December 15, 2015

VENTURA COUNTY AGRICULTURAL IRRIGATED LANDS GROUP (VCAILG)

2014-2015 Annual Monitoring Report & Water Quality Management Plan

DRAFT

submitted to:

LOS ANGELES REGIONAL WATER QUALITY CONTROL BOARD

prepared by:

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On behalf of the:

VENTURA COUNTY AGRICULTURAL IRRIGATED LANDS GROUP (VCAILG)

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Acronyms

AMR	Annual Monitoring Report
BMP	Best Management Practice
CC	Calleguas Creek
CCW	Calleguas Creek Watershed
CCWTMP	Calleguas Creek Watershed TMDL Monitoring Program
DNQ	Detected Not Quantified
EST	Estimated
LA	Load Allocation
LARWQCB	Los Angeles Regional Water Quality Control Board (Regional Board)
MDL	Method Detection Limit
MRP	Monitoring and Reporting Plan
NA	Not Applicable
ND	Not Detected
NM	Not Measured
NOA	Notice of Applicability
NOI	Notice of Intent
NS	Not Sampled
OC	Organochlorine
OP	Organophosphorus
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RL	Reporting Limit
SCR	Santa Clara River
SCRW	Santa Clara River Watershed
TDS	Total Dissolved Solids
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
VCAILG	Ventura County Agricultural Irrigated Lands Group
VR	Ventura River
VRW	Ventura River Watershed
WQI	Water Quality Index
WQMP	Water Quality Management Plan

Executive Summary

Bordering the Pacific Ocean, Ventura County covers approximately 1.2 million acres with the Los Padres National Forest in the northern half of the county and residential, agricultural and business uses in the southern portion. Agriculture has long played an economic and cultural role in Ventura County with over 90,000 acres of irrigated cropland in current production. Home to three major watersheds, the Calleguas Creek Watershed contains the highest number of irrigated acres (approximately 51,000), followed by the Santa Clara River Watershed (approximately 32,000), Ventura River Watershed (approximately 5,500), and finally the Oxnard Plain Coastal Watershed (approximately 3,800).

On October 7, 2010 the Los Angeles Regional Water Quality Control Board (Regional Board) adopted a *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands within the Los Angeles Region* ("Conditional Waiver", Order No. R4-2010-0186). The purpose of the Conditional Waiver is to assess the effects of and control discharges from irrigated agricultural lands in Los Angeles and Ventura Counties, including irrigation return flows, flows from tile drains, and storm water runoff. These discharges can affect water quality by transporting nutrients, pesticides, sediment, salts, and other pollutants from cultivated fields into surface waters, potentially impairing designated beneficial uses. Owners and operators of agricultural lands in Ventura and Los Angeles Counties must comply with provisions contained in the Conditional Waiver or be regulated under other Regional Board programs.

The Conditional Waiver allows individual landowners and growers to comply with its provisions by working collectively as a Discharger Group, or as an individual. To assist agricultural landowners and growers that farm within the boundaries of Ventura County, various agricultural organizations, water districts and individuals joined together to form the Ventura County Agricultural Irrigated Lands Group (VCAILG), which acts as a Discharger Group for those agricultural landowners and growers that wish to participate.

During this past year, over 79% of Ventura County's agricultural landowners, representing approximately 90% of its total irrigated acres, were active and collaborative VCAILG participants. VCAILG members, as land and water stewards, understand the links between drought and water use and water quality. For decades, farming operations have invested in technology and adopted irrigation practices to use water more efficiently. Ventura County agriculture relies primarily on groundwater (about 75%) with the remaining supplied from surface and recycled water. In the late 1980s, following the last big drought, analysis of historical groundwater extraction by farmers within the boundary of the Fox Canyon Groundwater Management Agency showed a sharp decline and then water use settled into a five-year average of approximately 80,000 acre feet per year. Numbers show that while that level of extraction has been stable for over 20 years, production of water-intensive strawberries and raspberries has increased 145% and 425%, respectively. In fact, Ventura County agriculture generated over $2 billion in gross sales in 2014, with strawberries as the number one grossing crop. Lemons were the second highest grossing crop in 2014 with raspberries, nursery stock, and celery rounding out the top five crop types. Ventura County farmers are growing more with the same amount of water and that efficiency is also reducing runoff and protecting water quality.

Demonstrating VCAILG's commitment, this document serves as the fourth Annual Monitoring Report (AMR) under the current Waiver term and summarizes water quality monitoring results as well as other VCAILG activities during the July 2014 through June 2015 reporting period.

For the first time, a Water Quality Management Plan (WQMP) detailing efforts to reduce water quality impacts from irrigated agricultural discharges is being submitted with this AMR. The WQMP analyzes and responds to water quality benchmark exceedances that occurred during the 2014-2015 monitoring year. Historically, the WQMP has been submitted each May following the submittal of the AMR. Accordingly, a WQMP was submitted in May 2015. However, Regional Board staff and VCAILG members have concurred that combining the two reports more effectively communicates both monitoring results and program management planning. As the first combined AMR/WQMP report, this submittal includes new analysis as well as refined information for several elements contained in the May 2015 WQMP.

Also included in the report is data from Total Maximum Daily Loads (TMDL) monitoring program for the Calleguas Creek Watershed to meet the requirements incorporated into the 2010 Conditional Waiver for agriculture. VCAILG coordinates with established TMDL monitoring programs and plays an active role in facilitating the participation of agriculture in TMDL development and implementation processes. Acting on behalf of its members, VCAILG representatives participate in stakeholder meetings, provide comments, and contribute to cooperative agreements.

The combined AMR/WQMP is structured as follows:

- Background
    - Description of the VCAILG membership and its governance
    - Overview of irrigated agriculture in Ventura County
- Results of the Water Quality Monitoring Program
    - Description of the water quality monitoring program, including its objectives, site descriptions, monitored constituents and frequency of events, sampling and analytical methods, and the water quality objectives ("benchmarks") that monitoring data are compared against.
    - Detailed results of the monitoring events
    - Evaluation of data quality (outcomes of quality assurance procedures related to precision and accuracy, such as analysis of field duplicates and blanks, laboratory spike and recovery tests, adherence to required detection and reporting limits).
    - Summary of exceedances of water quality benchmarks and TMDL LAs
    - Temporal trend analysis for individual constituents
- Water Quality Management Plan
    - Update on progress implementing the most recent WQMP, including education and outreach activities and the status of the program to track use of Best Management Practices (BMPs) by the VCAILG membership
    - New analysis and synthesis of monitoring data and other data to support a targeted outreach plan

- Targeted outreach plan and summary of next steps in Waiver implementation

Monitoring Results

The VCAILG AMR reviews progress toward attainment of water quality benchmarks included in the Conditional Waiver and with the final or interim Load Allocations (LAs) assigned to irrigated agriculture in TMDLs throughout Ventura County. Sixteen sites representing runoff from agriculture-dominated drainages are monitored by VCAILG during two dry events and two wet events annually to assess attainment of the water quality benchmarks. In addition, the Calleguas Creek Watershed TMDL Monitoring Program (CCWTMP) monitors an additional seven agricultural land use sites representing runoff from agriculture-dominated drainages, and several receiving water sites, each during four dry events and two wet events annually. Data from CCWTMP agricultural land use sites, or receiving water sites depending on the TMDL, are integrated in the VCAILG AMR to assess compliance with the applicable LAs for irrigated agriculture.

In summary, during the 2014-2015 monitoring year, Conditional Waiver benchmarks or TMDL LAs were exceeded for the following constituents at least at one monitoring location:

- Organochlorine (OC) Pesticides (DDT and breakdown products, total chlordane, toxaphene, dieldrin)
- Copper and Selenium
- Chlorpyrifos and Diazinon
- Toxicity
- Nitrate
- pH
- Salts

A long-term statistical trend analysis for individual constituents was performed using data from the VCAILG monitoring program collected between June 2007 and May 2015 with the following findings:

- After a total of 25 monitoring events, rarely detected or never detected OC pesticides include aldrin, alpha-BHC, beta-BHC, gamma-BHC, dieldrin, endosulfan I, endosulfan II, endosulfan sulfate, endrin, and endrin aldehyde.
- Statistically significant downward trends were demonstrated for pesticides (one or more of 4,4'-DDD, 4,4'-DDE, and chlorpyrifos at 5 sites), nitrate (at 1 site), and one or more salts (at 2 sites).
- Statistically significant increasing trends were observed for dissolved copper (at 1 site), nutrients (at 2 sites), and one or more salts (at 3 sites).

Another influencing factor is that many of the VCAILG sites have been dry during monitoring conducted under both the 2005 and 2010 Conditional Waivers. Of note, 10 of 16 VCAILG monitoring sites are frequently dry, at frequencies ranging between 40-88% of monitoring events to date. This indicates that agricultural entities are not causing or contributing to Conditional

Waiver or TMDL benchmark exceedances in these drainages under sampling conditions. As Ventura County continues to experience significant drought conditions and irrigation efficiency methods improve, it is likely the trend of dry monitoring sites will increase.

Water Quality Management Plan

Each year, the WQMP identifies actions to be taken by VCAILG to address exceedances of the standard water quality benchmarks included in the Conditional Waiver and applicable TMDL LAs. As shown by this year's monitoring data and multi-year trends, benchmark exceedances are continuing for some constituents.

At a meeting on April 27, 2015 between Regional Board staff and VCAILG representatives, it was agreed that a more effective approach than previously utilized priority areas (Tiers 1-3) would be to educate VCAILG members about water quality benchmark exceedances in their specific area and to advance implementation of related BMPs. To guide this process, it was also requested that water quality monitoring results be better integrated with surveyed BMP implementation to demonstrate links between them. This is possible because, over the two Waivers terms, a more robust data set has been constructed. As a result, this WQMP attempts to evaluate the relationship between BMP implementation and water quality, with the goal of refining the outreach strategy to more directly address exceedances. Therefore, this WQMP supplements information contained in the May 2015 by performing four types of data analysis, which are listed below with summaries of methods and results.

<u>Pesticide Use Evaluation (analysis required annually by the Conditional Waiver)</u>

Of the 15 sites visited during the monitoring events, 5 of the VCAILG monitoring sites had exceedances of the chlorpyrifos water quality benchmark, all during wet weather. There does not appear to be any correlation between chlorpyrifos application amount and benchmark exceedances. There were no exceedances of the diazinon water quality benchmark during the 3 monitoring events and application amounts within the monitoring drainage areas were minimal.

<u>BMP Adoption Rates for Principal Watersheds (new analysis of existing data)</u>

Previously, the analysis of BMP survey data presented in WQMPs has focused on the calculation of several metrics for each of several dozen specific BMPs:

- Current Adoption Rate
- Adoption Rate Prior to October 2010
- Change in Adoption Rate During the Current Waiver Term
- Future Additional Planned Adoption

The metrics reflect percents of applicable surveyed irrigated acreage upon which survey respondents report that particular BMPs are in use, or planned to be in use in the future. The raw survey results are initially assigned to individual parcels, but are then aggregated on a geographic basis (e.g., according to drainage areas) before computation of adoption rates. Adoption rates are further simplified by averaging results for logical groupings of BMPs. To date, the finest scaled survey metrics that have been calculated are based on the specific drainage areas of VCAILG or TMDL-related agricultural land use monitoring sites. However, much of the acreage falls outside of the drainages of specific agricultural land use monitoring sites and was previously

identified as a single geographical group. This wide of a scale provides limited insight to potential trends.

To assist in matching areas with varying levels of BMP adoption for specific categories, 2015 BMP survey metrics for this WQMP were generated for eleven principal watersheds in the County (three coastal watersheds, the Ventura River Watershed, the Santa Clara River Watershed, and six subwatersheds within the Calleguas Creek Watershed) covering in aggregate all of the irrigated agricultural land in Ventura County.

In general terms, this revealed that very high current adoption rates were reported for BMPs that address management of nutrients, pesticides, and trash, and the lowest current adoption rates were reported for BMPs that address management of irrigation/salts or sediment.

Water Quality Indices (new approach)

The Canadian Council of Ministers of the Environment (CMME) Water Quality Index (WQI) was selected as a new tool that could be used to:

- Simplify long-term VCAILG monitoring data sets involving multiple constituents
- Easily communicate water quality conditions and trends
- Track progress toward attainment of water quality benchmarks
- Establish water quality scores for analyte groups that might reflect effectiveness of logical categories of BMPs .

The WQI mathematically combines a number of variables into easily understood values (or "scores") and can be computed for analyte groups tailored to particular reporting activities and audiences. WQI scores are customarily binned into five tiers, allowing for further simplification using letter "grades" and communication using "heat maps," as shown below. This is also a more direct method of evaluating incremental steps towards improvement as scores can demonstrate progress, even at levels below benchmark attainment.

WQI score	Grade	Interpretation
96-100	A	Excellent – Benchmarks almost always met
81-95	B	Very Good
66-80	C	Fair
46-65	D	Marginal
0-45	F	Poor – All constituents excced benchmarks with high frequency

The following information and assumptions led to the development of the WQI:

- In considering the ways that pollutant transport is likely to be affected by agricultural BMPs, four analyte groups - Nutrients, Salts, Current Use Pesticides, and Legacy Pesticides - were established for the VCAILG WQI using a subset of the constituents and numeric benchmarks listed in Appendix 2 of the Conditional Waiver.
- The four analyte groups - Nutrients, Salts, Current Use Pesticides, and Legacy Pesticides - were designed so that they will align with BMP categories established for the online BMP surveys.
- A robust database was created combining all available monitoring data from 2007-2015 for VCAILG sites and data from both agricultural land use sites and receiving water sites

in the CCW TMDL Monitoring Program. For the first time, water quality conditions in the CCW can be evaluated using receiving water data and other related results to develop a more comprehensive picture.

- As weather is a defining element for water quality conditions, a time series of annual WQI scores was generated separately for dry and wet event data for each agricultural land use site, and all available receiving water sites in the CCWTMP.
- In addition to the annual scores by watershed sites, average scores for the two Waiver periods for each site were computed as the mean of component annual scores. An analysis of progress between the two Waiver periods is now possible.
- For each analyte group, two heat map tables were created showing the time series of WQI raw scores (and grades) for dry or wet weather (Tables 101-108). In addition, companion maps displaying the average grades for the current Conditional Waiver are also included in the WQMP (Figures 14- 21, beginning on page 182).

Key findings from the WQI evaluation are as follows:

Salts

- Based on receiving water quality, Conejo Creek, Arroyo Simi, and Revolon Slough subwatersheds receive "poor" grades for salts during dry weather.
- In the problematic subwatersheds, it appears that runoff from row crops may contribute to salt exceedances, but that runoff from orchards is not a source of salts during dry weather.
- The only subwatershed with poor salt conditions during wet weather is Revolon Slough. In that subwatershed, there is no evidence that orchards are an important source of salts during wet weather, but runoff from row crops may be an important source. The absolute WQI scores for salts in Revolon Slough receiving water have improved between Waivers for wet weather.

Nutrients

- During dry weather, Conejo Creek receives "very good" to "excellent" nutrient grades. Receiving water in the other subwatersheds in the Calleguas Creek Watershed receives only "fair" or "marginal" nutrient grades. However, in all of the subwatersheds with "fair" or "marginal" nutrient grades, the absolute WQI scores increased somewhat between Waivers.
- Receiving water scores are not available for Santa Clara and Ventura Rivers for nutrients, but based on the WQI scores, orchards are not an important source of nutrients to receiving waters during dry weather in those watersheds, and do not appear to be an important source of nutrients during wet weather either.
- Nutrient grades for nutrients are generally better during wet weather than dry weather at receiving water sites and at many agricultural land use sites, resulting in "excellent" to "very good" grades at receiving water sites that have only "fair" or "marginal" grades during dry weather. The key exception is in Revolon Slough, where wet weather nutrient conditions are equally poor during dry and wet weather.

Current Use Pesticides

- With few exceptions, grades for current use pesticides at receiving water and agricultural land use monitoring sites are "very good" to "excellent" throughout the County during dry weather. The key exception may involve agricultural runoff from row crops, nurseries, and/or sod fields on the Oxnard Plain that drain directly to Mugu Lagoon, although the receiving water site in Mugu Lagoon has a very good WQI score for current-use pesticides.

- During wet weather, concentrations of current use pesticides lower grades from "very good" or "excellent" (during dry weather) to "fair" or "marginal" at monitoring sites throughout the County, with the key exception that runoff from orchard-dominated drainages in the Ventura River Watershed maintains "excellent" grades during both dry and wet weather.

- Marked improvement in WQI scores for current-use pesticides occurred during the implementation period of the current Waiver. Almost every monitoring site that received an average grade of "poor" for the previous Waiver for wet weather received a "fair" or "marginal" grade during the current Waiver. In the few exceptions where improvements were not sufficient to change the "letter" grade at a monitoring site, the absolute WQI scores still improved. Improvements in grades for many sites also occurred between waivers for dry weather.

Legacy Pesticides

- With the exception of Conejo Creek, receiving water sites in Calleguas Creek Watershed receive only "marginal" or "poor" grades for legacy pesticides during both dry and wet weather. However, in three areas (Arroyo Simi subwatershed, lower reaches of Calleguas Creek Watershed, and McGrath Lake subwatershed) grades improved (e.g., from "poor" to "marginal") between Waivers for dry and/or wet weather.

- Receiving water scores are not available for Santa Clara and Ventura Rivers for legacy pesticides, but orchards in these watersheds appear to pose a lower risk of legacy pesticide discharges compared to orchards elsewhere and row crops generally.

- In the Revolon Slough subwatershed, orchard land use sites share a "poor" grade with row crop land use sites during wet weather.

<u>Selected Comparisons of WQI Scores and BMP Adoption Rates (new approach)</u>

Preliminary data exploration was conducted to investigate whether BMP adoption rates are reflected by water quality at agricultural land use sites. The WQI analyte groups were designed so that they aligned logically with one or more BMP management categories. Scatterplots were prepared using BMP adoption rates calculated for the drainages of individual monitoring sites (using results of the 2015 online BMP survey) as the independent (horizontal) axis, and dry weather Waiver averages of WQI scores for same sites as the dependent (vertical) axis.

Predictive relationships between individual BMP adoption rates and WQI scores were not revealed by the preliminary data exploration. This is not necessarily unexpected because the extent to which surveyed acreage reflects the total irrigated land in a drainage area varies widely among the monitored drainages, and total irrigated land can represent a small portion of total land cover in the drainages of agricultural land use sites. Consequently, WQI scores for

agricultural land use monitoring sites represent commingled discharges from more than one land use.

In many cases, the scatterplots revealed dual tiers of high performing sites (with very good water quality) and lower performing sites (with poorer water quality) – each associated with a wide range of BMP adoption rates. In order to investigate what factors might be driving this pattern, an overall WQI score was generated for each agricultural land use site for dry weather and wet weather by averaging the respective WQIs for all four analyte groups. Then, the sites were ranked according to either dry weather scores or wet weather scores, and the top- and bottom-ranked sites were identified.

Three important findings resulted from this exercise:

- Approximately the same sites were among either the top ranked or the bottom ranked sites for both dry and wet weather. This finding should be useful for planning BMP training and outreach; it should not be necessary to establish different priority areas to tackle both dry and wet weather water quality issues.

- Drainages dominated by orchards are clearly differentiated from drainages dominated by row crops in terms of water quality at their downstream monitoring sites. However, according to the BMP survey data for individual drainages, good water quality outcomes for orchard-dominated drainages are not the result of consistent high adoption of irrigation management BMPs. Growers in the drainages of the monitoring sites with the best overall water quality report some of the highest – and some of the lowest – adoption rates for irrigation management BMPs. This may mean that minimization of runoff can be achieved in some orchards without employing many of the BMPs included in the VCAILG online BMP surveys. Based on the analysis, it would be reasonable to focus BMP training and outreach in all pollutant management categories toward growers of row crops.

- Overall water quality appears poorest at agricultural land use sites that drain directly to Mugu Lagoon or are in the Revolon Slough Watershed, with improvements warranted in the discharge of all of the analyte groups. In addition, based on data from 07D_HITCH_LEVEE_2, and on receiving water WQI scores for Arroyo Simi, it may also be a priority to improve management of salts, nutrients and current-use pesticides by growers of row crops in the Moorpark area.

Education Program Report

Ongoing water quality education of VCAILG members is an important component of the overall program. In addition to monitoring and reporting, VCAILG works with cooperating organizations and commodity groups to provide education opportunities for its members related to Conditional Waiver requirements, local water quality issues, and best management practices (BMPs) to improve farm water quality. The Conditional Waiver requires 8 hours of education. During this monitoring year, 28.5 hours of classes qualified for education credit and an additional 15 hours were offered since the end of the monitoring year to the present. Since 2010, over 50 education classes have been offered, adding up to 169.5 hours. At this time, 840 VCAILG members have fulfilled the eight hour requirement; 535 of those members have completed more than 8 hours, totaling 12,782 hours of water quality education.

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Introduction

On October 7, 2010 the Los Angeles Regional Water Quality Control Board (Regional Board) adopted a *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands within the Los Angeles Region* ("Conditional Waiver", Order No. R4-2010-0186). The purpose of the Conditional Waiver is to assess the effects of and control discharges from irrigated agricultural lands in Los Angeles and Ventura Counties, including irrigation return flows, flows from tile drains, and storm water runoff. These discharges can affect water quality by transporting nutrients, pesticides, sediment, salts, and other pollutants from cultivated fields into surface waters, potentially impairing designated beneficial uses. Owners and operators of agricultural lands in Ventura and Los Angeles Counties must comply with provisions contained in the Conditional Waiver or be regulated under other Regional Board programs.

The Conditional Waiver allows individual landowners and growers to comply with its provisions by working collectively as a Discharger Group, or as an individual. A Discharger Group is defined by the Conditional Waiver as "any group of dischargers and/or organizations that forms to comply with this Order. Discharger Groups can be, but are not limited to, organizations formed on a geographic basis or formed with other factors in common such as commodities." The primary purpose of allowing Discharger Groups is to encourage collaboration on monitoring and reporting and to increase the effectiveness of management practices throughout a watershed to attain water quality standards. Those landowners and growers choosing to comply with the Conditional Waiver as a Discharger Group must signify by submitting a Group Notice of Intent and by developing a Discharger Group monitoring program.

To assist agricultural landowners and growers that farm within the boundaries of Ventura County, various agricultural organizations, water districts and individuals joined together to form the Ventura County Agricultural Irrigated Lands Group (VCAILG), which is intended to act as one unified "Discharger Group" for those agricultural landowners and growers that wish to participate. A Notice of Intent (NOI) to comply with the Conditional Waiver was submitted to the Regional Board by the VCAILG on April 7, 2011. The NOI included the VCAILG membership roster, as well as the required Quality Assurance Project Plan (QAPP) and Monitoring and Reporting Program Plan (MRP), which detail the water quality monitoring and reporting procedures being conducted in compliance with the terms of the Conditional Waiver. The Regional Board responded by issuing the Notice of Applicability (NOA) to the VCAILG on September 15, 2011, signifying the Regional Board's approval of the VCAILG and its Monitoring Program.

This document serves as the fourth Annual Monitoring Report (AMR) summarizing data collected under the 2010 Conditional Waiver (Order No. R4-2010-0186). This report provides a detailed summary of activities of the VCAILG during 2014-2015, including administration of the VCAILG, an overview of farming in Ventura County, coursework offered to VCAILG members to fulfill the Conditional Waiver's education requirement, a list of education hours completed to date by each member, and monitoring data collected during the wet and dry monitoring events conducted. Also included is a discussion of monitoring results that exceeded water quality benchmarks.

In addition, a Water Quality Management Plan (WQMP) detailing efforts to reduce water quality impacts from irrigated agricultural discharges is being submitted as part of this AMR in response to water quality benchmark exceedances that occurred during the 2014-2015 monitoring year.

Historically, the WQMP has been submitted each May following the submittal of the AMR. Accordingly, a WQMP was submitted in May 2015. However, Regional Board staff and VCAILG members have been working to coordinate the submittal of documents to the Regional Board and combining the two reports was determined to be a more effective way of communicating the information and managing the program. This WQMP includes updated information for several elements that were also included in the May 2015 WQMP, and some new elements. The WQMP submitted in May 2015 contained a variety of detailed analyses of the results of the web-based best management practices (BMP) surveys conducted in 2014 and 2015. No additional BMP surveys were solicited from VCAILG members after the submittal of the May 2015 WQMP. However, additional analysis of the 2015 BMP survey results was conducted for this WQMP, including an exploration of relationships between BMP survey metrics and water quality data for drainage areas of VCAILG monitoring sites. The latter evaluation was supported by new metrics (Water Quality Indices, or WQIs) derived using monitoring data from VCAILG and available TMDL monitoring programs that provide water quality "scores" for constituent groups (Nutrients, Salts, Current Use Pesticides, and Legacy Pesticides) on an annual basis and for Conditional Waiver terms. The WQI scores facilitated development of a targeted outreach plan for the next year of Conditional Waiver Implementation and can provide a basis for tracking water quality outcomes going forward.

Group Membership and Setting

The VCAILG was formed in 2006 to act as one unified "Discharger Group" in Ventura County for the purpose of compliance with the Conditional Waiver. VCAILG oversight is provided by an 18-member Steering Committee and a 7-member Executive Committee (also members of the Steering Committee). Steering Committee membership consists of agricultural organization representatives, agricultural water district representatives, landowners and growers from the three primary watersheds in Ventura County (Calleguas Creek, Santa Clara River, and Ventura River). Steering Committee membership also represents the major commodities grown in Ventura County (strawberries, nursery stock, citrus, vegetables, and avocados). The Steering Committee roster is presented in Table 1.

Because the VCAILG is an unincorporated organization, the Farm Bureau of Ventura County acts as the responsible entity for the collection of funds, contracting with consultants, and other fiscal and/or business matters that require an organization with some form of tax status; the Farm Bureau is a non-profit 501(c)(5) organization.

A list of VCAILG members and associated parcels is included as Appendix A. The membership list includes the following information:

- Landowner Name
- Mailing Address
- Parcel number(s)
- Irrigated acres per parcel
- Watershed associated with each parcel

Table 2 contains a summary of VCAILG membership statistics, including the number of landowners and parcels enrolled, as well as irrigated acreage enrolled in each watershed. All membership statistics represent group status in December of 2015. At that time, VCAILG represented 1,281 Ventura County agricultural landowners and 82,189 irrigated acres.

According to the Ventura County Assessor's records, there are an estimated 337 landowners not enrolled in VCAILG. Therefore, VCAILG represents 79 percent of agricultural landowners in Ventura County covering approximately 90 percent of the estimated irrigated acreage.

Table 1. VCAILG Steering Committee Membership

Member, Organization [1]	Crop(s) Represented	Watershed(s) Represented
Edgar Terry, Terry Farms, Inc. (Committee Chair)	Strawberries, Vegetables	Calleguas Creek, Santa Clara River
Steve Bachman, United Water District*	N/A	N/A
Jonathan Chase, Hailwood, Inc.	Strawberries, Vegetables	Calleguas Creek
Jerry Conrow, Ojai Basin GMA*	Citrus	Ventura River
Robert Crudup, Valley Crest Tree Company	Nursery Stock	Santa Clara River
Paul DeBusschere, DeBusschere Ranch	Strawberries, Avocados	Calleguas Creek
Mike Friel, Laguna Grove Service	Citrus	Calleguas Creek
Jesse Gomez, Newhall Land & Farming	Citrus, Hay, Nursery Stock, Vegetables, Sod, Pasture	Santa Clara River
Jurgen Gramckow, Southland Sod Farms	Sod, Hay, Oats, Vegetables	Calleguas Creek, Santa Clara River, Ventura River
Gus Gunderson, Limoneira Company	Avocado, Citrus	Santa Clara River
John Krist, Farm Bureau of Ventura County*	N/A	N/A
Jim Lloyd-Butler, Lloyd Butler Ranch	Avocado, Citrus	Calleguas Creek, Santa Clara River
John Mathews, Arnold, Bleuel, LaRochelle, et al.*	N/A	N/A
Doug O'Hara, Somis Pacific Ag Management Company	Avocado, Citrus	Calleguas Creek, Santa Clara River
Kelle Pistone, Assoc. of Water Agencies of Ventura County*	N/A	N/A
Rob Roy, Ventura County Agricultural Association*	N/A	N/A
Dave Souza, Pleasant Valley County Water District*	N/A	N/A
Craig Underwood, Underwood Ranches	Avocado, Citrus, Vegetables	Calleguas Creek, Santa Clara River

N/A = Not Applicable

1. An asterisk denotes Executive Committee membership

Table 2. VCAILG Membership Statistics as of December 2015

Watershed	Landowner Count	Parcel Count	Irrigated Acres
Calleguas Creek	563	1,301	42,268
Oxnard Coastal	72	159	5,890
Santa Clara River	519	1,212	29,146
Ventura River	194	400	4,886
Total	*1,348* [1]	*3,072*	*82,189*

1. There are 1,281 unique landowners enrolled, a number of whom own property in more than one watershed.

IRRIGATED AGRICULTURE IN VENTURA COUNTY

Ventura County covers 1,843 square miles (approximately 1.2 million acres) with 43 miles of coastline (Figure 1). The Pacific Ocean forms its southwestern boundary, with Los Angeles County to the southeast, Kern County to the north and Santa Barbara County to the west. The Los Padres National Forest accounts for the northern half of the county, with residential, agricultural and business uses in the southern portion. According to the most recent Crop and Livestock Report, Ventura County has approximately 93,376 acres of irrigated cropland.[1] The Calleguas Creek Watershed contains the highest number of irrigated acres (approximately 51,000), followed by the Santa Clara River Watershed (approximately 32,000), Ventura River Watershed (approximately 5,500), and finally the Oxnard Plain Coastal Watershed (approximately 3,800).[2]

Agriculture is a major industry in Ventura County, generating over $2 billion in gross sales for 2014. This gross value is up 2 percent from 2013.[3] Strawberries are the number one grossing crop type in Ventura County, but with a 3 percent increase in gross sales between 2013 and 2014. Lemons were the second highest grossing crop in 2014 with raspberries, nursery stock, and celery rounding out the top five crop types. Table 3 lists the County's ten leading crops in gross value for 2014. Characteristics of each of the three main watersheds in Ventura County are discussed in more detail in the following sections.

[1] Ventura County Agricultural Commissioner. *Ventura County's Crop & Livestock Report 2014*. November 3, 2015.

[2] Estimates of irrigated agricultural acreage by watershed are based on the geographic information system (GIS) crop data as of September 2015 provided by Ventura County.

[3] Ventura County Agricultural Commissioner. *Ventura County's Crop & Livestock Report 2014*. November 3, 2015.

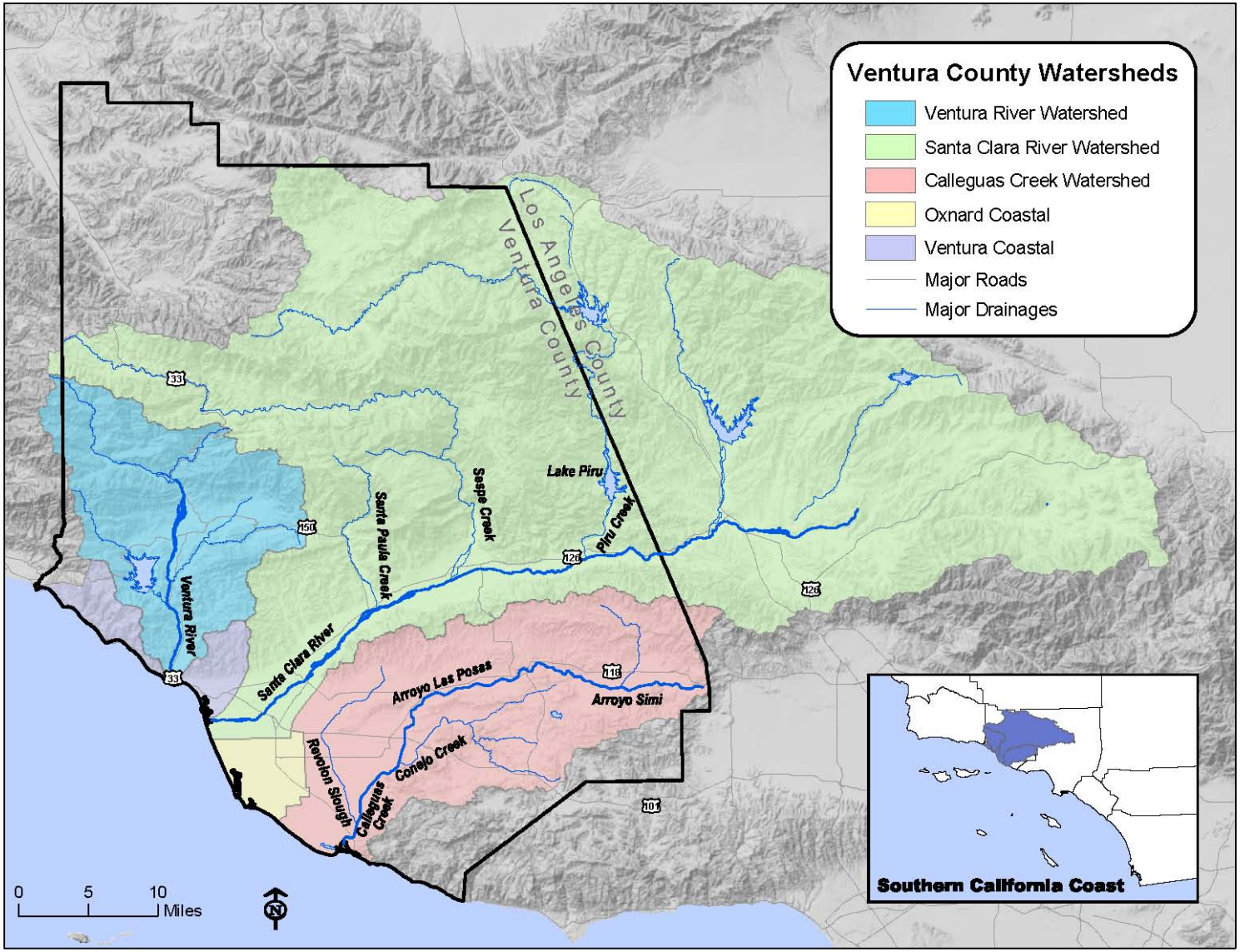


Figure 1. Ventura County Watersheds

Table 3. Ventura County's Leading Agricultural Commodities–2014

Commodity	Gross Value ($)
1. Strawberries	627,964,000
2. Lemons	269,428,000
3. Raspberries	240,662,000
4. Nursery Stock	180,449,000
5. Celery	152,153,000
6. Avocados	127,978,000
7. Tomatoes	72,207,000
8. Peppers	67,268,000
9. Cut Flowers	47,615,000
10. Kale	35,932,000

Source: Ventura County Agricultural Commissioner. *Ventura County's Agricultural Crop & Livestock Report 2014.* November 3, 2015.

Calleguas Creek Watershed

The Calleguas Creek Watershed (Figure 2) is approximately 30 miles long, 14 miles wide, and drains an area of approximately 343 square miles or 219,520 acres. Cities within the watershed include Camarillo, Thousand Oaks, Moorpark, and Simi Valley. The main surface water system drains from the mountains in the northeast part of the watershed toward the southwest, where it flows through the Oxnard Plain before emptying into the Pacific Ocean through Mugu Lagoon. The main waterbodies in the watershed include Calleguas Creek, Revolon Slough, Beardsley Channel, Conejo Creek, Arroyo Santa Rosa, Arroyo Las Posas and Arroyo Simi. All of these waterbodies appear on the federal 303(d) list of impaired waterbodies, triggering the requirement to develop Total Maximum Daily Loads (TMDLs) for specified pollutants identified as causing impairments. Runoff from irrigated agricultural lands has been identified as one of the sources of these water quality impairments for specified pollutants. To date, TMDLs have been adopted for Nitrogen Compounds, Trash, Organochlorine Pesticides, Polychlorinated Biphenyls (PCBs) and Siltation, Toxicity, Metals and Selenium, and Salts.

Approximately 51,000 acres or 23 percent of land in the Calleguas Creek Watershed is used for agricultural purposes. Avocados and citrus crops such as lemons and oranges are typically grown in flat or gently sloping foothill areas in the watershed. Agricultural land located on the Oxnard Plain is planted predominately in a wide variety of truck crops, including strawberries, raspberries, peppers, green beans, celery, and onions, as well as sod farms and nurseries. Many farms located in the watershed grow multiple crops during a single calendar year. This multi-cropping technique is most common in the lower parts of the watershed, adjacent to Revolon Slough and Lower Calleguas Creek.

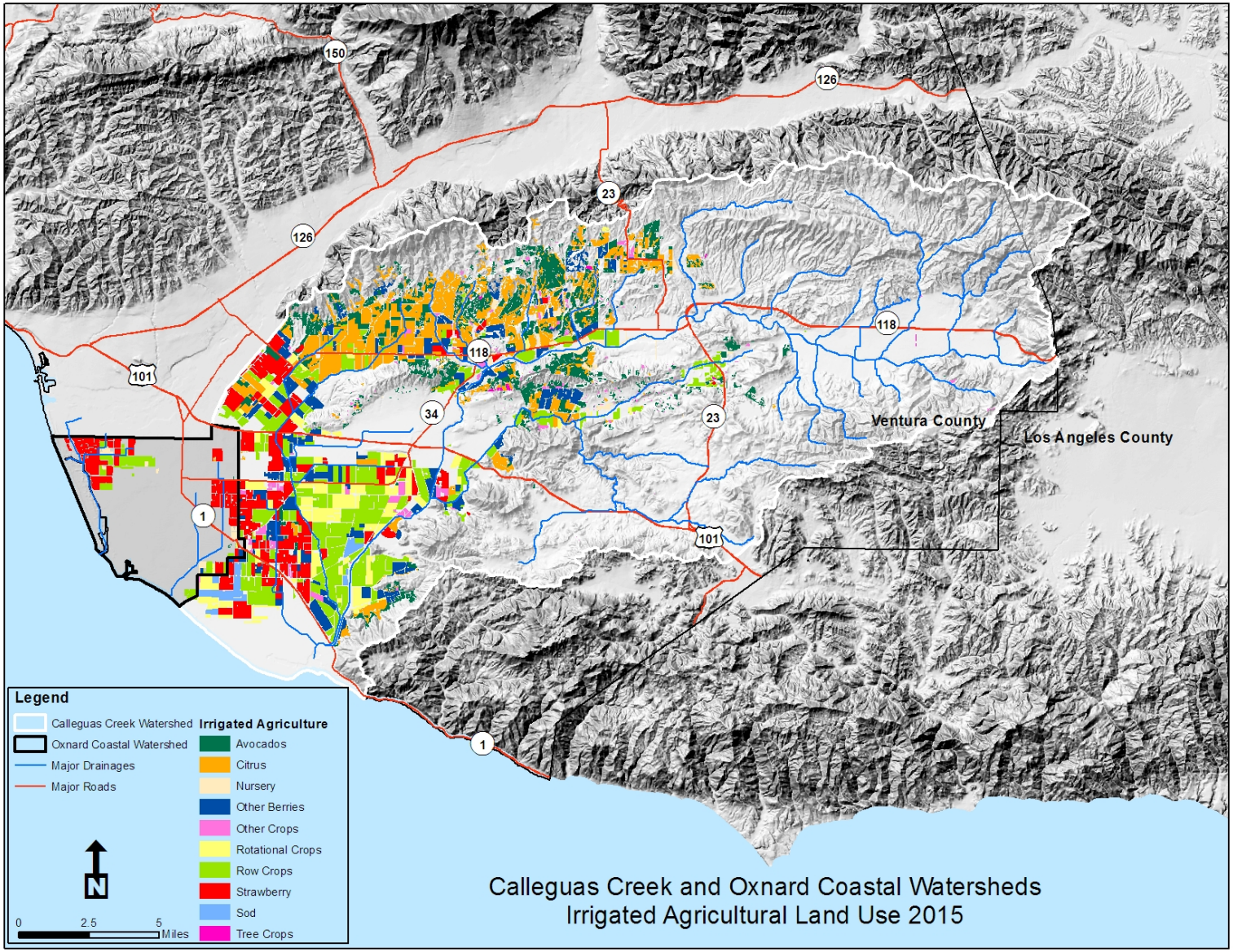


Figure 2. Calleguas Creek Watershed Agricultural Land Use

Santa Clara River Watershed

The Santa Clara River is the largest river system in southern California remaining in a relatively natural state. The river originates in the northern slope of the San Gabriel Mountains in Los Angeles County, traverses Ventura County, and flows into the Pacific Ocean halfway between the cities of San Buenaventura and Oxnard. The Santa Clara River and tributary system has a watershed area of about 1,634 square miles or over one million acres (Figure 3). Cities within the watershed include Ventura, Santa Paula, Fillmore, Piru, Santa Clarita, and Newhall. Major tributaries include Castaic Creek and San Francisquito Creek in Los Angeles County, and the Sespe, Piru, and Santa Paula Creeks in Ventura County. Approximately 40 percent of the watershed is located in Los Angeles County and 60 percent is in Ventura County. The most prevalent land use in the 500-year flood plain of the Santa Clara River is agriculture (62 percent), followed by industry (22 percent). Row crops and orchards are planted across the valley floor primarily in Ventura County and extend up adjacent slopes.

Several Santa Clara River reaches and tributaries appear on the federal 303(d) list of impaired waterbodies due to salts, nitrogen compounds, bacteria, and pesticides. TMDLs have been adopted for Nitrogen Compounds (upper and lower Santa Clara River reaches), Chloride (Reach 3) and Bacteria (Estuary and Reaches 3, 5, 6, and 7). A TMDL for toxaphene in the Santa Clara River Estuary was incorporated in the 2010 Waiver as a single regulatory action.

Just south of the Santa Clara River mouth lies a small coastal watershed that drains to McGrath Lake. A TMDL has been adopted to address pesticides and PCBs impairments in the lake. This TMDL addresses areas within the Oxnard Coastal Watershed that drain to the Central Ditch at Harbor Boulevard.

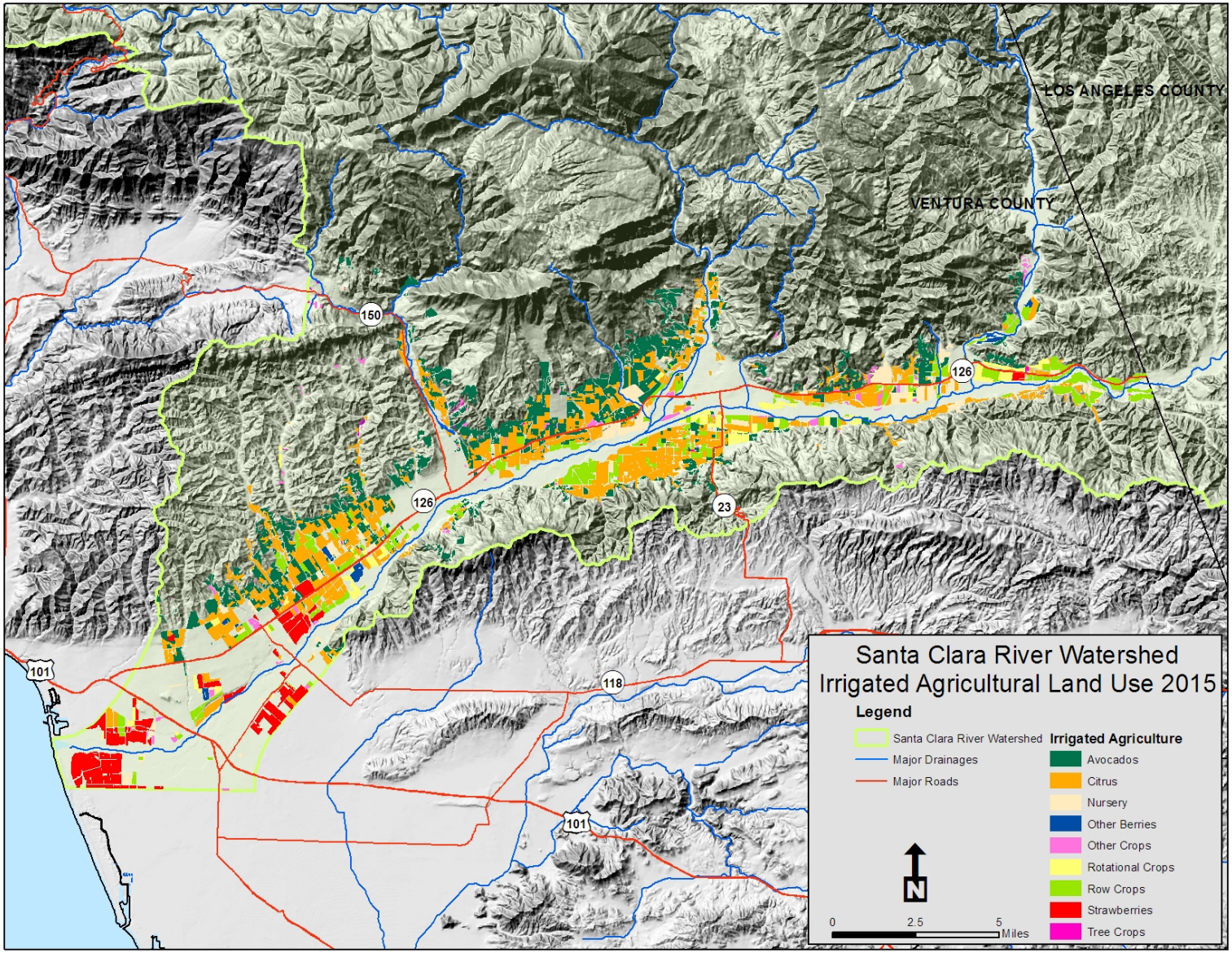


Figure 3. Santa Clara River Watershed Agricultural Land Use

Ventura River Watershed

The Ventura River and its tributaries drain a coastal watershed in western Ventura County. The watershed covers a fan-shaped area of 235 square miles, which is located within the western Transverse Ranges and is 31 miles long from upper Matilija Canyon to the Pacific Ocean (Figure 4). From the upper slopes of the Transverse Ranges, the surface water system in the Ventura River Watershed generally flows in a southerly direction to the estuary, located at the mouth of the Ventura River. Main tributaries in the watershed include Matilija Creek, Coyote Creek and San Antonio Creek. The City of Ojai and communities of Meiners Oaks, Oak View and Casitas Springs are located in the watershed, with surrounding suburban and agricultural areas comprising the Ventura River, Santa Ana, and Upper Ojai Valleys. Portions of the City of San Buenaventura border the lower reaches of the Ventura River. Irrigated agriculture constitutes approximately five percent of land uses in the watershed, with avocado and citrus as the predominant crops grown.

Several Ventura River reaches and tributaries appear on the federal 303(d) list of impaired waterbodies due to Algae/Eutrophic Conditions, Bacteria, Pumping/Water Diversion, and Trash. The Ventura River Estuary Trash TMDL became effective in 2008. A TMDL for algae, eutrophic conditions, and nutrients became effective in July 2013 (Algae TMDL). In its approval notice for the Algae TMDL, the USEPA determined that the Algae TMDL addresses the beneficial use impairments on the 303(d) list identified as being caused by by pumping and water diversions. Consequently, a separate TMDL for pumping and water diversions is not expected to be adopted.

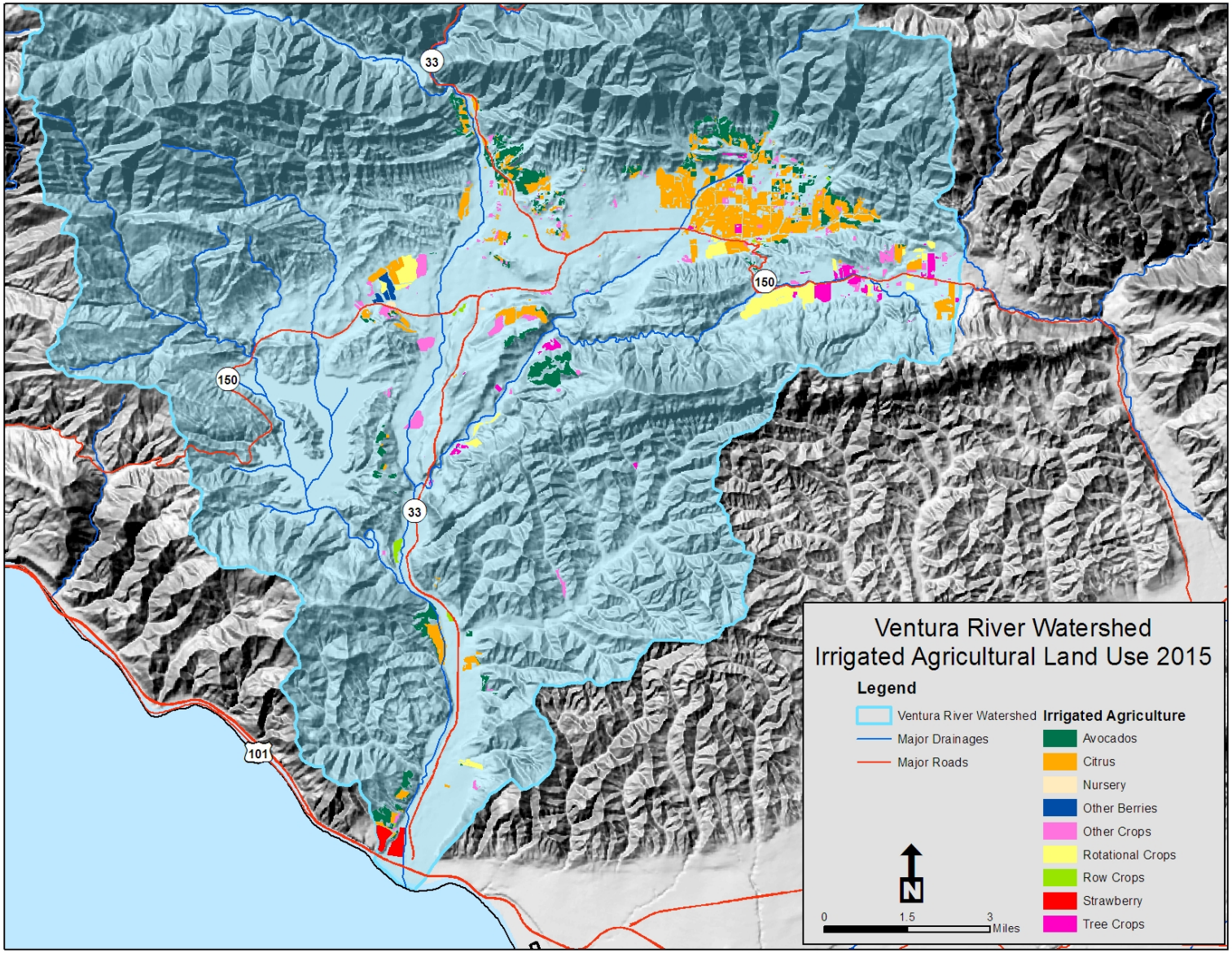


Figure 4. Ventura River Watershed Agricultural Land Use

VCAILG PARTICIPATION IN TMDLS

Within Ventura County, the VCAILG plays an active role in facilitating the participation of agriculture in TMDL development and implementation processes. Acting on behalf of its members, the VCAILG representatives participate in stakeholder meetings, provide comments, and contribute to cooperative agreements. For example, the VCAILG is a participant and funding partner of the Calleguas Creek Watershed TMDL implementation effort.

