2026	Use info from Etting-Wood Source Investigation Report for future BMP instructions