Effective TMDL monitoring requirements have been incorporated into the 2010 Conditional Waiver (Order No. R4-2010-0186). Therefore, the VCAILG will coordinate with established TMDL monitoring programs or conduct additional monitoring where necessary in order to meet TMDL requirements. Such TMDL data are included in this Annual Monitoring Report. The "Calleguas Creek Watershed TMDL Compliance Monitoring Program Seventh Year Annual Monitoring Report" is being submitted along with this VCAILG AMR.

Water Quality Monitoring

MONITORING OBJECTIVES

The objectives of the VCAILGMP required under the Conditional Waiver include the following:

- Monitor the discharge of wastes in irrigation return flows, tile drains, stormwater, and waters of the state and identify waste sources;
- Where discharges of waste cause or contribute to exceedances of water quality benchmarks or cause pollutions or nuisance, submit a Water Quality Management Plan (WQMP) to implement targeted management practices to reduce or eliminate the discharge of waste;
- Report results and other required information on an annual basis; and
- Coordinate monitoring efforts with existing and future monitoring programs so that data generated are complementary and not duplicative (*e.g.*, coordinate monitoring sites and sampling events with the TMDL Monitoring Programs within Ventura County).

MONITORING SITE SELECTION

The first step toward fulfilling monitoring program objectives was selecting appropriate monitoring sites. Because the focus of the program is on impacts to surface waterbodies from discharges from irrigated agricultural lands, monitoring sites were selected to best characterize agricultural inputs and are generally located at the lower ends of mainstem tributaries or agricultural drainages in areas associated primarily with agricultural activity. A background ("BKGD") site was chosen for one of the Santa Clara River Watershed sites in the natural area upstream. Calleguas Creek Watershed sites supplement monitoring performed under the Calleguas Creek Watershed TMDL Monitoring Program (CCWTMP) and retain consistency with previous VCAILG sampling. Monitoring sites in the Santa Clara River and Ventura River Watersheds were selected to continue building on existing data previously collected by VCAILG and meet TMDL requirements, where applicable.

The specific criteria for selection of monitoring sites are as follows:

- Land use (primarily agricultural drainages);
- Subwatershed representation;

- Acres of agricultural irrigated lands represented;
- Proximity to agricultural operations;
- Previous or existing monitoring locations under the *2005 Conditional Waiver* or TMDL monitoring programs;
- Drainage into waterbodies included on or proposed for the federal Clean Water Act 303(d) list of impaired waterbodies;
- Size and complexity of watershed;
- Size and flow of waterbodies; and,
- Safe access during dry and wet weather.

Table 4 lists monitoring sites selected in each watershed and associated global positioning system (GPS) coordinates for sampling Conditional Waiver Appendix 1, Table 1 constituents. Table 5 lists monitoring sites and GPS coordinates for effective TMDL monitoring locations. Figure 5 through Figure 11 show site locations for all monitoring sites within each watershed.

The format for the monitoring site ID/code is XXXA_YYYY_ZZZZ, where:

- "XXX" is a 2- or 3-character code that identifies the mainstem receiving water reach (where applicable) into which the monitored waterbody drains;
- "A" identifies the monitored waterbody as an agricultural drain (D) or a tributary (T) to the receiving water;
- "YYYY" is a 3-, 4-, or 5-character abbreviation for the site location;
- "ZZZZ" is an optional 3-, 4-, or 5-character abbreviation that provides additional site location information (*e.g.*, "BKGD" indicates a background site).

Examples:

S03D_BARDS signifies that the monitoring site is an agricultural drain located in the Santa Clara River Watershed. The site is located along Bardsdale Avenue.

S04T_TAPO_BKGD signifies that this a background monitoring site located on Tapo Creek, which is a tributary to the Santa Clara River, Reach 4.

Table 4. VCAILGMP Monitoring Locations for Conditional Waiver Constituents

Watershed / Subwatershed	Station ID	Reach	Waterbody Type [1]	Station Location	GPS Coordinates [2]	
					Latitude	Longitude
Calleguas Creek / Mugu Lagoon	01T_ODD3_ARN	1	T	Rio de Santa Clara/Oxnard Drain #3 at Arnold Rd.	34.123564	-119.156514
Calleguas Creek / Revolon Slough	04D_ETTG	4	D	Discharge to Revolon Slough at Etting Rd.	34.161797	-119.091419
	04D_LAS	4	D	Discharge to Revolon Slough at S. Las Posas Rd.	34.134208	-119.079767
Calleguas Creek / Beardsley Channel	05D_LAVD	5	T	La Vista Drain at La Vista Ave.	34.265950	-119.093589
	05T_HONDO	5	T	Hondo Barranca at Hwy. 118	34.263608	-119.057431
Calleguas Creek / Arroyo Las Posas	06T_LONG2	6	T	Long Canyon at Balcom Canyon Rd. crossing	34.281721	-118.958565
Oxnard Coastal	OXD_CENTR	--	D	Central Ditch at Harbor Blvd.	34.220555	-119.254983
Santa Clara River	S02T_ELLS	2	T	Ellsworth Barranca at Telegraph Rd.	34.306805	-119.141275
	S02T_TODD	2	T	Todd Barranca at Hwy. 126	34.313584	-119.117095
	S03T_TIMB	3	T	Timber Canyon at Hwy. 126	34.370172	-119.020939
	S03T_ BOULD	3	T	Boulder Creek at Hwy. 126	34.389578	-118.958738
	S03D_BARDS	3	D	Discharge along Bardsdale Ave. upstream of confluence with Santa Clara River	34.371535	-118.964470
	S04T_TAPO	4	T	Tapo Canyon Creek	34.401717	-118.723706
	S04T_TAPO_BKGD	4	B	S04T_TAPO background site upstream of agricultural operations	34.387316	-118.7204509
Ventura River	VRT_THACH	--	T	Thacher Creek at Ojai Avenue	34.446719	-119.210893
	VRT_SANTO	--	T	San Antonio Creek at Grand Avenue	34.454455	-119.221723

1. T = Tributary to receiving water; D = agricultural Drain; B = Background site.
2. All GPS coordinates presented in decimal degrees latitude and longitude in North American Datum 1983 (NAD83).

Table 5. Monitoring Locations for Effective TMDLs

Watershed/ Subwatershed	Site ID	Reach	Waterbody Type [1]	Site Location	GPS Coordinates [2]	
					Latitude	Longitude
Calleguas Creek/ Mugu Lagoon	01T_ODD2_DCH	1	T	Duck Pond/Oxnard Drain #2/Mugu Drain S. of Hueneme Rd.	34.1395	-119.1183
Calleguas Creek/ Calleguas Creek	02D_BROOM	2	D	Discharge to Calleguas Creek at Broome Ranch Rd.	34.1434	-119.0711
Calleguas Creek/ Revolon Slough	04D_WOOD	4	D	Agricultural drain on E. side of Wood Rd. N of Revolon	34.1707	-119.0960
	05D_SANT_VCWPD	5	D	Santa Clara Drain at VCWPD Gage #781	34.2425	-119.1114
Calleguas Creek/ Arroyo Las Posas	06T_FC_BR	6	T	Fox Canyon at Bradley Rd.	34.2646	-119.0115
Calleguas Creek/ Arroyo Simi	07D_HITCH_LEVEE_2	7	D	2nd corrugated pipe discharging on N. site of Arroyo Simi flood control levee off of Hitch Blvd.	34.2714	-118.9205
Calleguas Creek/ Conejo Creek	9BD_GERRY	9A [3]	D	Drain crossing Santa Rosa Rd. at Gerry Rd.	34.2369	-118.9473
Santa Clara River Estuary	S01D_MONAR	1	D	Drain entering SCR Estuary at Monarch Lane between Harbor Blvd. and Victoria Ave.	34.2333	-119.2413
Santa Clara River	S02T_ELLS	2	T	Ellsworth Barranca at Telegraph Rd.	34.3068	-119.1413
Oxnard Coastal	OXD_CENTR	--	D	Central Ditch at Harbor Blvd.	34.2206	-119.2550
Oxnard Coastal/ Channel Islands Harbor	CIHD_VICT	--	D	Discharge to Doris Drain at S. Victoria Ave.	34.2099	-119.2207

1. T = Tributary to receiving water; D = agricultural Drain
2. All GPS coordinates presented in decimal degrees latitude and longitude in North American Datum 1983 (NAD83).
3. In the 2012 updates to the Los Angeles Region Basin Plan, the reach designations for 9A and 9B were switched. For consistency with the TMDLs and historic site naming conventions, the site names in the annual monitoring reports maintain the original reach designations.

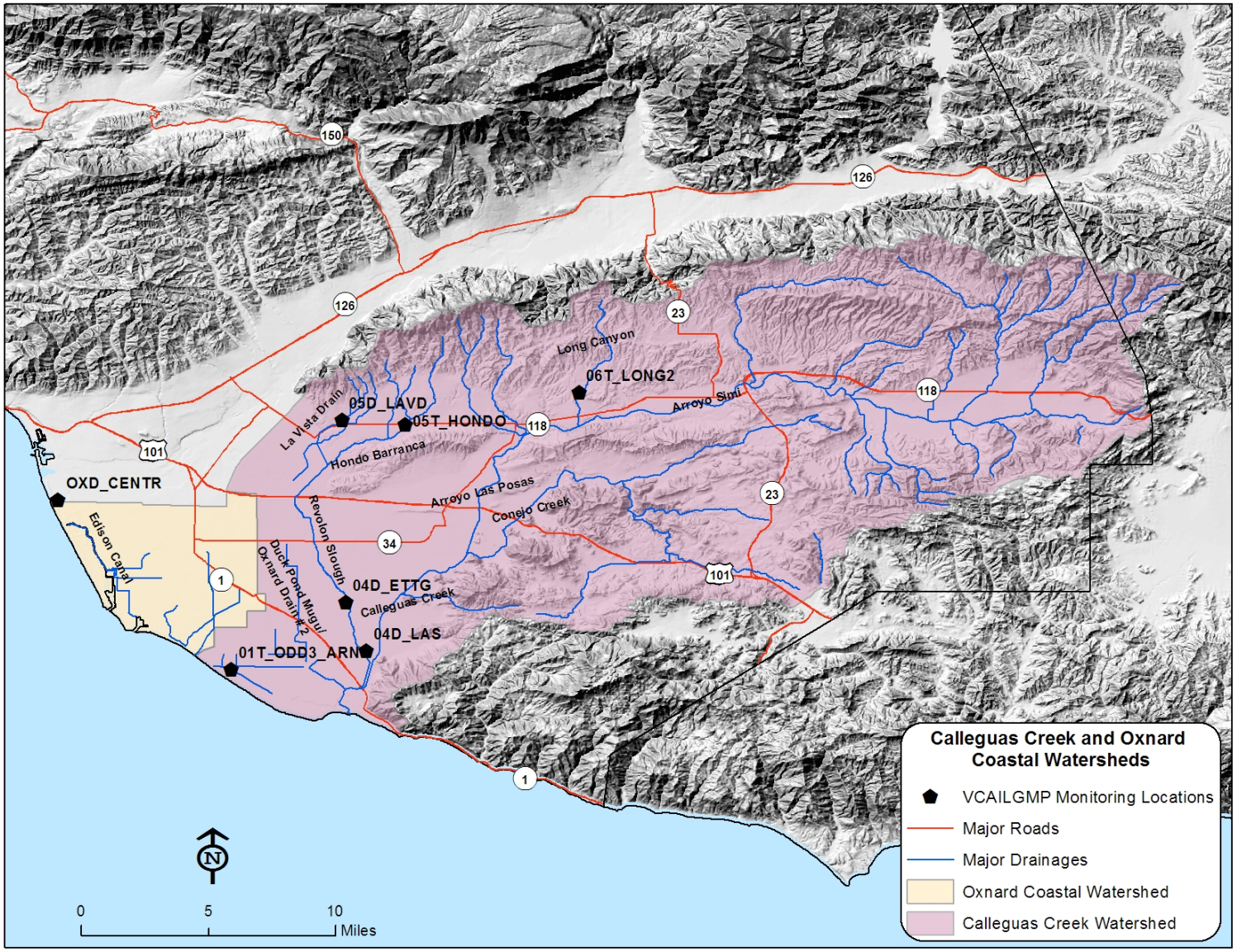


Figure 5. VCAILG Monitoring Sites in the Calleguas Creek/Oxnard Coastal Watersheds

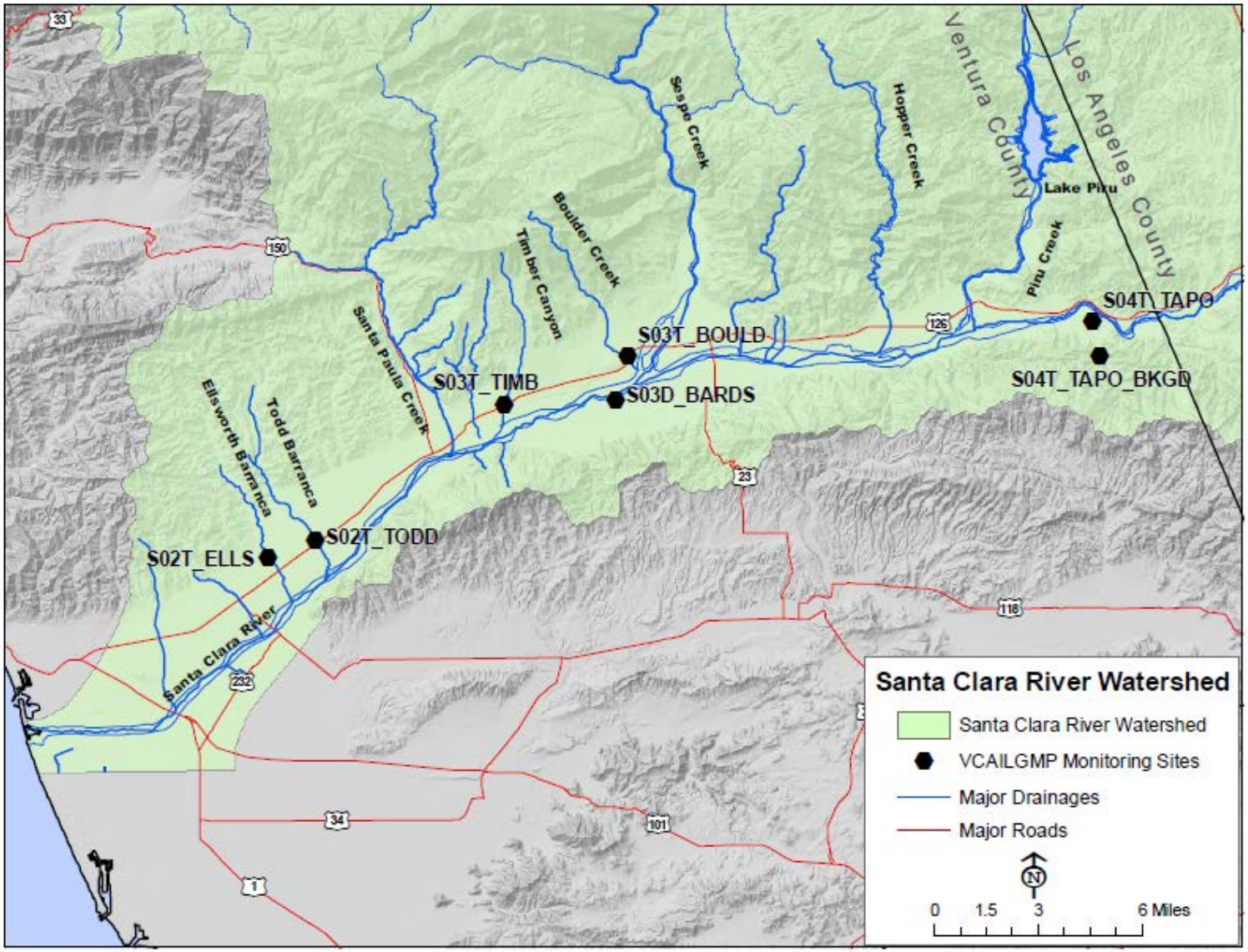


Figure 6. VCAILG Monitoring Sites Located in the Santa Clara River Watershed

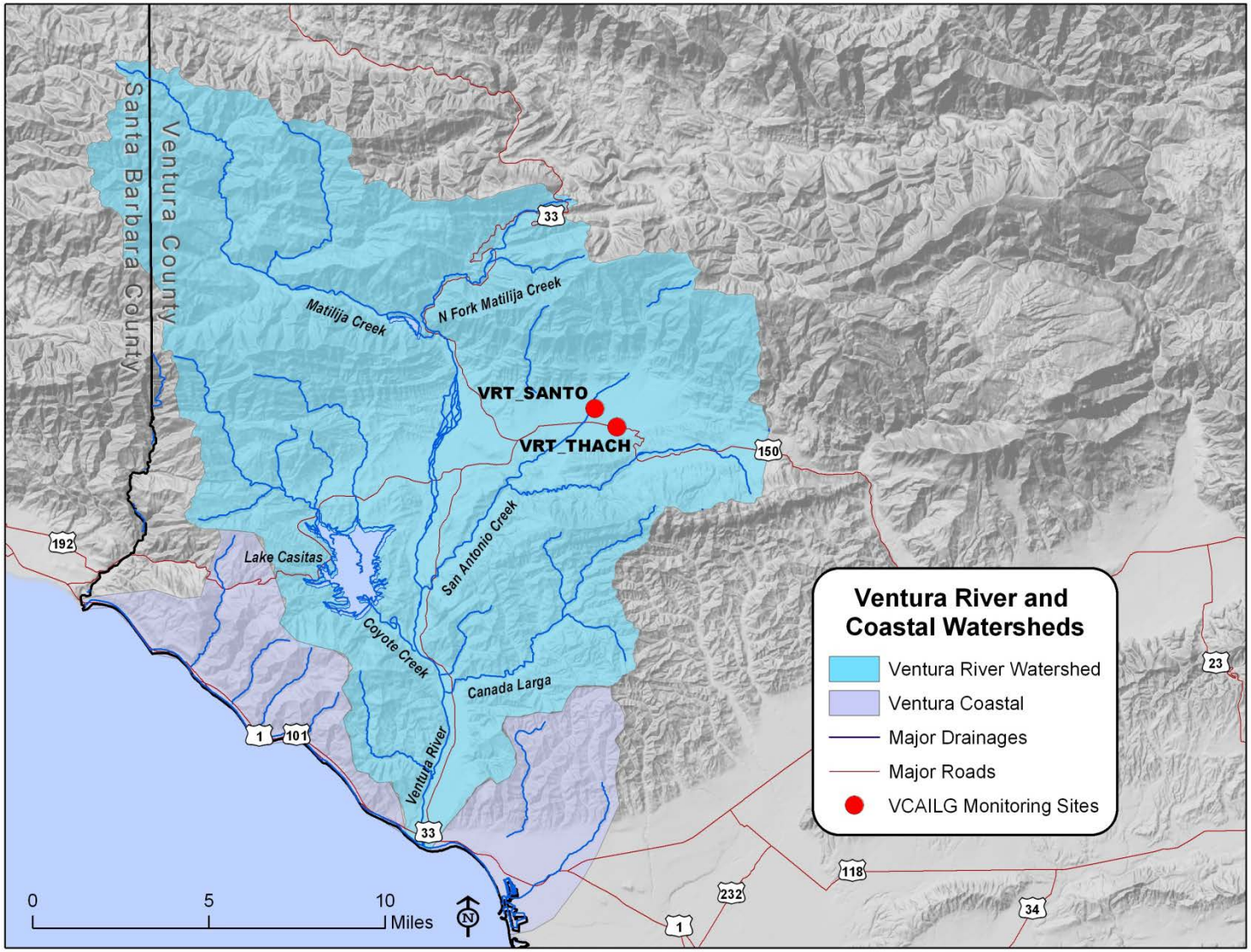


Figure 7. VCAILG Monitoring Sites Located in the Ventura River Watershed

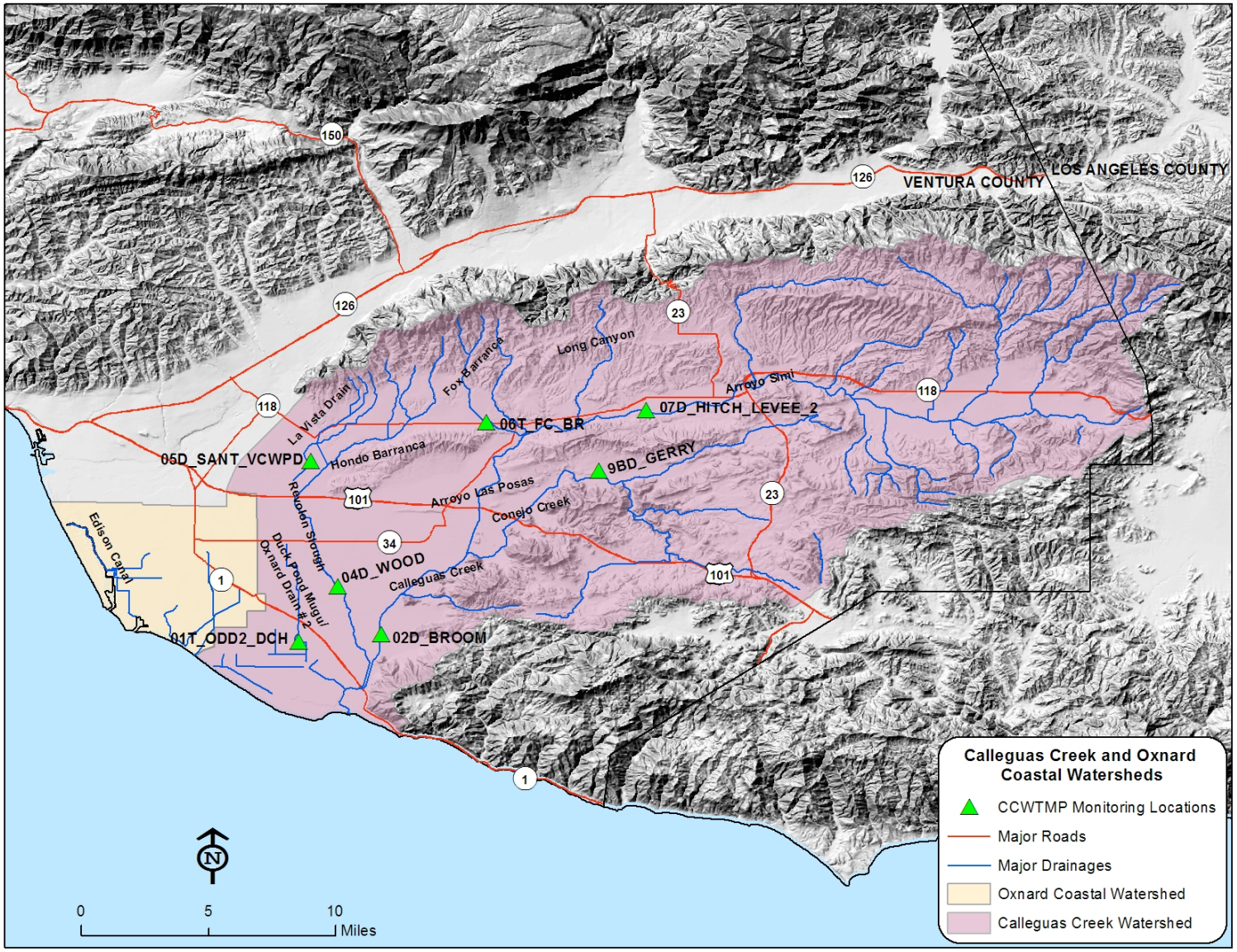


Figure 8. CCWTMP Monitoring Sites

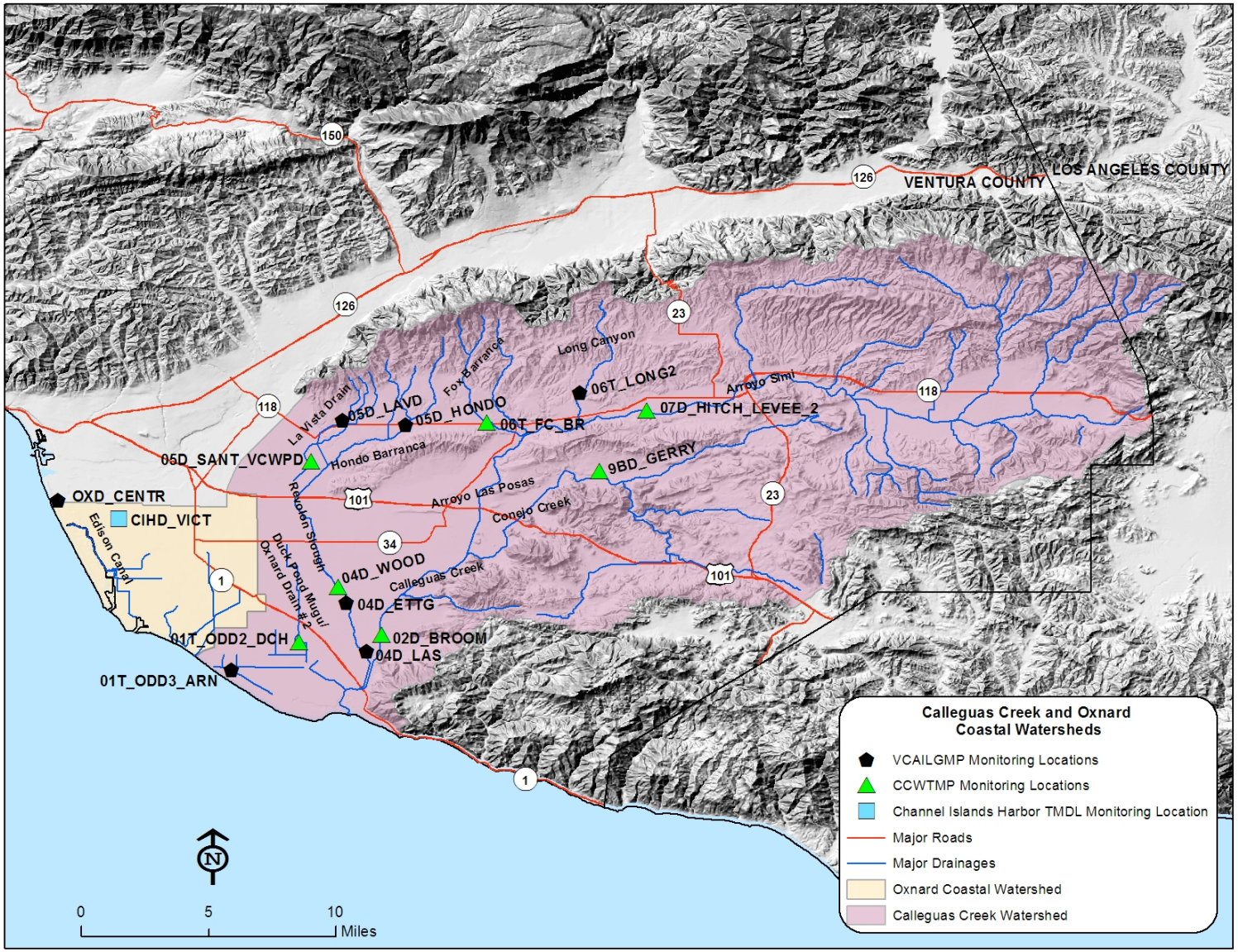


Figure 9. Calleguas Creek and Oxnard Coastal Watershed Monitoring Sites for All Programs

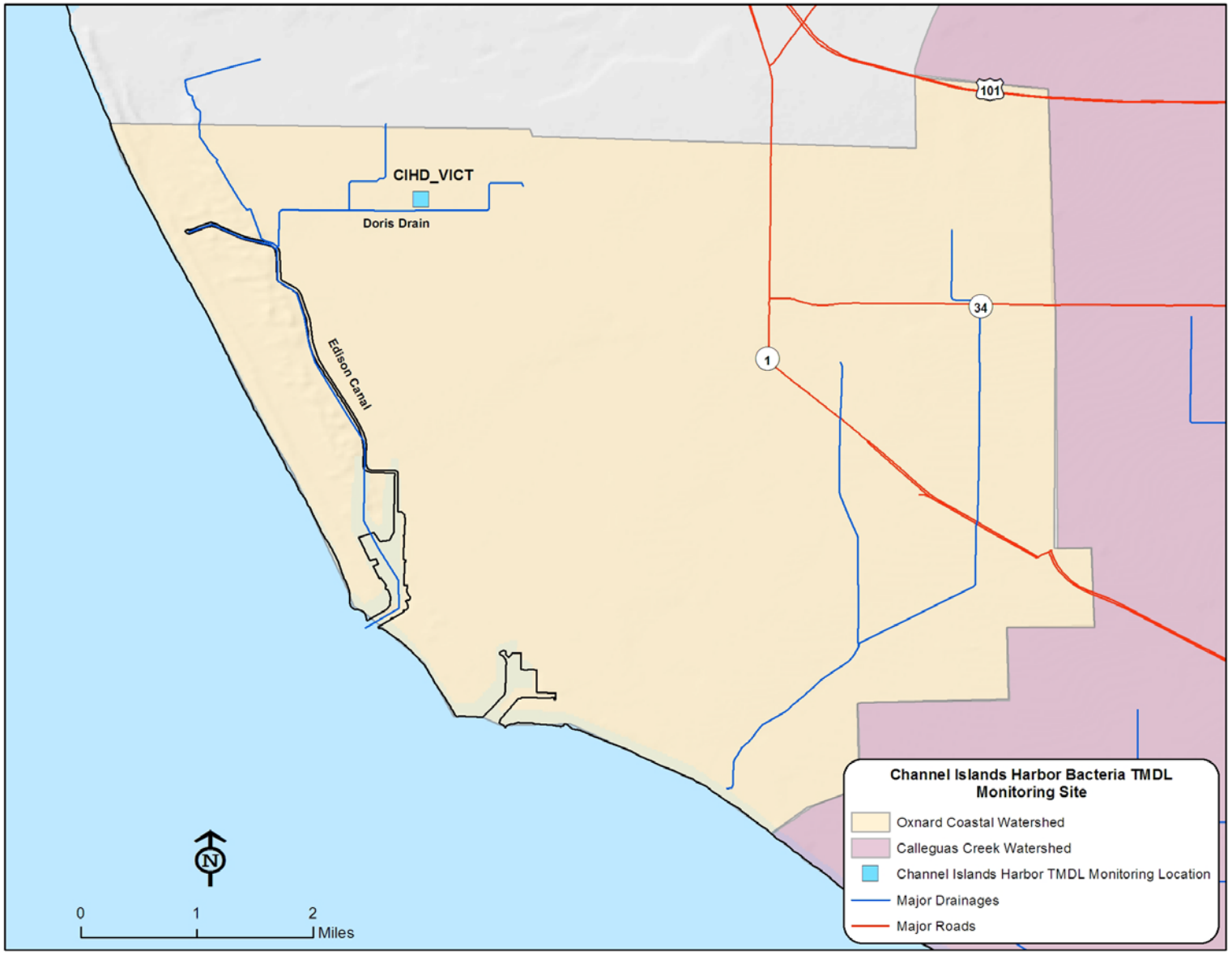


Figure 10. Channel Islands Harbor Bacteria TMDL Monitoring Site

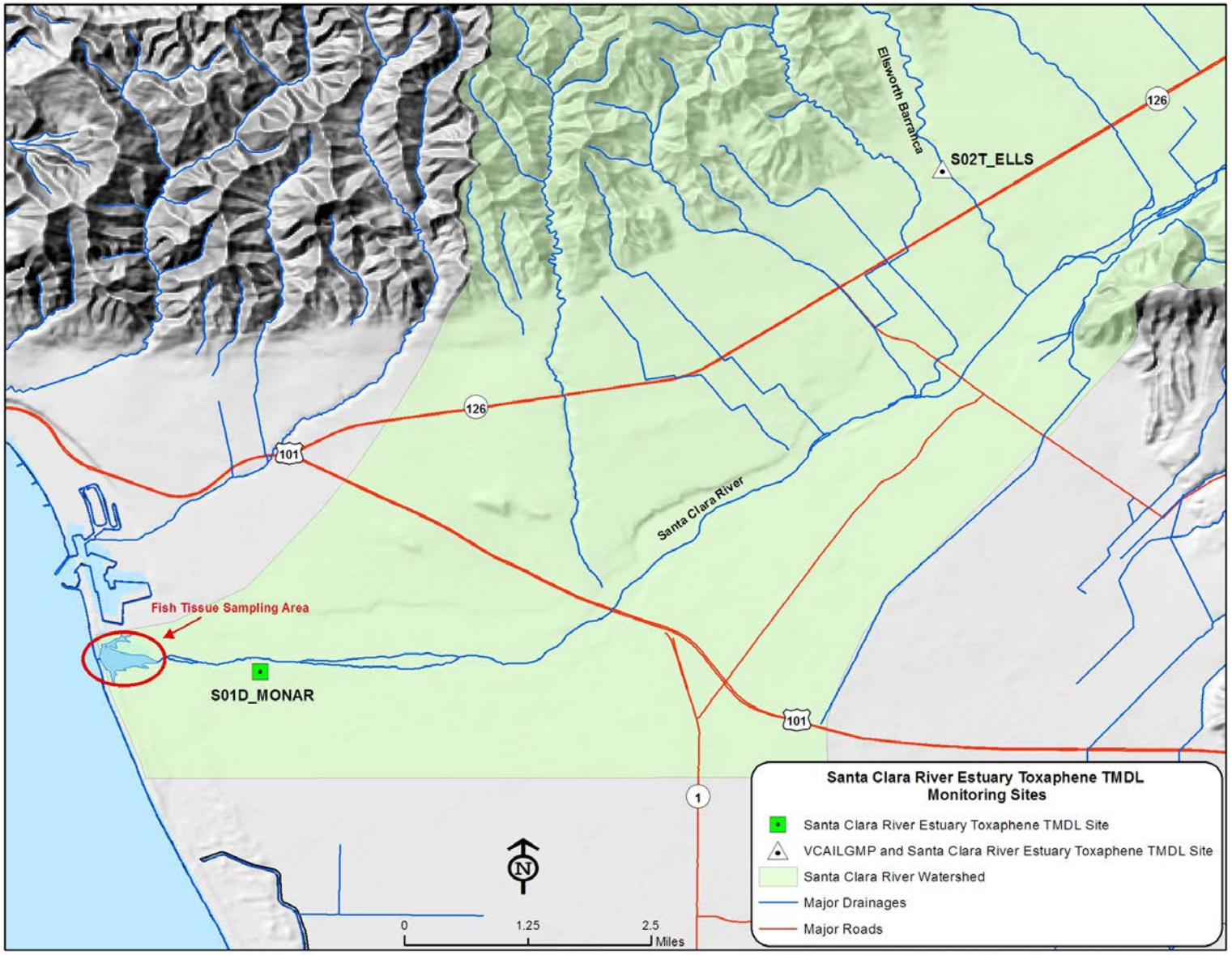


Figure 11. Santa Clara River Estuary Toxaphene TMDL Monitoring Sites

Table 6. Estimated Irrigated Acreage Represented at VCAILG Monitoring Sites

Station ID	Irrigated Agricultural Acreage [1, 2]										Drainage Area Acres
	Row Crops	Rotational Crops	Citrus	Avocados	Tree Crops	Strawberries	Other Berries	Sod	Nursery	Other Crops	
01T_ODD3_ARN	782							287		15	800
04D_ETTG	3113		117			438	605			53	3,779
04D_LAS	1291					95		160	12	62	1,339
05D_LAVD	59		341	257			132			3	877
05T_HONDO	19		2003	724	2		118		25	17	3,928
06T_LONG2	4		706	3909		28	258		88	45	2,813
OXD_CENTR	38					807			77	5	1,243
S02T_ELLS	109		614	720	1					6	9,015
S02T_TODD	134	31	974	290	3		43		127	20	5,748
S03D_BARDS	49		1120	168					17	2	2,214
S03T_BOULD	1		223	1309					150	8	3,764
S03T_TIMB	31		263	496	2		2				2,183
S04T_TAPO	399		197						54		3,686
VRT_SANTO			454	412	24					8	7,220
VRT_THACH	6		1275	228	13				3	79	6,003

1. Data Source: Ventura County Agricultural Commissioner's Office, September 2015.
2. Some acreage is double or triple counted due to multi-cropping practices.

Table 7. Estimated Irrigated Acreage Represented at TMDL Monitoring Sites

Station ID [1]	Irrigated Agricultural Acreage [2, 3]										Total Drainage Area Acres
	Row Crops	Rotational Crops	Citrus	Avocados	Tree Crops	Strawberries	Other Berries	Sod	Nursery	Other Crops	
01T_ODD2_DCH	834	4				283	110	254	7		1,564
02D_BROOM	1310		376	391		86	424	24		5	8,236
04D_WOOD	582						150				470
05D_SANT_VCWPD	277		875	511			327				1,154
06T_FC_BR	73		1126	270		71	134		17	18	2,602
07D_HITCH_LEVEE_2	277								63		142
9BD_GERRY			151	271			570			20	447
S01D_MONAR						108					209
CIHD_VICT						231					99

1. Sites OXD_CENTR and S02T_ELLS are also monitored for specific TMDL constituents; their drainage area and crop type information is listed in the previous table.
2. Data Source Ventura County Agricultural Commissioner's Office, September 2015.
3. Some acreage is double or triple counted due to multi-cropping practices.

PARAMETERS MONITORED AND MONITORING FREQUENCY

Conditional Waiver Monitoring Constituents and Frequency

The Conditional Waiver specifies the constituents to be monitored during each monitoring event (Table 8) as well as the monitoring frequency. Per the Conditional Waiver, monitoring is required twice during the wet season and twice during the dry season. In addition, toxicity monitoring is required during one wet event and once during the dry season each year. The wet season is October 15th through May 15th and the dry season is from May 16th through October 14th. Wet season samples shall be collected within 24 hours of a storm occurring with precipitation totals greater than 0.5 inch. The initial dry weather monitoring event shall be completed after the application of pesticides or fertilizers during the period when irrigation is required.

In 2014-2015, storm monitoring occurred on December 2, 2014 and December 12, 2014. Wet weather toxicity monitoring was completed during the December 2, 2014 event. Dry weather monitoring occurred on August 14, 2014 and May 26, 2015. Dry weather toxicity samples were collected during the second dry weather event during the 2013-2014 monitoring year. An issue occurred in the toxicity laboratory that invalidated parts of the toxicity testing, so on June 22, 2015, samples were collected at two sites to remedy the laboratory issue.

Table 9 provides a summary of monitoring sites and constituents that were monitored during the wet and dry weather monitoring events in 2014 and 2015. Field measurements were also collected at the sites where samples were collected.

Table 8. Constituents and Monitoring Frequency for the VCAILGMP

Constituent	Frequency [1]
Field Measurements	2 dry events; 2 wet events
Flow, pH, Temperature, Dissolved Oxygen, Turbidity, Conductivity	
General Water Quality Constituents (GWQC)	
Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Hardness, Chloride, Sulfate	
Nutrients	
Total Ammonia-N, Nitrate-N, Phosphate	
Pesticides	
Organochlorine Pesticides [2], Organophosphorus Pesticides [3], Pyrethroid Pesticides [4]	
Metals	
Dissolved Copper, Total Copper	
Trash	
Trash observations	
Aquatic Chronic Toxicity	1 wet event; second dry event

1. The "wet" season is defined as October 15th through May 15th; the "dry" season is defined as May 16th through Ocober 14th each year.
2. Organochlorine Pesticides include: 2,4'-DDD, 2,4'-DDE, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, adrin, BHC-alpha, BHC-beta, BHC-delta, BHC-gamma, chlordane-alpha, chlordane-gamma, dieldrin, endosulfan sulfate, endosulfan I, endosulfan II, endrin, endrin aldehyde, endrin ketone, and toxaphene.
3. Organophosphorus Pesticides include: bolstar, chlorpyrifos, demeton, diazinon, dichlorvos, disulfoton, ethoprop, fenchlorphos, fensulfothion, fenthion, malathion, merphos, methyl parathion, mevinphos, phorate, tetrachlorvinphos, tokuthion, and trichloronate.
4. Pyrethroid Pesticides include: allethrin, bifenthrin, cyfluthrin, cypermethrin, danitol, deltamethrin, esfenvalerate, fenvalerate, lambda-cyhalothrin, permethrin, and prallethrin.

Table 9. VCAILG Sites Monitored and Constituents Sampled in 2014-2015

Watershed / Subwatershed	Site ID	Reach	Yearly Events			
			Dry 8/14/14	Wet 12/2/14	Wet 12/12/14	Dry 5/26/15
Calleguas Creek / Mugu Lagoon	01T_ODD3_ARN	1	WQ	WQ, TOX [2]	WQ [2]	WQ, TOX
Calleguas Creek / Revolon Slough	04D_ETTG	4	WQ	WQ	WQ	WQ
	04D_LAS	4	WQ	WQ	WQ	WQ
Calleguas Creek / Beardsley Channel	05D_LAVD	5	WQ [3]	WQ, TOX	WQ	WQ, TOX [3]
	05T_HONDO	5	WQ [3]	WQ, TOX	WQ	WQ, TOX [3]
Calleguas Creek / Arroyo Las Posas	06T_LONG2	6	WQ [3]	WQ, TOX	WQ [3]	WQ, TOX [3]
Oxnard Coastal	OXD_CENTR	--	WQ	WQ	WQ	WQ
Santa Clara River	S02T_ELLS	2	WQ [3]	WQ, TOX [3]	WQ	WQ, TOX [3]
	S02T_TODD	2	WQ	WQ, TOX	WQ	WQ, TOX [4]
	S03T_TIMB	3	WQ [3]	WQ, TOX [3]	WQ	WQ, TOX [3]
	S03T_BOULD	3	WQ [3]	WQ, TOX	WQ	WQ, TOX [3]
	S03D_BARDS	3	WQ [3]	WQ	WQ	WQ [3]
	S04T_TAPO	4	WQ	WQ, TOX	WQ	WQ, TOX [4]
	S04T_TAPO_BKGD	4	WQ [3]	WQ [3]	WQ [3]	WQ [3]
Ventura River	VRT_THACH	--	WQ [3]	WQ, TOX [3]	WQ	WQ, TOX [3]
	VRT_SANTO	--	WQ [3]	WQ, TOX [3]	WQ [3]	WQ, TOX [3]

TOX = Toxicity

WQ = All water quality constituents listed in Table 8, excluding toxicity, which is noted separately

1. Toxicity testing was performed during both dry weather events and the storm event.
2. No samplies collected as site was innaccessible.
3. No samples collected due to insufficient flow/dry conditions.
4. A laboratory issue lead to the need for toxicity re-testing. Samples were collected on June 22, 2014 for toxicity re-testing.

TMDL Monitoring Constituents and Frequency

Monitoring for TMDL compliance is either prescribed in the adopted Basin Plan Amendment, or performed according to a TMDL Monitoring Plan, approved by the Regional Board Executive Officer. The following tables summarize the TMDL monitoring that was performed under the VCAILGMP. When appropriate, TMDL monitoring events were conducted at the same time as Conditional Waiver monitoring.

Calleguas Creek Watershed TMDL monitoring was completed per the CCWTMP QAPP and monitoring approach for the Calleguas Creek Watershed Salts TMDL. The *Calleguas Creek Watershed TMDL Compliance Monitoring Program Seventh Year Annual Monitoring Report* describes the TMDL monitoring program and results in detail.[4] All efforts have been made to coordinate the VCAILG monitoring program and CCWTMP when timing sampling events. CCWTMP monitoring is conducted quarterly with an additional two storm events each year.

Table 10. Constituents and Frequency for TMDL Monitoring Performed Under the VCAILGMP

Site ID	Constituent [1]	Frequency
S01D_MONAR	Field Measurements TSS, toxaphene, chlordane, dieldrin (water)	2 dry events; 2 wet events
	Field Measurements Toxaphene, chlordane, dieldrin (filtered sediment)	2 wet events
S02T_ELLS	Toxaphene, chlordane, dieldrin (filtered sediment) [2]	2 wet events
Santa Clara River Estuary	Toxaphene, chlordane, dieldrin (fish tissue)	Every three years
CIHD_VICT	Field Measurements *E. coli*, enterococcus, total coliform, fecal coliform	2 dry events; 2 wet events
OXD_CENTR	Total organic carbon, total PCBs (water)	2 dry events; 2 wet events [2]
	Total organic carbon, total PCBs, DDT and derivatives, dieldrin, total chlordane (sediment)	Once after 1st rain event; once after the wet season [2]

1. This table only lists constituents necessary for data comparison with TMDL LAs that are not already collected at the specified site as part of the Table 8 VCAILGMP sampling.
2. TMDL monitoring at OXD_CENTR is for compliance with the McGrath Lake TMDL, which became effective after the adoption of the Conditional Waiver. Monitoring was conducted according to the September 21, 2012 conditional approval letter of the MRP and QAPP for the McGrath Lake TMDL Phase 1 Monitoring Program.

[4] Larry Walker Associates. 2015. Calleguas Creek Watershed TMDL Compliance Monitoring Program Seventh Year Annual Monitoring Report. December 15, 2015.

Table 11. TMDL Sites Monitored and Constituents Sampled in 2014-2015

TMDL	Site ID	Yearly Events			
		Dry 8/22/13	Wet 2/28/14	Post-Rain [1] 3/7/14	Dry 5/29/14
Santa Clara River Estuary Toxaphene TMDL	S01D_MONAR	OC-W TSS [2]	OC-W OC-S TSS		OC-W TSS [2]
	S02T_ELLS	OC-W TSS [2]	OC-W OC-S TSS [2]		OC-W TSS [2]
	Santa Clara River Estuary	Frequency is every three years. Fish tissue was collected during this monitoring year.			
Channel Islands Harbor Bacteria TMDL	CIHD_VICT	Bact [2]	Bact		Bact [2]
McGrath Lake PCBs, Pesticides and Sediment Toxicity TMDL	OXD_CENTR	OC-PCB-W TOC TSS	OC-PCB-W TOC TSS	OC-PCB-S TOC	OC-PCB-W OC-PCB-S TOC TSS

OC-W = OC pesticides toxaphene, chlordane, and dieldrin in water
OC-S = OC pesticides toxaphene, chlordane, and dieldrin in filtered sediment
Bact = *E. coli*, enterococcus, total coliform, fecal coliform
OC-PCB-W = OC pesticides chlordane, dieldrin, DDT and derivatives, total PCBs in water
OC-PCB-S = OC pesticides chlordane, dieldrin, DDT and derivatives, total PCBs in sediment
TOC = Total Organic Carbon
TSS = Total Suspended Solids
1. Event specific to monitoring sediment for the McGrath Lake TMDL.
2. Site not sampled due to insufficient flow/dry conditions.

SAMPLING METHODS

The VCAILG QAPP contains requirements for sampling procedures that are designed to ensure that high-quality data are generated through the VCAILGMP. Field crews are trained to adhere strictly to standard operating procedures for all aspects of monitoring, including use of sample containers that are appropriate to each constituent or constituent group analyzed, avoiding potential sources of contamination, and accurately completing field log sheets and chain-of-custody forms, to name a few examples.

Samples were collected either by the direct immersion technique or by using a secondary container; filled sample containers were immediately put on ice in an ice chest. Notes regarding sample bottle fill method and sample collection depth can be found in the field log sheets (Appendix B).

Flow measurements were performed according to the standard operating procedure included in Appendix C-1 of the QAPP using either current-meter or float measurements. During wet events, the float method of measuring flow is most practical. At some sites, channel depth was estimated using a reference photo, painted gauge, or other appropriate tool. Estimated flows are qualified as such in the field data (Appendix C) and site summary tables. *Flow estimates made during the wet event, therefore, should be regarded as gross estimates and used with discretion.* Flow measurements were made according to the standard operating procedure included in Appendix C-1 of the QAPP, as previously noted.

During all monitoring events, a Hydrolab MS5 Data Sonde was used to measure a number of parameters in situ, including temperature, pH, dissolved oxygen, conductivity, and turbidity. Data and information collected at each monitoring site were recorded on a field log sheet. The completed field log sheets for each event are included with this Annual Report as Appendix B, which is included on the Annual Report Data CD. Information recorded on the field log sheet at each monitoring site includes the following:

- Field crew initials;
- Date and time samples were collected;
- Water quality results for constituents measured using field probes (pH, temperature, conductivity, etc.);
- Measurements supporting flow calculations (channel width, depth, water velocity);
- Observations regarding the weather, water color and odor, contact and non-contact recreation, instream activity, the presence of foreign matter, trash counts and types, wildlife, etc.;
- Vegetation and channel substrate (*i.e.*, concrete, cobble, sand, etc.) observations.

Information entered on field log sheets is ultimately entered into the VCAILGMP database for reporting. Field data are included with this Annual Report in Appendix C, which can be found on the Annual Report Data CD. Photo documentation of each monitoring site for all four events is also included on the Annual Report Data CD as Appendix D.

Samples were transported back to FGL Environmental Laboratory in Santa Paula, where chain-of-custody (COC) documentation was completed and toxicity samples were prepared for overnight delivery to the toxicity testing laboratory, Pacific EcoRisk (PER). A courier picked up the samples to be analyzed at Physis Environmental Laboratories and delivered them according to the requirements of the QAPP.

The completed COC forms are included this Annual Report as Appendix E; also included on the Annual Report Data CD.

ANALYTICAL METHODS

Table 12 provides a summary of analytical methods used by contract laboratories for analyzing samples collected for Conditional Waiver constituents during the 2014-2015 monitoring year. Table 13 lists analytical methods for TMDL constituents monitored as part of the VCAILGMP. Refer to the CCWTMP QAPP for methods used on samples collected at CCW agricultural land use sites.

Table 12. Analytical Methods for Conditional Waiver Constituents

Constituent	Analytical Method
Aquatic Chronic Toxicity [1]	
Ceriodaphnia dubia (water flea) [2]	EPA-821-R-02-013 and EPA 600-4-91-002
Pimephales promelas (fathead minnow) [3]	
Selenastrum capricornutum (green algae) [4]	
General Water Quality Constituents (WQ)	
Flow, pH, Temperature, Dissolved Oxygen, Conductivity, Turbidity	Field Measurement
Total Dissolved Solids (TDS)	SM 2540C
Total Suspended Solids (TSS)	SM 2540D
Chloride	EPA 300.0
Sulfate	EPA 300.0
Hardness	SM 2340B
Nutrients	
Total Ammonia-N	SM 4500-NH_3F
Nitrate-N	EPA 300.0
Phosphate (Total Orthophosphate as P)	SM4500-PE
Metals	
Total and Dissolved Copper	EPA 200.8
Organic Constituents [5]	
Organochlorine Pesticides [6]	EPA 625
Organophosphorus Pesticides	EPA 625
Pyrethroid Pesticides	EPA 625-NCI

1. Chronic toxicity tests were performed on three species for the first toxicity monitoring event where water was present at each particular site, after which the most sensitive species was selected for use in subsequent monitoring events.
2. If sample conductivity exceeded 3000 uS/cm, *Hyalella azteca* was used for toxicity testing.
3. If sample conductivity exceeded 3000 uS/cm, *Menidia beryllina* was used for toxicity testing.
4. If sample conductivity exceeded 3000 uS/cm, *Thalassiosira pseudonana* was used for toxicity testing.
5. See Table 8 for the list of constituents in each pesticide group.
6. Toxaphene is analyzed using EPA 625-NCI.

Table 13. TMDL Analytical Methods for Laboratory Analyses Performed Under the VCAILGMP

Constituent [1]	Analytical Method
OC Pesticides (filtered sediment)	EPA 8270C
OC Pesticides (fish tissue)	EPA 8280C
E. coli	9223B
Enterococcus	Indexx Enterolert
Total coliform	9221B
Fecal coliform	9221E
Total organic carbon (TOC) (water)	5310C
PCBs (water)	EPA 625
Total organic carbon (TOC) (sediment)	EPA 9060A
OC Pesticides (sediment)	EPA 8270C
PCBs (sediment)	EPA 8270C

1. Listed constituents are those that are required by a TMDL and not already listed in the previous table.

WATER QUALITY BENCHMARKS AND OTHER OBJECTIVES

The Conditional Waiver requires that if monitoring data exceeds applicable benchmarks, a WQMP designed to reduce pollutant loading to surface waters must be developed to address those exceedances. This section presents the water quality benchmarks as specified in the Conditional Waiver (R4-2010-0186) used to evaluate monitoring data collected at VCAILG monitoring sites. "Standard water quality benchmarks" in the Conditional Waiver include numeric and narrative water quality objectives contained in Appendix 2, and include several narrative and numeric Basin Plan objectives and water quality standards from the California Toxics Rule (CTR). In cases where the Conditional Waiver references the Basin Plan or CTR, in Appendix 2 without specifying a benchmark number, the lowest applicable number was selected for each watershed. CTR water quality criteria are available for several OC pesticides that are analyzed as part of the VCAILGMP; though not listed as benchmarks in Appendix 2 of the Conditional Waiver they are provided in a separate table in this section for reference. In addition to the Appendix 2 benchmarks, the Conditional Waiver also includes effective TMDL LAs as additional water quality benchmarks in Appendix 3. Due to the complexity of appropriately comparing TMDL LAs to the proper location, site type, sample media, and sampling condition; these benchmarks and the associated monitoring results are presented and discussed separately in the report section titled "TMDL Load Allocations and Monitoring Results".

Several of the narrative water quality objectives contained in the Basin Plan specify that discharges of wastes to receiving waters cannot alter "natural" or "ambient" conditions above or below a stated level. Many of the VCAILG monitoring sites are located on agricultural drains that discharge to receiving waters. Because "natural" and "ambient" conditions have not been established in receiving waters or are non-existent on agricultural drains and ephemeral streams, monitoring data from sites located on agricultural drains are evaluated based on the assumption that if benchmarks are not exceeded in the agricultural drain, it is unlikely that the discharge from that drain will cause benchmark exceedances in the receiving water.

Table 14. Conditional Waiver Appendix 2 Standard Water Quality Benchmarks Derived From Narrative Objectives

Constituent	Watershed [1]	Narrative Objective [2]	Applicable Benchmark
pH	CC, OXD, SCR, VR	The pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed by more than 0.5 pH units from natural conditions as a result of waste discharges.	$6.5 \leq pH \leq 8.5$ Changes to ambient receiving water conditions are not assessed; "ambient" or "natural" conditions have not been established
Temperature	CC, OXD, SCR, VR	For waters designated WARM, water temperature shall not be altered by more than 5°F above the natural temperature. At no time shall WARM-designated waters be raised above 80°F as a result of waste discharges.	WARM: $\leq 80^{o}F$ Changes to ambient receiving water conditions are not assessed; "ambient" or "natural" conditions have not been established
	SCR, VR	For waters designated COLD, water temperature shall not be altered by more than 5°F above the natural temperature.	COLD: No numeric benchmark. Changes to ambient receiving water conditions are not assessed; "ambient" or "natural" conditions have not been established
Dissolved Oxygen	OXD	No single dissolved oxygen determination shall be less than 5 mg/L, except when natural conditions cause lesser concentrations.	$\geq$ 5 mg/L
	CC, SCR, VR	The dissolved oxygen content of all surface waters designated as WARM shall not be depressed below 5 mg/L as a result of waste discharges.	WARM: $\geq$ 5 mg/L
	SCR, VR	The dissolved oxygen content of all surface waters designated as COLD and SPWN shall not be depressed below 7 mg/L as a result of waste discharges.	COLD, SPWN: $\geq$ 7 mg/L
Turbidity	CC, OXD, SCR, VR	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in natural turbidity attributable to controllable water quality factors shall not exceed the following limits: ▪ Where natural turbidity is between 0 and 50 NTU, increases shall not exceed 20%; ▪ Where natural turbidity is greater than 50 NTU, increases shall not exceed 10%.	No numeric benchmarks. Changes to ambient receiving water conditions are not assessed; "ambient" or "natural" conditions have not been established
Total Suspended Solids (TSS)	CC, OXD, SCR, VR	Wastes shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.	No numeric benchmarks.
Toxicity	CC, OXD, SCR, VR	All waters shall be free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal or aquatic life. There shall be no chronic toxicity in ambient waters outside mixing zones.	$\leq$ 1.0 TUc [3] Benchmarks for specific potentially toxic constituents are listed in Tables 16 through 20.

1. CC = Calleguas Creek Watershed OXD = Oxnard Coastal Watershed SCR = Santa Clara River Watershed VR = Ventura River Watershed
2. Source: Water Quality Control Plan, Los Angeles Region (Basin Plan), 1994.
3. Source: "Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands," Order No. R4-2010-0186, Los Angeles Regional Water Quality Control Board, adopted October 7, 2010.

Table 15. Conditional Waiver Appendix 2 Standard Water Quality Benchmarks for Salts and Nutrients (Basin Plan Table 3-8 Numeric Water Quality Objectives)

Watershed / Reach	Reach Description	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Nitrogen (mg/L)	Ammonia [1] (mg/L)
CC below Potrero Rd.	-----	-----	-----	-----	10 [2]	pH, temperature dependent
CC above Potrero Rd.	-----	150	250	850	10 [3]	pH, temperature dependent
OXD	-----	-----	-----	-----	10 [2]	pH, temperature dependent
SCR Reach 1	Tidally-influenced mouth of Santa Clara River upstream to 101 Bridge	-----	-----	-----	10 [2]	pH, temperature dependent
SCR Reach 2	Upstream of Hwy 101 Bridge to Freeman Diversion	150	600	1200	10 [2]	pH, temperature dependent
SCR Reach 3	Upstream of Freeman Diversion to A Street Bridge in Fillmore	100 [4]	650	1300	5 [3]	pH, temperature dependent
SCR Reach 4	Upstream of A Street Bridge in Fillmore to Blue Cut Gaging Station	100	600	1300	5 [3]	pH, temperature dependent
VR Reach 4	Between Camino Cielo Rd. and Casitas Vista Rd.	60	300	800	5 [3]	pH, temperature dependent

Watersheds: CC = Calleguas Creek OXD = Oxnard Coastal SCR = Santa Clara River VR = Ventura River

1. Ammonia benchmarks are based on 1) freshwater ammonia objectives as calculated according to LARWQCB Resolutions 2002-011 and 2005-014, and 2) saltwater ammonia objectives as calculated according to LARWQCB Resolution 2004-022. Ammonia objectives are calculated based on the pH and temperature of the receiving water measured at the time of sample collection for ammonia analysis. Ammonia objectives used as benchmarks are chronic, 30-day averages.
2. There is no site-specific nitrogen objective in the Basin Plan (Table 3-8) applicable to this reach. The Basin Plan objective of 10 mg/L Nitrate-N was used for comparison with VCAILG data collected at monitoring sites in this reach.
3. The Nitrogen benchmark listed is as Nitrate-N plus Nitrite-N.
4. The 100 mg/L benchmark for chloride is the revised water quality objective adopted by the Regional Board in Resolution 2003-015.

Table 16. Conditional Waiver Appendix 2 Standard Water Quality Benchmarks for Copper

Constituent	Freshwater [1, 2]		Brackish or Saltwater [1]	
	Benchmark (µg/L)	Benchmark Source	Benchmark (µg/L)	Benchmark Source
Copper	$= 0.96e^{[0.8545(\ln hardness)+(-1.702)]}$	CTR CCC [3]	3.1	CTR CCC [3]

1. Freshwater benchmark applies to discharges to waters with salinities <1 ppt at least 95% of the time. Saltwater benchmark applies when salinities are ≥10 ppt at least 95% of the time. For discharges between these categories, or tidally influenced freshwater that supports EST beneficial uses, the lower criteria of the two shall be used; which is the saltwater benchmark.
2. As per footnote "m" to the Table in Paragraph (b)(1) of the CTR; "The freshwater criteria for metals are expressed in terms of the dissolved fraction of the metal in the water column." In instances where the measured hardness is >400 mg/L as $CaCO_3$, a hardness of 400 is used to calculate the benchmark. This was done in accordance with CTR §31692, f. Hardness.
3. CTR = California Toxics Rule (USEPA, May 18, 2000).
   CCC = Criteria Continuous Concentration

Table 17. Conditional Waiver Appendix 2 Standard Water Quality Benchmarks for Organophosphorus Pesticides

Constituent	CC, OXD, SCR, VR Watersheds
	Benchmark (ug/L)
Chlorpyrifos	0.025
Diazinon	0.10

Watersheds: CC = Calleguas Creek OXD = Oxnard Coastal SCR = Santa Clara River VR = Ventura River

Table 18. Conditional Waiver Appendix 2 Water Quality Benchmarks for Organochlorine Pesticides

Constituent	CC Watershed		OXD, SCR Watersheds		VR Watershed	
	Benchmark (ug/L)	Benchmark Source [1]	Benchmark (ug/L)	Benchmark Source [1]	Benchmark (ug/L)	Benchmark Source [1]
Chlordane, sum	0.00059	CTR HHO	0.00059	CTR HHO	0.00059	CTR HHO
4,4'-DDD	0.00084	CTR HHO	0.00084	CTR HHO	0.00084	CTR HHO
4,4'-DDE	0.00059	CTR HHO	0.00059	CTR HHO	0.00059	CTR HHWO
4,4'-DDT	0.00059	CTR HHO	0.00059	CTR HHO	0.00059	CTR HHWO
Dieldrin	0.00014	CTR HHO	0.00014	CTR HHO	0.00014	CTR HHWO
Toxaphene	0.00075	CTR HHO	0.00075	CTR HHO	0.00075	CTR HHO

Watersheds: CC = Calleguas Creek OXD = Oxnard Coastal SCR = Santa Clara River VR = Ventura River

1. CTR = California Toxics Rule (USEPA, May 18, 2000).
   HHO = Human Health for Consumption of Organisms Only (30-day average)
   HHWO = Human Health for Consumption of Water and Organisms (MUN-designation) (30-day average)

Table 19. Organochlorine Pesticides Monitored by the VCAILGMP with CTR Water Quality Criteria

Constituent	CC Watershed		OXD, SCR Watersheds		VR Watershed	
	Benchmark (ug/L)	Benchmark Source [1]	Benchmark (ug/L)	Benchmark Source [1]	Benchmark (ug/L)	Benchmark Source [1]
Aldrin	0.00014	CTR HHO	0.00014	CTR HHO	0.00013	CTR HHWO
Alpha-BHC	0.013	CTR HHO	0.013	CTR HHO	0.0039	CTR HHWO
Beta-BHC	0.046	CTR HHO	0.046	CTR HHO	0.014	CTR HHWO
Gamma-BHC (Lindane)	0.063	CTR HHO	0.063	CTR HHO	0.019	CTR HHWO
Endosulfan I	0.056	CTR AFWC	0.056	CTR AFWC	0.056	CTR AFWC
Endosulfan II	0.056	CTR AFWC	0.056	CTR AFWC	0.056	CTR AFWC
Endosulfan Sulfate	240	CTR HHO	240	CTR HHO	110	CTR HHWO
Endrin	0.036	CTR AFWC	0.036	CTR AFWC	0.036	CTR AFWC
Endrin Aldehyde	0.81	CTR HHO	0.81	CTR HHO	0.76	CTR HHWO

Watersheds: CC = Calleguas Creek OXD = Oxnard Coastal SCR = Santa Clara River VR = Ventura River

2. CTR = California Toxics Rule (USEPA, May 18, 2000).
HHO = Human Health for Consumption of Organisms Only (30-day average)
HHWO = Human Health for Consumption of Water and Organisms (MUN-designation) (30-day average)
AFWC = Aquatic Life, Freshwater Chronic (4-day average)

WATER QUALITY MONITORING RESULTS

This section contains a summary of water quality monitoring data collected at VCAILG sites where flow was present during the four monitoring events conducted in 2014-2015. Information presented for each VCAILG monitoring site includes the receiving water of the drainage monitored, a site location map, a site photo, and a narrative summary of which events were monitored, exceedances (if any) of standard water quality benchmarks, and unusual occurrences (if any) from each event. The predominant crop type(s) potentially contributing to the flow at each monitoring site is also noted in this section; this information is also listed in Table 6. All constituents listed in Appendix 2 of the Conditional Waiver are included in the data tables for each site. Additional constituents are listed only if they have been detected at a particular site. Non-detect data is included with all of the water quality monitoring data for 2014-2015 as Appendix F on the Annual Report Data CD. All hard copy laboratory reports are also included on the Data CD. Results summarized in this section are compared with Conditional Waiver water quality benchmarks from Appendix 2 as well as available CTR criteria for OC pesticides that are analyzed but not included in Appendix 2. Tables 14 through 19 list the Conditional Waiver benchmarks and CTR criteria. Where applicable, all exceedances are indicated in **bold type** in the data tables.

Any data reported by the laboratory in units of ng/L were converted to µg/L for comparison with benchmarks expressed in units of µg/L. Results reported by the laboratory as "Total Orthophosphate as P" were converted to "Total Orthophosphate" by multiplying the result by the molecular weight of phosphate (95 g/mol) and dividing the product by the molecular weight of phosphorus (31 g/mole). The converted result is reported as "Total Orthophosphate" on data tables presented in this section. The electronic data file remains unconverted and is labeled "Total Orthophosphate-P."

Results of toxicity tests conducted during the 2014-2015 monitoring year are discussed separately in a subsequent section.

All analyses included in this report were conducted at a laboratory certified for such analyses by the California Department of Health Services – Environmental Laboratory Accreditation Program (ELAP) or the National Environmental Laboratory Accreditation Program (NELAP), and in accordance with current USEPA guidance procedures, or as specified in this Monitoring Program.

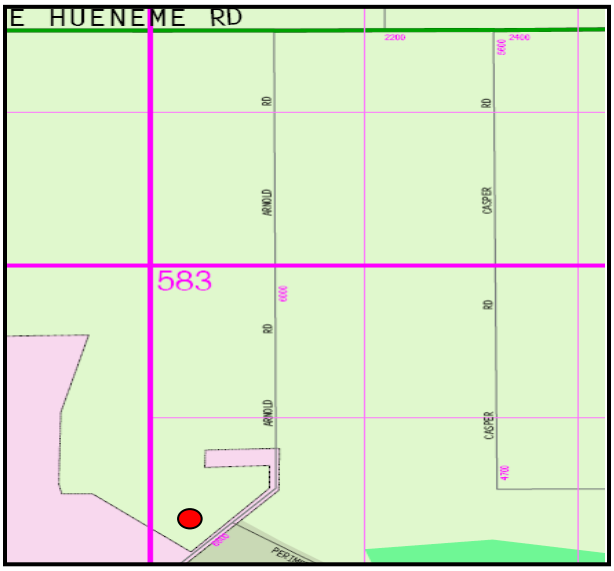
Calleguas Creek Watershed

The Calleguas Creek Watershed contains six VCAILG monitoring sites. Monitoring sites are discussed below in order of the Calleguas Creek reach into which they drain.

01T_ODD3_ARN

Rio de Santa Clara / Oxnard Drain No. 3. The monitoring site is located on an agricultural drain just upstream from the Arnold Road Bridge. Flow from this drain eventually discharges into the western arm of Mugu Lagoon (Calleguas Creek Reach 1). Because the site is tidally influenced, an attempt is made to conduct monitoring at this site approximately one-half hour after low tide.

Site Map



View downstream at sampling point

Samples were collected at this site during two of the four 2013-2014 monitoring events; the site was inaccessible due to flooding during Event 23 and 24. Table 20 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks. Flow is not measured at this site because it is unsafe to do so. Table 21 summarizes the trash observations for each event. This area is frequently used by bird watchers and others participating in non-contact recreation. The trash found near the monitoring site is not specific to agriculture.

Exceedances of the nitrate, dissolved copper, and DDT compounds occurred during both dry events during the 2014-2105 monitoring year. The pH value during Event 22 was lower than the acceptable lower limit. The ammonia-N and total chlordane benchmarks were exceeded during the second dry weather event (Event 25). There were no wet weather exceedances as no samples were collected during Event 23 and Event 24 due to the site being inaccessible. Row crops and sod are the primary crop types in the vicinity of this site.

Table 20. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: 01T_ODD3_ARN

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements						
Flow	CFS		NM			NM
pH		6.5≤ pH ≤ 8.5	**6.1**			7.61
Temperature	°C		21.7			20.7
Dissolved Oxygen	mg/L	≥ 5	9.1			NS
Turbidity	NTU		18.1			122.3
Conductivity	µS/cm		19867			6230
General Water Quality						
Total Dissolved Solids (TDS)	mg/L		12900			4520
Total Suspended Solids (TSS)	mg/L		25.8			200
Total Hardness as $CaCO_3$	mg/L		3229			1819
Chloride	mg/L		6210			1080
Sulfate	mg/L		1990			1540
Nutrients						
Ammonia-N	mg/L	50.6/1.77[1]	0.7			**3.2**
Nitrate-N	mg/L	10[2]	**28.7**			**40.3**
Total Orthophosphate	mg/L		0.2			0.37
Metals				Not Sampled; flooded	Not Sampled; flooded	
Dissolved Copper	µg/L	3.1[3]	**4.4**			2.8
Total Copper	µg/L		5.2			4.7
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*	ND			ND
BHC-alpha	µg/L	0.013*	ND			ND
BHC-beta	µg/L	0.046*	ND			ND
BHC-gamma	µg/L	0.063*	DNQ			ND
Chlrodane-alpha	µg/L		ND			DNQ
Chlordane-gamma	µg/L		ND			DNQ
Total Chlordane	µg/L	0.00059	ND			**0.004**
4,4'-DDD	µg/L	0.00084	**0.006**			**0.01**
4,4'-DDE	µg/L	0.00059	**0.02**			**0.04**
4,4'-DDT	µg/L	0.00059	DNQ			**0.007**
Dieldrin	µg/L	0.00014	ND			ND
Endosulfan-I	µg/L	0.056*	ND			ND
Endosulfan-II	µg/L	0.056*	ND			ND
Endosulfan Sulfate	µg/L	240*	ND			ND
Endrin	µg/L	0.036*	ND			ND

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endrin Aldehyde	µg/L	0.81*	ND			ND
Toxaphene	µg/L	0.00075	ND			ND
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025	ND			ND
Diazinon	µg/L	0.1	ND			ND

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.
NS=no sample collected due to instrument malfunction.
NM=not measured due to unsafe conditions.
See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

1. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the Basin Plan Amendment to Update Saltwater Ammonia Objectives (LARWQCB Resolution No. 2004-022). The benchmarks are based on the chronic saltwater equation and are dependent upon the pH, temperature, and salinity of the water at the time of sample collection.
2. There is no site-specific nitrogen objective in the Basin Plan (Table 3-8) applicable to this reach. The Basin Plan objective of 10 mg/L nitrate-N was used for comparison with VCAILG data for this site.
3. Copper benchmark for saltwater applies at this site as prescribed in Table 16.

Table 21. 2014 - 2015 Trash Observations for 01T_ODD3_ARN

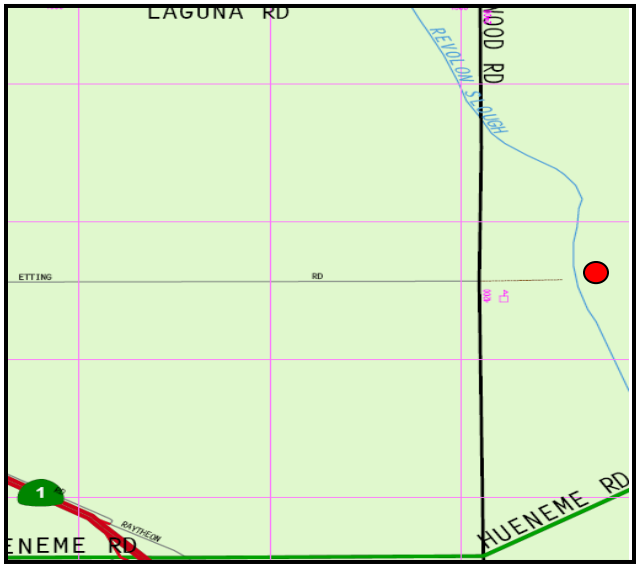
Event	Count	Types
Event 22	10-20	Small urban trash: paper cups, glove
Event 23	NS[1]	N/A
Event 24	NS[1]	N/A
Event 25	20-40	Small urban trash: cans, plastics, Styrofoam cups

1. No samples collected due to the site being inaccessible from flooding.

04D_ETTG

This monitoring site is located on an agricultural drain just upstream from its confluence with Revolon Slough, just east of the intersection of Wood Road and Etting Road. Flow from this drain eventually discharges into Calleguas Creek Reach 4 (Revolon Slough).

Site Map



View toward SW looking downstream an ag drain before the confluence with Revolon

Flow was present at this site during every monitoring event. Table 22 contains a summary of concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks. The approximate amount and types of trash observed at this site is recorded in Table 23.

The nitrate-N benchmark and the 4,4'-DDE benchmark were exceeded during all four monitoring events. The dissolved copper benchmark was exceeded during the first three monitoring events and the toxaphene benchmark was exceeded during the first, third, and fourth monitoring events. Additionally, there were exceedances of the total chlordane, 4,4'-DDD, 4,4'-DDT, dieldrin, chlorpyrifos, and diazinon benchmarks during the wet weather events (Events 23 and 24). Row crops are the most common crops grown within this site drainage area. Additional crop types include strawberries, other berries (such as raspberries or blueberries), and citrus.

Table 22. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: 04D_ETTG

Constituent	Units	Benchmark/ Criteria	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements						
Flow	CFS		2.1	37.44	166.7	1.89
pH		6.5≤ pH ≤ 8.5	7.6	7.64	7.7	7.71
Temperature	°C	≤ 26.67°C[1]	21.7	15.73	14.7	18.54
Dissolved Oxygen	mg/L	≥ 5	**4.9**	6.77	9.3	9.53
Turbidity	NTU		3.1	1013	>3000	0.7
Conductivity	µS/cm		3217	2143	836	4474
General Water Quality						
Total Dissolved Solids (TDS)	mg/L		2520	1720	558	3980
Total Suspended Solids (TSS)	mg/L		2.99	1120	3430	5
Total Hardness as $CaCO_3$	mg/L		1294.3	797.9	280.4	1989.9
Chloride	mg/L		249	13	47.2	380
Sulfate	mg/L		1060	73	239	2020
Nutrients						
Ammonia-N	mg/L	2.48/3.53/3.42/2.73[2]	0.24	1	0.31	0.20
Nitrate-N	mg/L	10[3]	**42.2**	**33.3**	**11.4**	**49.95**
Total Orthophosphate	mg/L		9.7	4.6	2.9	1.53
Metals						
Dissolved Copper	µg/L	3.1[4]	**8.9**	**4.6**	**4.5**	2.75
Total Copper	µg/L		8.9	46.6	143.5	3
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*	ND	ND	ND	ND
BHC-alpha	µg/L	0.013*	ND	ND	ND	ND
BHC-beta	µg/L	0.046*	ND	ND	ND	ND
BHC-gamma	µg/L	0.063*	ND	ND	ND	ND
cis-Nonachlor	µg/L		ND	ND	0.009	ND
trans-Nonachlor	µg/L		ND	DNQ	0.02	ND
Chlordane-alpha	µg/L		ND	0.006	0.03	ND
Chlordane-gamma	µg/L		ND	0.003	0.02	ND
Total Chlordane	µg/L	0.00059	ND	**0.009**	**0.05**	ND
2,4'-DDD	µg/L		DNQ	0.02	0.05	ND
2,4'-DDE	µg/L		ND	DNQ	0.026	ND
2,4'-DDT	µg/L		ND	0.07	0.095	ND
4,4'-DDD	µg/L	0.00084	DNQ	**0.05**	**0.1**	DNQ

Constituent	Units	Benchmark/ Criteria	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
4,4'-DDE	µg/L	0.00059	**0.009**	**0.2**	**1**	**0.0062**
4,4'-DDT	µg/L	0.00059	DNQ	DNQ	**0.40**	ND
Dieldrin	µg/L	0.00014	ND	ND	**0.01**	ND
Endosulfan-I	µg/L	0.056*	ND	ND	ND	ND
Endosulfan-II	µg/L	0.056*	ND	ND	ND	ND
Endosulfan Sulfate	µg/L	240*	ND	ND	ND	ND
Endrin	µg/L	0.036*	ND	ND	ND	ND
Endrin Aldehyde	µg/L	0.81*	ND	ND	ND	ND
Toxaphene	µg/L	0.00075	**0.6**	ND	**2.8**	**0.16**
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025	ND	**0.05**	**0.1**	ND
Diazinon	µg/L	0.1	ND	**0.3**	0.076	ND
Malathion	µg/L		ND	0.20	0.18	ND
Pyrethroid Pesticides						
Bifenthrin	µg/L		ND	0.04	0.04	ND
L-Cyhalothrin	µg/L		ND	0.004	0.01	ND
Cypermethrin	µg/L		ND	0.06	0.09	ND
Esfenvalerate	µg/L		ND	DNQ	0.004	ND
cis-Permethrin	µg/L		ND	0.09	0.04	ND
trans-Permethrin	µg/L		ND	0.06	0.05	ND

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

The temperature limit for waterbodies designated as WARM is 80°F (26.7°C).

1. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS absent) and are dependent upon the pH and temperature of the water at the time of sample collection.
2. There is no site-specific nitrogen objective in the Basin Plan (Table 3-8) applicable to this reach. The Basin Plan objective of 10 mg/L nitrate-N was used for comparison with VCAILG data for this site.
3. The copper benchmark for saltwater applies at this site as prescribed in Table 16.

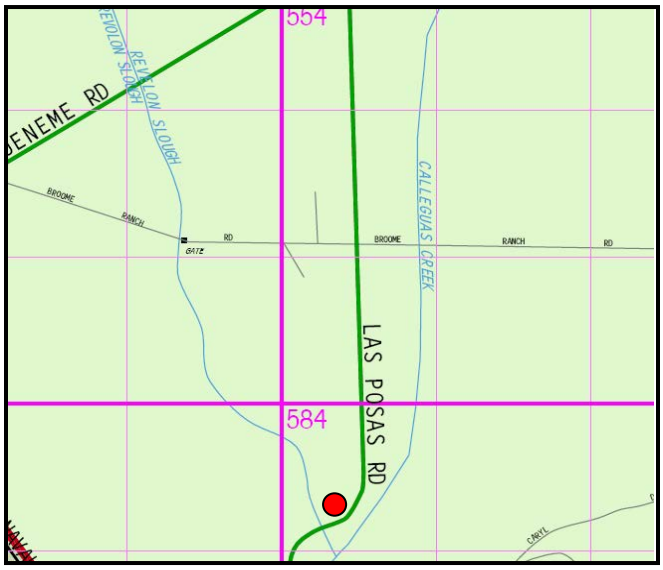
Table 23. 2014 - 2015 Trash Observations for 04D_ETTG

Event	Count	Types
Event 22	5-10	Cups, paper bags
Event 23	30-50	Plastics, Styrofoam, PVC pipe, wood
Event 24	20-50	Wood, cups, wrappers
Event 25	5-10	Ag trash, cans, plastic containers, tire

04D_LAS

This monitoring site is located on an agricultural drain just upstream of its confluence with Revolon Slough just upstream of South Las Posas Road. A tile drain discharge is intermittently pumped into this ag drain upstream of the monitoring site. Flow from this drain eventually flows into Calleguas Creek Reach 4 (Revolon Slough).

Site Map



View toward S looking downstream on ag drain before the culvert draining into Revolon Slough

Flow was present at this site during all four 2014-2015 monitoring events. Table 24 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks. Table 25 quantifies and describes trash found at this site.

The nitrate-N, 4,4'-DDE, and toxaphene benchmarks were exceeded during all four monitoring events. The dissolved copper benchmark was exceeded during the first three monitoring events. There were exceedances of the total chlordane, 4,4'-DDD, 4,4'-DDT, and chlorpyrifos benchmarks during wet weather. Row crops are the primary crop type along with significant acreage of strawberries being grown in the vicinity of this site.

Table 24. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: 04D_LAS

Constituent	Units	Benchmark/ Criteria	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements						
Flow	CFS		1.8	7.1	16.9	1.9
pH		6.5≤ pH ≤ 8.5	7.6	7.8	7.6	7.7
Temperature	°C	≤ 26.67°C[1]	20.5	15.7	15.2	17.8
Dissolved Oxygen	mg/L	≥ 5	7.9	8.6	8.4	10.6
Turbidity	NTU		5.6	1706	670	20
Conductivity	µS/cm		4018	3003	1122	3654
General Water Quality						
Total Dissolved Solids (TDS)	mg/L		3270	2270	745	2900
Total Suspended Solids (TSS)	mg/L		4.62	2040	486	12
Total Hardness as $CaCO_3$	mg/L		1592	977	343	1380
Chloride	mg/L		414	200	101	410
Sulfate	mg/L		1240	520	256	1130
Nutrients						
Ammonia-N	mg/L	2.63/2.99/3.77/2.99[2]	0.8	0.9	0.4	1.2
Nitrate-N	mg/L	10[3]	**55.1**	**37.8**	**13**	**36.9**
Total Orthophosphate	mg/L		0.7	1.6	0.2	1.6
Metals						
Dissolved Copper	µg/L	3.1[4]	**4.7**	**5.1**	**4.5**	1.9
Total Copper	µg/L		4.9	55.5	26.6	2.7
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*	ND	ND	ND	ND
BHC-alpha	µg/L	0.013*	ND	ND	ND	ND
BHC-beta	µg/L	0.046*	ND	ND	ND	ND
BHC-gamma	µg/L	0.063*	ND	ND	ND	ND
Chlordane-alpha	µg/L		ND	0.02	0.01	ND
Chlordane-gamma	µg/L		ND	0.01	DNQ	ND
Total Chlordane	µg/L	0.00059	ND	**0.03**	**0.009**	ND
trans-Nonachlor	µg/L		ND	0.01	DNQ	ND
2,4'-DDD	µg/L		ND	0.06	0.007	DNQ
2,4'-DDE	µg/L		ND	0.02	DNQ	ND
2,4'-DDT	µg/L		ND	0.2	0.007	ND
4,4'-DDD	µg/L	0.00084	DNQ	**0.2**	**0.02**	DNQ
4,4'-DDE	µg/L	0.00059	**0.005**	**0.8**	**0.1**	**0.01**
4,4'-DDT	µg/L	0.00059	DNQ	**0.04**	**0.03**	ND
Dieldrin	µg/L	0.00014	ND	ND	ND	ND

Constituent	Units	Benchmark/ Criteria	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endosulfan-I	µg/L	0.056*	ND	ND	ND	ND
Endosulfan-II	µg/L	0.056*	ND	ND	ND	ND
Endosulfan Sulfate	µg/L	240*	ND	ND	ND	ND
Endrin	µg/L	0.036*	ND	ND	ND	ND
Endrin Aldehyde	µg/L	0.81*	ND	ND	ND	ND
Toxaphene	µg/L	0.00075	**0.5**	**1.4**	**0.5**	**0.2**
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025	ND	**0.07**	0.02	0.02
Diazinon	µg/L	0.1	ND	0.033	ND	ND
Malathion	µg/L		ND	0.03	0.05	DNQ
Pyrethroid Pesticides						
Bifenthrin	µg/L		ND	0.3	0.01	ND
L-Cyhalothrin	µg/L		ND	0.01	ND	ND
Cypermethrin	µg/L		ND	0.02	0.006	ND
Esfenvalerate	µg/L		ND	0.02	ND	ND
Fenvalerate	µg/L		ND	0.01	ND	ND
cis-Permethrin	µg/L		ND	5.2	ND	ND
trans-Permethrin	µg/L		ND	6.3	ND	ND

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

The temperature limit for waterbodies designated as WARM is 80°F (26.7°C).

1. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS absent) and are dependent upon the pH and temperature of the water at the time of sample collection.
2. There is no site-specific nitrogen objective in the Basin Plan (Table 3-8) applicable to this reach. The Basin Plan objective of 10 mg/L nitrate-N was used for comparison with VCAILG data for this site.
3. The copper benchmark for saltwater applies at this site as prescribed in Table 16.

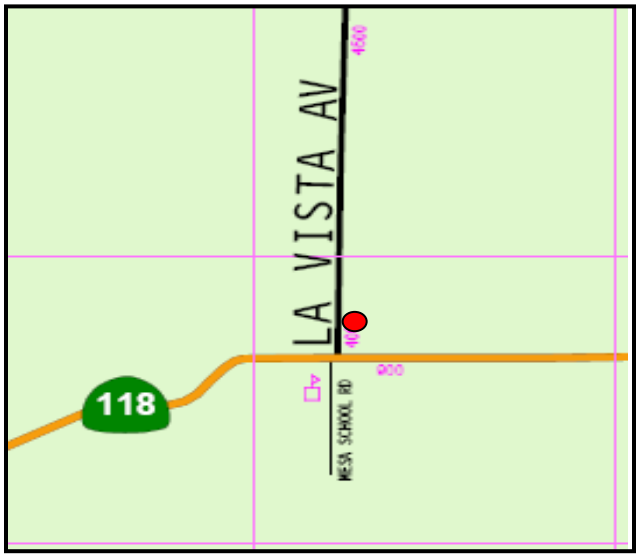
Table 25. 2014 - 2015 Trash Observations for 04D_LAS

Event	Count	Types
Event 22	0	N/A
Event 23	10-15	Gloves, plate, cup
Event 24	10-15	Cups, cans, plastics, Styrofoam
Event 25	0	N/A

05D_LAVD

This monitoring site is located on the La Vista Drain just east of La Vista Avenue, north of Hwy 118. Flow from this drain eventually discharges into Calleguas Creek Reach 5 (Beardsley Channel). The Ventura County Watershed Protection District maintains a stormwater monitoring station just downstream of the VCAILG monitoring site.

Site Map



View upstream (NE) from sampling location

Sufficient flow to sample was present only during wet weather (Events 23 and 24) for the 2014-2015 monitoring year. Table 26 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks. Table 27 quantifies and describes trash found at this site.

There were exceedances of the dissolved copper, total chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, toxaphene, chlorpyrifos, and diazinon benchmarks. Citrus, avocados, and berries (other than strawberries) are the major crop types that drain to this monitoring location.

Table 26. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: 05D_LAVD

Constituent	Units	Benchmark/ Criteria	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements			Not Sampled; site dry			Not Sampled; site dry
Flow	CFS			11.4	0.05	
pH		6.5≤ pH ≤ 8.5		8.3	8.3	
Temperature	°C	≤ 26.67°C[1]		14.5	16.0	
Dissolved Oxygen	mg/L	≥ 5		12.0	10.5	
Turbidity	NTU			1846	161	
Conductivity	µS/cm			314.9	954.2	
General Water Quality						
Total Dissolved Solids (TDS)	mg/L	850		220	634	
Total Suspended Solids (TSS)	mg/L			867	110	
Total Hardness as $CaCO_3$	mg/L			109.8	327.3	
Chloride	mg/L	150		11	65.3	
Sulfate	mg/L	250		77	195	
Nutrients						
Ammonia-N	mg/L	1.52/1.34[2]		0.4	0.1	
Nitrate-N	mg/L	10		3.5	8.6	
Total Orthophosphate	mg/L			2.2	0.8	
Metals						
Dissolved Copper	µg/L	9.7/24.67[3]		**12.1**	14.6	
Total Copper	µg/L			96.8	25.6	
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*		ND	ND	
BHC-alpha	µg/L	0.013*		ND	ND	
BHC-beta	µg/L	0.046*		ND	ND	
BHC-gamma	µg/L	0.063*		ND	ND	
Chlordane-alpha	µg/L			0.006	ND	
Chlordane-gamma	µg/L			0.002	ND	
Total Chlordane	µg/L	0.00059		**0.008**	ND	
2,4'-DDD	µg/L			0.007	ND	
2,4'-DDE	µg/L			0.007	ND	
2,4'-DDT	µg/L			0.05	ND	
4,4'-DDD	µg/L	0.00084		**0.05**	DNQ	
4,4'-DDE	µg/L	0.00059		**0.3**	0.03	
4,4'-DDT	µg/L	0.00059		**0.05**	**0.006**	
Dieldrin	µg/L	0.00014		ND	ND	
Endosulfan-I	µg/L	0.056*		ND	ND	

Constituent	Units	Benchmark/ Criteria	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endosulfan-II	µg/L	0.056*		ND	ND	
Endosulfan Sulfate	µg/L	240*		ND	ND	
Endrin	µg/L	0.036*		ND	ND	
Endrin Aldehyde	µg/L	0.81*		ND	ND	
Toxaphene	µg/L	0.00075		ND	**0.3**	
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025		**0.5**	**0.6**	
Diazinon	µg/L	0.1		**1.1**	**0.1**	
Malathion	µg/L			0.04	ND	
Pyrethroid Pesticides						
Bifenthrin	µg/L			0.03	0.03	
Cypermethrin	µg/L			0.3	0.02	

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

The temperature limit for waterbodies designated as WARM is 80°F (26.7°C).

1. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS absent) and are dependent upon the pH and temperature of the water at the time of sample collection.
2. The benchmarks for copper are listed in order of monitoring event and were calculated for freshwater at this site as prescribed in Table 16.

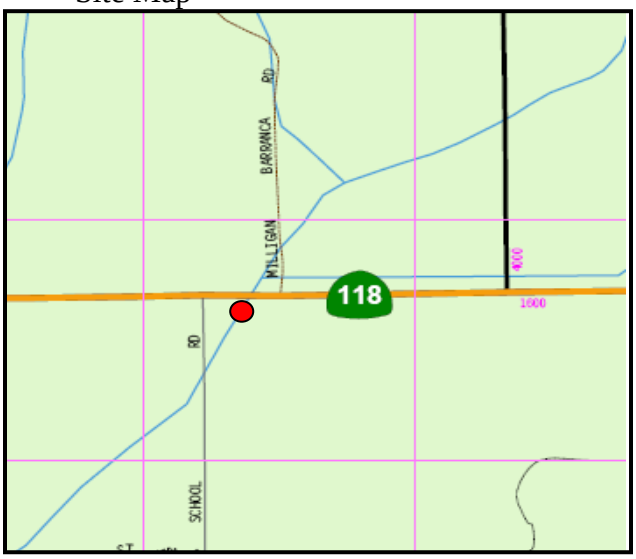
Table 27. 2014 - 2015 Trash Observations for 05D_LAVD

Event	Count	Types
Event 22	0	N/A
Event 23	5-10	Plastic toys
Event 24	0	N/A
Event 25	1	Plastic toy

05T_HONDO

This monitoring site is located on Hondo Barranca just downstream of the Hwy 118 Bridge. Hondo Barranca is a tributary to Calleguas Creek Reach 5 (Beardsley Channel).

Site Map



View downstream (S) at sampling location

Flow was only present at this site during the two wet weather events. There were exceedances of the dissolved copper, total chlordane, DDT compound, chlorpyrifos, and diazinon benchmarks during the wet weather events. Table 28 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks.

Table 29 quantifies and describes trash found at this site. The site is located directly adjacent to Hwy 118 and as noted in the table, a significant portion of the trash does not appear to come from an agricultural source. Hondo Barranca drains land planted primarily with citrus and avocado orchards.

Table 28. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: 05T_HONDO

Constituent	Units	Benchmark/ Criteria	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements			Not Sampled; site dry			Not Sampled; site dry
Flow	CFS			9.9	0.9	
pH		6.5≤ pH ≤ 8.5		8.2	8.4	
Temperature	°C	≤ 26.67°C[1]		14.3	15	
Dissolved Oxygen	mg/L	≥ 5		98.5	10.1	
Turbidity	NTU			2082	>1000	
Conductivity	µS/cm			214.4	552.1	
General Water Quality						
Total Dissolved Solids (TDS)	mg/L	850		170	404	
Total Suspended Solids (TSS)	mg/L			1490	3380	
Total Hardness as $CaCO_3$	mg/L			74	232.9	
Chloride	mg/L	150		11	12.9	
Sulfate	mg/L	250		50	186	
Nutrients						
Ammonia-N	mg/L	1.94/1.27[2]		0.3	0.2	
Nitrate-N	mg/L	10		3.9	3.7	
Total Orthophosphate	mg/L			1.4	1.01	
Metals						
Dissolved Copper	µg/L	6.92/18.44[3]		**7.1**	8.8	
Total Copper	µg/L			100	106.9	
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*		ND	ND	
BHC-alpha	µg/L	0.013*		ND	ND	
BHC-beta	µg/L	0.046*		ND	ND	
BHC-gamma	µg/L	0.063*		ND	ND	
Chlordane-alpha	µg/L			DNQ	DNQ	
Chlordane-gamma	µg/L			DNQ	DNQ	
Total Chlordane	µg/L	0.00059		**0.007**	**0.003**	
trans-Nonachlor	µg/L			DNQ	DNQ	
2,4'-DDD	µg/L			0.01	ND	
2,4'-DDE	µg/L			0.005	ND	
2,4'-DDT	µg/L			0.08	ND	
4,4'-DDD	µg/L	0.00084		**0.06**	DNQ	
4,4'-DDE	µg/L	0.00059		**0.3**	**0.04**	
4,4'-DDT	µg/L	0.00059		**0.06**	**0.01**	
Dieldrin	µg/L	0.00014		ND	ND	

Constituent	Units	Benchmark/ Criteria	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endosulfan-I	µg/L	0.056*		ND	ND	
Endosulfan-II	µg/L	0.056*		ND	ND	
Endosulfan Sulfate	µg/L	240*		ND	ND	
Endrin	µg/L	0.036*		ND	ND	
Endrin Aldehyde	µg/L	0.81*		ND	ND	
Toxaphene	µg/L	0.00075		ND	ND	
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025		**0.6**	**0.2**	
Diazinon	µg/L	0.1		**1.1**	ND	
Malathion	µg/L			0.04	ND	
Pyrethroid Pesticides						
Bifenthrin	µg/L			0.06	ND	
Cypermethrin	µg/L			0.5	0.006	

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

The temperature limit for waterbodies designated as WARM is 80°F (26.7°C).

1. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS absent) and are dependent upon the pH and temperature of the water at the time of sample collection.
2. The benchmarks for copper are listed in order of monitoring event and were calculated for freshwater at this site as prescribed in Table 16.

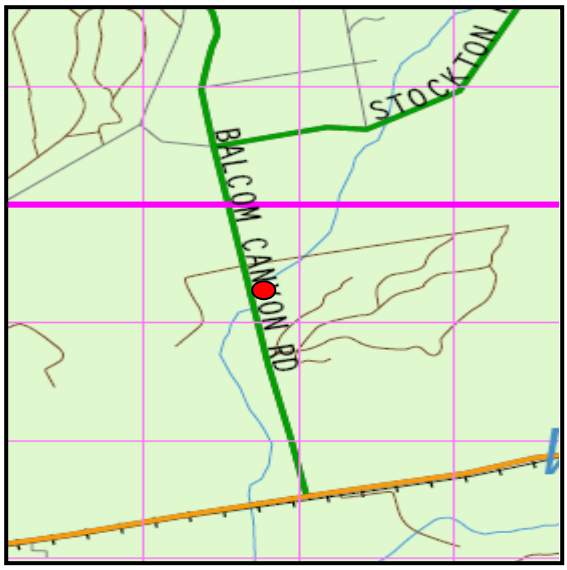
Table 29. 2014 - 2015 Trash Observations for 05T_HONDO

Event	Count	Types
Event 22	>50	Urban trash: bottles, cups, wrappers, bags
Event 23	>50	Urban trash: bottles, cups, wrappers, bags, wood
Event 24	30-50	Ag trash, urban trash: cups, cans, wrappers
Event 25	>50	Ag trash, urban trash: bottles, cups, bags

06T_LONG2

This monitoring site is located on Long Canyon where it crosses Balcom Canyon Road north of Highway 118. Long Canyon is a tributary to Calleguas Creek Reach 6 (Arroyo Las Posas).

Map of Sites



View upstream from sampling location

Flow was only present at this site during Event 23 (wet weather). There were exceedances of the DDT compounds, total chlordane, and chlorpyrifos benchmarks during Event 23. Table 30 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks.

Table 31 quantifies and describes trash found at this site. The drainage area for this monitoring site consists mostly of citrus and avocado orchards, with small portions used for growing nursery stock, berries, and cut flowers.

Table 30. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: 06T_LONG2

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements						
Flow	CFS			9		
pH		6.5≤ pH ≤ 8.5		8		
Temperature	°C	≤ 26.67°C[1]		14		
Dissolved Oxygen	mg/L	≥ 5		10.2		
Turbidity	NTU			>3000		
Conductivity	µS/cm			191		
General Water Quality						
Total Dissolved Solids (TDS)	mg/L	850		160		
Total Suspended Solids (TSS)	mg/L			950		
Total Hardness as $CaCO_3$	mg/L			62		
Chloride	mg/L	150		5		
Sulfate	mg/L	250		28		
Nutrients						
Ammonia-N	mg/L	2.56[2]		0.3		
Nitrate-N	mg/L	10		2.5		
Total Orthophosphate	mg/L			1.9		
Metals			Not Sampled; site dry		Not Sampled; site dry	Not Sampled; site dry
Dissolved Copper	µg/L	5.99[3]		5.7		
Total Copper	µg/L			114.8		
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*		ND		
BHC-alpha	µg/L	0.013*		ND		
BHC-beta	µg/L	0.046*		ND		
BHC-gamma	µg/L	0.063*		ND		
Chlordane-alpha	µg/L			DNQ		
Chlordane-gamma	µg/L			DNQ		
Total Chlordane	µg/L	0.00059		**0.005**		
trans-Nonachlor	µg/L			0.01		
2,4'-DDE	µg/L			0.01		
2,4'-DDT	µg/L			0.02		
4,4'-DDD	µg/L	0.00084		**0.01**		
4,4'-DDE	µg/L	0.00059		**0.03**		
4,4'-DDT	µg/L	0.00059		ND		
Dieldrin	µg/L	0.00014		ND		
Endosulfan-I	µg/L	0.056*		ND		

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endosulfan-II	µg/L	0.056*		ND		
Endosulfan Sulfate	µg/L	240*		ND		
Endrin	µg/L	0.036*		ND		
Endrin Aldehyde	µg/L	0.81*		ND		
Toxaphene	µg/L	0.00075		ND		
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025		**0.4**		
Diazinon	µg/L	0.1		0.02		
Pyrethroid Pesticides						
Cypermethrin	µg/L			0.3		

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

The temperature limit for waterbodies designated as WARM is 80°F (26.7°C).

1. The benchmark for Ammonia-N was calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS absent) and are dependent upon the pH and temperature of the water at the time of sample collection.
2. The benchmark for copper was calculated for freshwater at this site as prescribed in Table 16.

Table 31. 2014 - 2015 Trash Observations for 06T_LONG2

Event	Count	Types
Event 22	0	N/A
Event 23	5-10	Cans, Styrofoam, chip bags
Event 24	5-10	Bags, cups, cans, bottles
Event 25	10-15	Cups, bottles, wrappers, bags

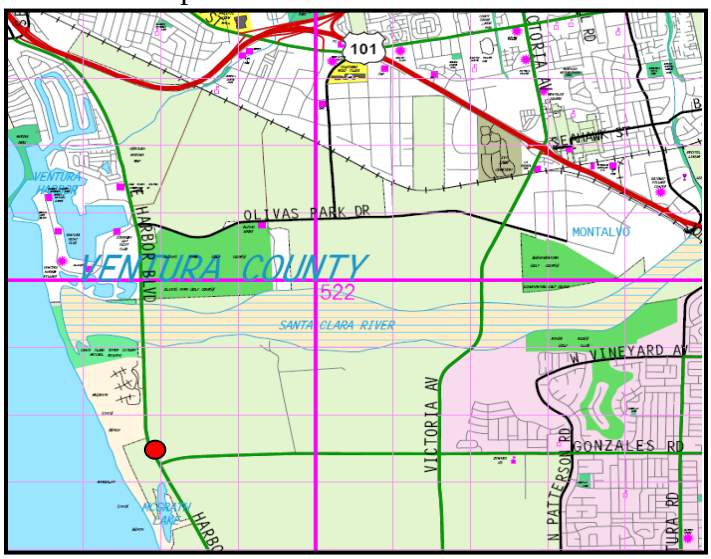
Oxnard Coastal Watershed

The Oxnard Coastal Watershed contains only one VCAILG monitoring site. The site is located on a drain used primarily for irrigated agriculture.

OXD_CENTR

This is the only VCAILG monitoring site in the Oxnard Coastal Watershed. The site is located on the Central Ditch, which flows under Harbor Boulevard and into McGrath Lake. Water from McGrath Lake is pumped periodically into the ocean to prevent the Central Ditch from backing up and flooding Harbor Boulevard.

Site Map



View looking downstream

Sufficient flow was present at this site during all four monitoring events. An exceedance of the nitrate-N benchmark occurred during dry weather (Event 25) and exceedances of the nitrate-N, dissolved copper, total chlordane, DDT compounds, and chlorpyrifos benchmarks during wet weather. Table 32 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks.

Table 33 quantifies and describes trash found at this site. Strawberries and row crops are the predominant crop types that drain to this site.

Table 32. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: OXD_CENTR

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements						
Flow	CFS		0.2	16.8	15.5	0.5
pH		6.5≤ pH ≤8.5	7.6	**6.4**	7.8	7.2
Temperature	°C		19.5	15	16	18.2
Dissolved Oxygen	mg/L	≥ 5	7.5	8.9	8	6
Turbidity	NTU		0	1091	315	0
Conductivity	µS/cm		3565	1960	1242	3615
General Water Quality						
Total Dissolved Solids (TDS)	mg/L		2940	1670	936	2940
Total Suspended Solids (TSS)	mg/L		2.8	1160	204	2
Total Hardness as $CaCO_3$	mg/L		1518	797.6	513	1514
Chloride	mg/L		299	105	59	320
Sulfate	mg/L		1490	720	453	1450
Nutrients						
Ammonia-N	mg/L	2.94/6.59/2.31/4.27[1]	0.4	0.5	0.06	0.3
Nitrate-N	mg/L	10[2]	8.8	**34.5**	**10.3**	**11.9**
Total Orthophosphate	mg/L		0.3	1.6	1.6	0.1
Metals						
Dissolved Copper	µg/L	3.1[3]	2	**4.2**	**16.9**	1.1
Total Copper	µg/L		1.9	49.6	3.8	1.3
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*	ND	ND	ND	ND
BHC-alpha	µg/L	0.013*	ND	ND	ND	ND
BHC-beta	µg/L	0.046*	ND	ND	ND	ND
BHC-gamma	µg/L	0.063*	ND	ND	ND	ND
trans-Nonachlor	µg/L		ND	0.01	DNQ	ND
Chlordane-alpha	µg/L		ND	0.02	0.007	ND
Chlordane-gamma	µg/L		ND	0.005	0.006	ND
Total Chlordane	µg/L	0.0059	ND	**0.02**	**0.01**	ND
2,4'-DDD	µg/L		ND	0.01	0.02	ND
2,4'-DDE	µg/L		ND	0.02	DNQ	ND
2,4'-DDT	µg/L		ND	0.3	0.03	ND
4,4'-DDD	µg/L	0.00084	DNQ	**0.3**	**0.06**	ND
4,4'-DDE	µg/L	0.00059	**0.01**	**0.7**	**0.2**	DNQ
4,4'-DDT	µg/L	0.00059	DNQ	**0.2**	**0.18**	ND
Dieldrin	µg/L	0.00014	ND	ND	ND	ND
Endosulfan-I	µg/L	0.056*	ND	ND	ND	ND

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endosulfan-II	µg/L	0.056*	ND	ND	ND	ND
Endosulfan Sulfate	µg/L	240*	ND	ND	ND	ND
Endrin	µg/L	0.036*	ND	ND	ND	ND
Endrin Aldehyde	µg/L	0.81*	ND	ND	ND	ND
Toxaphene	µg/L	0.00075	ND	ND	ND	ND
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025	ND	**0.4**	**0.1**	ND
Diazinon	µg/L	0.1	ND	ND	ND	ND
Dichlorvos	µg/L		ND	ND	0.02	ND
Malathion	µg/L		ND	0.2	ND	ND
Pyrethroid Pesticides						
Bifenthrin	µg/L		ND	1.6	0.06	ND
Danitol	µg/L		ND	2.9	0.4	ND

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

1. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS absent) and are dependent upon the pH and temperature of the water at the time of sample collection.
2. There is no site-specific nitrogen objective in the Basin Plan (Table 3-8) applicable to this reach. The Basin Plan objective of 10 mg/L nitrate-N was used for comparison with VCAILG data for this site.
3. The copper benchmark was applied for saltwater at this site as prescribed in Table 16.

Table 33. 2014 - 2015 Trash Observations for OXD_CENTR

Event	Count	Types
Event 22	1	Pill bottle
Event 23	20	Cans, boxes, lids
Event 24	10-15	Cups, cans, wrappers
Event 24	0	N/A

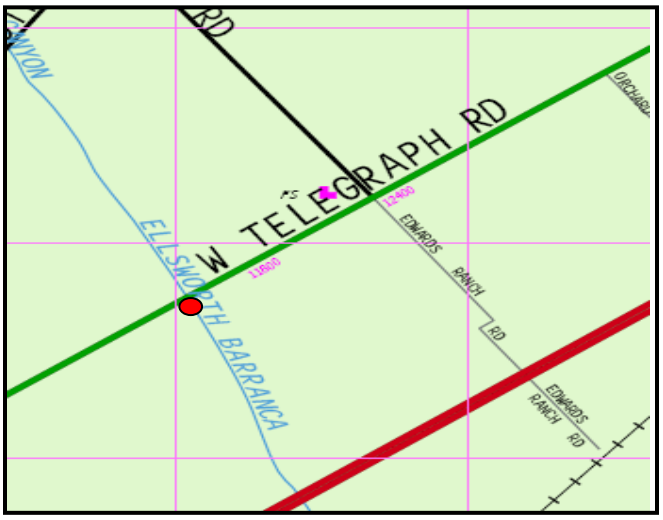
Santa Clara River Watershed

The Santa Clara River Watershed contains seven VCAILG monitoring sites, including one background site. Five of the sites are located on tributaries to the Santa Clara River. S03D_BARDS is the only monitoring site located on a drain used primarily for irrigated agriculture. Monitoring sites are discussed below in order of the Santa Clara River reach into which they drain.

S02T_ELLS

This monitoring site is located on Ellsworth Barranca just downstream of the Telegraph Road Bridge. Ellsworth Barranca drains the Aliso Canyon area and is a tributary to Santa Clara River Reach 2.

Site Map



View upstream at the bridge

Flow was present at this site only during wet Event 24. There were exceedances of the chloride, total chlordane, 4,4'-DDE, and chlorpyrifos benchmarks during Event 24. Table 34 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks.

Table 35 describes trash found at this site. Citrus and avocados are the primary crop types associated with this site.

Table 34. 2014- 2015 VCAILG Monitoring Data v. Waiver Benchmarks: S02T_ELLS

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements			Not Sampled; site dry	Not Sampled; ponded		Not Sampled; site dry
Flow	CFS				13.6	
pH		6.5≤ pH ≤ 8.5			7.9	
Temperature	°C	≤ 26.67°C[1]			13	
Dissolved Oxygen	mg/L	≥ 5			10.2	
Turbidity	NTU				>3000	
Conductivity	µS/cm				1697	
General Water Quality						
Total Dissolved Solids (TDS)	mg/L	1200			1110	
Total Suspended Solids (TSS)	mg/L				9490	
Total Hardness as $CaCO_3$	mg/L				411	
Chloride	mg/L	150			**192**	
Sulfate	mg/L	600			429	
Nutrients						
Ammonia-N	mg/L	3.22[2]			0.8	
Nitrate-N	mg/L	10			2.2	
Total Orthophosphate	mg/L				ND	
Metals						
Dissolved Copper	µg/L	29.28[3]			6.9	
Total Copper	µg/L				504	
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*			ND	
BHC-alpha	µg/L	0.013*			ND	
BHC-beta	µg/L	0.046*			ND	
BHC-gamma	µg/L	0.063*			ND	
Chlordane-alpha	µg/L				DNQ	
Chlordane-gamma	µg/L				DNQ	
Total Chlordane	µg/L	0.00059			**0.006**	
2,4'-DDE	µg/L				0.05	
4,4'-DDD	µg/L	0.00084			ND	
4,4'-DDE	µg/L	0.00059			**0.02**	
4,4'-DDT	µg/L	0.00059			ND	
Dieldrin	µg/L	0.00014			ND	
Endosulfan-I	µg/L	0.056*			ND	
Endosulfan-II	µg/L	0.056*			ND	
Endosulfan Sulfate	µg/L	240*			ND	

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endrin	µg/L	0.036*			ND	
Endrin Aldehyde	µg/L	0.81*			ND	
Toxaphene	µg/L	0.00075			ND	
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025			**0.04**	
Diazinon	µg/L	0.1			ND	

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent.
See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

1. The temperature limit for waterbodies designated as WARM is 80°F (26.7°C).
2. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS present) and are dependent upon the pH and temperature of the water at the time of sample collection.
3. The copper benchmarks are listed in order of monitoring event and were calculated for freshwater at this site as prescribed in Table 16.

Table 35. 2014 - 2015 Trash Observations for S02T_ELLS

Event	Count	Types
Event 22	5-10	Wrappers, wood, gloves, cups, can
Event 23	10-15	Plastic bag, paper, wood
Event 24	6	Aluminum foil, paper
Event 25	3	Food wrappers

S02T_TODD

This monitoring site is located on Todd Barranca upstream of Hwy 126. Todd Barranca drains the Wheeler Canyon area and is a tributary to Santa Clara River Reach 2.

Site Map

View upstream of the sampling site

Sufficient flow was present during all four 2014-2015 monitoring events. There were exceedances of the TDS and sulfate benchmarks during dry weather and exceedances of total chlordane and DDT compounds during wet weather. Additionally, the pH value during Event 23 was below the acceptable lower benchmark value. Table 36 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks.

Table 37 lists trash observation made at the site. Row crops, cut flowers, and orchards drain to this site.

Table 36. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: S02T_TODD

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements						
Flow	CFS		0.2	5.1	11.7	0.1
pH		6.5≤ pH ≤8.5	8	**5.8**	8.1	7.7
Temperature	°C	≤ 26.67°C[1]	18.5	16.5	12.8	16.5
Dissolved Oxygen	mg/L	≥ 6	8.9	8.8	9.8	8.7
Turbidity	NTU		0	216.5	>3000	4.3
Conductivity	µS/cm		2248	1405	685.9	2067
General Water Quality						
Total Dissolved Solids (TDS)	mg/L	1200	**1750**	1110	479	**2180**
Total Suspended Solids (TSS)	mg/L		ND	100	1760	ND
Total Hardness as $CaCO_3$	mg/L		990.1	593.1	229.4	914.7
Chloride	mg/L	150	95.3	37	35.2	68
Sulfate	mg/L	600	**852**	280	182	**720**
Nutrients						
Ammonia-N	mg/L	1.89/6.16/2.45/3.09[2]	ND	0.4	0.2	DNQ
Nitrate-N	mg/L	10	4.6	3.8	2.4	5.9
Total Orthophosphate	mg/L		0.2	1.3	0.6	0.1
Metals						
Dissolved Copper	µg/L	29.28/29.28/18.21/29.28[3]	2.1	1.3	7	0.8
Total Copper	µg/L		2.1	6.1	85.6	1.8
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*	ND	ND	ND	ND
BHC-alpha	µg/L	0.013*	ND	ND	ND	ND
BHC-beta	µg/L	0.046*	ND	ND	ND	ND
BHC-gamma	µg/L	0.063*	ND	ND	ND	ND
Chlordane-alpha	µg/L		ND	DNQ	DNQ	ND
Chlordane-gamma	µg/L		ND	DNQ	DNQ	ND
Total Chlordane	µg/L	0.00059	ND	**0.005**	**0.005**	ND
2,4'-DDE	µg/L		ND	ND	0.06	ND
2,4'-DDT	µg/L		ND	0.007	ND	ND
4,4'-DDD	µg/L	0.00084	ND	**0.006**	ND	ND
4,4'-DDE	µg/L	0.00059	ND	DNQ	**0.08**	DNQ
4,4'-DDT	µg/L	0.00059	ND	ND	ND	DNQ
Dieldrin	µg/L	0.00014	ND	ND	ND	ND
Endosulfan-I	µg/L	0.056*	ND	ND	ND	ND

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endosulfan-II	µg/L	0.056*	ND	ND	ND	ND
Endosulfan Sulfate	µg/L	240*	ND	ND	ND	ND
Endrin	µg/L	0.036*	ND	ND	ND	ND
Endrin Aldehyde	µg/L	0.81*	ND	ND	ND	ND
Toxaphene	µg/L	0.00075	ND	ND	ND	ND
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025	0.004	0.02	0.01	0.003
Diazinon	µg/L	0.1	ND	ND	ND	0.009
Pyrethroid Pesticides						
Bifenthrin	µg/L		ND	ND	0.02	ND
Cypermethrin	µg/L		ND	0.4	0.05	0.003

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

1. The temperature limit for waterbodies designated as WARM is 80°F (26.7°C).
2. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS present) and are dependent upon the pH and temperature of the water at the time of sample collection.
3. The copper benchmark was calculated for freshwater at this site as prescribed in Table 16.

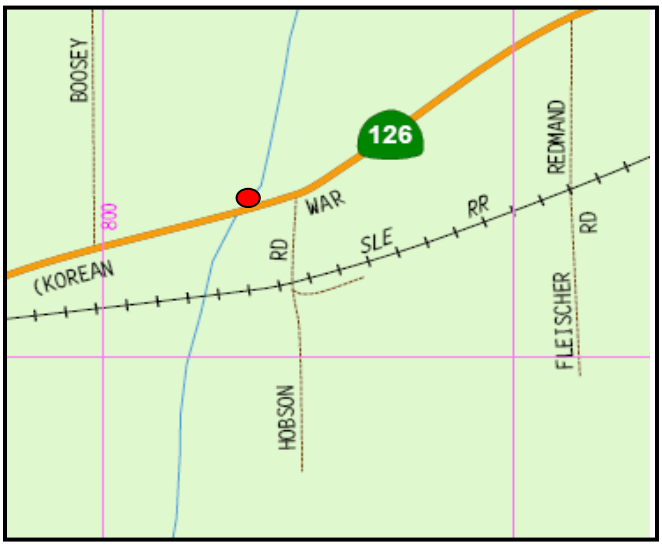
Table 37. 2014 - 2015 Trash Observations for S02T_TODD

Event	Count	Types
Event 22	0	N/A
Event 23	0	N/A
Event 24	1	Bag
Event 24	1	Glass bottle

S03T_TIMB

This monitoring site is located on Timber Canyon Creek just upstream of Hwy 126, east of Santa Paula. Timber Creek is a tributary to Santa Clara River Reach 3.

Site Map



View of site (S) toward Hwy 126

Sufficient flow to monitor was only present for Event 24 during the 2014-2015 monitoring year. There were exceedances of the TDS and sulfate benchmarks for Event 24. Table 38 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks.

Trash observations are provided in Table 39. This site drains mostly avocado and citrus orchards.

Table 38. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: S03T_TIMB

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements						
Flow	CFS				1.4	
pH		6.5≤ pH ≤ 8.5			7.8	
Temperature	°C	≤ 26.67°C[1]			12	
Dissolved Oxygen	mg/L	≥ 5			10.7	
Turbidity	NTU				>3000	
Conductivity	µS/cm				2230	
General Water Quality						
Total Dissolved Solids (TDS)	mg/L	1300			**1700**	
Total Suspended Solids (TSS)	mg/L				71600	
Total Hardness as $CaCO_3$	mg/L				497.5	
Chloride	mg/L	150			97.5	
Sulfate	mg/L	600			**1010**	
Nutrients						
Ammonia-N	mg/L	3.9[2]			0.9	
Nitrate-N	mg/L	5			2.7	
Total Orthophosphate	mg/L				ND	
Metals			Not Sampled; site dry	Not Sampled; site dry		Not Sampled; site dry
Dissolved Copper	µg/L	29.28[3]			7.6	
Total Copper	µg/L				1101.4	
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*			ND	
BHC-alpha	µg/L	0.013*			ND	
BHC-beta	µg/L	0.046*			ND	
BHC-gamma	µg/L	0.063*			ND	
Chlordane-alpha	µg/L				ND	
Chlordane-gamma	µg/L				ND	
Total Chlordane	µg/L	0.00059			ND	
4,4'-DDD	µg/L	0.00084			ND	
4,4'-DDE	µg/L	0.00059			ND	
4,4'-DDT	µg/L	0.00059			ND	
Dieldrin	µg/L	0.00014			ND	
Endosulfan-I	µg/L	0.056*			ND	
Endosulfan-II	µg/L	0.056*			ND	
Endosulfan Sulfate	µg/L	240*			ND	
Endrin	µg/L	0.036*			ND	

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endrin Aldehyde	µg/L	0.81*			ND	
Toxaphene	µg/L	0.00075			ND	
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025			ND	
Diazinon	µg/L	0.1			ND	

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

1. The temperature limit for waterbodies designated as WARM is 80°F (26.7°C).
2. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS present) and are dependent upon the pH and temperature of the water at the time of sample collection.
3. The copper benchmark was calculated for freshwater at this site as prescribed in Table 16.

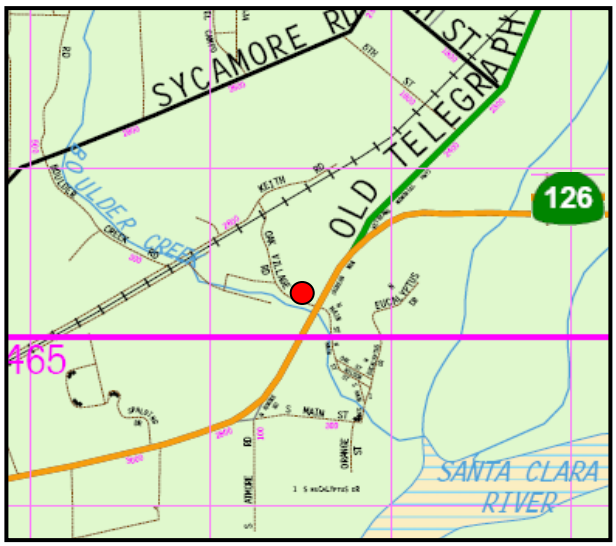
Table 39. 2014 - 2015 Trash Observations for S03T_TIMB

Event	Count	Types
Event 22	0	N/A
Event 23	0	N/A
Event 24	5	Soda bottle, aerosol can, Styrofoam
Event 25	0	N/A

S03T_BOULD

This monitoring site is located on Boulder Creek just upstream of Hwy 126, west of Fillmore. Boulder Creek is a tributary to Santa Clara River Reach 3.

Site Map



View of sampling location (upstream)

Sufficient flow to monitor was only present for Event 23 and Event 24 during 2014-2015. There were exceedances of the TDS, nitrate-N benchmarks, total chlordane, and 4,4'-DDE benchmarks for Event 23 and Event 24. In addition, the pH value for Event 23 was below the allowable lower benchmark pH value. Table 40 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks.

Trash observations for this site can be found in Table 41. Citrus, avocados, and nurseries are the primary crop types associated with this site.

Table 40. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: S03T_BOULD

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements			Not Sampled; site dry			Not Sampled; site dry
Flow	CFS			7.9	10.6	
pH		6.5≤ pH ≤ 8.5		**6.4**	7.8	
Temperature	°C	≤ 26.67°C[1]		13.7	12	
Dissolved Oxygen	mg/L	≥ 5		10.2	10.8	
Turbidity	NTU			2115	>3000	
Conductivity	µS/m			1946	896.8	
General Water Quality						
Total Dissolved Solids (TDS)	mg/L	1300		**1810**	660	
Total Suspended Solids (TSS)	mg/L			1450	3040	
Total Hardness as $CaCO_3$	mg/L			943.6	412.8	
Chloride	mg/L	150		66	18.7	
Sulfate	mg/L	600		**800**	330	
Nutrients						
Ammonia-N	mg/L	7.1/3.56[2]		0.8	0.5	
Nitrate-N	mg/L	5		**29.8**	**7.8**	
Total Orthophosphate	mg/L			2	2.2	
Metals						
Dissolved Copper	µg/L	29.28/29.28[3]		16.6	5.7	
Total Copper	µg/L			115.5	82.9	
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*		ND	ND	
BHC-alpha	µg/L	0.013*		ND	ND	
BHC-beta	µg/L	0.046*		ND	ND	
BHC-gamma	µg/L	0.063*		ND	ND	
trans-Nonachlor	µg/L			0.01	0.009	
Chlordane-alpha	µg/L			0.01	0.01	
Chlordane-gamma	µg/L			0.006	0.009	
Total Chlordane	µg/L	0.00059		**0.02**	**0.02**	
4,4'-DDD	µg/L	0.00084		ND	ND	
4,4'-DDE	µg/L	0.00059		ND	**0.008**	
4,4'-DDT	µg/L	0.00059		ND	ND	
Dieldrin	µg/L	0.00014		ND	ND	
Endosulfan-I	µg/L	0.056*		ND	ND	

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endosulfan-II	µg/L	0.056*		ND	ND	
Endosulfan Sulfate	µg/L	240*		ND	ND	
Endrin	µg/L	0.036*		ND	ND	
Endrin Aldehyde	µg/L	0.81*		ND	ND	
Toxaphene	µg/L	0.00075		ND	ND	
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025		0.01	0.008	
Diazinon	µg/L	0.1		ND	ND	
Pyrethroid Pesticides						
Bifenthrin	µg/L			0.2	0.09	
Cyfluthrin	µg/L			0.02	0.006	
Danitol	µg/L			0.2	0.2	
Fluvalinate	µg/L			0.005	ND	
cis-Permethrin	µg/L			0.2	0.1	
trans-Permethrin	µg/L			0.3	0.1	

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

1. The temperature limit for waterbodies designated as WARM is 80°F (26.7°C).
2. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS present) and are dependent upon the pH and temperature of the water at the time of sample collection.
3. The copper benchmark was calculated for freshwater at this site as prescribed in Table 16.

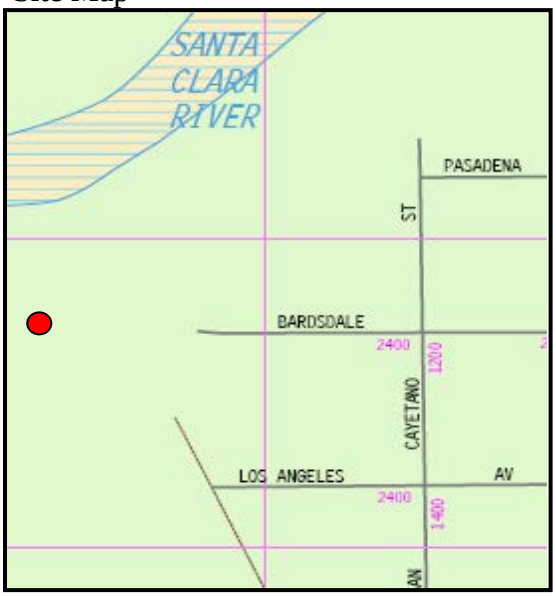
Table 41. 2014 - 2015 Trash Observations for S03T_BOULD

Event	Count	Types
Event 22	6	Tinfoil, plastic bags, cardboard, cups, Styrofoam
Event 23	9	Beer can, take-out cups
Event 24	4	Styrofoam cup, cigarette pack
Event 25	0	N/A

S03D_BARDS

This monitoring site is located near the end of the agricultural drain that runs parallel to Bardsdale Avenue in Bardsdale. The drain is located on the south side of the Santa Clara River and eventually discharges into Santa Clara River Reach 3.

Site Map



View of site looking upstream

Sufficient flow to monitor was present during the two wet weather events for the 2014-2015 monitoring year. There were exceedances of DDT compounds, chlorpyrifos, and total chlordane benchmarks during the two events. Table 42 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks.

Trash observations for S03D_BARDS are provided below in Table 43. This site drains mostly citrus orchards with small proportions of the area used for avocados and row crops.

Table 42. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: S03D_BARDS

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements			Not Sampled; site dry			Not Sampled; site dry
Flow	CFS			3.4	23.5	
pH		6.5≤ pH ≤8.5		7	8.3	
Temperature	°C	≤ 26.67°C[1]		13.9	11	
Dissolved Oxygen	mg/L	≥ 5		9.4	10.9	
Turbidity	NTU			>3000	>3000	
Conductivity	µS/cm			402	171.8	
General Water Quality						
Total Dissolved Solids (TDS)	mg/L	1300		320	131	
Total Suspended Solids (TSS)	mg/L			1720	4030	
Total Hardness as $CaCO_3$	mg/L			151.5	62.2	
Chloride	mg/L	150		12	5.6	
Sulfate	mg/L	600		116	39.3	
Nutrients						
Ammonia-N	mg/L	6.15/2.07[2]		0.6	0.3	
Nitrate-N	mg/L	5		3.4	1.3	
Total Orthophosphate	mg/L			1.8	1.5	
Metals						
Dissolved Copper	µg/L	12.77/5.97[3]		6.1	3	
Total Copper	µg/L			87.1	222	
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*		ND	ND	
BHC-alpha	µg/L	0.013*		ND	ND	
BHC-beta	µg/L	0.046*		ND	ND	
BHC-gamma	µg/L	0.063*		ND	ND	
cis-Nonachlor	µg/L			0.02	0.01	
trans-Nonachlor	µg/L			0.03	0.04	
Chlordane-alpha	µg/L			0.02	0.02	
Chlordane-gamma	µg/L			0.01	0.02	
Total Chlordane	µg/L	0.00059		**0.03**	**0.04**	
2,4'-DDT	µg/L			0.05	ND	
4,4'-DDD	µg/L	0.00084		**0.04**	**0.04**	
4,4'-DDE	µg/L	0.00059		**0.3**	**0.4**	
4,4'-DDT	µg/L	0.00059		ND	ND	
Dieldrin	µg/L	0.00014		ND	ND	

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endosulfan-I	µg/L	0.056*		ND	ND	
Endosulfan-II	µg/L	0.056*		ND	ND	
Endosulfan Sulfate	µg/L	240*		ND	ND	
Endrin	µg/L	0.036*		ND	ND	
Endrin Aldehyde	µg/L	0.81*		ND	ND	
Toxaphene	µg/L	0.00075		ND	ND	
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025		**0.3**	**0.85**	
Diazinon	µg/L	0.1		ND	ND	
Malathion	µg/L			0.3	ND	
Pyrethroid Pesticides						
Bifenthrin	µg/L			1	1.8	
Cyfluthrin	µg/L			0.3	0.03	
L-Cyhalothrin	µg/L			0.06	0.07	
Cypermethrin	µg/L			0.6	0.2	
Danitol	µg/L			0.004	ND	
cis-Permethrin	µg/L			0.2	ND	
trans-Permethrin	µg/L			0.2	ND	

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

1. The temperature limit for waterbodies designated as WARM is 80°F (26.7°C).
2. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS present) and are dependent upon the pH and temperature of the water at the time of sample collection.
3. The copper benchmark was calculated for freshwater at this site as prescribed in Table 16. It was the same for all three events.

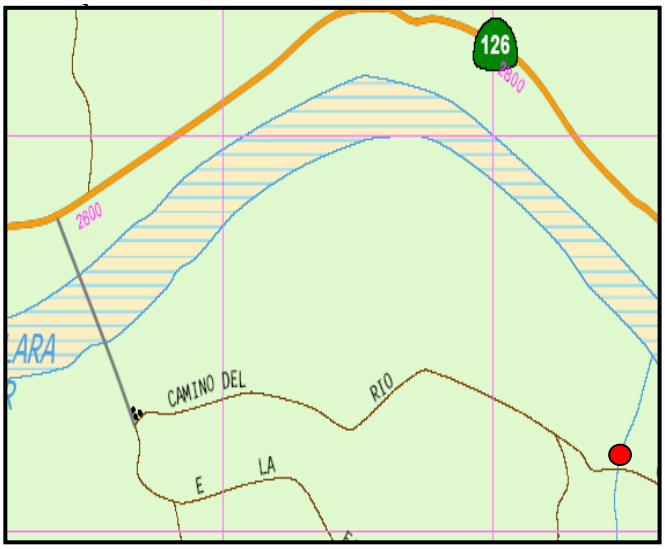
Table 43. 2014 - 2015 Trash Observations for S03D_BARDS

Event	Count	Types
Event 22	>20	Plastic bags, cups, Styrofoam, oil canister, Ag trash
Event 23	5	Ag trash
Event 24	25	Plastic pipe, plant containers, buckets, Ag trash
Event 25	10	Bucket, tape, irrigation tubing

S04T_TAPO

This monitoring site is located on Tapo Creek near the Ventura / Los Angeles County line, south of Hwy 126 and the Santa Clara River. Tapo Creek is a tributary to Santa Clara River Reach 4.

Site Map



View upstream toward the sample site at the

Sufficient flow was present for sampling at this site during all four monitoring events. TDS, chloride, sulfate and nitrate-N benchmarks were exceeded during dry weather. The benchmarks for sulfate, DDT compounds, and total chlordane were exceeded during the wet weather event. Table 44 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks.

Table 45 summarizes trash observations for this site. Citrus, row crops, and nursery stock are grown in the vicinity of this monitoring site.

Table 44. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: S04T_TAPO

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements						
Flow	CFS		0.1	24.2	22.2	0.2
pH		6.5≤ pH ≤8.5	7.3	6.8	7.7	8.1
Temperature	°C	≤ 26.67°C[1]	17.6	13.5	11.3	18.3
Dissolved Oxygen	mg/L	≥ 5	8.9	9.8	10.6	10.2
Turbidity	NTU		0	1869	>3000	0
Conductivity	µS/cm		3490	488	1628	1877
General Water Quality						
Total Dissolved Solids (TDS)	mg/L	1300	**2800**	410	1260	**1330**
Total Suspended Solids (TSS)	mg/L		ND	833	6380	1
Total Hardness as $CaCO_3$	mg/L		1317	196.6	609	691.5
Chloride	mg/L	100	**202**	28	54.1	**124**
Sulfate	mg/L	600	**1400**	173	**669**	510
Nutrients						
Ammonia-N	mg/L	4.26/6.67/4.26/1.7[2]	ND	0.2	0.2	0.4
Nitrate-N	mg/L	5	**19.1**	2.7	2.3	**5.9**
Total Orthophosphate	mg/L		0.3	1	0.9	0.1
Metals						
Dissolved Copper	µg/L	29.28/29.28/15.96/29.28[3]	3.2	7.2	7.8	1.8
Total Copper	µg/L		3.7	52.5	331.9	2.5
Organochlorine Pesticides						
Aldrin	µg/L	0.00014*	ND	ND	ND	ND
BHC-alpha	µg/L	0.013*	ND	ND	ND	ND
BHC-beta	µg/L	0.046*	ND	ND	ND	ND
BHC-gamma	µg/L	0.063*	ND	ND	ND	ND
cis-Nonachlor	µg/L		ND	0.009	DNQ	ND
trans-Nonachlor	µg/L		ND	0.02	0.006	ND
Chlordane-alpha	µg/L		ND	0.02	0.005	ND
Chlordane-gamma	µg/L		ND	0.01	DNQ	ND
Total Chlordane	µg/L	0.0059	ND	**0.03**	**0.009**	ND
2,4'-DDD	µg/L		ND	0.02	ND	ND
2,4'-DDE	µg/L		ND	0.02	0.02	ND
2,4'-DDT	µg/L		ND	0.1	ND	ND
4,4'-DDD	µg/L	0.00084	ND	**0.09**	ND	ND
4,4'-DDE	µg/L	0.00059	DNQ	**0.4**	**0.3**	DNQ

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
4,4'-DDT	µg/L	0.00059	ND	**0.048**	ND	ND
Dieldrin	µg/L	0.00014	ND	ND	ND	ND
Endosulfan-I	µg/L	0.056*	ND	ND	ND	ND
Endosulfan-II	µg/L	0.056*	ND	ND	ND	ND
Endosulfan Sulfate	µg/L	240*	ND	ND	ND	ND
Endrin	µg/L	0.036*	ND	ND	ND	ND
Endrin Aldehyde	µg/L	0.81*	ND	ND	ND	ND
Toxaphene	µg/L	0.00075	ND	ND	ND	ND
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025	ND	ND	ND	ND
Diazinon	µg/L	0.1	ND	0.005	ND	ND
Pyrethroid Pesticides						
Bifenthrin	µg/L		ND	0.03	0.1	ND
L-Cyhalothrin	µg/L		ND	0.003	ND	ND
Cypermethrin	µg/L		ND	0.03	ND	ND
Danitol	µg/L		ND	0.01	ND	ND
cis-Permethrin	µg/L		ND	0.06	ND	ND
trans-Permethrin	µg/L		ND	0.1	ND	ND

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

1. The temperature limit for waterbodies designated as WARM is 80°F (26.7°C).
2. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS present) and are dependent upon the pH and temperature of the water at the time of sample collection.
3. The copper benchmark was calculated for freshwater at this site as prescribed in Table 16.

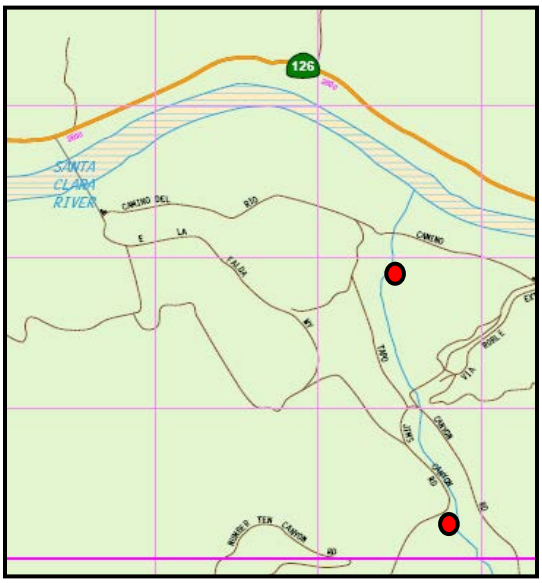
Table 45. 2014 - 2015 Trash Observations for S04T_TAPO

Event	Count	Types
Event 22	2	Plastic plate and cup
Event 23	0	N/A
Event 24	1	Plastic bag
Event 25	4	Sting, food wrappers

S04T_TAPO_BKGD

This monitoring site is a background site for S04T_TAPO that is located upstream of irrigated agricultural land that drains to S04T_TAPO. This site was selected to determine whether high salts concentrations are a background condition for the area. Since this site can only be reached by dirt roads, it has been too muddy to gain access for sampling during storm events.

Site Map



View of monitoring location

Sufficient flow for monitoring was not present for any of the monitoring events during 2014-2015 when the site was accessible. Table 46 summarizes trash observations for this site.

Table 46. 2013 - 2014 Trash Observations for S04T_TAPO_BKGD

Event	Count	Types
Event 22	0	N/A
Event 23	N/A[1]	N/A
Event 24	N/A[1]	N/A
Event 25	0	N/A

1. Site was inaccessible during this event.

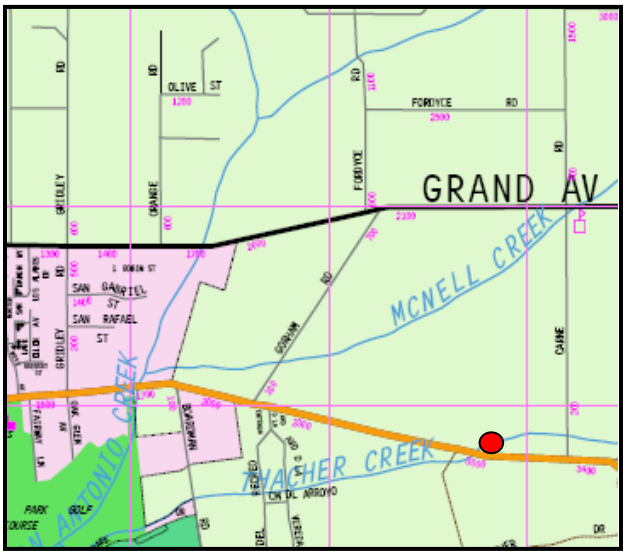
Ventura River Watershed

There are two VCAILG monitoring sites located in this watershed, both tributaries to the Ventura River and located on the east end of the City of Ojai.

VRT_THACH

This monitoring site is located on Thacher Creek just upstream of Ojai Avenue in Ojai. Thacher Creek is a tributary of San Antonio Creek, which is a tributary of the Ventura River.

Site Map



View downstream from site looking towards Ojai Ave. bridge

Sufficient flow was only present for Event 24 during the 2014-2015 monitoring year. There were no exceedances of any benchmarks during Event 24. Table 47 contains a summary of the concentrations for select constituents and provides a comparison of measured concentrations with applicable water quality benchmarks.

Table 48 provides trash observations for this site. Avocados and citrus are the predominant crop types associated with this site.

Table 47. 2014 - 2015 VCAILG Monitoring Data v. Waiver Benchmarks: VRT_THACH

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Field Measurements						
Flow	CFS				4.1	
pH		6.5≤ pH ≤8.5			8.1	
Temperature	°C				13.7	
Dissolved Oxygen	mg/L	≥ 7			10.2	
Turbidity	NTU				2498	
Conductivity	µS/cm				7487	
General Water Quality						
Total Dissolved Solids (TDS)	mg/L	800			550	
Total Suspended Solids (TSS)	mg/L				928	
Total Hardness as $CaCO_3$	mg/L				346.6	
Chloride	mg/L	60			18.4	
Sulfate	mg/L	300			246	
Nutrients						
Ammonia-N	mg/L	2.39[1]			0.1	
Nitrate-N	mg/L	5			4.3	
Total Orthophosphate	mg/L				0.6	
Metals						
Dissolved Copper	µg/L	25.91[2]			2.5	
Total Copper	µg/L				25.9	
Organochlorine Pesticides						
Aldrin	µg/L	0.00013*			ND	
BHC-alpha	µg/L	0.0039*			ND	
BHC-beta	µg/L	0.014*			ND	
BHC-gamma	µg/L	0.019*			ND	
Chlordane-alpha	µg/L				ND	
Chlordane-gamma	µg/L				ND	
Total Chlordane	µg/L	0.0059			ND	
4,4'-DDD	µg/L	0.00084			ND	
4,4'-DDE	µg/L	0.00059			ND	
4,4'-DDT	µg/L	0.00059			ND	
Dieldrin	µg/L	0.00014			ND	
Endosulfan-I	µg/L	0.056*			ND	
Endosulfan-II	µg/L	0.056*			ND	
Endosulfan Sulfate	µg/L	110*			ND	
Endrin	µg/L	0.036*			ND	

Constituent	Units	Benchmark	Event 22 Dry 8/14/14	Event 23 Wet 12/2/14	Event 24 Wet 12/12/14	Event 25 Dry 5/26/15
Endrin Aldehyde	µg/L	0.76*			ND	
Toxaphene	µg/L	0.00075			ND	
Organophosphorus Pesticides						
Chlorpyrifos	µg/L	0.025			ND	
Diazinon	µg/L	0.1			ND	

Concentrations in **bold** indicate an exceedance of a water quality benchmark applicable to this site for the specified constituent. See Tables 14 through 18 for a list of benchmarks applicable to this site. Additional OC pesticides CTR criteria are denoted with an "*" and also listed in Table 19.

1. The benchmarks for Ammonia-N are listed in order of monitoring event and were calculated based on the April 2002 Basin Plan Amendment chronic equation (ELS present) and are dependent upon the pH and temperature of the water at the time of sample collection.
2. The copper benchmark was calculated for freshwater at this site as prescribed in Table 16.

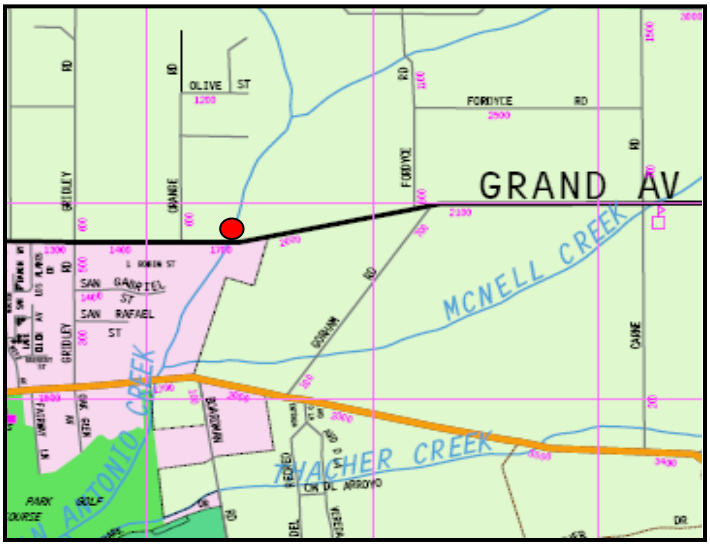
Table 48. 2014 - 2015 Trash Observations for VRT_THACH

Event	Count	Types
Event 22	0	N/A
Event 23	0	N/A
Event 24	2	Metal pipe, newspaper
Event 25	2	Paper, paper cup

VRT_SANTO

This monitoring site is located on San Antonio Creek just upstream of Grand Avenue in Ojai. San Antonio Creek is a tributary of the Ventura River.

Site Map



View downstream at the Grand Ave. bridge

Sufficient flow was not present for any of the monitoring events during 2013-2014. Table 49 includes the number and types of trash observed at the monitoring site. Citrus and avocados are the predominant crop types associated with this site.

Table 49. 2013 - 2014 Trash Observations for VRT_SANTO

Event	Count	Types
Event 22	0	N/A
Event 23	0	N/A
Event 24	4	Plastic bag, paper, bottle
Event 25	2	Foam, plastic bag

CHRONIC TOXICITY TEST RESULTS

During the 2014-2015 monitoring year, Pacific EcoRisk (PER) performed single-species short-term chronic toxicity tests for samples collected during all the first wet weather and second dry weather events. The toxicity reports submitted by PER contain test results and raw data. PER submitted two types of reports, an electronic data deliverable (EDD), which is compatible with the Surface Water Ambient Monitoring Program (SWAMP), and a narrative report. The reports are included as Appendix G on the data CD accompanying this report.

Determination of Most Sensitive Species at Toxicity Monitoring Sites

There are 11 toxicity sites that are part of the VCAILGMP. The Conditional Waiver requires that three-species chronic toxicity testing be performed on samples collected at each site to determine the most sensitive species among the invertebrate, vertebrate, and algae; the most sensitive species is then used for subsequent toxicity testing for the duration of the VCAILGMP.

Based on previously conducted three-species screening tests at eight of the eleven VCAILGMP sites, the Regional Board approved a single-species to be used at each of these sites for the remainder of this Conditional Waiver in a June 28, 2012 letter. Sites with conductivity measuring less than 3,000 µS/cm at the time of sampling will be evaluated based on the survival and reproduction of the invertebrate *Ceriodaphnia dubia* (*C. dubia*). High conductivity sites (>3,000 µS/cm) will be tested using *Hyalella azteca* (*Hyalella*) (Table 50).

Through the 2012-2013 monitoring year, there were three remaining sites where flow had not been present during any of the toxicity sampling events to be able to conduct a three-species screening test (S03T_TIMB, VRT_THACH, and VRT_SANTO). However, during the 2013-2014 monitoring year one of these sites, S03T_TIMB, had enough flow present during Event 20 to collect toxicity sample. As such, PER conducted a three-species screening test. As the conductivity of the sample water collected at the S03T_TIMB site was greater than 3,000 µS/cm, toxicity testing was conducted using organisms that are tolerant of water with high conductivity. The organisms included the invertebrate *Hyalella*, the algae *Thalassiosira pseudonana* (*Thalassiosira*), and the vertebrate *Cyprinodon variegates* (*Cyprinodon*). No toxicity was observed for *Hyalella* and *Thalassiosira*; however, there was 100 percent mortality of the *Cyprinodon* organisms. PER indicated the sample was extremely turbid and it was PER's best professional judgment that the matrix was not conducive to performing aqueous phase testing and therefore, prohibited their capacity to interpret the presence/absences of toxicity in the sample. As such, a most sensitive species was not identified upon completion of the three-species screening test. As a result, another three-species screening test will be performed at the S03T_TIMB site and the other two remaining sites (VRT_THACH and VRT_SANTO) when there is sufficient flow during any future toxicity monitoring events. Flow was not present at any of the three sites during the 2014-2015 monitoring year toxicity events.

Table 50. Most Sensitive Species Selected for Toxicity Testing

Site ID	Species
01T_ODD3_ARN	*Hyalella azteca*
05D_LAVD	*Ceriodaphnia dubia*
05T_HONDO	*Ceriodaphnia dubia*
06T_LONG2	*Ceriodaphnia dubia*
S02T_ELLS	*Ceriodaphnia dubia*
S02T_TODD	*Ceriodaphnia dubia*
S03T_BOULD	*Ceriodaphnia dubia*
S04T_TAPO	*Hyalella azteca*

Single-Species Test Results

Toxicity samples were collected during the first wet weather monitoring event and the second dry weather monitoring event during the 2014-2015 monitoring year. Toxicity testing was conducted using either *C. dubia* or *Hyalella* using the Regional Board-approved species for the specific sites (Table 50). The C. dubia chronic test consisted of the 3-brood (6- to 8-day) survival and reproduction test and the Hyalella test consisted of a 10-day survival test.

Toxicity testing during Event 23 indicated reproduction toxicity for *C. dubia* at the S02T_TODD, S03T_BOULD, and S04T_TAPO sites. In addition, toxicity testing indicated survival toxicity for *C. dubia* at the 05D_LAVD, 05D_HONDO, and 06T_LONG2 sites greater than 50 percent. TIE testing targeted for organics was triggered by the survival toxicity results for all three sites.

During TIE testing for the 05D_LAVD site, there was a reduction in survival and reproduction in the baseline TIE treatment for the site water, indicating toxicity was persistent. There were no blank interferences present in the TIE treatments. There was removal of toxicity observed in the C_{18} Solid Phase Extraction (SPE) treatment. As such, the TIE results suggest dissolved non-polar organic compound(s) caused the toxicity.

During TIE testing for the 05T_HONDO site, there was a reduction in survival and reproduction in the baseline TIE treatment for the site water, indicating toxicity was persistent. There were no blank interferences present in the TIE treatments. There was removal of toxicity observed in the C_{18} SPE treatment. In addition, toxicity was reduced in the 100µg/L Piperonyl Butoxide (PBO) treatment. As such, the TIE results suggest dissolved non-polar organic compound(s), a metabolically activated substance (e.g., OP pesticides) were responsible for the survival toxicity, and a particulate associated contaminant may have also been partially responsible for the survival toxicity.

During TIE testing for the 06T_LONG2 site, there was a reduction in survival and reproduction in the baseline TIE treatment for the site water, indicating toxicity was persistent. There were no blank interferences present in the TIE treatments. Centrifuging removed survival and reproduction toxicity and the C_{18} SPE treatment completely removed toxicity. Additionally, survival toxicity was reduced or removed and reproduction toxicity was reduced in the PBO treatments. These results suggest that a particulate associated contaminant was responsible for most of the toxicity and non-polar organic compound(s) and a metabolically activated substance (e.g., OP pesticides) were responsible for some of the toxicity.

Toxicity testing during Event 25 indicated no significant survival toxicity for *Hyalella* at the 01T_ODD3_ARN. *C. dubia* tests could not be completed for the Event 25 S02T_TODD and S04T_TAPO samples due to a decline in the laboratory culture. As such, these sites were re-tested. There was no *C. dubia* survival toxicity at the S02T_TODD sample, but there was a significant reduction in *C. dubia* reproduction. There was no significant survival or reproduction toxicity in the S04T_TAPO sample. TIE testing was not initiated for the S02T_TODD site as the threshold for initiating TIE testing is based on survival toxicity, not reproduction toxicity.

Single species test results for freshwater and high conductivity sites for Events 23 and 25 are found in Table 51.

Table 51. Chronic Toxicity Results for Single-Species Testing for 2014-2015

Site	Event	*C. dubia* [1]			*Hyalella* [2]	TIE Triggered?
		Survival Toxicity	Reproduction Toxicity	Reproduction % Reduction	Survival Toxicity	
05D_LAVD	23: 12/2/14	Yes	No	100% [3]		Yes
05T_HONDO	23: 12/2/14	Yes	No	100% [3]		Yes
06T_LONG2	23: 12/2/14	Yes	No	100% [3]		Yes
S02T_TODD	23: 12/2/14	No	Yes	38.8% [4]		No
S02T_TODD dup	23: 12/2/14	No	Yes	36.9% [4]		No
S03T_BOULD	23: 12/2/14	No	Yes	26.9% [4]		No
S04_TAPO	23: 12/2/14	No	Yes	98.1% [4]		No
01T_ODD3_ARN	25: 5/26/14				No	No
S02T_TODD	25.1: 6/22/14	No	Yes	41.3% [4]		No
S02T_TODD dup	25.1: 6/22/14	No	Yes	44.0% [4]		No
S04_TAPO	25.1: 6/22/14	No	No	-4.9%/1.8% [5]		No

1. *Ceriodaphnia dubia* (invertebrate – water flea) is evaluated for the survival and reproduction endpoints.
2. *Hyalella azteca* (invertebrate – crustacean) is evaluated for the survival endpoint.
3. There was 100 percent survival toxicity in the samples, so reproduction toxicity was not able to be assessed.
4. The response at this test treatment was significantly less than the Lab Control treatment response ($p < 0.05$).
5. Statistical analyses indicated that the reproduction response for one of the replicates at this test treatment was a statistical outlier, and the results reported above are for the analyses of the test data excluding (-4.9%) and including (1.8%) this outlier. As per EPA guidelines, the test data were analyzed both with and without the outlier.

TMDL LOAD ALLOCATIONS AND MONITORING RESULTS

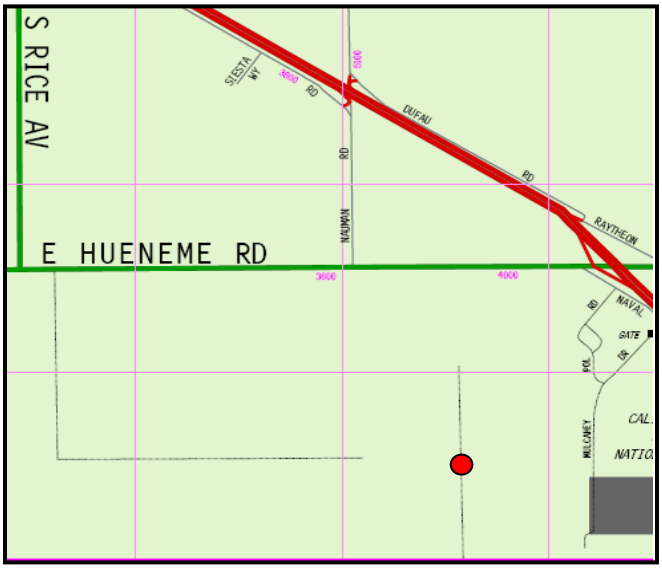
Calleguas Creek Watershed Agricultural Land Use Monitoring Sites

Seven agricultural land use sites are monitored under the CCWTMP. Site descriptions, maps, and photos are included below. Following the site descriptions is compliance information related to TMDL load allocations (LAs). Receiving water site information and files with all monitoring data collected at CCWTMP sites can be found in the CCWTMP seventh year annual monitoring report.

01T_ODD2_DCH

Duck Pond Agricultural Drains / Mugu Drain / Oxnard Drain No. 2. The monitoring site is located on an agricultural drain just south of Hueneme Road near the Duck Ponds. Flow from this drain eventually discharges into the western arm of Mugu Lagoon (Calleguas Creek Reach 1).

Site Map

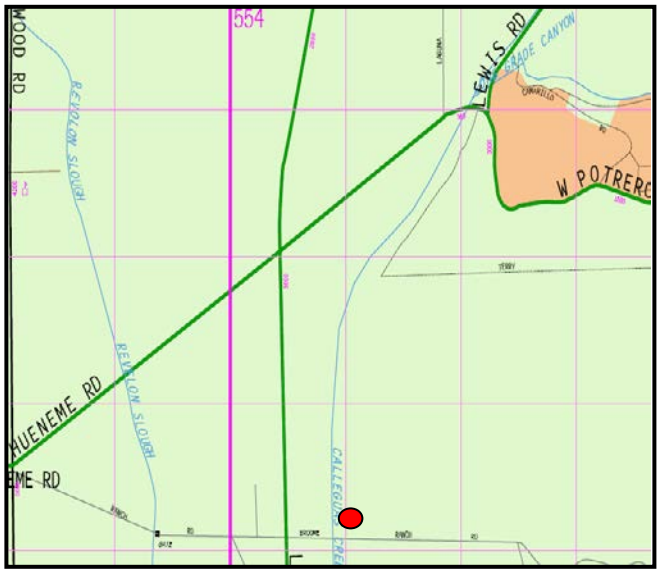


View toward the NE (looking downstream)

02D_BROOM

The monitoring site is located on an agricultural drain that discharges into Calleguas Creek Reach 2 at Broome Ranch Road.

Site Map



View of discharge (looking upstream on Calleguas Creek)

04D_WOOD

The monitoring site is located on an agricultural drain on the east side of Wood Road. Flow from this drain discharges into Calleguas Creek Reach 4 (Revolon Slough) above the 04_WOOD monitoring site.

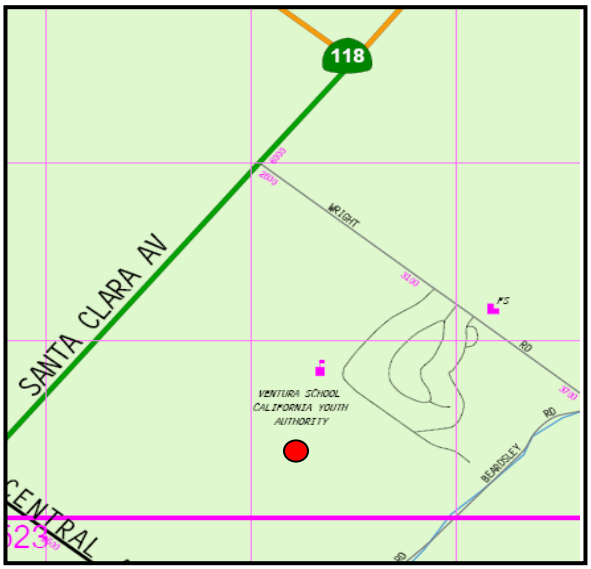
Site Map

View at site looking upstream

05D_SANT_VCWPD

This monitoring site is located on the Santa Clara Drain east of Santa Clara Avenue at the Ventura County Watershed Protection District's Stream Gage #781. Flow from this drain eventually discharges into Calleguas Creek Reach 5 (Beardsley Channel).

Site Map

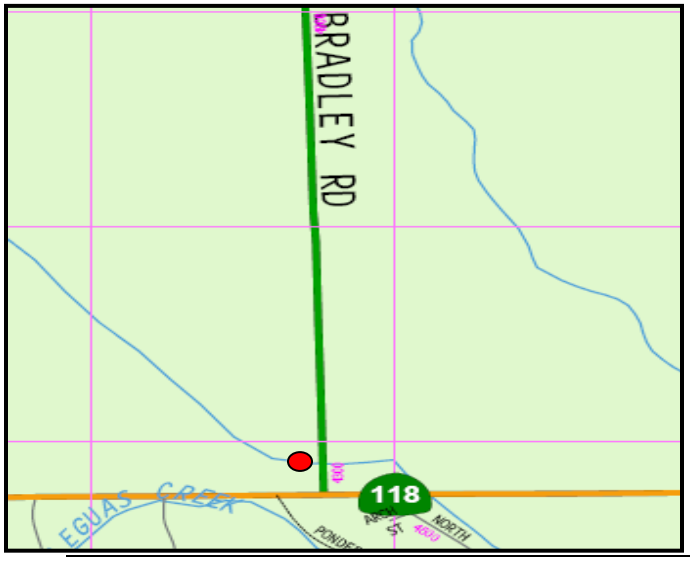


View upstream (NW) facing gage #781

06T_FC_BR

This monitoring site is located on Fox Barranca just upstream of the Bradley Road Bridge, north of Hwy 118. Fox Barranca is a tributary to Calleguas Creek Reach 6 (Arroyo Las Posas).

Site Map



View downstream (E) from sampling location toward Bradley Road

07D_HITCH_LEVEE_2

The site is sampled from a corrugated pipe discharging on the north side of the Arroyo Simi Flood Control Levee off of Hitch Blvd, directly into Calleguas Creek Reach 7 (Arroyo Simi).

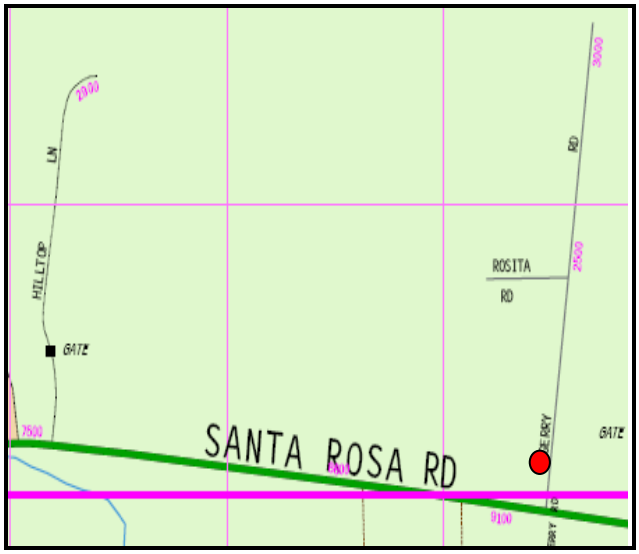
Site Map

View of pipe discharging into Arroyo Simi

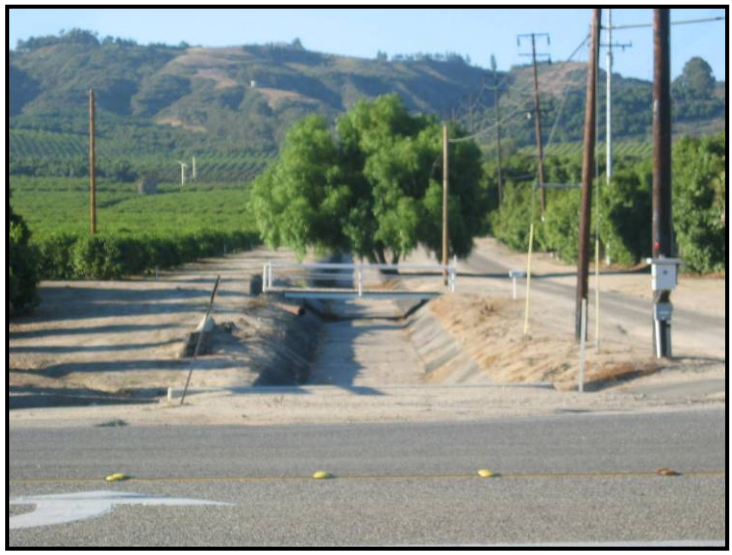
9BD_GERRY

This monitoring site is located on an agricultural drain adjacent to Gerry Road north of Santa Rosa Road. Flow from this drain eventually discharges into Calleguas Creek Reach 9B (Conejo Creek).

Site Map



View (N) of the sampling site



Calleguas Creek Watershed and Mugu Lagoon OC Pesticides and PCBs TMDL

Interim Load Allocations

Interim sediment LAs are currently in effect for this TMDL (Table 52). Compliance with these LAs is measured at the base of each subwatershed.

Table 52. CCW OC Pesticides and PCBs Interim Sediment Load Allocations

		Subwatershed					
Constituent	**Units [1]**	**Mugu Lagoon [2]**	**Calleguas Creek**	**Revolon Slough**	**Arroyo Las Posas**	**Arroyo Simi**	**Conejo Creek**
Chlordane	ng/g	25	17	48	3.3	3.3	3.4
4,4'-DDD	ng/g	69	66	400	290	14	5.3
4,4'-DDE	ng/g	300	470	1,600	950	170	20
4,4'-DDT	ng/g	39	110	690	670	25	2
Dieldrin	ng/g	19	3	5.7	1.1	1.1	3
PCBs	ng/g	180	3,800	7,600	25,700	25,700	3,800
Toxaphene	ng/g	22,900	260	790	230	230	260

1. ng/g = nanograms/ gram
2. The Mugu Lagoon subwatershed includes Duck Pond/Agricultural Drain/Mugu/Oxnard Drain #2.

Monitoring Results and Compliance

The following table (Table 53) includes sediment monitoring results from receiving waters at the base of each subwatershed. The data were collected as part of the CCWTMP. Additional information related to the sample collection and upstream land use data can be found in the "Calleguas Creek Watershed TMDL Compliance Monitoring Program Seventh Year Annual Monitoring Report." Monitoring at sites within Mugu Lagoon occurs every three years; as such, sediment samples were collected during the 2014-2015 monitoring year and also reported below.

Table 53. OC Pesticides and PCBs TMDL Load Allocations Compared to Sediment Monitoring Data

Site & Constituent	**Units**	**Interim LA [1]**	**Event 44 Aug-2014**
Mugu Lagoon – Eastern Arm (01_BPT_3)			
Total Chlordane [2]	ng/g dw	25	ND
4,4'-DDD	ng/g dw	69	DNQ
4,4'-DDE	ng/g dw	300	5.70
4,4'-DDT	ng/g dw	39	ND
Dieldrin	ng/g dw	19	ND
PCBs [3]	ng/g dw	180	ND
Toxaphene	ng/g dw	22,900	ND

Table continued on next page.

Site & Constituent	Units	Interim LA [1]	Event 44 Aug-2014
Mugu Lagoon – Eastern Part of Western Arm (01_BPT_6)			
Total Chlordane [2]	ng/g dw	25	ND
4,4'-DDD	ng/g dw	69	DNQ
4,4'-DDE	ng/g dw	300	10.7
4,4'-DDT	ng/g dw	39	ND
Dieldrin	ng/g dw	19	ND
PCBs [3]	ng/g dw	180	ND
Toxaphene	ng/g dw	22,900	ND
Mugu Lagoon – Central Part of Western Arm (01_BPT_14)			
Total Chlordane [2]	ng/g dw	25	ND
4,4'-DDD	ng/g dw	69	DNQ
4,4'-DDE	ng/g dw	300	23.9
4,4'-DDT	ng/g dw	39	ND
Dieldrin	ng/g dw	19	ND
PCBs [3]	ng/g dw	180	18 [4]
Toxaphene	ng/g dw	22,900	ND
Mugu Lagoon – Central Lagoon (01_BPT_15)			
Total Chlordane [2]	ng/g dw	25	ND
4,4'-DDD	ng/g dw	69	DNQ
4,4'-DDE	ng/g dw	300	11.8
4,4'-DDT	ng/g dw	39	ND
Dieldrin	ng/g dw	19	ND
PCBs [3]	ng/g dw	180	ND
Toxaphene	ng/g dw	22,900	ND
Mugu Lagoon – Central Lagoon, South of Drain #7 (01_SG_74)			
Total Chlordane [2]	ng/g dw	25	ND
4,4'-DDD	ng/g dw	69	DNQ
4,4'-DDE	ng/g dw	300	8.7
4,4'-DDT	ng/g dw	39	ND
Dieldrin	ng/g dw	19	ND
PCBs [3]	ng/g dw	180	16 [4]
Toxaphene	ng/g dw	22,900	ND

Table continued on next page.

Site & Constituent	Units	Interim LA [1]	Event 44 Aug-2014
Calleguas Creek – Hwy 1 Bridge (02_PCH)			
Total Chlordane [2]	ng/g dw	17	ND
4,4'-DDD	ng/g dw	66	ND
4,4'-DDE	ng/g dw	470	DNQ
4,4'-DDT	ng/g dw	110	DNQ
Dieldrin	ng/g dw	3	ND
PCBs [3]	ng/g dw	3,800	ND
Toxaphene	ng/g dw	260	ND
Revolon Slough – Wood Road (04_WOOD)			
Total Chlordane [2]	ng/g dw	48	ND
4,4'-DDD	ng/g dw	400	DNQ
4,4'-DDE	ng/g dw	1,600	ND
4,4'-DDT	ng/g dw	690	7
Dieldrin	ng/g dw	5.7	ND
PCBs [3]	ng/g dw	7,600	ND
Toxaphene	ng/g dw	790	ND
Calleguas Creek – University Drive CSUCI (03_UNIV)			
Total Chlordane [2]	ng/g dw	17	ND
4,4'-DDD	ng/g dw	66	ND
4,4'-DDE	ng/g dw	470	DNQ
4,4'-DDT	ng/g dw	110	ND
Dieldrin	ng/g dw	3	ND
PCBs [3]	ng/g dw	3,800	ND
Toxaphene	ng/g dw	260	ND
Conejo Creek – Adolfo Road (9B_ADOLF)			
Total Chlordane [2]	ng/g dw	3.4	**5** [4]
4,4'-DDD	ng/g dw	5.3	ND
4,4'-DDE	ng/g dw	20	19
4,4'-DDT	ng/g dw	2	**29.3**
Dieldrin	ng/g dw	3	ND
PCBs [3]	ng/g dw	3,800	ND
Toxaphene	ng/g dw	260	ND

Table continued on next page.

Site & Constituent	Units	Interim LA [1]	Event 44 Aug-2014
Arroyo Las Posas – Somis Road (06_SOMIS)			
Total Chlordane [2]	ng/g dw	3.3	ND
4,4'-DDD	ng/g dw	290	ND
4,4'-DDE	ng/g dw	950	5.1
4,4'-DDT	ng/g dw	670	DNQ
Dieldrin	ng/g dw	1.1	ND
PCBs [3]	ng/g dw	25,700	ND
Toxaphene	ng/g dw	230	ND
Arroyo Simi – Hitch Boulevard (07_HITCH)			
Total Chlordane [2]	ng/g dw	3.3	ND
4,4'-DDD	ng/g dw	14	ND
4,4'-DDE	ng/g dw	170	ND
4,4'-DDT	ng/g dw	25	ND
Dieldrin	ng/g dw	1.1	ND
PCBs [3]	ng/g dw	25,700	ND
Toxaphene	ng/g dw	230	ND

ng/g dw=nanograms/ gram dry weight; ND=not detected; DNQ=detected not quantified

Concentrations in **bold** indicate an exceedance of the interim LA for the specified constituent applicable to the specific site.

1. Interim LAs for agricultural dischargers; effective until March 24, 2026 (R4-2005-010).
2. Total chlordane is the sum of alpha and gamma-chlordane.
3. PCBs concentrations are the sum of the seven aroclors identified in CTR (1016, 1221, 1232, 1242, 1248, 1254, and 1260).
4. Includes a DNQ(s) value(s) in the calculation.

As shown in the table above, there were no exceedances of the toxaphene interim LA during the 2014-2015 monitoring year.

Calleguas Creek Watershed and Mugu Lagoon Toxicity, Chlorpyrifos, and Diazinon TMDL

Interim Load Allocations

Interim LAs are currently in effect for this TMDL (Table 54). Compliance with these LAs is measured at the base of each subwatershed.

Table 54. CCW Toxicity, Chlorpyrifos, and Diazinon Interim Load Allocations

	Interim LA [1]	
Constituent	**Acute (1 hour) (µg/L) [2]**	**Chronic (4 day) (µg/L) [3]**
Chlorpyrifos	2.57	0.81
Diazinon	0.278	0.138
Toxicity	1 TU_c	1 TU_c

1. These TMDL LAs apply to the receiving water at the base of each subwatershed.
2. Acute interim LAs are used for assessing wet-weather data.
3. Chronic interim LAs are used for assessing dry-weather data.

Monitoring Results and Compliance

The following table (Table 55) includes monitoring results from receiving waters at the base of each subwatershed. The data was collected as part of the CCWTMP. Additional information related to the sample collection and upstream land use data can be found in the "Calleguas Creek Watershed TMDL Compliance Monitoring Program Seventh Year Annual Monitoring Report."

Table 55. Toxicity, Chlorpyrifos, and Diazinon TMDL Load Allocations Compared to Monitoring Data

Site & Constituent	Units	Dry Interim LA[1]	Event 44 Dry Aug-2014	Event 45 Dry Nov-2014	Event 48 Dry Feb-2015	Event 49 Dry May-2015	Wet Interim LA[1]	Event 46 Wet Dec-2014	Event 47 Wet Dec-2014
Mugu Lagoon – Ronald Reagan Bridge (01_RR_BR)									
Chlorpyrifos	µg/L	0.81	0.002	0.03	ND	ND	2.57	0.7	0.4
Diazinon	µg/L	0.138	ND	ND	ND	ND	0.278	0.004	ND
Revolon Slough – Wood Road (04_WOOD)									
Chlorpyrifos	µg/L	0.81	0.0005	0.08	0.006	0.003	2.57	**3.1**	0.6
Diazinon	µg/L	0.138	ND	**0.16**	ND	ND	0.278	0.2	**0.9**
Calleguas Creek – University Drive CSUCI (03_UNIV)									
Chlorpyrifos	µg/L	0.81	ND	0.1	0.004	0.005	2.57	0.4	0.2
Diazinon	µg/L	0.138	ND	ND	ND	ND	0.278	0.006	ND
Conejo Creek – Adolfo Road (9B_ADOLF)									
Chlorpyrifos	µg/L	0.81	ND	0.003	ND	0.003	2.57	0.02	0.03
Diazinon	µg/L	0.138	ND	ND	ND	ND	0.278	0.03	0.01
Arroyo Las Posas – Somis Road (06_SOMIS)									
Chlorpyrifos	µg/L	0.81	NS	0.01	0.003	NS	2.57	0.3	0.1
Diazinon	µg/L	0.138	NS	ND	ND	NS	0.278	ND	ND
Arroyo Simi – Hitch Boulevard (07_HITCH)									
Chlorpyrifos	µg/L	0.81	0.06	0.002	0.005	0.004	2.57	0.7	0.02
Diazinon	µg/L	0.138	ND	ND	ND	ND	0.278	ND	ND

ND=not detected
NS=no sample, site dry
1. Interim dry and wet weather LAs are effective until March 24, 2016 (R4-2005-009).

During year seven of CCWTMP monitoring, there was an exceedance of the dry weather interim LA for diazinon at the 04_WOOD site during Event 45. In addition, there were exceedances of the wet weather interim LAs for chlorpyrifos and diazinon at the 04_WOOD site during Event 46 and Event 47, respectively. Due to the exceedances, the contributing agricultural land use data were assessed to evaluate whether agricultural discharges were potentially causing the exceedances. Diazinon data from the 04D_WOOD site for Event 45 were ND, indicating agricultural discharges were unlikely causing the execeedance. The diazinon concentration from the 04D_WOOD site for Event 47 was 0.093µg/L, which was 10 times less than the concentration in the receiving water at the 04_WOOD site. The chlorpyrifos concentration from the 04D_WOOD site for Event 46 was 0.039µg/L, which was more than 75 time less than the concentration in the receiving water at the 04_WOOD site. Due to the low chlorpyrifos and diazinon concentrations at the 04D_W00D site, it is difficult to say agricultural discharges potentially caused the exceedances.

Calleguas Creek Watershed Boron, Chloride, Sulfate, and TDS (Salts) TMDL

Interim Dry Weather Load Allocations

Interim dry weather LAs are measured as in-stream monthly averages at the base of each subwatershed, except for chloride which is measured as an instantaneous maximum (Table 56). Dry weather LAs apply when flow rates are below the 86th percentile and there was no measurable precipitation in the previous 24 hour period.

Table 56. CCW Boron, Chloride, Sulfate, and TDS (Salts) Interim Dry Weather Load Allocations

Constituent	Interim Dry Weather LA (mg/L)
Boron Total	1.8
Chloride Total	230
Sulfate Total	1,962
TDS Total	3,995

Monitoring Results and Compliance

Compliance monitoring for salts was required starting September 9, 2012. The following table (Table 57) includes monthly dry weather mean salt concentrations for the five compliance sites. Data was collected as part of the CCWTMP and additional information related to salts monitoring can be found in the "Calleguas Creek Watershed TMDL Compliance Monitoring Program Seventh Year Annual Monitoring Report." Interim LAs for salts constituents are currently being met at all sites, with the exception of boron and sulfate at 04_WOOD and chloride at 03_UNIV. There is one agricultural land use site where salts are measured upstream of the 04_WOOD compliance site, but none upstream of the 03_UNIV compliance site. The results for boron and sulfate from the 04D_WOOD agricultural land use site alongside the receiving water data are presented in Table 58 and Table 59, respectively. When comparing the receiving water and land use data, it is important to keep in mind that quarterly dry weather grab samples are collected at 04D_WOOD as compared to monthly dry weather means reported for 04_WOOD, generated from daily averages of five-minute sensor data.

Table 57. Salts Load Allocations Compared to Monitoring Data

	Units	Interim LA	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
Revolon Slough – Wood Road (04_WOOD)														
Total Dissolved Solids	mg/L	3995	3730	3544	3489	2727	3297	3510	3374	3316	3237	3132	3188	3692
Chloride	mg/L	230	210	200	197	155	186	198	190	187	183	177	180	208
Sulfate	mg/L	1962	**1982**	1883	1854	1449	1752	1865	1793	1762	1720	1664	1694	1962
Boron	mg/L	1.8	**1.9**	1.8	1.8	1.4	1.7	1.8	1.8	1.7	1.7	1.6	1.7	**1.9**
Calleguas Creek – University Drive CSUCI (03_UNIV)														
Total Dissolved Solids	mg/L	3995	1031	1070	1081	1090	1114	1008	1039	1049	1061	1082	1093	1073
Chloride	mg/L	230	217	225	228	230	**235**	211	218	220	223	228	230	226
Sulfate	mg/L	1962	264	274	276	278	284	258	266	268	272	276	279	274
Conejo Creek – Howard Road Bridge (9A_HOWAR)														
Total Dissolved Solids	mg/L	3995	957	1014	1012	1041	1063	964	979	985	1015	1028	1040	1024
Chloride	mg/L	230	205	218	217	224	229	206	210	211	218	221	224	220
Sulfate	mg/L	1962	240	255	255	262	268	242	246	248	255	259	262	258
Conejo Creek – Baron Brothers Nursery (9B_BARON)														
Total Dissolved Solids	mg/L	3995	689	707	687	711	750	789	777	766	763	768	773	752
Chloride	mg/L	230	154	158	153	159	169	178	175	172	172	173	174	169
Sulfate	mg/L	1962	171	176	171	177	187	197	194	191	190	191	192	187
Arroyo Simi – Tierra Rejada Road (07_TIERRA)														
Total Dissolved Solids	mg/L	3995	1152	1145	1141	1138	1151	1209	1189	1177	1174	1179	1184	1202
Chloride	mg/L	230	173	172	171	171	173	182	179	177	176	177	178	181
Sulfate	mg/L	1962	433	430	429	427	433	455	448	443	442	444	445	452
Boron	mg/L	1.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7

Notes:

a. Monthly dry weather mean salt concentrations were generated using mean daily salt concentrations (from 5-min data) for days that met the definition of dry weather in the Salts TMDL (i.e., discharge < 86th percentile flow *and* no measureable rain in preceding 24 hrs). The 86th percentile of mean daily discharge at 03_Univ (generated using 5-min discharge data for the period July 1, 2012-June 30, 2013) was used as the flow-related threshold for distinguishing wet and dry days for all five compliance sites. Daily precipitation records for 23 gages in the CCW watershed (accessed via the VCWPD Hydrologic Data Server) were used to determine days with "measureable precipitation". Days were considered as having measureable precipitation if two or more rain gages in the watershed received 0.1 inch or more of precipitation.

Concentrations in **bold** indicate an exceedance of the interim LA for the specified constituent applicable to the specific site.

Table 58. Boron Monitoring Data (mg/L) in Revolon Slough

Site ID	Site Type	Interim LA	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
04_WOOD [1]	Receiving Water	1.8	**1.9**	1.8	1.8	1.4	1.7	1.8	1.7	1.7	1.7	1.6	1.7	**1.9**
04D_WOOD [2]	Ag	1.8		NS			0.8			0.5			1.1	

NS=no sample, dry
1. Data presented are monthly means
2. Data presented are quarterly dry weather grabs
Results in **bold type** exceed the interim LA

Table 59. Sulfate Monitoring Data (mg/L) in Revolon Slough

Site ID	Use	Interim LA	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
04_WOOD [1]	RW	1962	**1982**	1883	1854	1449	1752	1865	1793	1762	1720	1664	1694	1962
04D_WOOD [2]	Ag	1962		NS			688			344			926.4	

NS=no sample, dry
1. Data presented are monthly means
2. Data presented are quarterly dry weather grabs
Results in **bold type** exceed applicable interim WLA or interim LA.

Calleguas Creek Watershed and Mugu Lagoon Metals and Selenium TMDL

Interim Load Allocations

Dry weather LAs apply to days when flows in the stream are less than the 86th percentile flow rate for each subwatershed. Wet weather LAs apply to days when flows in the stream exceed the 86th percentile flow rate for each subwatershed. Interim LAs for total recoverable metals and selenium are applied in the receiving water at the compliance points (Table 60).

Table 60. Interim Load Allocations for Total Recoverable Metals and Selenium

	Calleguas and Conejo Creeks			Revolon Slough		
Constituent	Dry Daily Max (µg/L)	Dry Monthly Avg. (µg/L)	Wet Daily Max (µg/L)	Dry Daily Max (µg/L)	Dry Monthly Avg. (µg/L)	Wet Daily Max (µg/L)
Copper	24	19	1,390	24	19	1,390
Nickel	43	42	---	43	42	---
Selenium	---	---	---	6.7 [1]	6 [1]	---

1. Attainment of interim LAs will be evaluated in consideration of background loading data, if available.

Interim LAs for mercury are evaluated based on suspended sediment measured in-stream at the base of Revolon Slough and Calleguas Creek (Table 61).

Table 61. Interim Load Allocations for Mercury in Suspended Sediment

Flow Range (Million gallons/year)	Calleguas Creek (lbs/yr)	Revolon Slough (lbs/yr)
0-15,000	3.9	2
15,000-25,000	12.6	4.8
>25,000	77.5	12.2

Monitoring Results and Compliance

As shown in the table below, the interim allocations are being met in the receiving waters for all metals constituents; the exception is selenium in Revolon Slough during dry weather conditions. It has been noted in the current and previous CCW TMDL annual reports that rising groundwater is a large background source of selenium in the Revolon Slough subwatershed. There are two agricultural land use sites located in this subwatershed and their selenium monitoring results are provided below (Table 63). Of the two agricultural land use sites, 05D_SANT_VCWPD is located further upstream in the subwatershed and also has significantly higher selenium concentrations. Samples from the agricultural land use site 04D_WOOD were all below the total selenium LA. Further investigation of selenium sources will be conducted through special studies as required by the TMDL.

Table 62. Metals and Selenium Interim Load Allocations Compared to Monitoring Data

Site & Constituent	Units	Dry Interim LA [1]	Event 44 Dry Aug-2014	Event 45 Dry Nov-2014	Event 48 Dry Feb-2015	Event 49 Dry May-2015	Wet Interim LA [2]	Event 46 Wet Dec-2014	Event 47 Wet Feb-2014	Annual Average [3]
Revolon Slough – Wood Road (04_WOOD)										
Total Copper	µg/L	19	3.5	4	3.5	3.2	1,390	66.3	90.2	--
Total Nickel	µg/L	42	7.3	8.6	7.1	6.3	---	42.5	72.7	--
Total Selenium	µg/L	6	**34.1**	**19.5**	**19.5**	**18.5**	---	0.8	0.9	--
Total Mercury [4]	lbs/yr	2	--	--	--	--	--	--	--	0.5
Calleguas Creek – University Drive CSUCI (03_UNIV)										
Total Copper	µg/L	19	2.3	2.4	2.6	2.9	1,390	27	99.1	--
Total Nickel	µg/L	42	6.7	8.1	4.9	6.1	---	27.2	137.3	--
Total Selenium	µg/L	---	0.5	0.5	0.9	0.9	---	0.3	1.7	--
Total Mercury [4]	lbs/yr	3.9	--	--	--	--	--	--	--	0.2

1. Dry interim LAs are listed as the dry monthly average concentrations.
2. Wet interim LAs are the daily maximum.
3. The mercury LA is assessed as an annual load in suspended sediment. The water column mercury concentrations were used in calculating the loads, conservatively assuming that all mercury is on suspended sediment rather than being dissolved. The loads at each site are based on estimated annual concentrations (average of all monitored events at each site) and total annual flow calculated from preliminary streamflow data received from real time data loggers recording 5-minute flow data in the creeks.
4. Interim LAs for mercury are expressed as annual loads. Total annual flow for 07/01/14 to 6/31/15 into Mugu Lagoon from Calleguas Creek and Revolon Slough is calculated as 6,120 Mgal/yr. As such, the interim LA shown corresponds to the flow range of 0 to 15,000 Mgal/yr, per R4-2006-0012.

Table 63. Selenium Interim Load Allocation Compared to Revolon Slough Receiving Water and Agricultural Land Use Monitoring Data

Site ID [1]	Dry Weather Events & Dates					Wet Weather Events & Dates		
	Interim LA	44 Aug-2014	45 Nov-2014	48 Feb-2015	49 May-2015	Interim LA	46 Dec-2014	47 Dec-2014
04_WOOD	6	**34.1**	**19.5**	**19.5**	**18.5**	---	0.8	0.9
04D_WOOD	6	NS	1.87	1.29	0.6	---	0.1	1.1
05D_SANT_VCWPD	6	**46**	**46.2**	**12.5**	**45.7**	---	7.7	1.7

NS = Not Sampled; site dry

1. 04_WOOD is the receiving water site; 04D_WOOD and 05D_SANT_VCWPD are both agricultural land use sites further upstream of the receiving water monitoring location.

Calleguas Creek Watershed Nitrogen Compounds TMDL

Load Allocations

The LA for the Calleguas Creek Watershed Nitrogen Compounds TMDL is expressed as the sum of nitrate-nitrogen and nitrite-nitrogen (Table 64).

Table 64. Load Allocations for Nitrogen Compounds

Constituent	Load Allocation (mg/L)
Nitrate-N + Nitrite-N	9

Monitoring Results and Compliance

Monitoring sites located in the lower part of the watershed consistently exceed the nitrogen LAs, whereas sites in the upper reaches are typically below the allocation. The following two tables (Table 65 and Table 66) include monitoring data from CCWTMP agricultural land use sites and VCAILGMP sites located within the CCW for comparison to the Nitrogen TMDL LAs.

Table 65. Nitrogen Load Allocations Compared to CCW TMDL Agricultural Land Use Site Data

Site	Constituent	Allocation (mg/L)	Event 44 Dry Aug-2014	Event 45 Dry Nov-2014	Event 46 Wet Dec-2014	Event 47 Wet Dec-2014	Event 48 Dry Feb-2015	Event 49 Dry May-2015
01T_ODD2_DCH	Nitrate-N + Nitrite-N	9	**62.7**	**63.3**	**9.1** [1]	4.9 [1]	**56.3**	**67.3**
02D_BROOM	Nitrate-N + Nitrite-N	9	NS	NS	NS	**12.6**	NS	NS
04D_WOOD	Nitrate-N + Nitrite-N	9	NS	6.04	**12.4**	**11.6**	4.5	0.3
05D_SANT_VCWPD	Nitrate-N + Nitrite-N	9	**27.9**	**34.7**	**14** [1]	**3.5** [1]	**9.3**	**37.2**
06T_FC_BR	Nitrate-N + Nitrite-N	9	NS	NS	**10.9**	2.9	6.3	NS
07D_HITCH_LEVEE_2	Nitrate-N + Nitrite-N	9	**41.5**	NS	**23.2**	**11.6**	NS	NS
9BD_GERRY	Nitrate-N + Nitrite-N	9	NS	NS	3.2	2.7	NS	NS

NS = Not Sampled; site dry.

1. Includes a DNQ(s) value(s) in the calculation.

Table 66. Nitrogen Load Allocations Compared to CCW VCAILGMP Site Data

Site	Constituent	Allocation (mg/L)	Event 22 Dry Aug-2014	Event 23 Wet Dec-2014	Event 24 Wet Dec-2014	Event 25 Dry May-2015
01T_ODD3_ARN	Nitrate-N	9	**28.7**	NS [1]	NS [1]	**40.3**
04D_ETTG	Nitrate-N	9	**42.2**	**33.3**	**11.4**	**50**
04D_LAS	Nitrate-N	9	**55.1**	**37.8**	**13**	**36.9**
05D_LAVD	Nitrate-N	9	NS [2]	3.5	8.6	NS [2]
05T_HONDO	Nitrate-N	9	NS [2]	3.9	3.7	NS [2]
06T_LONG2	Nitrate-N	9	NS [2]	2.5	NS [2]	NS [2]

Concentrations in **bold** indicate an exceedance of the LA.

1. No samples collected due to the site being inaccessible because of road flooding.
2. No samples collected due to the site being dry.

Revolon Slough and Beardsley Wash Trash TMDL

Load Allocation

The LA for this TMDL is zero trash. Dischargers may achieve compliance with the LAs by implementing a minimum frequency of assessment and collection/best management practice (MFAC/BMP) program. By March 6, 2010, agricultural dischargers were required to demonstrate full compliance and attainment of the zero trash target and assure that trash is not accumulating in deleterious amounts between the required trash assessment and collection events.

Compliance

VCAILG members are complying with the Trash TMDL requirements through a MFAC/BMP Program. The MFAC program includes regular collection and assessment of trash. VCAILG members are in compliance with the TMDL requirement to ensure zero trash immediately after each MFAC event. Additionally, VCAILG has implemented additional BMPs to control trash and reduce the accumulation of trash between collection events. The importance of collecting and properly disposing of trash has also been a reoccurring topic at multiple VCAILG education classes. The VCAILG WQMP Management Practice Survey has also included BMPs related to trash and property management. For additional information, please refer to the "2015 Revolon Slough/Beardsley Wash Trash TMDL TMRP/MFAC Annual Report."

Santa Clara River Nitrogen Compounds TMDL

Load Allocations

The LA for the Santa Clara River Nitrogen Compounds TMDL applicable to VCAILG monitoring sites is listed in Table 67.

Table 67. Load Allocations for Nitrogen Compounds

Constituent	Load Allocation (mg/L) [1]
Ammonia-N + Nitrate-N + Nitrite-N	10

1. The specified LA applies to all Santa Clara River reaches within Ventura County.

Monitoring Results and Compliance

Table 68 lists the data collected at the VCAILGMP monitoring sites located within the Santa Clara River Watershed for comparison to the nitrogen LA. The LA was exceeded at two monitoring sites, S03T_BOULD and S04T_TAPO. The S03T_BOULD site was sampled during all four events with only the concentration from Event 23 exceeding the LA. The S04T_TAPO site was sampled during all four events with the concentration from Event 22 exceeding the LA.

Table 68. Nitrogen Load Allocations Compared to SCR VCAILGMP Site Data

Site	Constituent	LA [1] (mg/L)	Event 22 Dry Aug-2014	Event 23 Wet Dec-2014	Event 24 Wet Dec-2014	Event 25 Dry May-2015
S02T_ELLS	Ammonia-N + Nitrate-N	10	NS	NS	3	NS
S02T_TODD	Ammonia-N + Nitrate-N	10	4.6	4.2	2.7	5.9 [2]
S03T_TIMB	Ammonia-N + Nitrate-N	10	NS	NS	3.5	NS
S03T_BOULD	Ammonia-N + Nitrate-N	10	NS	**30.6**	8.3	NS
S03D_BARDS	Ammonia-N + Nitrate-N	10	NS	4	1.6	NS
S04T_TAPO	Ammonia-N + Nitrate-N	10	**19.1**	2.9	2.5	6.3

NS = Not Sampled; site dry.

Bold numbers indicate the value is greater than the LA.

1. Nitrite-N concentrations are not monitored as part of the VCAILGMP, however, levels of nitrite are typically insignificant compared to the other nitrogen compounds that are measured.
2. Includes a DNQ(s) value(s) in the calculation.

Ventura River Estuary Trash TMDL

Load Allocation

The LA for the Ventura River Estuary Trash TMDL is zero trash. Dischargers may achieve compliance with the LA by implementing a minimum frequency of assessment and collection/best management practice (MFAC/BMP) program. By March 6, 2010 agricultural dischargers must demonstrate full compliance and attainment of the zero trash target and the requirement that trash is not accumulating in deleterious amounts between the required trash assessment and collection events.

Compliance

Non-point source dischargers are complying with the Trash TMDL requirements through a MFAC/BMP Program, which was revised for the 2013-2014 monitoring year. VCAILG members are in compliance with the TMDL requirement to ensure zero trash immediately after each MFAC event. Additionally, the VCAILG has implemented additional BMPs to control trash and reduce the accumulation of trash between collection events. The importance of collecting and properly disposing of trash has also been a reoccurring topic at multiple VCAILG education classes. The VCAILG WQMP Management Practice Survey has also included BMPs related to trash and property management. For additional information, please refer to the "2013-2014 Ventura River Estuary Trash TMDL TMRP/MFAC Annual Report."

Santa Clara River Estuary Toxaphene TMDL

The Santa Clara River Estuary Toxaphene TMDL was adopted as a single regulatory action through the Conditional Waiver. Conditional Waiver Appendix 1, Monitoring and Reporting Requirements, specifies the following constituents be monitored as part of this TMDL: chlordane, dieldrin, and toxaphene. The constituents are also required to be analyzed in various media: fish tissue (every three years in the Estuary), water, and suspended sediment (during wet weather events). Two sites were selected to meet the TMDL requirements of having one water quality monitoring site representing agricultural discharges directly to the Estuary and one representative discharge to the Santa Clara River upstream of the Estuary. The existing

VCAILGMP site S02T_ELLS is monitored as the upstream TMDL site by collecting additional sample volume for suspended sediment analysis, which is beyond normal Conditional Waiver monitoring. Site S01D_MONAR was selected to represent agricultural discharges to the Estuary. A description of S02T_ELLS was provided previously with the Conditional Waiver monitoring results for that site. Analogous information regarding S01D_MONAR is provided below:

S01D_MONAR

This monitoring site is located on an agricultural drain that discharges directly to the Santa Clara River Estuary between Harbor Boulevard and Victoria Avenue.

Site Map

View downstream towards Estuary

Load Allocations

The Conditional Waiver incorporated toxaphene LAs for suspended sediment and fish tissue as Water Quality Benchmarks (Appendix 3) shown in the table below.

Table 69. Load Allocations for Toxaphene

Reach	Toxaphene in Fish Tissue (µg/kg)	Toxaphene in Suspended Sediment (µg/kg)
Santa Clara River Estuary	6.1	0.1

Monitoring Data and Compliance

LAs for the Santa Clara River Estuary Toxaphene TMDL were established for toxaphene measured in fish tissue and suspended sediment. Additionally, monitoring of chlordane and dieldrin is required; however, these constituents do not have LAs. In the VCAILG QAPP, it was specified that if possible, targeted fish should be those that are commonly consumed by humans, but based on the results of other studies in the Estuary that may not be feasible.

Chlordane, dieldrin, and toxaphene were not detected in any of the suspended sediment samples. In the water samples collected, there were concentrations of chlordane at the S01T_ELLS site

and there were concentrations of chlordane and dieldrin at the S01D_MONAR site. The results of water and suspended sediment monitoring for the Santa Clara River Estuary Toxaphene TMDL are presented in Table 70.

Chlordane and toxaphene were detected in the fish tissue collected in the Santa Clara River Estuary with the toxaphene concentration exceeding the LA. The results of the fish tissue monitoring for the Santa Clara River Estuary Toxaphene TMDL are presented in Table 71.

Table 70. Santa Clara River Estuary Toxaphene TMDL Monitoring Data: Water and Suspended Sediment

Site	Constituent	Units	Load Allocation	Event 22 Dry Aug-2014	Event 23 Wet Dec-2014	Event 24 Wet Dec-2014	Event 25 Dry May-2015
S01T_ELLS	***Water***						
	TSS	mg/L	---	NS	NS	9490	NS
	Chlordane [1]	µg/L	---	NS	NS	0.001 [2, 3]	NS
	Dieldrin	µg/L	---	NS	NS	ND	NS
	Toxaphene	µg/L	---	NS	NS	ND	NS
	Suspended Sediment (>63 µg/kg)						
	Chlordane [1]	µg/kg	---	NR	ND	ND	NS
	Dieldrin	µg/kg	---	NR	ND	ND	NS
	Toxaphene	µg/kg	0.1	NR	ND	ND	NS
S01D_MONAR	***Water***						
	TSS	mg/L	---	NS	2100	404	32
	Chlordane [1]	µg/L	---	NS	0.01 [3]	0.03	ND
	Dieldrin	µg/L	---	NS	ND	0.01	ND
	Toxaphene	µg/L	---	NS	ND	ND	ND
	Suspended Sediment (>63 µg/kg)						
	Chlordane [1]	µg/kg	---	NR	ND	ND	NR
	Dieldrin	µg/kg	---	NR	ND	ND	NR
	Toxaphene	µg/kg	0.1	NR	ND	ND	NR

NS = Site Dry

ND = Not detected at the applicable reporting limit.

NR = Not Required; filtered sediment sampling is only required during wet weather sampling events.

1. Reported total chlordane is the sum of alpha- and gamma-chlordane.
2. Includes sample water filtrate <63µm and sample water concentrations.
3. Includes a DNQ(s) value(s) in the calculation.

Table 71. Santa Clara River Estuary Toxaphene TMDL Monitoring Data: Fish Tissue

Site	Fish Tissue			
	Constituent	**Units**	**Interim LA**	**Common Carp 5/26/15**
Santa Clara River Estuary	Chlordane [1]	µg/kg	--	12.4 [2]
	Dieldrin	µg/kg	--	ND
	Toxaphene	µg/kg	6.1	**1658**

Bold numbers indicate the value is greater than the LA.

1. Reported total chlordane is the sum of alpha- and gamma-chlordane.
2. Includes a DNQ(s) value(s) in the calculation.

Harbor Beaches of Ventura County Bacteria TMDL

The Harbor Beaches of Ventura County Bacteria TMDL does not specify LAs for agricultural dischargers, but does include a provision for monitoring. The VCAILG QAPP specified a site, monitoring frequency, and constituents to comply with the implementation actions specified for agricultural dischargers in the TMDL. A site description, map, and photo are provided below for the site used to evaluate agricultural discharges upstream of the Channel Islands Harbor.

CIHD_VICT

The monitoring site is located along Victoria Avenue, just north of Doris Avenue and the Doris Drain.

Site Map

View at sampling point looking upstream

Monitoring Data

As specified in the VCAILG QAPP, the CIHD_VICT site is visited at the same frequency as Conditional Waiver monitoring. At each event flow and field meter parameters are measured in addition to water samples collected for bacteria testing. Flow was present at this site during Event 23 and Event 24 of the 2014-2015 monitoring year. *E. coli*, fecal coliform, total coliform, and enterococcus data are presented in Table 72.

Table 72. Harbor Beaches of Ventura County Bacteria TMDL Monitoring Data

		Bacteria Concentrations (MPN/100mL)			
Site	**Event**	***E. coli***	**Fecal Coliform**	**Total Coliform**	**Enterococcus**
CIHD_VICT	23: 12/2/2014	730	4900	160000	36400
CIHD_VICT	24: 12/12/2014	865	3300	>160000	49000

McGrath Lake PCBs, Pesticides, and Sediment Toxicity TMDL

The TMDL for PCBs, Pesticides, and Sediment Toxicity in McGrath Lake became effective June 30, 2011; after the adoption of the current Conditional Waiver. Though the agricultural LAs for this TMDL have not been incorporated into the Conditional Waiver as water quality benchmarks, actions have been taken by VCAILG to comply with the TMDL Implementation Schedule. The

VCAILG QAPP and MRP were revised to include the Phase 1 Central Ditch monitoring specified in the McGrath Lake TMDL. Inclusion of monitoring data within this AMR also fulfills the TMDL requirement for annual reporting.

The existing VCAILGMP site OXD_CENTR is located at the Central Ditch, which drains into McGrath Lake. Information and Conditional Waiver monitoring results related to this site can be found in the previous data compilation section. Using the OXD_CENTR site, attainment of TMDL LAs in the inflow to the lake can be assessed. At this time, until the incorporation of the McGrath Lake TMDL LAs (Table 73) as water quality benchmarks, exceedances of the LAs will not trigger the need for a WQMP. However, the existence of this TMDL will influence prioritization and BMP implementation within the McGrath Lake subwatershed.

TMDL Monitoring and Load Allocations

Phase 1 of the McGrath Lake TMDL requires water and sediment sampling in the Central Ditch. Water samples are to be analyzed for:

- Total Organic Carbon (TOC)
- Total Suspended Solids (TSS)
- Total PCBs
- DDT and derivatives
- Dieldrin
- Total Chlordane

All of the above listed constituents except for PCBs and TOC are already required as standard Conditional Waiver monitoring constituents.

Sediment samples are analyzed for the following:

- Total Organic Carbon (TOC)
- Total PCBs
- DDT and derivatives
- Dieldrin
- Total Chlordane

Field parameters and flow are also required at each sampling event, which is already a Conditional Waiver requirement.

Table 73. McGrath Lake Central Ditch Load Allocations

Constituent	Water Column Load Allocation (µg/L)	Sediment Load Allocation (µg/dry kg)
Chlordane	0.00059	0.5
Dieldrin	0.00014	0.02
4,4'-DDD	0.00084	2
4,4'-DDE	0.00059	2.2
4,4'-DDT	0.00059	1
Total DDT	---	1.58
Total PCBs	0.00017	22.7

Monitoring Data

The QAPP and MRP revisions and Regional Board approval to incorporate the proposed monitoring for compliance with the McGrath Lake TMDL occurred midway through the 2012 monitoring year. This is the third full monitoring year since the TMDL monitoring approach was approved. Water sampling occurred concurrently with VCAILG monitoring and included the additional TOC and PCBs constituents. Sediments were collected during the second dry weather event and approximately a week after the first storm event when water levels were safe to enter. Results applicable to this TMDL are reported in the tables below.

Table 74. McGrath Lake TMDL Central Ditch Monitoring Data in Water: OXD_CENTR

Constituents in Water	Units	Water LA	Event 22 Dry 8/14/2014	Event 23 Wet 12/2/2014	Event 24 Wet 12/12/2014	Event 25 Dry 5/26/2014
TOC	mg/L	---	1.5	NS [3]	26.2	3.3
TSS	mg/L	---	2.8	1160	204	2
Total PCBs [1]	µg/L	0.00017	ND	ND	ND	ND
4,4'-DDD	µg/L	0.00084	DNQ	**0.3**	**0.06**	ND
4,4'-DDE	µg/L	0.00059	**0.006**	**0.7**	**0.2**	DNQ
4,4'-DDT	µg/L	0.00059	DNQ	**0.1**	**0.2**	ND
Dieldrin	µg/L	0.00014	ND	ND	ND	ND
Total Chlordane [2]	µg/L	0.00059	ND	**0.02**	**0.01**	ND

Bold numbers indicate the value is greater than the LA.

1. Total PCBs include the 7 aroclors identified in CTR (1016, 1221, 1232, 1242, 1248, 1254, 1260).
2. Total chlordane is considered the sum of alpha- and gamma-chlordane.
3. Data could not be reported due to instrument failure in the laboratory.

Table 75. McGrath Lake TMDL Central Ditch Monitoring Data in Sediment: OXD_CENTR

Constituents in Sediment	Units	Sediment LA	Event 23.1 Post-Rain 12/8/2014	Event 25 Dry 5/26/2015
TOC	% dry wt.	---	3.11	3.6
Total PCBs [1]	ng/dry g	22.7	ND	ND
4,4'-DDD	ng/dry g	2	0.02	0.1
4,4'-DDE	ng/dry g	2.2	0.1	0.4
4,4'-DDT	ng/dry g	1	ND	0.006
Total DDT [2]	ng/dry g	1.58	0.1	0.5
Dieldrin	ng/dry g	0.02	ND	ND
Total Chlordane [3]	ng/dry g	0.5	0.001 [4]	0.01

1. Total PCBs include the 7 aroclors identified in CTR (1016, 1221, 1232, 1242, 1248, 1254, 1260).
2. Total DDT is the sum of 4,4'-DDD, 4,4'-DDT, and 4,4'-DDT.
3. Total chlordane is considered the sum of alpha- and gamma-chlordane.
4. Includes a DNQ(s) value(s) in the calculation.

EVALUATION OF DATA QUALITY

The VCAILG QAPP specifies monitoring program requirements and procedures designed to ensure that the quality of data generated through the VCAILGMP are such that data can be used to 1) accurately assess environmental conditions and 2) make environmentally-sound decisions. This section provides a summary of the data quality evaluation performed on data collected through the VCAILGMP in 2014 through 2015. An evaluation of the data quality for Calleguas Creek Watershed TMDL monitoring is included as Appendix E in the seventh year annual monitoring report for that program.[5] The evaluation herein is based on data quality objectives and quality control requirements specified in the VCAILG QAPP.

Data Quality Objectives

Data quality objectives specified in the QAPP for the VCAILGMP include requirements pertaining to maximum detection limits achieved by field methods and analytical laboratories, and acceptance criteria for quality control samples. Additional data quality objectives were defined in the QAPP for percent completeness. Table 74, Table 77, and Table 78 provide data quality objectives for field measured constituents and laboratory analyzed constituents.

Detection Limits

Table 76. Analytical Methods and Project Reporting Limits for Field Measurements

Parameter	Method	Range	Project Reporting Limit
Flow	Electromagnetic	-0.5 to +20 ft/s	0.05 ft/s
pH	Electrometric	0 – 14 pH units	NA
Temperature	High stability thermistor	-5 – 50°C	NA
Dissolved Oxygen	Luminescent dissolved oxygen	0 – 50 mg/L	0.5 mg/L
Turbidity	Nephelometric	0 – 3000 NTU	0.2 NTU
Conductivity	Graphite electrodes	0 – 10 mmhos/cm	2.5 µmhos/cm

NA = Not Applicable

[5] Larry Walker Associates. Calleguas Creek Watershed TMDL Compliance Monitoring Program Seventh Year Annual Monitoring Report. December 15, 2015.

Table 77. VCAILGMP Analytical Methods and Project Detection Limits / Project Reporting Limits for Laboratory Analyses

Parameter	Analytical Method	Units	Project MDL	Lab Reported MDL	Project RL	Lab Reported RL
Aquatic Chronic Toxicity						
Pimephales promelas (fathead minnow)	EPA-821-R-02-013 and EPA 600-4-91-002	N/A	N/A	N/A	N/A	N/A
Ceriodaphnia dubia (water flea)	EPA 821-R-02-013 and EPA 600-4-91-002	N/A	N/A	N/A	N/A	N/A
Selenastrum capricornutum (green algae)	EPA 821-R-02-013 and EPA 600-4-91-002	N/A	N/A	N/A	N/A	N/A
General Water Quality Constituents						
Total Dissolved Solids (TDS)	SM 2540C	mg/L	13	5.8	20	20
Total Suspended Solids (TSS)	SM 2540D	mg/L	0.4	0.49	1	1
Chloride	EPA 300.0	mg/L	0.04	0.042	1	1
Sulfate	EPA 300.0	mg/L	0.13	0.092	2	2
Hardness	SM 2340B	mg/L	1	0.1	5	0.5
Nutrients						
Total Ammonia-N	SM 4500-NH_3D	mg/L	0.03	0.02	0.06	0.05
Nitrate-N	EPA 300.0	mg/L	0.01	0.01	0.05	0.05
Total Orthophosphate-P	SM 4500-PE	mg/L	0.01	0.01	0.01	0.02
Metals						
Dissolved Copper	EPA 200.8	µg/L	0.4	0.005	0.8	0.01
Total Copper	EPA 200.8	µg/L	0.4	0.005	0.8	0.01
Organochlorine Pesticides						
Aldrin	EPA 625	ng/L	1	1	5	5

Parameter	Analytical Method	Units	Project MDL	Lab Reported MDL	Project RL	Lab Reported RL
BHC-alpha	EPA 625	ng/L	1	1	5	5
BHC -beta	EPA 625	ng/L	1	1	5	5
BHC-delta	EPA 625	ng/L	1	1	5	5
BHC-gamma (Lindane)	EPA 625	ng/L	1	1	5	5
Chlordane-alpha	EPA 625	ng/L	1	1	5	5
Chlordane-gamma	EPA 625	ng/L	1	1	5	5
2,4'-DDD	EPA 625	ng/L	1	1	5	5
2,4'-DDE	EPA 625	ng/L	1	1	5	5
2,4'-DDT	EPA 625	ng/L	1	1	5	5
4,4'-DDD	EPA 625	ng/L	1	1	5	5
4,4'-DDE	EPA 625	ng/L	1	1	5	5
4,4'-DDT	EPA 625	ng/L	1	1	5	5
Dieldrin	EPA 625	ng/L	1	1	5	5
Endosulfan I	EPA 625	ng/L	1	1	5	5
Endosulfan II	EPA 625	ng/L	1	1	5	5
Endosulfan Sulfate	EPA 625	ng/L	1	1	5	5
Endrin	EPA 625	ng/L	1	1	5	5
Endrin Aldehyde	EPA 625	ng/L	1	1	5	5
Endrin Ketone	EPA 625	ng/L	1	1	5	5
Toxaphene	NCI/GCMS	ng/L	10	10	50	50

Parameter	Analytical Method [1]	Units	Project MDL	Lab Reported MDL	Project RL	Lab Reported RL
Organophosphorus Pesticides						
Bolstar	EPA 625	ng/L	2	2	4	4
Chlorpyrifos	EPA 625	ng/L	1	0.5	2	1
Demeton	EPA 625	ng/L	1	1	2	2
Diazinon	EPA 625	ng/L	2	0.5	4	1
Dichlorvos	EPA 625	ng/L	3	3	6	6
Dimethoate	EPA 625	ng/L	3	5	6	10
Disulfoton	EPA 625	ng/L	1	1	2	2
Ethoprop	EPA 625	ng/L	1	1	2	2
Fenchlorphos	EPA 625	ng/L	2	2	4	4
Fensulfothion	EPA 625	ng/L	1	1	2	2
Fenthion	EPA 625	ng/L	2	2	4	4
Malathion	EPA 625	ng/L	3	3	6	6
Methyl Parathion	EPA 625	ng/L	1	1	2	2
Mevinphos	EPA 625	ng/L	8	5	16	10
Phorate	EPA 625	ng/L	6	5	12	10
Tetrachlorvinphos	EPA 625	ng/L	2	2	4	4
Tokuthion	EPA 625	ng/L	3	3	6	6
Trichloronate	EPA 625	ng/L	1	1	2	2

Parameter	Analytical Method [1]	Units	Project MDL	Lab Reported MDL	Project RL	Lab Reported RL
Pyrethroid Pesticides						
Allethrin	EPA 625 (NCI)	ng/L	0.5	0.5	2	2
Bifenthrin	EPA 625 (NCI)	ng/L	0.5	0.5	2	2
Cyfluthrin	EPA 625 (NCI)	ng/L	0.5	0.5	2	2
Cypermethrin	EPA 625 (NCI)	ng/L	0.5	0.5	2	2
Danitol	EPA 625 (NCI)	ng/L	0.5	0.5	2	2
Deltamethrin	EPA 625 (NCI)	ng/L	0.5	0.5	2	2
Esfenvalerate	EPA 625 (NCI)	ng/L	0.5	0.5	2	2
Fenvalerate	EPA 625 (NCI)	ng/L	0.5	0.5	2	2
Fluvalinate	EPA 625 (NCI)	ng/L	0.5	0.5	2	2
L-Cyhalothrin	EPA 625 (NCI)	ng/L	0.5	0.5	2	2
cis-Permethrin	EPA 625 (NCI)	ng/L	5	5	25	10
trans-Permethrin	EPA 625 (NCI)	ng/L	5	5	25	10
Prallethrin	EPA 625 (NCI)	ng/L	0.5	0.5	2	2
Resmethrin	EPA 625 (NCI)	ng/L	5	5	10	10

MDL = Method Detection Limit RL = Reporting Limit

Table 78. TMDL Analytical Methods and Project Method Detection Limits / Project Reporting Limits for Laboratory Analyses Performed Under the VCAILGMP

Parameter [1]	Analytical Method	Units	Project MDL	Lab Reported MDL	Project RL	Lab Reported RL
Total Organic Carbon (TOC) (water)	SM 5310C	mg/L	0.2	0.15	0.3	0.5
Total Organic Carbon (TOC) (sediment)	EPA 9060	% dry weight	0.01	0.01	0.05	0.02
OC Pesticides (filtered sediment)	EPA 8270C	ng/L	1 [2]	1	5 [2]	5
OC Pesticides (sediment)	EPA 8270C	ng/ dry g	1	1	5	5
OC Pesticides (fish tissue)	EPA 625	ng/L	1 [3]	1	5 [3]	5
PCBs (aroclors) (water)	EPA 8270C	ng/ dry g	10	10	20	20
PCBs (aroclors) (sediment)	SM 9223B	MPN/100mL	10	10	20	20
E. coli	SM 9221B or SM 9223B	MPN/100mL	<2	N/A	<2	1
Total Coliform	SM 9221B	MPN/100mL	<2	N/A	<2	1
Fecal Coliform	SM 5310C	mg/L	<2	N/A	<2	0.25

MDL = Method Detection Limit RL = Reporting Limit

1. Table lists only those TMDL constituents not included in the previous table
2. MDL for toxaphene is 10 ng/L; RL for toxaphene is 50 ng/L
3. MDL for toxaphene is 10 ng/g; RL for toxaphene is 50 ng/g

All project detection limits were met in 2014 to 2015 monitoring year for field measurements.

For lab measurements; MDLs for chloride, TSS, and dimethoate were not met during 2014-15 sampling year. Levels for these constituents greatly exceeded the MDLs in most cases. Therefore, higher MDLs for these constituents are not considered quality control failures. With dimethoate, all the environmental samples were reported as non-detected, and the best possible science does not meet the project limits, but were very close.

The lab RLs for total orthophosphate, dimethoate, and TOC in water did not meet the project RLs. For total orthophosphate, 32 of the 34 samples measured were above the project RL and lab's RL and the two samples that were below the RLs were also below the lab's MDL. For dimethoate, the project RL is 6 ng/L and the lab's reported RL is 10 ng/L, but the lab MDL is 5 ng/L, so the MDL meets the project RL, and every sample had ND values for dimethoate, so no dimethoate was detected at the 5 ng/L level. For TOC, the project RL is 0.3 mg/L and lab's reported RL is 0.5 mg/L, but the lab's MDL is 0.15 mg/L. Of the three TOC samples collected in water, all were above the lab's RL of 0.5 mg/L.

Data Quality Objectives for Precision and Accuracy

Table 79 and Table 80 list data quality objectives for precision and accuracy for field measurements and laboratory analyses.

Table 79. VCAILGMP Data Quality Objectives for Precision and Accuracy

Parameter	Accuracy	Precision	Recovery
Water Velocity (for Flow calc.)	± 2%	NA	NA
pH	± 0.2 pH units	± 0.5 pH units	NA
Temperature	± 0.5 ^{o}C	± 5%	NA
Dissolved Oxygen	± 0.5 mg/L	± 10%	NA
Turbidity	± 10%	± 10%	NA
Conductivity	± 5%	± 5%	NA
Aquatic Chronic Toxicity	[1]	[2]	NA
Total Suspended Solids (TSS)	NA	30%	NA
Total Dissolved Solids (TDS)	NA	10%	NA
Hardness (as $CaCO_3$)	NA	30%	NA
Chloride	NA	3%	85-121%
Sulfate	NA	4%	82-124%
Ammonia-Nitrogen	NA	30%	70-130%
Nitrate-Nitrogen	NA	30%	70-130%
Orthophosphate-P	NA	30%	70-130%
Dissolved Copper	NA	30%	75-125%
Total Copper	NA	30%	75-125%
Organochlorine Pesticides	NA	30% [3]	50-150% [3]
Organophosphorus Pesticides	NA	30% [3]	50-150% [3]
Pyrethroid Pesticides	NA	30% [3]	50-150% [3]
Trash	NA	NA	NA

NA = Not Applicable

1. Must meet all method performance criteria relative to the reference toxicant test.
2. Must meet all method performance criteria relative to sample replicates.
3. Or control limits established as the mean ± 3 standard deviations based on laboratory precision and recovery data.

Table 80. TMDL Specific Data Quality Objectives [1]

Parameter	Accuracy	Precision	Recovery
Total Organic Carbon (water)	NA	30%	80-120%
Total Organic Carbon (sediment)	NA	30%	80-120%
PCBs (water)	NA	30%	50-150%
PCBs (sediment)	NA	30%	50-150%
Toxaphene (filtered sediment)	NA	30%	50-150% [1]
Chlordane (filtered sediment)	NA	30%	50-150% [1]
Dieldrin (filtered sediment)	NA	30%	50-150% [1]
E. coli (water)	NA	30%	NA
Total Coliform (water)	NA	30%	NA
Fecal Coliform (water)	NA	30%	NA

1. This table lists only those constituents not included in the previous table.

Field Data Quality

Hydrolab MS5 Data Sondes (field probe) were calibrated within 24 hours of each monitoring event, and calibration was verified for each probe by analyzing a mid-range standard. If a calibration failure occurred, the probe that failed calibration was not used for monitoring. At the end of each event, mid-range standards were re-run to verify that each probe was still in calibration. Calibration data are recorded on the calibration sheet in the field logbook, and ultimately entered into the VCAILG Monitoring Database. During event 24, the turbidity sensor on one of the probes would not calibrate and pass calibration checks, so a hand held Hach Turbidimeter 2100P was used for the field sampling. All other calibration checks performed on field meters met data quality objectives for accuracy, signifying the validity of those field measurements.

Flow results for all events were obtained using a velocity meter or estimated by measuring stream width and average depth, and multiplying those estimates by the reciprocal of the time required for a floating object to travel over a measured distance (float method).

Blank Contamination

Overall there was very little blank contamination detected during the 2014-2015 monitoring year. Field blank hits were found in copper only. Lab blank hits were detected in chloride, sulfate, and TOC samples. An equipment blank was conducted on the sediment gathering equipment and a hit was found for TOC, at an estimated value. All these hits were at levels less than 10 times (5 times for metals) the expected levels found in all the field samples. Details of all the blank hits are reported in Table 81 below. The following lists a basic summary of the blank contamination results:

- Field Blanks – 359 analyzed – 3 detections above the MDL (0.8%) (does not include surrogates)
- Laboratory Blanks – 1014 analyzed – 11 detections above MDL (1.1%) (does not include surrogates)
- Equipment Blanks – 182 analyzed – 1 detection above MDL (0.6%) (does not include surrogates)

Table 81. Blank Sample Contamination Detected – 2014-2015

Constituent	Matrix	Event	Lab Batch	Field Blank	Lab Blank	Equip Blank	Program Qualifier	Comments
General Water Quality								
Chloride (mg/L)	Blankwater	22	2P1409811-001:A		*0.467*		b	Analyte Found in Blank, below PQL
Chloride (mg/L)	Blankwater	22	2P1409852-001:A		*0.459*		b	Analyte Found in Blank, below PQL
Chloride (mg/L)	Blankwater	22	2P1410495-027:B		*0.463*		b	Analyte Found in Blank, below PQL
Total Organic Carbon (mg/L)	BlankWater	23	QC1151620			*0.400*	J	Estimated - detected below the RL but above the MDL
Chloride (mg/L)	Blankwater	24	2P1415375-003:A		*0.128*		b	Analyte Found in Blank, below PQL
Total Organic Carbon (mg/L)	Blankwater	24	2P1500115-024:B		*0.492*		b	Analyte Found in Blank, below PQL
Total Organic Carbon (mg/L)	Blankwater	25	2P1506255-001:A		*0.194*		b, J	Analyte Found in Blank, below PQL, Estimated - detected below the RL but above the MDL
Sulfate (mg/L)	Blankwater	25	2P1506735-001:A		*0.472*		b, J	Analyte Found in Blank, below PQL, Estimated - detected below the RL but above the MDL
Chloride (mg/L)	Blankwater	25	2P1506735-001:A		*0.110*		b, J	Analyte Found in Blank, below PQL, Estimated - detected below the RL but above the MDL
Sulfate (mg/L)	Blankwater	25	2P1506801-001:A		*1.560*		b, J	Analyte Found in Blank, below PQL, Estimated - detected below the RL but above the MDL
Chloride (mg/L)	Blankwater	25	2P1506801-001:A		*0.148*		b, J	Analyte Found in Blank, below PQL, Estimated - detected below the RL but above the MDL
Chloride (mg/L)	Blankwater	25	2P1506869-001:A		*0.071*		J	Estimated - detected below the RL but above the MDL
Nutrients								
None								
OC Pesticieds								

Constituent	Matrix	Event	Lab Batch	Field Blank	Lab Blank	Equip Blank	Program Qualifier	Comments
None								
PCBs								
None								
OP Pesticides								
None								
Pyrethroid Pesticides								
None								
Metals & Selenium								
Dissolved Copper (µg/L)	BlankWater	022.0	E-7136	0.059				
Total Copper (µg/L)	BlankWater	022.0	E-7136	0.073				
Total Copper (µg/L)	Blankwater	024.0	E-8041	0.012				

Precision

The purpose of analyzing sample duplicates is to demonstrate precision of sample collection, preparation, and analytical methods. The relative percent difference (RPD) is reported for field duplicates, lab duplicates, blank spike duplicates, laboratory control spike (LCS) duplicates, and matrix spike duplicates (MSDs). QA failures for precision are noted when the RPD between a sample and its duplicate are greater than the acceptance value. See Table 82 below for details of all the precision failures. See Table 79 and Table 80 above for the VCAILG acceptance values for precision. The following list summarizes the precision analysis results:

- Field Duplicates – 459 analyzed – 38 failed RPD (8.3%) (does not include surrogates)
- Laboratory Duplicates – 695 analyzed – 16 failed RPD (2.3%) (includes surrogates)
- Blank Spike/LCS Duplicates – 957 analyzed – 3 failed RPD (0.3%) (includes surrogates)
- Matrix Spike Duplicates – 602 analyzed – 24 failed RPD (4.0%) (includes surrogates)

Table 82. Precision Control Failures – 2014-2015

Constituent	Matrix	Event	Lab Batch	Site	Field Dup RPD	Lab Dup RPD	BS/BSD RPD	MS/MSD RPD	Program Qualifier	Comments
General Water Quality										
Percent Solids (% Dry Weight)	Sediment	023.0	C-22065	OXD_CENTR	***56***	3	x	x		
Solids, Total Suspended (TSS) (mg/L)	Samplewater	025.0	2P1506171-004:A	LABQA	x	***37.4***	x	x	J, LD RPD	Estimate - detected below RL but above MDL, LD failed the RPD
Nutrients										
Chloride (mg/L)	Samplewater	023.0	2A1419109	04D_LAS	***40***	x	x	x	bL, FD RPD	Matrix interference, FD failed RPD
Chloride (mg/L)	Samplewater	024.0	2P1414970-002:A	LABQA	x	x	x	***163***	L, MS <LL, EST MS/MSD	Matrix interference, MS < Lower Limit, Estimate due to MS/MSD RPD Failure
Chloride (mg/L)	Samplewater	024.0	2P1414970-006:A	LABQA	x	x	x	***164***	MS <LL, EST MS/MSD	MS < Lower Limit, Estimate due to MS/MSD RPD Failure
Sulfate (mg/L)	Samplewater	023.0	2A1419109	04D_LAS	***57***	x	x	x	L, FD RPD	Matrix interference, FD failed RPD
Sulfate (mg/L)	Samplewater	023.0	2P1414468-002:A	LABQA	x	x	x	***37***	L, MS <LL, MS >UL, EST MS/MSD	Matrix interference, MS < Lower Limit, MS > Upper Limit, Estimate due to MS/MSD RPD Failure
Sulfate (mg/L)	Samplewater	023.0	2P1414468-029:B	04D_LAS	x	x	x	***34.1***	MS <LL, MS >UL, EST MS/MSD	MS < Lower Limit, MS > Upper Limit, Estimate due to MS/MSD RPD Failure
Sulfate (mg/L)	Samplewater	024.0	2P1414970-002:A	LABQA	x	x	x	***163***	L, MS <LL, EST MS/MSD	Matrix interference, MS < Lower Limit, Estimate due to MS/MSD RPD Failure
Sulfate (mg/L)	Samplewater	024.0	2P1414970-006:A	LABQA	x	x	x	***164***	MS <LL, EST MS/MSD	MS < Lower Limit, Estimate due to MS/MSD RPD Failure

Constituent	Matrix	Event	Lab Batch	Site	Field Dup RPD	Lab Dup RPD	BS/BSD RPD	MS/MSD RPD	Program Qualifier	Comments
OC Pesticides										
2,4'-DDD (µg/dry g)	Sediment	023.0	O-7026	OXD_CENTR	***40***	11	30	7		
2,4'-DDD (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***31***	27	5	0	FD RPD	FD failed RPD
2,4'-DDD (µg/L)	Samplewater, <63um	023.0	O-7028	S01D_MONAR	x	***31***	5	x	NH, FD RPD	Homogeneity could not be achieved in sample, FD failed the RPD
2,4'-DDE (µg/dry g)	Sediment	023.0	O-7026	OXD_CENTR	***40***	***31***	20	11	J,SL	Estimate - detected below RL but above MDL, results was < 10x the MDL
2,4'-DDE (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***54***	***44***	0	17	NH, LD RPD, FD RPD	Homogeneity could not be achieved in sample, LD and FD both failed the RPD
2,4'-DDT (µg/dry g)	Sediment	023.0	O-7026	OXD_CENTR	***40***	8	15	5	M	Matrix interference
2,4'-DDT (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***33***	18	2	1	FD RPD	FD failed RPD
4,4'-DDD (µg/dry g)	Sediment	023.0	O-7026	OXD_CENTR	***40***	8	6	8		
4,4'-DDD (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***31***	15	2	29	FD RPD	FD failed RPD
4,4'-DDE (µg/dry g)	Sediment	025.0	O-7138	OXD_CENTR	x	6	3	***50***	SH	Sample concentration exceeded the spike amount
4,4'-DDE (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***46***	27	4	9	SH, MS >UL, FD RPD	Sample concentration exceeded the spike amount, MS > Upper Limit, FD failed RPD
4,4'-DDE (µg/L)	Samplewater	024.0	O-7040	04D_ETTG	***31***	17	0	26	SH, MS >UL, FD RPD	Sample concentration exceeded the spike amount, MS > Upper Limit, FD failed RPD
4,4'-DDE (µg/L)	Samplewater, <63um	024.0	O-7040	S02T_ELLS	x	***184***	0	x	SL, FD RPD	results was < 10x the MDL, FD Failed RPD
4,4'-DDT (µg/dry g)	Sediment	025.0	O-7138	OXD_CENTR	x	18	1	***36***	M	Matrix interference

Constituent	Matrix	Event	Lab Batch	Site	Field Dup RPD	Lab Dup RPD	BS/BSD RPD	MS/MSD RPD	Program Qualifier	Comments
4,4'-DDT (µg/L)	Samplewater	024.0	O-7040	04D_ETTG	***37***	13	2	15	M, MS >UL, FD RPD	Matrix interference, MS > Upper Limit, FD failed RPD
4,4'-DDT (µg/L)	Samplewater	025.0	O-7126	S02T_TODD	0	***111***	1	2	SL	results was < 10x the MDL
BHC-alpha (µg/dry g)	Sediment	025.0	O-7138	OXD_CENTR	x	0	1	***37***	M	Matrix interference
Chlordane-alpha (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***45***	***36***	4	3	NH, LD RPD, FD RPD	Homogeneity could not be achieved in sample, LD and FD both failed the RPD
Chlordane-gamma (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***45***	***78***	9	3	J,SL, LD RPD	Estimate - detected below RL but above MDL, Results was < 10x the MDL, LD failed the RPD
Chlordane-gamma (µg/L)	Samplewater, <63um	024.0	O-7040	S02T_ELLS	x	***56***	3	x	J,SL	Estimate - detected below RL but above MDL, results was < 10x the MDL
cis-Nonachlor (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***98***	18	11	8	J	Estimate - detected below RL but above MDL
cis-Nonachlor (µg/L)	Samplewater, <63um	023.0	O-7028	S01D_MONAR	x	***114***	11	x	J,SL	Estimate - detected below RL but above MDL, results was < 10x the MDL
Dieldrin (µg/L)	Samplewater	024.0	O-7040	04D_ETTG	***51***	1	2	8		
Endosulfan sulfate (µg/dry g)	Sediment	025.0	O-7138	OXD_CENTR	x	0	2	***42***	M	Matrix interference
Endosulfan-I (µg/dry g)	Sediment	023.0	O-7026	OXD_CENTR	0	0	10	***31***	M	Matrix interference
Endrin Aldehyde (µg/dry g)	Sediment	023.0	O-7026	OXD_CENTR	0	0	5	***33***	M	Matrix interference

Constituent	Matrix	Event	Lab Batch	Site	Field Dup RPD	Lab Dup RPD	BS/BSD RPD	MS/MSD RPD	Program Qualifier	Comments
Hexachlorobenzene (µg/dry g)	Tissue	025.0	O-7112	SC_EST	x	***36***	0	20	J,SL	Estimate - detected below RL but above MDL, results was < 10x the MDL
Hexachlorobenzene (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***38***	***49***	1	1	J,SL, LD RPD	Estimate - detected below RL but above MDL, Results was < 10x the MDL, LD failed the RPD
Hexachlorobenzene (µg/L)	Samplewater, <63um	023.0	O-7028	S01D_MONAR	x	***46***	1	x	SL, LD RPD	results was < 10x the MDL, LD Failed RPD
Mirex (µg/dry g)	Sediment	025.0	O-7138	OXD_CENTR	x	0	4	***39***	M	Matrix interference
trans-Nonachlor (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***40***	7	4	1		
trans-Nonachlor (µg/L)	Samplewater, <63um	023.0	O-7028	S01D_MONAR	x	***81***	4	x	J,SL	Estimate - detected below RL but above MDL, results was < 10x the MDL
Toxaphene (µg/dry g)	Sediment	023.0	O-7026	OXD_CENTR	***32***	8	2	7		
Toxaphene (µg/dry g)	Sediment	025.0	O-7138	OXD_CENTR	x	7	0	***46***	M	Matrix interference
Toxaphene (µg/dry g)	Tissue	025.0	O-7112	SC_EST	x	15	1	***97***	SH, MS <LL, EST MS/MSD	Sample concentration exceeded the spike amount, MS < Lower Limit, Estimate due to MS/MSD RPD Failure
Toxaphene (µg/L)	Samplewater	024.0	O-7040	04D_ETTG	***48***	3	7	2	FD RPD	FD failed RPD
PCBs										
PCB167 (µg/dry g)	Sediment	023.0	O-7026	OXD_CENTR	0	0	***42***	12	R	Random error < 5%
OP Pesticides										
Chlorpyrifos (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***61***	21	0	4	FD RPD	FD failed RPD
Chlorpyrifos (µg/L)	Samplewater	025.0	O-7126	S02T_TODD	12	***38***	12	0	SL, LD RPD	results was < 10x the MDL, LD Failed RPD

Constituent	Matrix	Event	Lab Batch	Site	Field Dup RPD	Lab Dup RPD	BS/BSD RPD	MS/MSD RPD	Program Qualifier	Comments
Demeton (µg/L)	Samplewater	022.0	O-6076	S04T_TAPO	0	0	18	***103***	M, MS <LL, EST MS/MSD	Matrix interference, MS < Lower Limit, Estimate due to MS/MSD RPD Failure
Diazinon (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***43***	1	9	0	FD RPD	FD failed RPD
Dichlorvos (µg/L)	Samplewater	023.0	O-7028	04D_LAS	0	0	***32***	3	EST BS/BSD	Estimate due to BS/BSD failure
Disulfoton (µg/L)	Samplewater	022.0	O-6076	S04T_TAPO	0	0	20	***110***	M, MS <LL, EST MS/MSD	Matrix interference, MS < Lower Limit, Estimate due to MS/MSD RPD Failure
Pyrethroid Pesticides										
Bifenthrin (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***99***	5	1	5	FD RPD	FD failed RPD
Cypermethrin (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***88***	2	3	0	FD RPD	FD failed RPD
Cypermethrin (µg/L)	Samplewater	024.0	O-7040	04D_ETTG	***35***	15	1	10	FD RPD	FD failed RPD
Esfenvalerate (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***92***	3	5	4	FD RPD	FD failed RPD
Esfenvalerate (µg/L)	Samplewater	024.0	O-7040	04D_ETTG	***49***	11	1	7	FD RPD	FD failed RPD
Fenvalerate (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***94***	10	2	4	FD RPD	FD failed RPD
L-Cyhalothrin (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***48***	1	2	1	FD RPD	FD failed RPD
L-Cyhalothrin (µg/L)	Samplewater	024.0	O-7040	04D_ETTG	***35***	22	3	9	FD RPD	FD failed RPD
Permethrin, cis- (µg/L)	Samplewater	022.0	O-6076	S04T_TAPO	0	0	***44***	17	R, M, MS <LL, BS <LL, EST BS/BSD	Random error < 5%, Matrix interference, MS < Lower Limit, BS < Lower Limit, Estimate due to BS/BSD failure
Permethrin, cis- (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***101***	10	2	19	SH, MS <LL, FD RPD	Sample concentration exceeded the spike amount, MS < Lower Limit, FD failed RPD

Constituent	Matrix	Event	Lab Batch	Site	Field Dup RPD	Lab Dup RPD	BS/BSD RPD	MS/MSD RPD	Program Qualifier	Comments
Permethrin, trans- (µg/L)	Samplewater	023.0	O-7028	04D_LAS	***100***	3	9	19	SH, MS <LL, FD RPD	Sample concentration exceeded the spike amount, MS < Lower Limit, FD failed RPD
Permethrin, trans- (µg/L)	Samplewater	024.0	O-7040	04D_ETTG	***44***	2	9	4	FD RPD	FD failed RPD
Metals and Selenium										
None										
Bacteria										
Enterococcus (MPN/100ml)	Samplewater	023.0	2A1418588	VICT_CIHD	***56***	x	x	x		
E.coli (MPN/100ml)	Samplewater	024.0	2A1419051	VICT_CIHD	***55***	x	x	x		
Enterococcus (MPN/100ml)	Samplewater	024.0	2A1419140	VICT_CIHD	***55***	x	x	x		

BS/BSD = Blank Spike/Blank Spike Duplicate
MS/MSD = Matrix Spike/Matrix Spike Duplicate
RPD = Relative Percent Difference

Accuracy

Percent recoveries of blank spike (BS) samples, LCS samples, and matrix spike (MS) samples check the accuracy of lab reported sample concentrations. BS samples that fell outside the acceptable range occurred within the pesticide constituent class. Three BS samples outside the acceptable range were OC pesticides, two were PCBs, and one each were from the OP and pyrethroids pesticides. The BS samples outside the acceptable range occurred in Events 22 and 23 in water samples. The MS samples that fell outside the acceptable range were generally evenly spread across all events and across both water and sediment. Table 83 provides the accuracy control failures for 2014-2015. The following summarizes the results of the accuracy analyses:

- Blank Spike/LCS Samples – 1867 Analyzed – 5 fell outside the range (0.27%) (does not include surrogates)
- Matrix Spike Samples – 1148 Analyzed – 45 fell outside the range (3.92%) (does not include surrogates)

Table 83. Accuracy Control Failures – 2014-2015

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
General Water Quality											
None											
Nutrients											
Chloride (mg/L)	Samplewater	23	2P1414468	85	121	***69.3***	x	103	***77.1***	L, MS <LL, MS >UL, EST MS/MSD	Matrix Interference, MS less than lower limit, MS greater than upper limit, Estimate due to MS/MSD RPD failure
Chloride (mg/L)	Samplewater	23	2P1414468	85	121	***69.3***	x	104	***126***	H, MS <LL, MS >UL, EST MS/MSD	Holdtime exceeded, MS less than lower limit, MS greater than upper limit, Estimate due to MS/MSD RPD failure
Chloride (mg/L)	Samplewater	23	2P1414468	85	121	***69.3***	x	***77.3***	102	L, MS <LL, MS >UL, EST MS/MSD	Matrix Interference, MS less than lower limit, MS greater than upper limit, Estimate due to MS/MSD RPD failure
Chloride (mg/L)	Samplewater	23	2P1414757	85	121	97.2	x	***81.3***	***73.5***	L, MS <LL	Matrix Interference, MS less than lower limit
Sulfate (mg/L)	Samplewater	23	2P1414468	82	124	90.3	x	103	***70.4***	L, MS <LL, MS >UL, EST MS/MSD	Matrix Interference, MS less than lower limit, MS greater than upper limit, Estimate due to MS/MSD RPD failure
Sulfate (mg/L)	Samplewater	23	2P1414468	82	124	90.3	x	103	***128***	H, MS <LL, MS >UL, EST MS/MSD	Holdtime exceeded, MS less than lower limit, MS greater than upper limit, Estimate due to MS/MSD RPD failure
Sulfate (mg/L)	Samplewater	23	2P1414468	82	124	***62.8***	x	***72.9***	103	L, R, MS <LL, MS >UL, EST MS/MSD	Matrix Interference, Random error < 5%, MS less than lower limit, MS greater than upper limit, Estimate due to MS/MSD RPD failure

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
Sulfate (mg/L)	Samplewater	23	2P1414757	82	124	97.7	x	***-0.3***	***-8.2***	L, MS <LL	Matrix Interference, MS less than lower limit
Sulfate (mg/L)	Samplewater	23	2P1414757	82	124	97.7	x	***74.6***	82.4	L, MS <LL	Matrix Interference, MS less than lower limit
Chloride (mg/L)	Samplewater	24	2P1414970	85	121	91.8	x	***9***	***9.6***	L, MS <LL, EST MS/MSD	Matrix Interference, MS less than lower limit, Estimate due to MS/MSD RPD failure
Chloride (mg/L)	Samplewater	24	2P1415370	85	121	93.6	x	***128***	99	H, MS >UL, EST MS/MSD	Holdtime exceeded, MS greater than upper limit, Estimate due to MS/MSD RPD failure
Sulfate (mg/L)	Samplewater	24	2P1414970	82	124	91.4	x	***9.3***	***9***	L, MS <LL, EST MS/MSD	Matrix Interference, MS less than lower limit, Estimate due to MS/MSD RPD failure
Sulfate (mg/L)	Samplewater	24	2P1415370	82	124	93.9	x	***131***	96.4	H, MS >UL, EST MS/MSD	Holdtime exceeded, MS greater than upper limit, Estimate due to MS/MSD RPD failure
OC Pesticides											
2,4'-DDT (µg/dry g)	Sediment	23	O-7026	50	150	93	80	148	***156***	M	Matrix Interference
4,4'-DDE (µg/L)	Samplewater	23	O-7028	50	150	95	99	***166***	***151***	SH, MS >UL, FD RPD	Concentration in sample exceeded spike amount, Recovery limits do not apply, MS greater than upper limit, FD failed RPD limit
Endosulfan Sulfate (µg/dryg)	Sediment	23	O-7026	50	150	100	97	***41***	55	M	Matrix Interference
Endosulfan-I (µg/dry g)	Sediment	23	O-7026	50	150	60	66	***41***	56	M	Matrix Interference

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
4,4'-DDE (µg/L)	Samplewater	24	O-7040	50	150	81	81	***237***	***307***	SH, MS >UL, FD RPD	Concentration in sample exceeded spike amount, Recovery limits do not apply, MS greater than upper limit, FD failed RPD limit
4,4'-DDT (µg/L)	Samplewater	24	O-7040	50	150	104	106	***206***	***178***	M, MS >UL, FD RPD	Matrix Interference, MS greater than upper limit, FD failed RPD
4,4'-DDE (µg/dry g)	Sediment	25	O-7138	50	150	94	91	113	***189***	SH	Concentration in sample exceeded spike amount, Recovery limits do not apply
Endrin (µg/dry g)	Tissue	25	O-7112	25	125	119	116	***135***	***145***	M	Matrix Interference
Endrin (µg/L)	Samplewater	25	O-7126	25	125	91	93	***127***	***132***	M	Matrix Interference
Methoxychlor (µg/dry g)	Sediment	25	O-7138	50	150	103	101	***35***	***34***	M	Matrix Interference
Toxaphene (µg/dry g)	Tissue	25	O-7112	50	150	103	104	58	***20***	SH, MS <LL, EST MS/MSD	Concentration in sample exceeded spike amount, Recovery limits do not apply, MS less than lower limit, Estimate due to MS/MSD RPD failure
PCBs											
PCB167 (µg/dry g)	Sediment	23	O-7026	50	150	102	***156***	96	108	R	Random error, < 5%
OP Pesticides											
Demeton (µg/L)	Samplewater	22	O-6076	25	125	77	64	***21***	66	M	Matrix Interference

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
Disulfoton (µg/L)	Samplewater	22	O-6076	25	125	77	63	***16***	55	M	Matrix Interference
Methyl parathion (µg/L)	Samplewater	24	O-7040	50	150	96	96	***176***	***182***	M, MS >UL	Matrix Interference, MS greater than upper limit
Pyrethroid Pesticides											
Permethrin, cis- (µg/L)	Samplewater	22	O-6076	50	150	***37***	58	57	***48***	M, R	Matrix Interference, Random error, < 5%
Deltamethrin/Tralomethrin (µg/L)	Samplewater	23	O-7028	50	150	148	147	***234***	***216***	M, MS >UL	Matrix Interference, MS greater than upper limit
Permethrin, cis- (µg/L)	Samplewater	23	O-7028	50	150	52	51	***-416***	***-345***	SH, MS <LL, FD RPD	Concentration in sample exceeded spike amount, Recovery limits do not apply, MS less than lower limit, FD failed RPD limit
Permethrin, trans- (µg/L)	Samplewater	23	O-7028	50	150	73	67	***-491***	***-404***	SH, MS <LL, FD RPD	Concentration in sample exceeded spike amount, Recovery limits do not apply, MS less than lower limit, FD failed RPD limit
Metals and Selenium											
None											

MS = Matrix Spike
MSD = Matrix Spike Duplicate
LCS = Lab Control Spike
LCSD = Lab Control Spike Duplicate
Rec. = Recovery

Completeness

Data completeness is a measure of the amount of successfully collected and validated data relative to the amount of data planned to be collected for the project. It is usually expressed as a percentage. A project objective for percent completeness is typically based on the percentage of the data needed for the program or study to reach valid conclusions.

Because the VCAILGMP is intended to be a long-term monitoring program, data that are not successfully collected for a specific monitoring event will not be collected at a later date. Rather, subsequent events conducted over the course of the program will provide a sufficient data set to appropriately characterize conditions at individual sampling sites. Moreover, some monitoring sites will often be dry (particularly during the dry season), which is important information necessary to identify areas where discharge from irrigated agricultural lands is nonexistent. For these reasons, most of the data planned for collection cannot be considered absolutely critical, and it is difficult to set a meaningful objective for data completeness. As explained in the QAPP, some reasonable objectives for data are desirable, if only to measure the effectiveness of the program. Program goals for data completeness were established at the 90% level for field measurements, general water quality constituents, organic constituents, and aquatic toxicity.

Table 84 lists the percent completeness of data collected during 2014-2015 in comparison with the established data quality objective.

Table 84. VCAILG MP and Associated TMDL Data Completeness – 2014-2015

Monitoring Element	Completeness Objective	Completeness Achieved
Field Measurements	90%	91%
General Water Quality Constituents	90%	91%
Total & Dissolved Copper	90%	89%
Organic Constituents - Pesticides	90%	90%
Organic Constituents – Filtered Sediment	90%	100%
Organic Constituents - Sediment	90%	100%
Bacteria	90%	100%
Aquatic Toxicity	90%	90%

Values listed for percent completeness achieved are based on successfully collecting samples at all VCAILG monitoring sites with sufficient flow present, and successfully generating analytical data for all planned constituents. For events 23 and 24, two sites were inaccessible due to road closures and those were counted toward the percent completeness, since there was sufficient flow, yet no samples were taken.

Additional Program Requirements

Data quality is dependent on samples that are collected properly by following established protocols. To ensure that samples are collected properly, the QAPP requires field crews to receive sampling training prior to initiation of sampling. Refresher training is required annually thereafter. Sampling refresher training took place October 31, 2014. Training included a PowerPoint presentation detailing program goals, requirements, monitoring sites, constituents,

field protocols, sample handling, safety, and a field visit to one site to give hands-on training for flow measurements. Training documentation is kept on file with other VCAILG MP documents and is available for review upon request.

Summary of Water Quality Benchmark Exceedances

Exceedances of water quality benchmarks occurred in all watersheds, except Ventura River, and triggered the requirement to prepare a Water Quality Management Plan. The WQMP included in this combined AMR/WQMP includes specific steps to attain water quality benchmarks through the use of best management practices.

WATER QUALITY BENCHMARK EXCEEDANCES (Conditional Waiver Appendix 2)

The following summarizes the exceedances of water quality benchmarks as specified in Conditional Waiver Appendix 2 or included by reference to narrative and numeric Basin Plan objectives and water quality standards from the California Toxics Rule. Any exceedances were previously noted in the data tables of each VCAILGMP site, the following is a compilation to evaluate the sites overall. Table 85 lists the exceedances that occurred at each site for each monitoring event.

pH

All sites except the 01T_ODD3_ARN, S02T_TODD, and S03T_BOULD were within the acceptable pH range of 6.5 to 8.5 during the 2014-2015 monitoring year. These three sites had pH levels below 6.5.

Temperature

No exceedances of the temperature benchmark occurred during the 2014-2015 monitoring year.

Dissolved Oxygen

No exceedances of the DO benchmark occurred during the 2014-2015 monitoring year except at the 04D_ETTG site, which had a DO value less than 5 mg/L.

Salts

Exceedances of the salts benchmarks (TDS, chloride, sulfate, or any combinations thereof) occurred at four monitoring sites in the Santa Clara River Watershed. The TDS and sulfate benchmarks were exceeded during dry weather at the S02T_TODD site, during the second wet weather event at the S03T_TIMB site, and during the first wet weather event at the S03T_BOULD site during the first wet weather event. For the S04T_TAPO site, the TDS, chloride, and sulfate benchmarks were exceeded during the first dry weather event, the sulfate benchmark was exceeded during the second wet weather event, and the TDS and chloride benchmarks were exceeded during the second dry weather event.

Nitrogen

Exceedances of the nitrate-N benchmark occurred at six of the monitoring sites. Sites with nitrate-N exceedances were split between watersheds with three sites located in the Calleguas Creek Watershed, two in the Santa Clara River Watershed, and one in the Oxnard Coastal

Watershed. An exceedance of the Ammonia-N benchmark occurred at the 01T_ODD_ARN site during the second dry event.

Copper

Exceedances of dissolved copper benchmarks occurred at five sites in the Calleguas Creek Watershed and one site in the Oxnard Coastal Watershed. In the Calleguas Creek watershed, benchmarks were exceeded at 01T_ODD3_ARN during the first dry weather, at 04D_ETTG during the first dry weather event and both wet weather events, at 04D_LAS during the first dry weather event and both wet weather events, at 05D_LAVD during the first wet weather event, and at 05T_HONDO during the first wet weather event. In the Oxnard Coastal Watershed, the benchmark exceedance occurred at the OXD_CENTR site during both wet weather events.

Pesticides

During dry weather, DDT four sites had concentrations of DDT compounds exceeding the applicable benchmark. Additionally, there were exceedances of the toxaphene benchmark at two sites, the chlorpyrifos benchmark at one site, and the dieldrin benchmark at one site.

During wet weather, there were exceedances of one or more of the DDT compounds benchmarks at 11 sites. In addition, there were exceedances of the total chlordane benchmark at 11 sites, the chlorpyrifos benchmark at seven sites, the diazinon benchmark at three sites, and the toxaphene benchmark at three sites during wet weather.

Chronic Toxicity

Toxicity sampling took place during the first wet weather monitoring event and during the second dry weather monitoring event during 2014-2015. An exceedance of the 1.0 TU_c benchmark occurred during the wet weather event at the 05D_LAVD, 05T_HONDO, and 06T_LONG2 sites.

Table 85. 2014 – 2015 Exceedances of Water Quality Benchmarks (as specified in Conditional Waiver Appendix 2) by Site and Event

Site	Event 22 – Dry August 14, 2014	Event 23 – Wet December 2, 2014	Event 24 – Wet December 12, 2014	Event 25 – Dry May 26, 2015
01T_ODD3_ARN	pH Nitrate-N Dissolved Copper 4,4'-DDD 4,4'-DDE	*NS*	*NS*	Ammonia-N Nitrate-N Total Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT
04D_ETTG	DO Nitrate-N Dissolved Copper 4,4'-DDE Toxaphene	Nitrate-N Dissolved Copper Total Chlordane 4,4'-DDD 4,4'-DDE Chlorpyrifos Diazinon	Nitrate-N Dissolved Copper Total Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin Toxaphene Chlorpyrifos	Nitrate-N 4,4'-DDE Toxaphene
04D_LAS	Nitrate-N Dissolved Copper 4,4'-DDE Toxaphene	Nitrate-N Dissolved Copper Total Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT Toxaphene Chlorpyrifos	Nitrate-N Dissolved Copper Total Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT Toxaphene	Nitrate-N 4,4'-DDE Toxaphene
05D_LAVD	*NS*	Dissolved Copper Total Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT Chlorpyrifos Diazinon	4,4'-DDT Toxaphene Chlorpyrifos Diazinon	*NS*
05T_HONDO	*NS*	Dissolved Copper Total Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT Chlorpyrifos Diazinon	Total Chlordane 4,4'-DDE 4,4'-DDT Chlorpyrifos	*NS*
06T_LONG2	*NS*	Total Chlordane 4,4'-DDD 4,4'-DDE Chlorpyrifos	*NS*	*NS*

Site	Event 22 – Dry August 14, 2014	Event 23 – Wet December 2, 2014	Event 24 – Wet December 12, 2014	Event 25 – Dry May 26, 2015
OXD_CENTR	4,4'-DDE	pH Nitrate-N Dissolved Copper Total Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT Chlorpyrifos	Nitrate-N Dissolved Copper Total Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT Chlorpyrifos	Nitrate-N
S02T_ELLS	*NS*	*NS*	Chloride Total Chlordane 4,4'-DDE Chlorpyrifos	*NS*
S02T_TODD	TDS Sulfate	pH Total Chlordane 4,4'-DDD	Total Chlordane 4,4'-DDE	TDS Sulfate
S03T_TIMB	*NS*	*NS*	TDS Sulfate	*NS*
S03T_BOULD	*NS*	pH TDS Sulfate Nitrate-N Total Chlordane	Nitrate-N Total Chlordane 4,4'-DDE	*NS*
S03D_BARDS	*NS*	Total Chlordane 4,4'-DDD 4,4'-DDE Chlorpyrifos	Total Chlordane 4,4'-DDD 4,4'-DDE Chlorpyrifos	*NS*
S04T_TAPO	TDS Chloride Sulfate Nitrate-N	Total Chlordane 4,4'-DDD 4,4'-DDE 4,4'-DDT	Sulfate Total Chlordane 4,4'-DDE	TDS Chloride Nitrate-N
VRT_SANTO	*NS*	*NS*	*NS*	*NS*
VRT_THACH	*NS*	*NS*	None	*NS*
Total Number of Sites Sampled	6	10	12	6
Total Number of Sites with Exceedances	6	10	11	6

NS = Not Sampled; site dry, ponded, or inaccessible

TMDL BENCHMARK EXCEEDANCES (Conditional Waiver Appendix 3)

Appendix 3 of the Conditional Waiver specifies water quality benchmarks that come from TMDL LAs. Exceedances of these benchmarks are another way of triggering a WQMP. The following evaluates TMDL LA benchmark compliance and required actions.

Calleguas Creek Watershed and Mugu Lagoon OC Pesticides and PCBs TMDL

Benchmarks for this TMDL are the interim sediment LAs, which are assessed at the base of each subwatershed. The interim LAs for total chlordane and 4,4'-DDT were exceeded at the 9B_ADOLF compliance monitoring location; however, this TMDL includes the requirement to develop an agricultural WQMP. The actions to be taken to implement the VCAILG WQMP will be designed to maintain compliance with the interim LAs and eventually achieve compliance with final LAs.

Calleguas Creek Watershed and Mugu Lagoon Toxicity, Chlorpyrifos, and Diazinon TMDL

Interim LAs are currently in effect for this TMDL and are used as the benchmarks. Compliance with these LAs is measured at the compliance sites, located at the base of each subwatershed. There were exceedances of the chlorpyrifos or diazinon interim LAs at the 04_WOOD site during wet weather. This TMDL also includes the requirement to develop an agricultural WQMP. The VCAILG WQMP will consider this TMDL and include BMPs to continue meeting interim LAs and lead to the achievement of final LAs.

Calleguas Creek Watershed Boron, Chloride, Sulfate, and TDS TMDL

Benchmarks for this TMDL are interim dry weather LAs, which are assessed at the five compliance monitoring sites and compared to monthly dry weather mean salt concentrations. Interim LAs were met at all sites and for all salts constituents, with the exception of sulfate and boron at the 04_WOOD site and chloride at the 03_UNIV site. Data from the upstream agricultural land use site did not exceed the interim LAs. However, the Salts TMDL also requires an agricultural WQMP, which will be addressed by VCAILG.

Calleguas Creek Watershed and Mugu Lagoon Metals and Selenium TMDL

The evaluation of receiving water data show that copper, nickel, and mercury allocations are all being attained. Exceedances did occur for the selenium interim dry weather LA at the Revolon Slough receiving water site as well as one of the upstream agricultural land use sites. These selenium results trigger the need for a WQMP, however, it is already a requirement of the TMDL.

Calleguas Creek Watershed Nitrogen Compounds TMDL

Exceedances of the nitrogen LA were observed at six out of the seven CCWTMP agricultural land use sites and three out of the six VCAILGMP sites located in the Calleguas Creek Watershed. Most of the sites with consistent exceedances are located in the lower parts of the watershed. Though this TMDL does not require a WQMP, the data demonstrates that one is required due to LA exceedances.

Revolon Slough and Beardsley Wash Trash TMDL

VCAILG members are complying with the Trash TMDL requirements through a MFAC/BMP Program. VCAILG members are in compliance with the TMDL requirements to ensure zero trash immediately after each MFAC event. To ensure that trash does not accumulate to deleterious amounts, trash BMPs are included in the WQMP.

Santa Clara River Nitrogen Compounds TMDL

The Santa Clara River Watershed LA for nitrogen was exceeded at two of the six monitoring sites during dry and wet weather over the 2014-2015 monitoring year. These observed exceedances trigger a WQMP.

Ventura River Estuary Trash TMDL

VCAILG members are complying with the Trash TMDL requirements through a MFAC/BMP Program. VCAILG members are in compliance with the TMDL requirements to ensure zero trash immediately after each MFAC event. To ensure that trash does not accumulate to deleterious amounts, trash BMPs are included in the WQMP.

Santa Clara River Estuary Toxaphene TMDL

There were no exceedances of the toxaphene interim sediment LA during the monitoring year. However, there was an exceedance of the toxaphene interim fish tissue LA. Data collected during the AMR reporting period does not trigger the need for a WQMP.

TEMPORAL TRENDS IN MONITORING DATA FOR INDIVIDUAL CONSTITUENTS

Multiple years of monitoring data are used in the section of the report to detect temporal trends for individual constituents at the VCAILG monitoring sites. It is important to note that not all constituents with standard water quality benchmarks were evaluated for trends. Field measurements (pH, DO, temperature), for example rarely exceed applicable benchmarks. In addition, many OC pesticides have very rarely been detected. Considering all 2005 Conditional Waiver events and the first four years of 2010 Conditional Waiver monitoring (Events 1-25), Table 86 lists the OC pesticides not considered for trend analysis and the number of detections that occurred for those constituents. In the monitoring trends evaluation that follows, the focus is on the constituents with benchmarks that are the most often detected.

Table 86. Rarely Detected OC Pesticides with Water Quality Benchmarks or CTR Criteria (Refer to Tables 18 and 19)

OC Pesticide	# of Detections Considering VCAILG Events 1-25
Aldrin[2]	0
Alpha-BHC[2]	0
Beta-BHC[2]	1
Gamma-BHC[2]	0
Dieldrin[1]	3
Endosulfan I[2]	1
Endosulfan II[2]	1
Endosulfan sulfate[2]	1
Endrin[2]	0
Endrin Aldehyde[2]	0

1. Constituent has a Water Quality Benchmark listed in Conditional Waiver Appendix 2 (See also Tables 14 through 18).
2. Constituent has an objective based on CTR criteria (See Table 19).

Trend analysis was performed for all collected water samples at the VCAILGMP sites in the receiving waters. Data was collected between June 2007 and May 2015. For water column samples, trends for dry weather data and for wet weather data at each site were analyzed.

Concentration trends over time were determined by correlating the measured constituent concentrations and their sample date. Nonparametric Kendall's Tau statistical method was used for analysis. Nonparametric methods have the benefit of not possessing an underling assumption of normality, therefore analysis of the distribution of the data or additional transformations were not needed. Correlation analysis was carried out for all constituent-water body combination for which at least 10 percent of the samples had detected concentrations. Detected but not quantifiable (DNQ) concentrations were analyzed using the laboratory calculated values. As a conservative estimate, not detected (ND) concentrations were analyzed at one half of the method detection limit (MDL). Trends were considered to be statistically significant at $p < 0.05$.

The results of the trends analysis are graphically presented in Table 87 through Table 92. Arrows are used to show statistically significant increasing or decreasing trends. Dashed lines are used to show constituent-water body combinations that had sufficient data for analysis, but did not have significant trends (i.e., $p \geq 0.05$).

Table 87. Dry Weather Water Quality Trends at Calleguas Creek Watershed Monitoring Sites

	01T_ODD3_ARN	04D_ETTG	04D_LAS	05D_LAVD	05D_HONDO	06T_LONG2
Nutrients						
Ammonia-N	--	--	--	--	[b]	[b]
Nitrate-N	--	--	↑	--	[b]	[b]
Salts						
TDS	--	--	--	--	[b]	[b]
Chloride	--	↑	↑	--	[b]	[b]
Sulfate	--	--	--	--	[b]	[b]
OC Pesticides						
Total Chlordane	--	--	--	--	[b]	[b]
4,4'-DDD	↓	↓	--	--	[b]	[b]
4,4'-DDE	--	↓	--	--	[b]	[b]
4,4'-DDT	--	--	--	--	[b]	[b]
Toxaphene	--	--	--	[a]	[b]	[b]
OP Pesticides						
Chlorpyrifos	--	--	--	--	[b]	[b]
Diazinon	↑	--	↓	--	[b]	[b]
Metals						
Dissolved Copper	--	--	--	--	[b]	[b]

Green arrows indicate statistically significant decreasing trends. **Red** arrows indicate statistically significant increasing trends
"--" indicates no significant trends observed
[a] fewer than 10% of the samples contained detected concentrations. Correlation analysis was not conducted
[b] no dry weather samples collected (sites were dry)
[c] insufficient number of detections for correlation analysis.
[d] no dry weather copper samples are available

Table 88. Dry Weather Water Quality Trends at Santa Clara River Watershed Monitoring Sites

	S02T_ELLS	S02T_TODD	S03T_TIMB	S03T_BOULD	S03T_BARDS	S04T_TAPO
Nutrients						
Ammonia-N	--	--	[c]	--	[c]	--
Nitrate-N	--	--	[c]	--	[c]	--
Salts						
TDS	--	--	[c]	--	[c]	--
Chloride	--	--	[c]	--	[c]	--
Sulfate	--	--	[c]	↑	[c]	--
OC Pesticides						
Total Chlordane	[a]	--	[c]	--	[c]	--
4,4'-DDD	[a]	[a]	[c]	[a]	[c]	--
4,4'-DDE	--	--	[c]	[a]	[c]	--
4,4'-DDT	[a]	--	[c]	[a]	[c]	--
Toxaphene	[a]	--	[c]	[a]	[c]	--
OP Pesticides						
Chlorpyrifos	--	--	[c]	[a]	[c]	--
Diazinon	[a]	↓	[c]	[a]	[c]	--
Metals						
Dissolved Copper	[c]	--	[c]	[d]	[c]	--

Green arrows indicate statistically significant decreasing trends. **Red** arrows indicate statistically significant increasing trends
"--" indicates no significant trends observed
[a] fewer than 10% of the samples contained detected concentrations. Correlation analysis was not conducted
[b] no dry weather samples collected (sites were dry)
[c] insufficient number of detectons for correlation analysis.
[d] no dry weather copper samples are available

Table 89. Dry Weather Water Quality Trends at Oxnard Coastal and Ventura River Watershed Monitoring Sites

	Oxnard Coastal	Ventura River	
	OXD_CENTR	**VRT_THACH**	**VRT_SANTO**
Nutrients			
Ammonia-N	--	[a]	[a]
Nitrate-N	--	[a]	[a]
Salts			
TDS	--	[a]	[a]
Chloride	--	[a]	[a]
Sulfate	↑	[a]	[a]
OC Pesticides			
Total Chlordane	--	[a]	[a]
4,4'-DDD	↓	[a]	[a]
4,4'-DDE	↓	[a]	[a]
4,4'-DDT	--	[a]	[a]
Toxaphene	--	[a]	[a]
OP Pesticides			
Chlorpyrifos	--	[a]	[a]
Diazinon	--	[a]	[a]
Metals			
Dissolved Copper	--	[a]	[a]

Green arrows indicate statistically significant decreasing trends. **Red** arrows indicate statistically significant increasing trends
"--" indicates no significant trends observed
[a] no dry weather samples collected (sites were dry)

Table 90. Wet Weather Water Quality Trends at Calleguas Creek Watershed Monitoring Sites

	01T_ODD3_ARN	04D_ETTG	04D_LAS	05D_LAVD	05D_HONDO	06T_LONG2
Nutrients						
Ammonia-N	--	--	--	--	--	[a]
Nitrate-N	--	--	--	--	--	[a]
Salts						
TDS	--	--	↑	--	--	[a]
Chloride	↑	--	--	--	--	[a]
Sulfate	--	--	↑	--	--	[a]
Total Chlordane	--	--	--	--	--	[a]
4,4'-DDD	--	--	--	--	--	[a]
4,4'-DDE	--	--	--	--	--	[a]
4,4'-DDT	--	--	--	--	--	[a]
Toxaphene	--	--	--	--	--	[a]
Chlorpyrifos	--	↓	--	--	--	[a]
Diazinon	--	--	↓	--	--	[a]
Metals						
Dissolved Copper	--	--	--	↑	--	[a]

Green arrows indicate statistically significant decreasing trends. **Red** arrows indicate statistically significant increasing trends
"--" indicates no significant trends observed
[a] insufficient number of detections for correlation analysis.

Table 91. Wet Weather Water Quality Trends at Santa Clara River Watershed Monitoring Sites

	S02T_ELLS	S02T_TODD	S03T_TIMB	S03T_BOULD	S03T_BARDS	S04T_TAPO
Nutrients						
Ammonia-N	--	--	--	--	--	--
Nitrate-N	--	--	--	--	--	--
Salts						
TDS	--	--	--	--	--	--
Chloride	--	--	--	--	--	--
Sulfate	--	--	--	--	--	--
OC Pesticides						
Total Chlordane	--	--	--	--	--	--
4,4'-DDD	--	--	--	--	--	--
4,4'-DDE	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	--
Toxaphene	--	--	[a]	--	[a]	[a]
OP Pesticides						
Chlorpyrifos	--	--	--	--	--	--
Diazinon	--	--	--	--	--	--
Metals						
Dissolved Copper	--	--	--	--	--	--

"--" indicates no significant trends observed

[a] fewer than 10% of the samples contained detected concentrations. Correlation analysis was not conducted.

Table 92. Wet Weather Water Quality Trends at Oxnard Coastal and Ventura River Watershed Monitoring Sites

	Oxnard Coastal	Ventura River	
	OXD_CENTR	**VRT_THACH**	**VRT_SANTO**
Nutrients			
Ammonia-N	--	--	--
Nitrate-N	--	--	--
Salts			
TDS	--	--	--
Chloride	--	--	--
Sulfate	--	--	--
OC Pesticides			
Total Chlordane	--	[a]	[a]
4,4'-DDD	--	[a]	[a]
4,4'-DDE	--	[a]	[a]
4,4'-DDT	--	--	[a]
Toxaphene	--	[a]	[a]
OP Pesticides			
Chlorpyrifos	--	[a]	[a]
Diazinon	--	[a]	[a]
Metals			
Dissolved Copper	--	[b]	[c]

"--" indicates no significant trends observed
[a] fewer than 10% of the samples contained detected concentrations. Correlation analysis was not conducted
[b] insufficient number of detections for correlation analysis.
[c] no wet weather copper samples are available

Chronic toxicity occurring during the 2005 Conditional Waiver period and during the four years of the 2010 Conditional Waiver period was reviewed to determine any trends. Table 93 details the chronic toxicity that occurred at the VCAILGMP sites during the 2005 and 2010 Conditional Waiver periods. For chronic toxicity during dry weather, the occurrences of chronic toxicity at the VCAILGMP sites have decreased, indicating a downward trend of toxicity in the CCW. For chronic toxicity during wet weather, toxicity was observed during the 2008, 2012, 2012-13, 2013-2014, and 2014-2015 monitoring years. The number of sites exhibiting chronic toxicity in wet weather samples increased from two sites during 2012-2013 and 2013-2014 to three sites during 2014-2015. However, toxicity at three sites is less than the five and six sites exhibiting toxicity during 2008 and 2012, respectively.

Table 93. Summary of Chronic Toxicity Occurring During Dry and Wet Weather for 2007-2015

Site	Monitoring Year							
	2007	2008	2009	2010	2012	2012-13	2013-14[1]	2014-15
01T_ODD3_ARN	Dry	--	--	--	--	--	--	--
05D_LAVD	Dry	--	--	--	Wet	Wet	--	Wet
05T_HONDO	--	Wet	--	--	Wet	--	--	Wet
06T_LONG2	--	--	--	--	Wet	--	--	Wet
S02T_ELLS	--	Wet	--	Dry	Wet	--	--	--
S02T_TODD	Dry	Wet	Dry	Dry	Wet	Wet	Dry/Wet/Dry	--
S03T_BOULD	Dry	Wet	Dry	--	Wet	--	Wet	--
S03T_TIMB	--	Wet	--	--	--	--	--	--
S04T_TAPO	Dry	--	Dry	--	--	--	--	--
VRT_SANTO	--	--	--	--	--	--	--	--
VRT_THACH	--	--	--	--	--	--	--	--

1. Toxicity testing was performed during all three events for 2013-2014 to make up for a missed event during the 2012-2013 monitoring year

Dry=an exceedance of the chronic toxicity benchmark during a dry weather toxicity event
Wet=an exceedances of the chronic toxicity benchmark during a storm toxicity event

Many of the VCAILG monitoring sites have been dry during monitoring conducted under the 2005 Conditional Waiver and the first three monitoring years of the 2010 Conditional Waiver. This indicates that agricultural entities are not causing or contributing to any Conditional Waiver or TMDL benchmark exceedances in these water bodies under the sampling conditions. As Ventura County continues to experience significant drought and irrigation methods continually improve, it is likely the trend of dry monitoring sites will continue. The following table details the number of times a VCAILG site was dry and the percentage it was dry during monitoring Events 1-25.

Table 94. Number and Percent of Times Monitoring Sites Were Dry

VCAILG Site	# of Events where Site was Dry	% of Events where Site was Dry
01T_ODD3_ARN	0	0
04D_ETTG	0	0
04D_LAS	0	0
05D_LAVD	10	40
05T_HONDO	17	68
06T_LONG2 [1]	22	88
OXD_CENTR	0	0
CIHD_VICT [2]	10	71
S02T_ELLS	13	52
S02T_TODD	1	4
S03D_BARDS	17	68
S03T_BOULD	11	44
S03T_TIMB	17	68
S04T_TAPO	0	0
VRT_SANTO	22	88
VRT_THACH	21	84

1. Monitoring of Long Canyon began during Event 1. However, monitoring was moved to the 06T_LONG2 site, which is just upstream of the original monitoring site, beginning with Event 12.
2. Monitoring at the CIHD_VICT site began during Event 12; 14 events total where the site was visited.

AMR Conclusions

Submittal of this report fulfills the Annual Monitoring Report requirements specified in Appendix 1 of the Conditional Waiver. All required elements are included in this narrative report and with the accompanying appendices.

The following summary highlights compliance with standard water quality benchmarks.

- Five OC pesticides that have applicable water quality benchmarks have never been detected during VCAILG monitoring to date (Events 1-25). An additional five OC pesticides with benchmarks have only been detected a few times throughout the entire monitoring program considering all the sites. Though DDT and its breakdown products are often detected during wet weather, dry weather exceedances have greatly decreased and it is the breakdown products that are most commonly detected. This demonstrates the degradation of DDT in the environment and the minimization of transport during the irrigation season, over which farmers have some control. Additional OC pesticides exceedances include total chlordane, toxaphene, and dieldrin.
- This is the fourth year of copper results. Two freshwater sites exceeded the copper benchmark. There were four sites where the saltwater benchmark applies that exhibited exceedances.

- For OP pesticides, the chlorpyrifos benchmark was exceeded at eleven sites and three sites exhibited exceedances of the diazinon benchmark during the monitoring year.
- Toxicity sampling took place during the first wet weather monitoring event and during the second dry weather monitoring event during 2014-2015. An exceedance of the 1.0 TU_c benchmark occurred during the wet weather event at the 05D_LAVD, 05T_HONDO, and 06T_LONG2 sites.
- Nitrate-N continues to be an issue at some monitoring locations (6 out of 15 VCAILGMP sites had exceedances).
- All sites except the 01T_ODD3_ARN, S02T_TODD, and S03T_BOULD were within the acceptable pH range of 6.5 to 8.5 during the 2014-20154 monitoring year. The three sites had pH levels below 6.5.
- Temperature was always under the upper limit, where applicable.
- No exceedances of the DO benchmark occurred during the 2013-2014 monitoring year except at the 04D_ETTG site, which had a DO value less than 5 mg/L.
- Salts benchmarks were exceeded at four sites during the monitoring year.

During this monitoring year, TMDL compliance was achieved by meeting LA benchmarks and/or by completing required actions prescribed in the following TMDLs: Calleguas Creek Watershed and Mugu Lagoon OC Pesticides and PCBs TMDL, Calleguas Creek Watershed and Mugu Lagoon Toxicity, Chlorpyrifos, and Diazinon TMDL, Calleguas Creek Watershed Boron, Chloride, Sulfate, and TDS (Salts) TMDL, Revolon Slough and Beardsley Wash Trash TMDL, Ventura River Estuary Trash TMDL, and Santa Clara River Estuary Toxaphene TMDL. Monitoring was performed in compliance with the Harbor Beaches of Ventura County Bacteria TMDL and the McGrath Lake PCBs, Pesticides, and Sediment Toxicity TMDL.

The following section contains the WQMP that will be utilized to address the observed benchmark exceedances. Using the process described in the WQMP, VCAILG members will continue implementing and installing BMPs to improve water quality and achieve Conditional Waiver benchmarks.

Water Quality Management Plan

This section of the report serves as the WQMP detailing efforts to reduce water quality impacts from irrigated agricultural discharges in response to water quality benchmark exceedances that occurred during the 2014-2015 monitoring year. Pertinent monitoring sites, monitoring results, and benchmark exceedances are described in preceding sections. The WQMP outlines the analysis conducted in response to those benchmark exceedances and the actions that will be taken by VCAILG in response to the exceedances.

This WQMP addresses exceedances of the standard water quality benchmarks included in the Waiver, and also satisfies the requirements for WQMP development included in the TMDLs with LAs for irrigated agriculture. Appendix 3 of the Waiver lists water quality benchmarks that originate from TMDL LAs. Including these LAs as benchmarks in the Waiver means an exceedance triggers the development of a WQMP. Additionally, certain TMDLs include a requirement for development of a WQMP regardless of whether monitoring data exceed the LAs for irrigated agriculture; they include the Calleguas Creek Watershed and Mugu Lagoon OC Pesticides and PCBs TMDL, Calleguas Creek Watershed and Mugu Lagoon Toxicity, Chlorpyrifos, and Diazinon TMDL, Calleguas Creek Watershed Metals and Selenium TMDL and Calleguas Creek Watershed Boron, Chloride, Sulfate, and TDS (Salts) TMDL. Therefore, this WQMP covers all the previously listed TMDLs regardless of benchmark exceedances. TMDLs that only require a WQMP in the event of a LA benchmark exceedance include the Calleguas Creek Watershed Nitrogen Compounds TMDL, the Revolon Slough and Beardsley Wash Trash TMDL, the Santa Clara River Nitrogen Compounds TMDL, and the Ventura River Estuary Trash TMDL. The process and BMPs outlined in the WQMP are designed to result in compliance with both the standard water quality and TMDL LA benchmarks.

WQMP IMPLEMENTATION PROCESS

Figure 12 illustrates the process utilized by VCAILG to identify the need for BMPs, implement specific management practices and track the implementation and effectiveness of those management practices to mitigate water quality benchmark exceedances and achieve TMDL load allocations. In addition to VCAILG, other agencies and organizations are working with Ventura County farmers to provide technical expertise, assistance with BMP implementation, and in some cases, cost sharing opportunities.

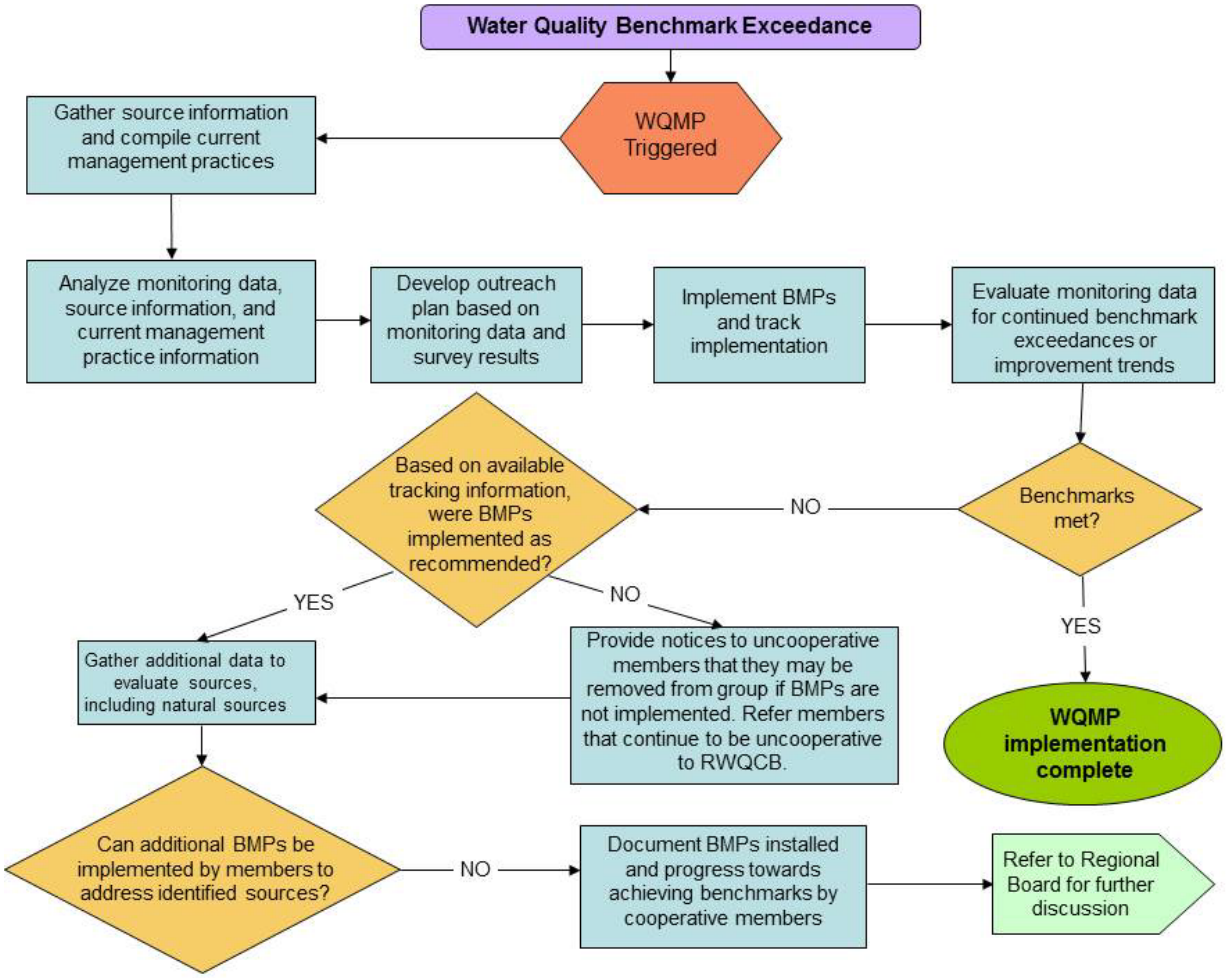


Figure 12. WQMP Implementation Process

As noted in the AMR, exceedances of Conditional Waiver benchmarks or TMDL LAs were observed for the following constituents at at least one monitoring location:

- Organochlorine pesticides[6]
- Copper, Selenium
- Chlopyrifos and Diazinon
- Toxicity
- Nitrate
- pH

[6] DDT and breakdown products, total chlordane, toxaphene, dieldrin

- Salts
- Dissolved oxygen

The previous two WQMPs (submitted in May 2014 and May 2015) focused on tracking implementation of BMPs to address the identified benchmark exceedances in previous WQMPs. As shown by this year's monitoring data, benchmark exceedances are continuing. As a result, VCAILG is using this WQMP to begin an evaluation of the relationship between BMP implementation and water quality and to refine the outreach strategy to address the exceedances.

WQMP IMPLEMENTATION PROGRESS

In the first WQMP developed under the 2010 Waiver, a three part approach was identified to address water quality priorities, as follows:

- ✓ Develop a comprehensive web-based survey system to better track and evaluate BMP implementation. Feedback VCAILG has received from outreach efforts and past surveys was used to develop the new web-based survey.
- ✓ Continue to provide outreach and education information to engage VCAILG members regarding education opportunities, water quality monitoring results, and Waiver requirements.
- ✓ Provide targeted additional follow-up activities focused on documenting occurrences of irrigation runoff and implementing BMPs to address it.

The most recent two WQMPs detailed VCAILG's progress while following this three-pronged approach. Past outreach efforts and WQMP implementation actions were driven by the identification of priority areas ("Tiers 1-3"). At a meeting on April 27, 2015 between Regional Board staff and VCAILG representatives, Regional Board staff expressed the opinion that the priority areas were no longer a useful tool in WQMP implementation. Their preference was to extend outreach to VCAILG members related to specific water quality benchmark exceedances and to better integrate the presentation of monitoring results with BMP implementation. In response to these preferences, the May 2015 WQMP identified three tasks that fell into the May-December 2015 time frame:

(1) Additional analysis of the available BMP survey data would be performed,

(2) Approaches to relate water quality to BMP implementation would be developed, and preliminary analyses conducted, and

(3) A targeted outreach plan would be developed based on the new analysis.

A review of the WQMP implementation progress documented in the May 2015 WQMP and brief descriptions of subsequent steps taken between May-December 2015 are provided below. In addition, an update is provided regarding the education and outreach opportunities that have been provided to date during the current Waiver term.

Additional Analysis of BMP Survey Data

The May 2015 WQMP included an evaluation of the results of the online BMP surveys conducted in 2014 and early 2015. To date, the analysis of BMP survey data presented in

WQMPs has focused on the calculation of several metrics for each of several dozen specific BMPs:

- Current Adoption Rate
- Adoption Rate Prior to October 2010
- Change in Adoption Rate During the Current Waiver Term
- Future Additional Planned Adoption

The metrics reflect percents of applicable surveyed irrigated acreage upon which survey respondents report that particular BMPs are in use, or planned to be in use in the future. The raw survey results are initially assigned to individual parcels, but are then aggregated on a geographic basis (e.g., according to drainage areas) before computation of adoption rates. Adoption rates are further simplified by averaging results for logical groupings of BMPs.

To date, the finest scaled survey metrics that have been calculated are based on the drainage areas of VCAILG or TMDL-related agricultural land use monitoring sites. The resulting drainage-area-specific adoption rates were tabulated in previous WQMPs for individual BMPs and also as averages for the following BMP groupings:

<u>Management Categories</u>

- Irrigation and Salinity Management
- Nutrient Management
- Sediment Management
- Pesticide Management
- Trash Management

<u>Action Categories</u>

- Real Time Data
- Testing
- Specialized Knowledge
- Cropped Area Actions
- Uncropped Area Actions

The following evaluations of BMP survey data were included in the May 2015 WQMP:

- A comparison of the results of the 2014 and 2015 surveys
- Identification of the top-ranked BMPs in use by the end of the previous waiver (i.e., October 2010)
- Identification of the top-ranked BMPs in use by early 2015
- Identification of the BMPs that increased in use the most during the current Waiver term (i.e., 2010-2015)
- Identification of the top-ranked BMPs planned for future implementation
- Suggestions for how the results might inform future targeted outreach

At the April 2015 meeting between Regional Board staff and VCAILG representatives referenced above, a request was made by Regional Board staff that survey results be geographically aggregated using hydrologic units larger than the individual drainages of VCAILG monitoring sites. This request was related to the unavoidable fact that much of the acreage addressed by survey respondents falls outside of the drainages of specific agricultural land use monitoring sites; survey metrics had previously been generated for these parcels by aggregating them county-wide into one geographic unit. In response to this request, BMP survey metrics were generated for the principal watersheds in the County (including subwatersheds for TMDL compliance sites in Calleguas Creek Watershed), and are provided below.

In addition to computation of watershed-based survey metrics, adoption rates associated with specific agricultural land-use monitoring sites drainages were used to explore relationships between BMP use and monitoring data for those sites. These results are also presented below in the next section of the WQMP.

Development of Approaches to Relate Water Quality to BMP Implementaton

This WQMP introduces the use of Water Quality Indices (WQIs) to track progress in attainment of water quality benchmarks at agricultural land use monitoring sites and in receiving waters. As described in detail below, WQIs were used to explore relationships between water quality outcomes and BMP adoption rates.

Targeted Outreach Plan

The WQIs and BMP survey results were used to develop a targeted outreach strategy to increase use of BMPs in areas where benchmark exceedances are most significant.

Education Opportunities

Since the adoption of this Conditional Waiver, VCAILG members have completed over 12,810 hours of water quality education. To date, 833 VCAILG members have fulfilled the eight hour requirement; 533 of those members have completed more than eight hours. The large number of members going above and beyond the education requirement is an indicator of the perceived value and benefit of the information being presented regarding specific water quality problems and the management practices and tools available to the farmers for addressing them.

During this Conditional Waiver period alone, over fifty-four education opportunities have been offered to VCAILG members, adding up to 174 hours. Education classes have been organized by VCAILG, Ventura County Resource Conservation District (VCRCD), University of California Cooperative Extension – Ventura, as well as commodity groups such as the California Avocado and Strawberry Commissions. Table 95 lists the courses that have been offered to date during this Conditional Waiver. Appendix H lists the number of education hours earned by each VCAILG member.

The effort to provide classes and encourage VCAILG members to obtain education credits is for compliance with the Conditional Waiver provision that within two years of issuance of the NOA, all dischargers shall complete eight hours of education. Course agendas are approved by the Executive Officer for a specified number of credit hours to ensure that the education classes meet

the training requirements related to water quality impairments, regulatory requirements, and management practices that control waste discharges.

Education and outreach has continued since the May 2015 WQMP was submitted as reflected in Table 95. Additionally, as described in the May 2015 WQMP, efforts by the VCRCD and National Resources Conservation Service (NRCS) to support BMP implementation, and the research and education opportunities provided by other entities, are ongoing.

Table 95. Courses Offered for Education Credit

Date	Course Title	Education Hours
Ongoing	Online FCGMA Irrigation Allowance Index Training	2
11/01/2010	ABC's of Fertilizer and Irrigation Management	6
11/02/2010	ABC sobre Manejo de Fertilizantes y Riego	6
02/18/2011	Strawberry Irrigation Field Day	2
06/20/2011	Waiver & TMDL Regulatory Overview & BMP Info.	4
06/21/2011	Waiver & TMDL Regulatory Overview & BMP Info.	4
06/22/2011	Waiver & TMDL Regulatory Overview & BMP Info.	4
06/23/2011	Waiver & TMDL Regulatory Overview & BMP Info.	4
07/25/2011	Waiver & TMDL Regulatory Overview & BMP Info.	4
07/26/2011	Waiver & TMDL Regulatory Overview & BMP Info.	4
07/27/2011	Waiver & TMDL Regulatory Overview & BMP Info.	4
07/28/2011	Waiver & TMDL Regulatory Overview & BMP Info.	4
09/13/2011	Erosion and Pesticide Runoff Management in Nurseries	4
9/14/2011	Erosion and Pesticide Runoff Management in Orchards	4
11/02/2011	Managing Nitrogen in Row Crops	2
11/15/2011	Irrigation and Nutrient Management	2
11/16/2011	General Waiver Education (Spanish)	4
02/23/2012	Reducing runoff through tailwater capture and reuse	2
03/21/2012	Nutrient Management, Grassed Waterways, & IPM for Improved Water Quality	4
04/05/2012	Irrigation and Nutrient Management	2
04/19/2012	Manejo de Irrigacion en Fresas	2
04/24/2012	Site Planning to Improve Water Quality from Farm Runoff	2
06/05/2012	Effective Use of Pesticides to Produce Healthy Ornamental Plants	4
06/06/2012	Irrigation Management	2

Date	Course Title	Education Hours
07/17/2012	Nursery Farm and Orchard Seminar	8
08/31/2012	Strawberry Production Meeting	2
09/11/2012	The New FCGMA Irrigation Allocation Index	2
10/10/2012	Managing Nitrogen in Row Crops	2
10/11/2012	Irrigation and Nutrient Management – Vendor Fair	2
10/17/2012	UC Hansen Ag Center Field Day	2
11/13/2012	Nutrient Management, Grassed Waterways, and IPM for Improved Water Quality	2
11/26/2012	Private Applicator Seminar	1
11/29/2012	Waiver – General overview	4
01/22/2013	NGA Water School	4
02/19/2013	4Rs of Nutrient Stewardship and Moisture Sensors	2
03/06/2013	Nutrient Trials and Moisture Sensors in Row Crops	2
03/20/2013	BMP's for California Nurseries	4
04/23/2013	Detention Basins and Nutrient Management for Improved Water Quality	2
05/08/2013	Algae TMDL Update and Nutrient Needs of Tree Crops	2
07/24/2013	Avocado Irrigation (Spanish)	3
08/07/2013	Farming without Fumigants, Grower Demonstration Field Day	2
09/05/2013	Strawberry Production Meeting	3
09/17/2013	BMPs for California Nurseries	3
09/19/2013	LAILG Summer Water School	5
09/26/2013	Strawberry Field Day, Water Saving Practices	2
01/27/2014	Strawberry Irrigation and Nutrient Management	4
01/28/2014	Programma Educativo del Manejo de Nutrientes y Riego en Fresas	4
03/04/2014	Waiver Educational Class	2
03/26/2014	Water Management in Strawberry: Field Day	2
04/08/2014	Vegetable Production Meeting	1.5
06/10/2014	Grower Demonstration Field Day Raised Bed Trough Experimental Site	2
06/24/2014	RCD Ag Education Breakfast	2.5

Date	Course Title	Education Hours
08/27/2014	Annual Strawberry Production Meeting	3
08/28/2014	Irrigation Management Efficiency in Nurseries	7.5
10/16/2014	Crop Production Services Grower Meeting	1.5
07/30/2015	Irrigation and Nutrient Management Meeting for Vegetable/Berry Crops	3

ANALYSIS OF MONITORING DATA, SOURCE DATA AND CURRENT MANAGEMENT PRACTICES

As shown in Figure 12, a key part of the iterative process is analysis of monitoring data, source data, and current management practices to inform the development of a targeted outreach strategy. As this WQMP will likely be the last WQMP developed under the 2010 Conditional Waiver, multiple years of monitoring data are now available, and the web-based survey results provide detailed information on the BMPs that have been implemented, additional analysis of available data was performed using (in several cases) new approaches. The purpose of the analysis was to inform the development of a more targeted outreach plan to support implementation of additional BMPs, or increased effectiveness of existing BMPs, to address the ongoing benchmark exceedances.

Four types of data analysis were performed for this WQMP and are listed below. Detailed descriptions of methodology and results follow for each analysis.

Pesticide Use Evaluation

Comparison of pesticide use data with VCAILG monitoring data (source data assessment, included in each WQMP)

BMP Adoption Rates for Principal Watersheds

Derivation of BMP survey metrics using subwatersheds that cover the entire county (new analysis of existing data)

Water Quality Indices

Derivation of WQIs for VCAILG using constituent groups that can be related to agricultural management practices and that can be used to track progress toward attainment of water quality benchmarks (new approach)

Selected Comparisons of WQI Scores and BMP Adoption Rates

Data were explored for potential relationships between WQI scores and BMP adoption rates using logical pairings of WQI analyte groups and BMP categories (new approach)

Pesticide Use Evaluation

In 1990, California became the first state to require full reporting of agricultural pesticide use in response to demands for more realistic and comprehensive pesticide use data. Under the program, all agricultural pesticide use must be reported monthly to county agricultural

commissioners, who in turn, report the data to DPR. California has a broad legal definition of "agricultural use" so the reporting requirements include pesticide applications to parks, golf courses, cemeteries, rangeland, pastures, and along roadside and railroad rights-of-way. In addition, all postharvest pesticide treatments of agricultural commodities must be reported along with all pesticide treatments in poultry and fish production as well as some livestock applications. Only agricultural applications, as noted by specific commodity treated, are summarized in this document.

Pesticide use records for 2014-2015 were compared with VCAILG monitoring data for the same year. The evaluation focused on diazinon and chlorpyrifos since those are the only two presently permitted pesticides with water quality benchmarks under the Conditional Waiver. For the comparison of the 2014-2015 pesticide use records to VCAILG monitoring data, pesticide application locations had to be linked to the appropriate monitoring site drainage area as not all pesticide applications within Ventura County occurred within a monitoring site drainage area. Additional manipulation of the pesticide use data included converting the percent concentration of active ingredient based on the product name to an amount of active ingredient applied during each application. Depending on the product formulation, the conversion was either into gallons or pounds of active chlorpyrifos or diazinon. The dates and amounts of pesticides applied were then compared to the benchmark exceedances. Table 96 includes 2014-2015 chlorpyrifos and diazinon application information by crop type as well as a comparison to water quality data from associated VCAILG monitoring sites.

Pesticide Use and VCAILG Monitoring Data

Chlorpyrifos

For agricultural application, chlorpyrifos is the active ingredient in several products including Lorsban, Dursban, Nufos, and Warhawk. Use of chlorpyrifos is common on lemons, tangerines, and cabbage in Ventura County. Chlorpyrifos was applied within the drainage areas of 7 of 15 VCAILG monitoring sites. Of the seven monitoring sites, five sites had a total of eight exceedances of the chlorpyrifos water quality benchmark during the monitoring year. Exceedances only occurred during wet weather. The following factors may contribute to the likelihood that chlorpyrifos is transported off-site: pesticide formulation and application method, date of application in relation to subsequent rain events, and proximity to a drainage channel, stream, or tributary.

Diazinon

Diazinon usage was much less widespread than chlorpyrifos in 2014-2015. The commodity receiving diazinon applications was green onions. Applications of diazinon occurred within one VCAILG monitoring site drainage area. There were no exceedances of the 0.10 µg/L benchmark.

Pesticide Use Summary

For the 2014-2015 monitoring year, chlorpyrifos and diazinon were applied throughout the year. Of the fifteen sites visited during the monitoring events, five of the VCAILG monitoring sites had exceedances of the chlorpyrifos water quality benchmark, all during wet weather. There does not appear to be any correlation between chlorpyrifos application amount and benchmark exceedances. There were no exceedances of the diazinon water quality benchmark during the

three monitoring events and application amounts within the monitoring drainage areas were minimal.

Pesticide use is variable and performed in response to a variety of factors such as pest pressures, sudden outbreaks of latent diseases and/or pathogens, cropping patterns, variation in neighboring crops that may have incompatible maximum residue limits, etc. Also, the use of a specific pesticide on a particular crop varies from year to year. All pesticide use decisions are based on farmer and pest control advisor (PCA) expertise, and applied under the authority of the local Agricultural Commissioner's office and the Department of Pesticide Regulation (DPR). Outside of compiling the provided pesticide use information and observing any trends, VCAILG does not have the authority to require pest control application modifications.

Table 96. Chlorpyrifos and Diazinon Applications and Benchmark Exceedances by Monitoring Site for 2014-2015

Site	Date	Crop	Active Ingredient (gal)	Active Ingredient (lbs)	Total Gallons	Total Pounds	Date Benchmark Exceeded	Event Type	Exceed-ance Conc. (µg/L)	Drainage Area (acres)
Chlorpyrifos Applications										
04D_ETTG	7/14/14	Cabbage		11.8						
	9/12/14	Cabbage	0.4		2.1	11.8	12/2/14,12/12/14	Wet,Wet	0.05, 0.13	3779
	9/15/14	Cabbage	1.7							
05T_HONDO	8/25/14	Lemon	2.3		2.3		12/2/14,12/12/14	Wet,Wet	0.64, 0.17	3928
06T_LONG2	11/21/14	Lemon	1.2		1.5		12/2/14	Wet	0.37	2813
	11/26/14	Tangerine	0.3							
S02T_ELLS	10/9/14	Lemon	6.9		7.7		12/12/14	Wet	0.039	9013
	12/28/14	Cabbage	0.8							
S02T_TODD	7/17/14	Cabbage		18		18	N/A	N/A	N/A	5747
S03D_BARDS	8/7/14	Lemon	0.3			0.3	12/2/14,12/12/14	Wet,Wet	0.29, 0.85	2213
S03T_BOULD	8/1/14	Lemon	8.6		11.3		N/A	N/A	N/A	3763
	10/9/14	Tangerine	1.4							
Diazinon Applications										
S04T_TAPO	9/27/14	Green Onion		5.0		5.0	N/A	N/A	N/A	3686

BMP Adoption Rates for Principal Watersheds

BMP survey responses associated with individual parcels were assigned to drainage areas that in aggregate covered all of Ventura County. The first step was to identify the smallest useful hydrologic units considering the spatial distribution of irrigated agriculture and monitoring sites from programs that VCAILG participates in. The watershed assignment was performed only for the results of the most recent online BMP survey (conducted in early 2015). The suvey data was ultimately partitioned into the following drainage areas:

- Coastal Watersheds
    - Rincon Coastal Watershed
    - Ventura Coastal Watershed
    - Oxnard Coastal Watershed
- Major River Watersheds
    - Santa Clara River Watershed
    - Ventura River Watershed
    - Calleguas Creek Watershed
        - Mugu Lagoon Subwatershed
        - Revolon Slough Subwatershed
        - Calleguas Creek Subwatershed
        - Conejo Creek Subwatershed
        - Arroyo Las Posas Subwatershed
        - Arroyo Simi Subwatershed

The drainage areas were constructed using an ArcGIS shapefile previously obtained from the Hydrology Section of the Ventura County Watershed Protection District (VCWPD) containing county-wide subwatershed boundaries. The shapefile was originally developed for a county-wide HEC-1 Hydrology Model with watershed boundaries digitized from USGS 1:24,000 topographic data and later refined by the VCWPD through additional hydrologic studies and on-the-ground observations. The VCWPD subwatersheds were grouped into the larger drainage areas listed above by filtering on the "MajWatersh" field of the attribute table (in the case of the coastal watersheds and the major river watersheds) or the "GenWtrshed" field (in the case of the subwatersheds within Calleguas Creek Watershed). VCWPD subwatersheds were aggregated slightly differently in some cases to align the bases of the drainage areas with the location of TMDL receiving water compliance sites and to correctly recognize the downstream receiving water site associated with some agricultural drains.

Surveyed parcels that straddled the boundary between two watersheds or subwatersheds were manually split in ArcGIS and the associated BMP survey responses were assigned to the parcel acreage belonging to each watershed or subwatershed. The May 2015 WQMP provides details regarding the computation of adoption rates from raw survey data; the same procedures were followed for generating average adoption rates for BMP categories for the watersheds listed above. The results of the analysis are presented in Table 97.

Inspection of Table 97 reveals that in every drainage area defined, very high current adoption rates were reported for BMPs that address management of nutrients, pesticides, and trash, and the lowest current adoption rates were reported for BMPs that address management of irrigation/salts or sediment.

No attempt was made to associate the watershed-based BMP adoption rates in Table 97 with monitoring data from agricultural land use monitoring sites. Agricultural land use monitoring sites nested within these drainages represent discharges from only a subset of the irrigated land in the larger watersheds. The limited geographic scope of the areas draining directly to VCAILG monitoring sites is illustrated in Figure 13. Similarly, no attempt was made to directly associate monitoring data from TMDL receiving water sites at the bases of watersheds with BMP adoption rates in Table 97 for two main reasons: (1) irrigated agriculture is not the only land cover discharging to the receiving waters, and (2) the BMP survey responses in aggregate address only a portion of the irrigated agricultural acreage in the larger watersheds.[7]

[7] The 2015 on-line BMP survey elicited responses addressing 64% of the irrigated acres farmed by VCAILG members and 58% of total irrigated acres in the county.

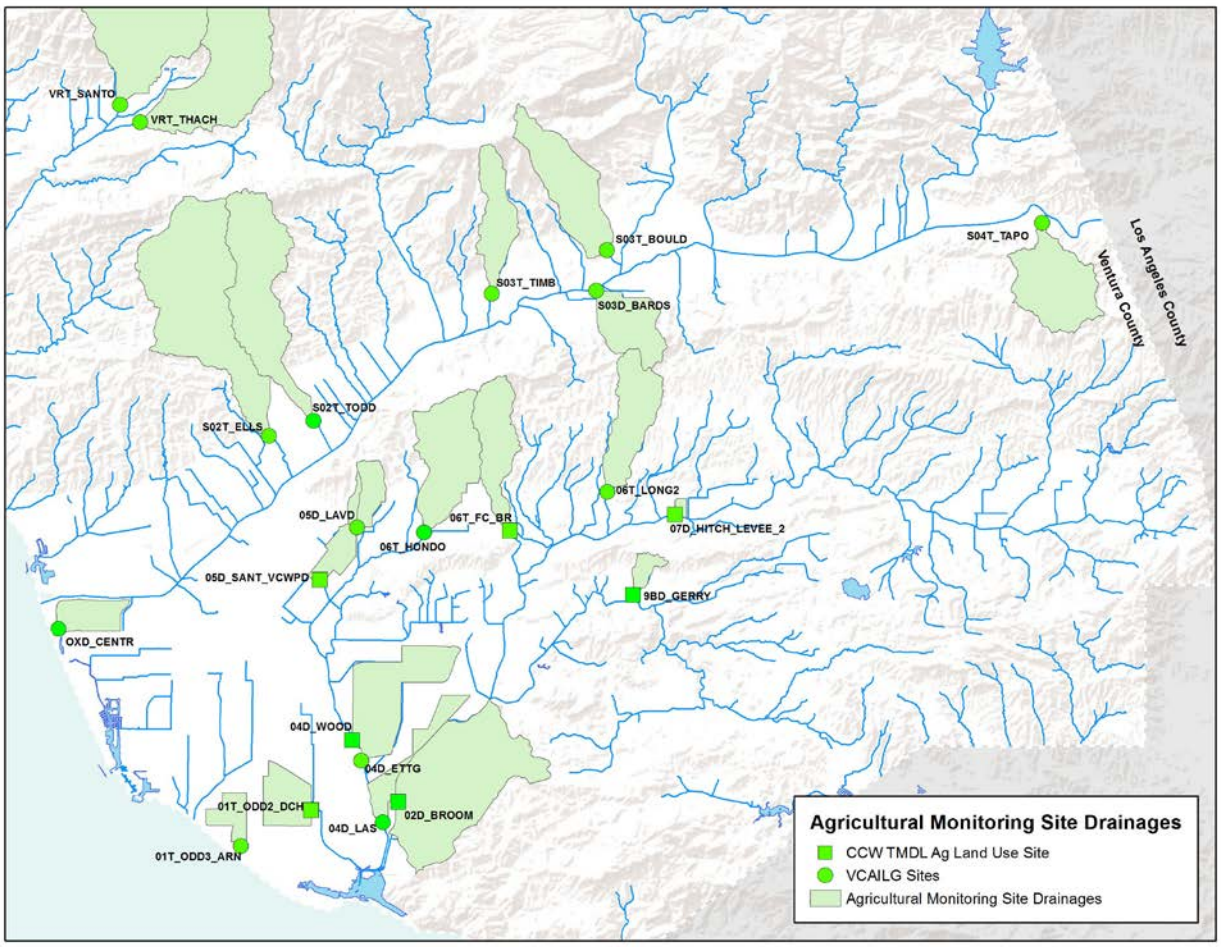


Figure 13. Areas draining to VCAILG monitoring sites and agricultural land use sites in the CCW TMDL Monitoring Program

Table 97. BMP Survey Metrics for Principal Watersheds in Ventura County.

Drainage Area	Surveyed Irrigated Acres	Adoption Rates as Percent of Applicable Irrigated Acreage (as reported in 2015 survey)	BMP Management Category					Type of Action				
			Irrigation & Salinity	Nutrients	Sediment	Pesticides	Trash	Cropped Area Action	Un-cropped Area Action	Testing	Use of Real Time Data	Application of Specialized Knowledge
Ventura Coastal Watershed	952	Current Adoption Rate	92%	100%	91%	100%	100%	97%	93%	93%	99%	100%
		Adoption Rate on Oct 2010	92%	99%	91%	99%	100%	96%	93%	92%	99%	99%
		Change During Waiver Term	1%	0%	0%	1%	0%	1%	0%	0%	1%	1%
		Planned Future Adoption	6%	0%	4%	0%	0%	2%	4%	7%	0%	0%
Rincon Coastal Watershed	222	Current Adoption Rate	87%	90%	81%	95%	100%	90%	86%	84%	79%	100%
		Adoption Rate on Oct 2010	63%	54%	62%	71%	60%	66%	58%	57%	64%	66%
		Change During Waiver Term	23%	36%	19%	24%	40%	24%	28%	27%	15%	34%
		Planned Future Adoption	2%	2%	2%	0%	0%	2%	2%	1%	2%	0%
Ventura River Watershed	2,333	Current Adoption Rate	80%	90%	80%	94%	99%	89%	89%	73%	70%	99%
		Adoption Rate on Oct 2010	61%	76%	68%	84%	81%	74%	76%	59%	49%	80%
		Change During Waiver Term	20%	14%	12%	10%	18%	15%	13%	14%	21%	19%
		Planned Future Adoption	6%	2%	3%	2%	1%	2%	4%	7%	7%	0%
Santa Clara River Watershed	19,536	Current Adoption Rate	87%	93%	81%	98%	99%	91%	90%	84%	83%	98%
		Adoption Rate on Oct 2010	67%	79%	66%	87%	89%	75%	77%	67%	59%	86%
		Change During Waiver Term	20%	14%	14%	11%	11%	16%	12%	17%	24%	13%
		Planned Future Adoption	7%	3%	6%	1%	0%	3%	4%	8%	10%	1%
Oxnard Coastal Watershed	2,038	Current Adoption Rate	83%	94%	83%	99%	99%	88%	93%	86%	76%	100%
		Adoption Rate on Oct 2010	73%	89%	76%	96%	97%	81%	86%	83%	69%	93%
		Change During Waiver Term	10%	4%	7%	3%	2%	7%	7%	3%	7%	6%
		Planned Future Adoption	9%	1%	6%	1%	1%	6%	3%	3%	7%	0%

Drainage Area	Surveyed Irrigated Acres	Adoption Rates as Percent of Applicable Irrigated Acreage (as reported in 2015 survey)	BMP Management Category					Type of Action				
			Irrigation & Salinity	Nutrients	Sediment	Pesticides	Trash	Cropped Area Action	Un-cropped Area Action	Testing	Use of Real Time Data	Application of Specialized Knowledge
Mugu Lagoon Subwatershed	3,282	Current Adoption Rate	85%	96%	83%	98%	98%	90%	91%	90%	76%	100%
		Adoption Rate on Oct 2010	65%	80%	76%	92%	96%	76%	80%	75%	63%	92%
		Change During Waiver Term	20%	16%	8%	6%	2%	14%	11%	15%	13%	8%
		Planned Future Adoption	11%	3%	7%	2%	2%	5%	7%	9%	19%	0%
Revolon Slough Subwatershed	8,171	Current Adoption Rate	86%	94%	85%	99%	99%	92%	91%	88%	78%	100%
		Adoption Rate on Oct 2010	70%	86%	78%	95%	96%	82%	84%	77%	61%	94%
		Change During Waiver Term	16%	8%	7%	4%	3%	10%	7%	11%	17%	6%
		Planned Future Adoption	7%	3%	5%	0%	0%	3%	4%	6%	12%	0%
Calleguas Creek Subwatershed	1,693	Current Adoption Rate	78%	91%	86%	98%	100%	87%	96%	83%	52%	100%
		Adoption Rate on Oct 2010	59%	78%	72%	97%	95%	71%	88%	65%	48%	98%
		Change During Waiver Term	18%	13%	14%	2%	5%	16%	8%	18%	5%	2%
		Planned Future Adoption	14%	6%	4%	2%	0%	6%	3%	7%	29%	0%
Conejo Creek Subwatershed	2,503	Current Adoption Rate	81%	95%	76%	99%	100%	87%	89%	85%	66%	99%
		Adoption Rate on Oct 2010	63%	74%	62%	91%	90%	71%	78%	64%	52%	80%
		Change During Waiver Term	18%	21%	14%	8%	10%	16%	11%	21%	14%	19%
		Planned Future Adoption	15%	4%	12%	1%	0%	7%	8%	10%	26%	1%
Arroyo Las Posas Subwatershed	5,481	Current Adoption Rate	90%	93%	85%	97%	97%	92%	93%	86%	84%	98%
		Adoption Rate on Oct 2010	69%	76%	69%	81%	82%	75%	76%	67%	61%	79%
		Change During Waiver Term	21%	17%	16%	16%	15%	17%	17%	19%	22%	19%
		Planned Future Adoption	5%	2%	5%	1%	2%	3%	3%	6%	7%	0%
Arroyo Simi Subwatershed	875	Current Adoption Rate	91%	94%	84%	97%	96%	92%	93%	88%	85%	96%
		Adoption Rate on Oct 2010	79%	76%	68%	86%	86%	75%	80%	79%	70%	80%
		Change During Waiver Term	13%	18%	16%	11%	10%	17%	13%	9%	14%	16%
		Planned Future Adoption	3%	3%	3%	1%	0%	0%	3%	6%	11%	1%

Water Quality Indices

The Canadian Council of Ministers of the Environment (CMME) Water Quality Index (WQI)[8] was selected as a tool that could be used to (1) simplify long-term VCAILG monitoring data sets involving multiple constituents, (2) easily communicate water quality conditions and trends, (3) track progress toward attainment of water quality benchmarks, and (4) generate water quality scores for analyte groups that might reflect effectiveness of logical categories of BMPs. The WQI mathematically combines a number of variables into easily understood values (or "scores"), and can be computed for analyte groups tailored to particular reporting activities and audiences.[9] WQI scores are customarily binned into five tiers, allowing for further simplification using letter "grades" and communication using "heat maps", as shown in Table 98.

Table 98. Customary Scheme for Binning WQI Scores

WQI score	Grade	Interpretation
96-100	A	Excellent – Benchmarks almost always met
81-95	B	Very Good
66-80	C	Fair
46-65	D	Marginal
0-45	F	Poor – All constituents excced benchmarks with high frequency

WQIs can only be computed using constituents for which numeric water quality criteria are specified. The formula used to calculate the WQI includes three factors that incorporate three distinct elements of monitoring data for a user-specified time period of interest:

- Percentage of total number of monitored constituents for which exceedances were observed (F1)
- Percentage of total analytical results that exceeded an applicable criterion (F2)
- Magnitude of the exceedances (F3)

The WQI formula takes the following form:

$$WQI = 100 - \left(\frac{\sqrt{F_1^2 + F_2^2 + F_3^2}}{1.732} \right)$$

[8] Canadian Council of Ministers of the Environment (2001). Canadian water quality guidelines for the protection of aquatic life: CCME Water Quality Index 1.0, Technical Report, http://www.ccme.ca/assets/pdf/wqi_techrprtfctsht_e.pdf

[9] The WQI has been adopted (with some modifications) by the Ventura County MS4 Permittees for the purpose of summarizing and tracking water quality at outfalls and mass emission stations. WQI scores are presented in MS4 Annual Monitoring Reports for six analyte groups (Salts, Bacteria, Nutrients, Organics, Metals, and Toxicity).

Where,

$$F_1 = \left(\frac{Number\ of\ constituents\ with\ exceedances}{Total\ number\ of\ constituents}\right)$$

$$F_2 = \left(\frac{Number\ of\ exceedances}{Total\ number\ of\ analytical\ results}\right)$$

$$F_3 = \left(\frac{nse}{(0.01)\ x\ (nse + 0.010)}\right)$$

$$nse = \frac{\sum_{i=1}^{n} magnitude}{\#\ of\ analytical\ results}$$

For the case in which the sample concentrations must not exceed the threshold:

$$magnitude_i = \left(\frac{Sample\ Concentration_i}{Objective_i}\right)$$

For the case in which the analytical result must not fall below the objective:

$$magnitude_i = \left(\frac{Objective_i}{Sample\ Concentration_i}\right)$$

After considering the ways that pollutant transport is likely to be affected by agricultural BMPs, four analyte groups (Nutrients, Salts, Current Use Pesticides, and Legacy Pesticides) were established for the VCAILG WQI using a subset of the constituents and numeric benchmarks listed in Appendix 2 of the Conditional Waiver. Analyte groups were designed so that they align with BMP categories established for the online BMP surveys, as illustrated in Table 99. The analyte groups, component constituents, and associated benchmarks are listed in Table 100.

Table 99. Conceptual Pairings of BMP Management Categories and WQI Analyte Groups

BMP Category	Associated WQI Analyte Groups
Nutrient Management	Nutrients
Sediment Management	Legacy Pesticides
Pesticide Management	Current Use Pesticides
Irrigation/Salt Management	Nutrients, Salts, Legacy Pesticides, Current Use Pesticides

Table 100. WQI Analyte Groups, Component Constituents, and Associated Conditional Waiver Benchmarks[1]

Analyte Group	Constituents	Units	Calleguas Creek Reach									Oxnard Coastal	Santa Clara River				Ventura River
			1	2	3	4	5	6	7	9A	9B		1	2	3	4	
Salts	Total Dissolved Solids	mg/L	N/A[2]	N/A[2]	850	850	850	850	850	850	850	N/A[2]	N/A[2]	1200	1300	1200	800
	Chloride	mg/L	N/A[2]	N/A[2]	150	150	150	150	150	150	150	N/A[2]	N/A[2]	150	100	150	60
	Sulfate	mg/L	N/A[2]	N/A[2]	250	250	250	250	250	250	250	N/A[2]	N/A[2]	600	150	600	300
Nutrients	Nitrogen	mg/L	10[3]		10[4]							10[3]			5[4]		
	Ammonia	mg/L	pH, temperature dependent[5]														
Current Pesticides	Dissolved Copper	µg/L	3.1	hardness dependent[6]								3.1	3.1	hardness dependent[6]			
	Chlorpyrifos	µg/L	0.025														
	Diazinon	µg/L	0.1														
	Chlordane[7]	µg/L	0.00059														
Legacy Pesticides	4,4'-DDD	µg/L	0.00084														
	4,4'-DDE	µg/L	0.00059														
	4,4'-DDT	µg/L	0.00059														
	Dieldrin	µg/L	0.00014														
	Toxaphene	µg/L	0.00075														

[1] Reaches are included that contain receiving water and agricultural land use sites monitored as part of the Calleguas Creek Watershed TMDL Monitoring Program and sites monitored as part of the Ventura County Agricultural Irrigated Lands Group Monitoring Program.

[2] Sites are tidally influenced and do not have benchmarks for salts.

[3] There is no site-specific nitrogen objective listed in the Basin Plan (Table 3-8) applicable to this reach. The Basin Plan objective of 10 mg/L Nitrate-N was used for comparison with data collected at monitoring sites in this reach.

[4] The Nitrogen benchmarks were compared to the sum of Nitrate-N and Nitrite-N in monitoring data.

[5] Ammonia benchmarks are based on 1) freshwater ammonia objectives calculated according to LARWQCB Resolutions 2002-011 and 2005-014, and 2) saltwater ammonia objectives are calculated according to LARWQCB Resolution 2004-022. Ammonia objectives used as benchmarks are chronic, 30-day averages.

[6] The freshwater hardness-dependent Criterion Continuous Concentration (CCC) was evaluated using the equation CCC = 0.96*exp[0.8545(ln(*hardness*) + (-1.702)] for the dissolved copper fraction. In instances where the measured hardness is >400 mg/L as $CaCO_3$, a hardness of 400 is used to calculate the benchmark.

[7] Chlordane benchmarks were compared against the sum of the alpha-chlordane and gamma-chlordane isomers.

A database was created that combined all available monitoring data for VCAILG sites and data from both agricultural land use sites and receiving water sites in the CCW TMDL Monitoring Program. Owing to a switch in the reporting period for VCAILG from a calendar year basis to a fiscal year basis starting in July 2012, and to an interruption in the VCAILG monitoring program in 2011 during the transition between the required monitoring for the 2005 and 2010 Conditional Waivers, the time series of monitoring data was binned into the following annual intervals and Conditional Waiver periods:

Waiver 1 (2005 Waiver)

- 2007 (calendar Year)
- 2008 (calendar Year
- 2009 (calendar Year)
- 2010 (calendar Year)

Waiver 2 (effective October 2010)

- 2012 (January-June; first 6 months of monitoring under 2010 Waiver)
- 2012/2013 (fiscal year)
- 2013/2014 (fiscal year)
- 2014/2015 (fiscal year)

WQI scores were generated separately for dry and wet event data. Average scores for Waiver periods were computed as the mean of component annual scores using the breakdown above. In cases in which an agricultural land use monitoring sites was visited, but was dry, the site visit was treated mathematically as a successful test for all analytes included in the sampling plan for that site/event combination. This was a reasonable approach given that lack of discharge at agricultural land use sites reflects good irrigation management and a lack of potential contribution by agricultural runoff to downstream receiving water site exceedances. The TMDL receiving water site at the base of the Arroyo Las Posas Subwatershed (06_SOMIS) was dry 4 times out of 40 monitoring events included in the database. Although irrigation management would not be the only factor contributing to lack of surface flow in the lower reaches of Arroyo Las Posas, these four dry site occurrences were mathematically treated as successful tests for the analytes scheduled to be sampled during those four site visits, in the same way as was done for the agricultural land use sites. An alternative approach that could be used in future iterations would be to omit the scheduled samples at 06_SOMIS from the sample totals for affected analytes when surface flows are lacking. It is unlikely that the selected treatment of the four dry site occurrences at 06_SOMIS greatly biased the time series of WQI scores for the site.

The resulting WQI scores are tabulated in Table 101 - Table 108. Receiving water sites and agricultural land use sites are grouped by reaches, waterbodies, or major watersheds,

depending on the availability of receiving water data. Average WQI scores for the current Condtional Waiver term are presented on maps in Figure 14 - Figure 21.

The WQI is a new tool that VCAILG can use to track water quality and investigate relationships between implementation actions and water quality responses over time. For this WQMP, the WQI time series were used in the following three principal ways:

(1) to look for broad patterns, for example differences in water quality between wet and dry weather or between Waiver implementation periods,

(2) to conduct preliminary data exploration using selected pairings of WQI scores and adoption rates for BMP categories, and

(3) to identify priority areas and pollutant categories for a targeted outreach effort during the rest of the 2015/2016 implementation period.

Broad Patterns in WQI Scores

Salts

- Based on receiving water quality, Conejo Creek, Arroyo Simi, and Revolon Slough subwatersheds receive "poor" salt grades during dry weather.
- In the problematic subwatersheds, it appears that runoff from row crops may contribute to salt exceedances, but that runoff from orchards is not a source of salts during dry weather.
- The only subwatershed with poor salt conditions during wet weather is Revolon Slough. In that subwatershed, there is no evidence that orchards are an important source of salts during wet weather, but runoff from row crops may be an important source. The absolute WQI scores for salts in Revolon Slough receiving water have improved between Waivers for wet weather.

Nutrients

- During dry weather, Conejo Creek receives "very good" to "excellent" nutrient grades. Receiving water in the other subwatersheds in the Calleguas Creek Watershed receives only "fair" or "marginal" nutrient grades. However, in all of the subwatersheds with "fair" or "marginal" nutrient grades, the absolute WQI scores increased somewhat between Waivers.
- Receiving water scores are not available for Santa Clara and Ventura Rivers for nutrients, but orchards are not a source of nutrients to receiving waters during dry weather in those watersheds, and do not appear to be an important source of nutrients during wet weather either.
- Nutrient grades are generally better during wet weather than dry weather at receiving water sites and at many agricultural land use sites, resulting in "excellent" to "very good" grades at receiving water sites that have only "fair" or "marginal" grades during dry weather. The key exception is in Revolon Slough,

where wet weather nutrient conditions are equally poor during dry and wet weather.

Current Use Pesticides

- With few exceptions, grades for current use pesticides at receiving water and agricultural land use monitoring sites are "very good" to "excellent" throughout the County during dry weather. The key exception may involve agricultural runoff from row crops, nurseries, and/or sod fields on the Oxnard Plain that drain directly to Mugu Lagoon, although the receiving water site in Mugu Lagoon has a very good WQI score for current-use pesticides.

- During wet weather, concentrations of current use pesticides lower grades from "very good" or "excellent" (during dry weather) to "fair" or "marginal" at monitoring sites throughout the County, with the key exception that runoff from orchard-dominated drainages in the Ventura River Watershed maintain "excellent" grades during both dry and wet weather.

- Marked improvement in WQI scores for current use pesticides occurred during the implementation period of the current Waiver. Almost every monitoring site that received an average grade of "poor" for the previous Waiver for wet weather received a "fair" or "marginal" grade during the current Waiver. In the few exceptions where improvements were not sufficient to change the "letter" grade at a monitoring site, the absolute WQI scores still improved. Improvements in grades for many sites also occurred between waivers for dry weather.

Legacy Pesticides

- With the exception of Conejo Creek, receiving water sites in Calleguas Creek Watershed receive only "marginal" or "poor" grades for legacy pesticides during both dry and wet weather. However, in three areas (Arroyo Simi subwatershed, lower reaches of Calleguas Creek Watershed, and McGrath Lake subwatershed) grades improved (e.g., from "poor" to "marginal") between Waivers for dry and/or wet weather.

- Receiving water scores are not available for Santa Clara and Ventura Rivers for legacy pesticides, but orchards in these watersheds appear to pose a lower risk of legacy pesticide discharges compared to orchards elsewhere and row crops generally.

- In the Revolon Slough subwatershed, orchard land use sites share a "poor" grade with row crop land use sites during wet weather.

Table 101. WQI Scores for SALTS – DRY WEATHER

Monitoring Site	2007	2008	2009	2010	2012	2012/13	2013/14	2014/15	Waiver 1	Waiver 2	Site Classification	
9BD_GERRY	100	100	100	100	No Data	74	44	No Data	100	59	Orchard/Sod	
9B_BARON	No Data	No Data	No Data	No Data	100	100	76	73	No Data	87	**Receiving Water**	**Conejo Creek**
9B_ADOLF	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
9A_HOWAR	No Data	No Data	No Data	No Data	73	29	27	24	No Data	38	**Receiving Water**	
07D_HITCH_LEVEE_2	No Data	No Data	No Data	No Data	9	No Data	44	14	No Data	22	Row Crops	**Arroyo Simi**
07_HITCH	No Data	No Data	No Data	No Data	24	18	No Data	No Data	No Data	21	**Receiving Water**	
07_TIERRA	No Data	No Data	No Data	No Data	No Data	21	17	16	No Data	18	**Receiving Water**	
06T_FC_BR	100	100	100	100	No Data	No Data	No Data	No Data	100	No Data	Orchard	**Arroyo Las Posas**
06T_LONG/LONG2	100	100	100	100	100	100	100	100	100	100	Orchard	
06_SOMIS	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
05T_HONDO	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Orchard	**Revolon Slough**
05D_LAVD	100	100	100	100	100	100	100	100	100	100	Orchard	
05D_SANT_VCWPD	38	No Data	No Data	No Data	19	38	No Data	No Data	38	28	Orchard	
04D_WOOD	11	10	10	38	No Data	No Data	No Data	No Data	17	No Data	Row Crops	
04D_LAS	No Data	No Data	No Data	No Data	7	8	11	23	No Data	12	Row Crops	
04D_ETTG	9	10	8	8	8	8	7	8	9	8	Row Crops	
04_WOOD	8	7	7	7	7	7	7	8	7	7	**Receiving Water**	
03_UNIV	No Data	No Data	No Data	No Data	45	29	24	20	No Data	30	**Receiving Water**	**Calleguas Creek, Mugu Lagooon**
02D_BROOM	No Data	No Data	No Data	No Data	7	14	8	11	No Data	10	Orchard/Sod	
01T_ODD2_DCH	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Row Crops/ Nursery	
01T_ODD3_ARN	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Row Crops/Sod	
01_RR_BR	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
OXD_CENTR	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Row Crops	**McGrath**
S03T_TIMB	100	100	100	100	100	100	100	100	100	100	Orchard	**Santa Clara River**
S03D_BARDS	100	100	100	100	100	100	100	100	100	100	Orchard	
S03T_BOULD	73	35	12	100	100	100	100	100	55	100	Orchard	
S02T_ELLS	100	100	100	100	100	100	100	100	100	100	Orchard	
S02T_TODD	43	55	44	73	100	44	21	44	54	52	Orchard	
S04T_HOPP	100	57	100	100	No Data	No Data	No Data	No Data	89	No Data		
S04T_TAPO	11	11	72	12	16	13	12	22	26	16	Row Crops	
S01D_MONAR	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data		
VRT_SANTO	100	100	100	100	100	100	100	100	100	100	Orchard	**Ventura River**
VRT_THACH	100	100	100	100	100	100	100	100	100	100	Orchard	

Table 102. WQI Scores for SALTS – WET WEATHER

Monitoring Site	2007	2008	2009	2010	2012	2012/13	2013/14	2014/15	Waiver 1	Waiver 2	Site Classification	
9BD_GERRY	100	100	100	100	100	No Data	100	100	100	100	Orchard/Sod	Conejo Creek
9B_BARON	No Data	No Data	No Data	No	100	100	100	100	No Data	100	**Receiving Water**	
9B_ADOLF	No Data	No Data	No Data	No	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
9A_HOWAR	No Data	No Data	No Data	No	100	100	100	100	No Data	100	**Receiving Water**	
07D_HITCH_LEVEE_2	No Data	No Data	No Data	No	100	10	41	78	No Data	58	Row Crops	Arroyo Simi
07_HITCH	No Data	No Data	No Data	No	100	No Data	No Data	No Data	No Data	100	**Receiving Water**	
07_TIERRA	No Data	No Data	No Data	No	No Data	73	100	100	No Data	91	**Receiving Water**	
06T_FC_BR	100	52	100	100	No Data	No Data	No Data	No Data	88	No Data	Orchard	Arroyo Las Posas
06T_LONG/LONG2	100	100	100	100	100	100	100	100	100	100	Orchard	
06_SOMIS	No Data	No Data	No Data	No	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
05T_HONDO	No Data	No Data	No Data	No	No Data	No Data	No Data	No Data	No Data	No Data	Orchard	Revolon Slough
05D_LAVD	100	78	100	100	100	100	100	100	95	100	Orchard	
05D_SANT_VCWPD	No Data	100	100	44	56	100	100	100	81	89	Orchard	
04D_WOOD	8	9	100	100	No Data	No Data	No Data	No Data	54	No Data	Row Crops	
04D_LAS	No Data	No Data	No Data	No	35	7	9	72	No Data	31	Row Crops	
04D_ETTG	13	27	10	9	8	7	12	28	15	14	Row Crops	
04_WOOD	9	8	11	7	8	6	14	77	9	26	**Receiving Water**	
03_UNIV	No Data	No Data	No Data	No	100	100	100	100	No Data	100	**Receiving Water**	Calleguas Creek, Mugu Lagooon
02D_BROOM	No Data	No Data	No Data	No	15	8	72	100	No Data	49	Orchard/Sod	
01T_ODD2_DCH	No Data	No Data	No Data	No	No Data	No Data	No Data	No Data	No Data	No Data	Row Crops/ Nursery	
01T_ODD3_ARN	No Data	No Data	No Data	No	No Data	No Data	No Data	No Data	No Data	No Data	Row Crops/Sod	
01_RR_BR	No Data	No Data	No Data	No	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
OXD_CENTR	No Data	No Data	No Data	No	No Data	No Data	No Data	No Data	No Data	No Data	Row Crops	McGrath Lake
S03T_TIMB	12	78	100	100	100	100	10	56	73	67	Orchard	Santa Clara River
S03D_BARDS	100	100	100	100	100	100	100	100	100	100	Orchard	
S03T_BOULD	100	100	100	100	100	100	100	57	100	89	Orchard	
S02T_ELLS	16	24	100	73	34	100	71	78	53	71	Orchard	
S02T_TODD	41	44	100	44	56	41	100	100	57	74	Orchard	
S04T_HOPP	100	100	100	100	No Data	No Data	No Data	No Data	100	No Data		
S04T_TAPO	14	11	100	13	33	13	100	78	35	56	Row Crops	
S01D_MONAR	No Data	No Data	No Data	No	No Data	No Data	No Data	No Data	No Data	No Data		
VRT_SANTO	100	100	100	100	100	100	100	100	100	100	Orchard	Ventura River
VRT_THACH	100	100	100	100	100	100	100	100	100	100	Orchard	

Table 103. WQI Scores for NUTRIENTS - DRY WEATHER

Monitoring Site	2007	2008	2009	2010	2012	2012/13	2013/14	2014/15	Waiver 1	Waiver 2	Site Classification	
9BD_GERRY	100	100	100	100	100	66	69	100	100	84	Orchard/Sod	Conejo Creek
9B_BARON	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
9B_ADOLF	No Data	100	100	100	100	100	100	100	100	100	**Receiving Water**	
9A_HOWAR	No Data	100	100	70	66	100	70	100	90	84	**Receiving Water**	
07D_HITCH_LEVEE_	No Data	29	100	16	19	100	32	31	48	46	Row Crops	Arroyo Simi
07_HITCH	No Data	68	63	63	59	100	70	68	65	74	**Receiving Water**	
07_TIERRA	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
06T_FC_BR	100	69	100	100	100	100	100	100	92	100	Orchard	Arroyo Las Posas
06T_LONG/LONG2	100	100	100	100	100	100	100	100	100	100	Orchard	
06_SOMIS	No Data	67	64	68	68	68	64	68	66	67	**Receiving Water**	
05T_HONDO	100	100	100	100	100	100	100	100	100	100	Orchard	Revolon Slough
05D_LAVD	57	No Data	No Data	No Data	100	100	No Data	No Data	57	100	Orchard	
05D_SANT_VCWPD	100	61	54	51	47	47	48	55	66	49	Orchard	
04D_WOOD	No Data	49	44	42	27	60	33	100	45	55	Row Crops	
04D_LAS	56	53	57	47	47	47	46	45	53	46	Row Crops	
04D_ETTG	51	14	39	39	45	43	45	45	36	45	Row Crops	
04_WOOD	No Data	43	44	46	45	48	47	45	45	46	**Receiving Water**	
03_UNIV	No Data	68	70	70	100	40	100	100	69	85	**Receiving Water**	Calleguas Creek, Mugu Lagooon
02D_BROOM	100	100	50	57	41	49	26	100	77	54	Orchard/Sod	
01T_ODD2_DCH	100	49	43	44	42	43	41	42	59	42	Row Crops/ Nursery	
01T_ODD3_ARN	35	45	9	8	12	46	46	19	24	31	Row Crops/Sod	
01_RR_BR	No Data	59	51	70	100	56	64	66	60	71	**Receiving Water**	
OXD_CENTR	58	58	58	57	58	57	58	68	57	60	Row Crops	**McGrath Lake**
S03T_TIMB	100	100	100	100	100	100	100	100	100	100	Orchard	Santa Clara River
S03D_BARDS	100	100	100	100	100	100	100	100	100	100	Orchard	
S03T_BOULD	12	22	37	100	100	100	100	100	43	100	Orchard	
S02T_ELLS	100	100	100	100	100	100	100	100	100	100	Orchard	
S02T_TODD	68	68	100	100	100	67	67	100	84	84	Orchard	
S04T_HOPP	100	100	100	100	No Data	No Data	No Data	No Data	100	No Data		
S04T_TAPO	67	54	1	44	57	51	49	52	42	52	Row Crops	
S01D_MONAR	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data		
VRT_SANTO	100	100	100	100	100	100	100	100	100	100	Orchard	Ventura River
VRT_THACH	100	100	100	100	100	100	100	100	100	100	Orchard	

Table 104. WQI Scores for NUTRIENTS - WET WEATHER

Monitoring Site	2007	2008	2009	2010	2012	2012/13	2013/14	2014/15	Waiver 1	Waiver 2	Site Classification	
9BD_GERRY	100	100	100	100	100	100	100	100	100	100	Orchard/Sod	Conejo Creek
9B_BARON	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
9B_ADOLF	No Data	100	100	100	100	100	100	100	100	100	**Receiving Water**	
9A_HOWAR	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
07D_HITCH_LEVEE_2	No Data	41	44	100	57	42	44	56	62	50	Row Crops	Arroyo Simi
07_HITCH	No Data	100	100	100	100	100	100	100	100	100	**Receiving Water**	
07_TIERRA	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
06T_FC_BR	100	100	100	100	100	100	100	68	100	92	Orchard	Arroyo Las Posas
06T_LONG/LONG2	100	100	100	100	100	100	100	100	100	100	Orchard	
06_SOMIS	No Data	100	100	100	66	100	100	100	100	92	**Receiving Water**	
05T_HONDO	100	100	47	54	39	41	100	68	75	62	Orchard	Revolon Slough
05D_LAVD	100	100	100	100	100	100	100	100	100	100	Orchard	
05D_SANT_VCWPD	No Data	100	100	51	68	100	100	100	84	92	Orchard	
04D_WOOD	100	68	69	100	48	45	100	67	84	65	Row Crops	
04D_LAS	No Data	47	62	55	6	43	44	59	54	38	Row Crops	
04D_ETTG	49	48	46	43	43	45	45	52	47	46	Row Crops	
04_WOOD	41	41	45	38	40	40	46	54	41	45	**Receiving Water**	
03_UNIV	No Data	100	100	100	100	100	100	100	100	100	**Receiving Water**	Calleguas Creek, Mugu Lagooon
02D_BROOM	No Data	100	100	100	47	44	59	100	100	63	Orchard/Sod	
01T_ODD2_DCH	100	68	68	57	50	44	53	100	73	62	Row Crops/ Nursery	
01T_ODD3_ARN	49	55	58	100	48	45	No Data	No Data	66	46	Row Crops/Sod	
01_RR_BR	No Data	100	56	64	63	100	100	63	73	82	**Receiving Water**	
OXD_CENTR	50	55	55	100	63	51	52	54	65	55	Row Crops	**McGrath Lake**
S03T_TIMB	100	67	59	100	100	100	100	100	82	100	Orchard	Santa Clara River
S03D_BARDS	100	100	100	100	100	100	56	100	100	89	Orchard	
S03T_BOULD	100	100	52	100	64	100	50	47	88	65	Orchard	
S02T_ELLS	100	100	100	100	100	100	100	100	100	100	Orchard	
S02T_TODD	58	100	100	100	68	59	100	100	90	82	Orchard	
S04T_HOPP	100	100	100	100	No Data	No Data	No Data	No Data	100	No Data		
S04T_TAPO	100	100	100	59	66	50	100	100	90	79	Row Crops	
S01D_MONAR	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data		
VRT_SANTO	100	100	100	100	100	100	100	100	100	100	Orchard	Ventura River
VRT_THACH	100	100	100	100	100	100	100	100	100	100	Orchard	

Table 105. WQI Scores for CURRENT USE PESTICIDES - DRY WEATHER

Monitoring Site	2007	2008	2009	2010	2012	2012/13	2013/14	2014/15	Waiver 1	Waiver 2	Site Classification	
9BD_GERRY	100	100	100	100	100	47	85	100	100	83	Orchard/Sod	Conejo Creek
9B_BARON	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
9B_ADOLF	No Data	100	100	100	78	100	100	100	100	95	**Receiving Water**	
9A_HOWAR	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
07D_HITCH_LEVEE_2	No Data	42	100	29	31	100	100	37	57	67	Row Crops	Arroyo Simi
07_HITCH	No Data	78	78	100	78	100	100	79	86	89	**Receiving Water**	
07_TIERRA	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
06T_FC_BR	100	36	100	55	100	64	77	69	73	78	Orchard	Arroyo Las Posas
06T_LONG/LONG2	100	100	100	100	100	100	100	100	100	100	Orchard	
06_SOMIS	No Data	100	100	100	100	100	100	100	100	100	**Receiving Water**	
05T_HONDO	100	100	80	100	81	100	79	100	95	90	Orchard	Revolon Slough
05D_LAVD	100	100	100	100	100	100	100	100	100	100	Orchard	
05D_SANT_VCWPD	48	No Data	No Data	No Data	100	100	No Data	No Data	48	100	Orchard	
04D_WOOD	58	67	85	78	100	100	100	83	72	96	Row Crops	
04D_LAS	No Data	100	100	73	82	85	100	63	91	82	Row Crops	
04D_ETTG	77	24	100	100	100	100	100	100	75	100	Row Crops	
04_WOOD	100	76	100	100	82	100	100	100	94	95	**Receiving Water**	
03_UNIV	No Data	100	100	100	100	85	100	82	100	92	**Receiving Water**	Calleguas Creek, Mugu Lagooon
02D_BROOM	No Data	50	85	85	100	83	100	54	73	84	Orchard/Sod	
01T_ODD2_DCH	100	70	80	62	64	65	63	67	78	65	Row Crops/ Nursery	
01T_ODD3_ARN	69	52	100	53	50	62	84	60	68	64	Row Crops/Sod	
01_RR_BR	No Data	70	54	70	100	85	100	85	65	92	**Receiving Water**	
OXD_CENTR	100	100	100	100	100	83	100	100	100	96	Row Crops	McGrath Lake
S03T_TIMB	100	100	100	100	100	100	100	100	100	100	Orchard	Santa Clara River
S03D_BARDS	100	100	100	100	100	100	100	100	100	100	Orchard	
S03T_BOULD	100	77	100	100	100	100	100	100	94	100	Orchard	
S02T_ELLS	100	61	100	100	100	100	100	100	90	100	Orchard	
S02T_TODD	100	100	65	100	100	74	100	100	91	94	Orchard	
S04T_HOPP	100	100	100	100	No Data	No Data	No Data	No Data	100	No Data		
S04T_TAPO	100	100	100	100	100	100	100	100	100	100	Row Crops	
S01D_MONAR	No Data	No Data	No Data	No Data	100	100	100	100	No Data	100		
VRT_SANTO	100	100	100	100	100	100	100	100	100	100	Orchard	Ventura River
VRT_THACH	100	100	100	100	100	100	100	100	100	100	Orchard	

Table 106. WQI Scores for CURRENT USE PESTICIDES - WET WEATHER

Monitoring Site	2007	2008	2009	2010	2012	2012/13	2013/14	2014/15	Waiver 1	Waiver 2	Site Classification	
9BD_GERRY	100	47	35	31	37	100	44	33	53	54	Orchard/Sod	Conejo Creek
9B_BARON	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
9B_ADOLF	No Data	61	100	34	39	100	100	45	65	71	**Receiving Water**	
9A_HOWAR	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
07D_HITCH_LEVEE_2	No Data	21	18	10	10	31	100	24	16	41	Row Crops	Arroyo Simi
07_HITCH	No Data	52	49	12	44	100	100	33	38	69	**Receiving Water**	
07_TIERRA	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
06T_FC_BR	68	30	36	35	47	49	100	28	42	56	Orchard	Arroyo Las Posas
06T_LONG/LONG2	100	100	100	100	54	100	35	45	100	58	Orchard	
06_SOMIS	No Data	71	63	12	63	100	68	31	48	65	**Receiving Water**	
05T_HONDO	100	58	36	44	100	100	100	54	60	88	Orchard	Revolon Slough
05D_LAVD	32	34	23	100	44	100	36	12	47	48	Orchard	
05D_SANT_VCWPD	No Data	25	24	24	45	61	21	11	24	34	Orchard	
04D_WOOD	47	30	24	22	44	73	73	24	31	53	Row Crops	
04D_LAS	No Data	100	34	34	57	72	77	40	56	61	Row Crops	
04D_ETTG	72	24	3	25	57	79	46	37	31	55	Row Crops	
04_WOOD	23	23	23	23	38	100	33	22	23	48	**Receiving Water**	
03_UNIV	No Data	57	35	27	36	100	100	37	40	68	**Receiving Water**	Calleguas Creek, Mugu Lagooon
02D_BROOM	No Data	31	24	33	58	75	66	31	29	57	Orchard/Sod	
01T_ODD2_DCH	38	21	12	22	25	43	41	30	23	35	Row Crops/ Nursery	
01T_ODD3_ARN	100	45	3	26	42	79	No Data	No Data	43	60	Row Crops/Sod	
01_RR_BR	No Data	32	24	20	50	100	79	36	25	66	**Receiving Water**	
OXD_CENTR	39	25	23	21	34	65	45	34	27	45	Row Crops	McGrath Lake
S03T_TIMB	100	70	5	37	100	100	100	100	53	100	Orchard	Santa Clara River
S03D_BARDS	46	15	22	24	100	100	46	31	27	69	Orchard	
S03T_BOULD	100	61	44	45	66	100	46	45	62	64	Orchard	
S02T_ELLS	71	100	24	41	41	100	35	53	59	57	Orchard	
S02T_TODD	54	68	24	2	45	100	100	57	37	76	Orchard	
S04T_HOPP	100	100	100	100	No Data	No Data	No Data	No Data	100	No Data		
S04T_TAPO	43	46	40	50	56	100	41	45	45	61	Row Crops	
S01D_MONAR	No Data	No Data	No Data	No Data	1	100	No Data	No Data	No Data	51		
VRT_SANTO	100	100	100	100	100	100	100	100	100	100	Orchard	Ventura River
VRT_THACH	100	100	100	57	100	100	100	100	89	100	Orchard	

Table 107. WQI Scores for LEGACY PESTICIDES - DRY WEATHER

Monitoring Site	2007	2008	2009	2010	2012	2012/13	2013/14	2014/15	Waiver 1	Waiver 2	Site Classification	
9BD_GERRY	100	100	100	100	100	100	100	100	100	100	Orchard/Sod	Conejo Creek
9B_BARON	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
9B_ADOLF	No Data	69	100	100	57	100	80	87	90	81	**Receiving Water**	
9A_HOWAR	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
07D_HITCH_LEVEE_	No Data	31	100	15	23	100	27	17	49	42	Row Crops	Arroyo Simi
07_HITCH	No Data	62	73	76	37	70	57	45	70	52	**Receiving Water**	
07_TIERRA	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
06T_FC_BR	100	17	27	16	40	26	17	17	40	25	Orchard	Arroyo Las Posas
06T_LONG/LONG2	100	100	100	100	100	100	100	100	100	100	Orchard	
06_SOMIS	No Data	50	59	42	20	37	76	61	50	48	**Receiving Water**	
05T_HONDO	40	25	22	47	21	35	21	100	34	44	Orchard	Revolon Slough
05D_LAVD	100	100	100	100	100	100	100	100	100	100	Orchard	
05D_SANT_VCWPD	36	No Data	No Data	No Data	37	100	No Data	No Data	36	68	Orchard	
04D_WOOD	27	18	31	25	38	34	50	86	25	52	Row Crops	
04D_LAS	No Data	38	22	22	23	27	43	22	27	29	Row Crops	
04D_ETTG	28	17	25	39	27	31	17	16	27	23	Row Crops	
04_WOOD	30	17	25	40	32	33	25	16	28	27	**Receiving Water**	
03_UNIV	No Data	38	74	57	81	53	78	70	56	71	**Receiving Water**	Calleguas Creek, Mugu Lagooon
02D_BROOM	No Data	27	36	20	21	24	24	24	28	23	Orchard/Sod	
01T_ODD2_DCH	57	23	24	26	34	36	27	42	33	35	Row Crops/ Nursery	
01T_ODD3_ARN	36	26	13	14	17	30	17	27	22	23	Row Crops/Sod	
01_RR_BR	No Data	30	29	28	76	67	33	42	29	55	**Receiving Water**	
OXD_CENTR	43	24	13	60	58	100	41	47	35	62	Row Crops	McGrath Lake
S03T_TIMB	100	100	100	100	60	100	100	100	100	90	Orchard	Santa Clara River
S03D_BARDS	100	100	100	100	100	100	42	100	100	86	Orchard	
S03T_BOULD	100	100	100	100	100	100	100	100	100	100	Orchard	
S02T_ELLS	100	78	100	100	100	63	100	100	95	91	Orchard	
S02T_TODD	100	100	35	100	63	37	47	67	84	53	Orchard	
S04T_HOPP	100	100	100	100	No Data	No Data	No Data	No Data	100	No Data		
S04T_TAPO	22	100	25	100	63	82	100	74	62	80	Row Crops	
S01D_MONAR	No Data	No Data	No Data	No Data	34	37	100	100	No Data	68		
VRT_SANTO	100	100	100	100	100	100	100	100	100	100	Orchard	Ventura River
VRT_THACH	100	100	100	100	100	100	100	100	100	100	Orchard	

Table 108. WQI Scores for LEGACY PESTICIDES - WET WEATHER

Monitoring Site	2007	2008	2009	2010	2012	2012/13	2013/14	2014/15	Waiver 1	Waiver 2	Site Classification	
9BD_GERRY	100	60	33	29	31	100	100	31	56	66	Orchard/Sod	Conejo Creek
9B_BARON	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
9B_ADOLF	No Data	35	100	33	42	100	100	34	56	69	**Receiving Water**	
9A_HOWAR	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
07D_HITCH_LEVEE_2	No Data	13	19	18	21	25	36	13	17	24	Row Crops	Arroyo Simi
07_HITCH	No Data	35	23	21	31	59	100	25	26	54	**Receiving Water**	
07_TIERRA	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	**Receiving Water**	
06T_FC_BR	26	23	18	20	24	13	100	6	22	36	Orchard	Arroyo Las Posas
06T_LONG/LONG2	100	100	100	100	31	100	25	44	100	50	Orchard	
06_SOMIS	No Data	35	19	18	34	55	100	25	24	54	**Receiving Water**	
05T_HONDO	45	23	13	19	31	29	45	33	25	35	Orchard	Revolon Slough
05D_LAVD	25	27	13	100	23	100	25	25	41	43	Orchard	
05D_SANT_VCWPD	No Data	25	13	13	13	13	35	16	17	19	Orchard	
04D_WOOD	46	19	17	18	31	50	35	18	25	34	Row Crops	
04D_LAS	No Data	13	18	21	29	26	25	13	17	23	Row Crops	
04D_ETTG	36	24	13	13	22	28	13	13	21	19	Row Crops	
04_WOOD	25	24	13	13	16	14	13	6	19	12	**Receiving Water**	
03_UNIV	No Data	13	31	21	30	59	100	13	22	50	**Receiving Water**	Calleguas Creek, Mugu Lagooon
02D_BROOM	No Data	13	21	21	32	28	36	13	18	27	Orchard/Sod	
01T_ODD2_DCH	25	21	13	18	21	26	25	13	20	21	Row Crops/ Nursery	
01T_ODD3_ARN	26	25	13	24	17	14	No Data	No Data	22	15	Row Crops/Sod	
01_RR_BR	No Data	13	21	16	32	42	100	13	16	47	**Receiving Water**	
OXD_CENTR	26	24	13	13	16	31	13	24	19	21	Row Crops	**McGrath Lake**
S03T_TIMB	100	65	41	100	100	100	100	100	77	100	Orchard	Santa Clara River
S03D_BARDS	57	32	35	25	100	100	26	34	37	65	Orchard	
S03T_BOULD	100	76	100	100	32	100	28	65	94	56	Orchard	
S02T_ELLS	100	100	26	13	25	100	42	52	60	55	Orchard	
S02T_TODD	100	55	13	26	24	39	100	39	48	50	Orchard	
S04T_HOPP	100	100	100	100	No Data	No Data	No Data	No Data	100	No Data		
S04T_TAPO	34	36	34	46	29	45	40	29	38	36	Row Crops	
S01D_MONAR	No Data	No Data	No Data	No Data	16	13	No Data	No Data		15		
VRT_SANTO	100	100	100	100	100	100	100	100	100	100	Orchard	Ventura River
VRT_THACH	100	67	100	100	100	100	100	100	92	100	Orchard	

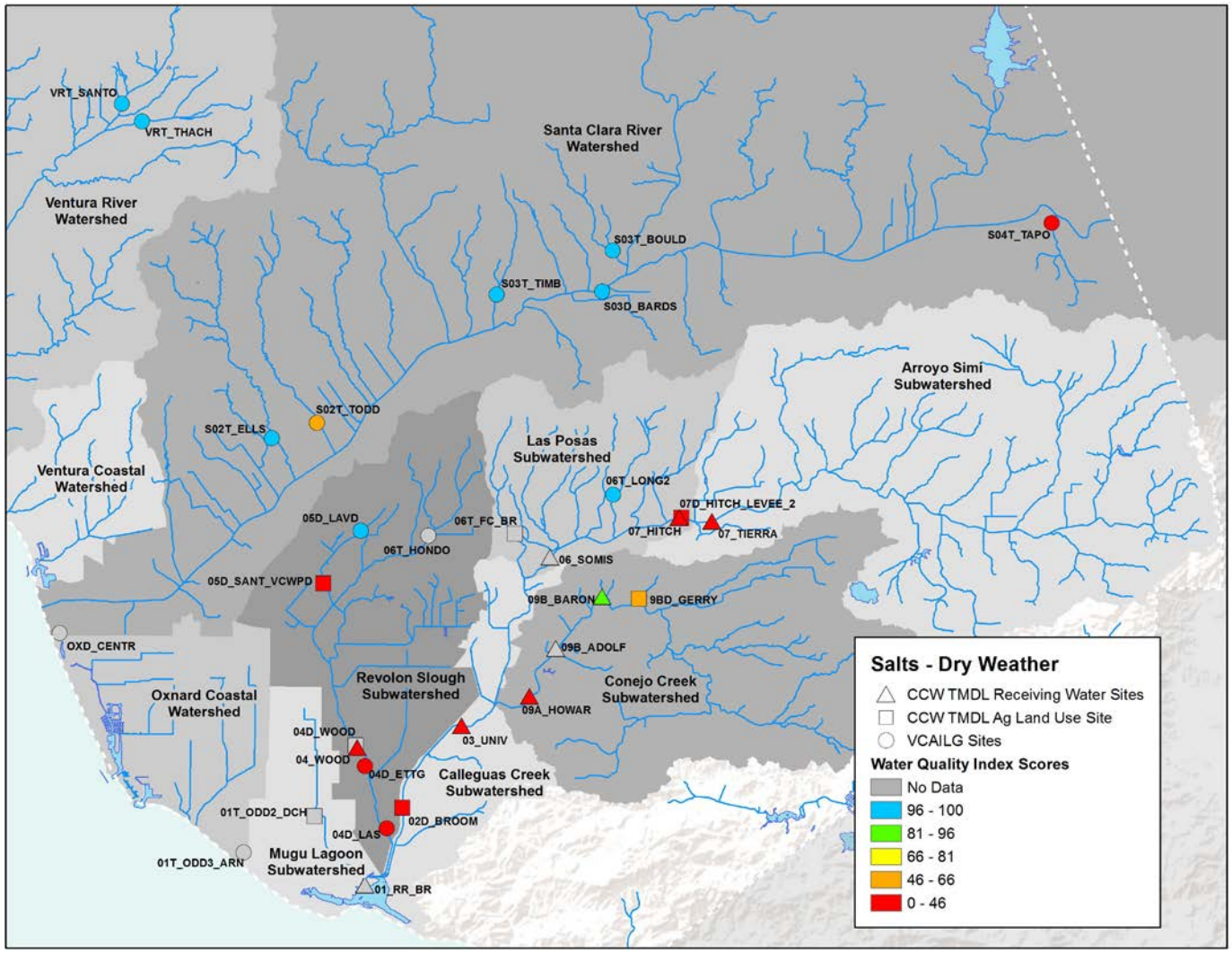


Figure 14. 2012-2015 Average WQI Scores for Salts during Dry Weather

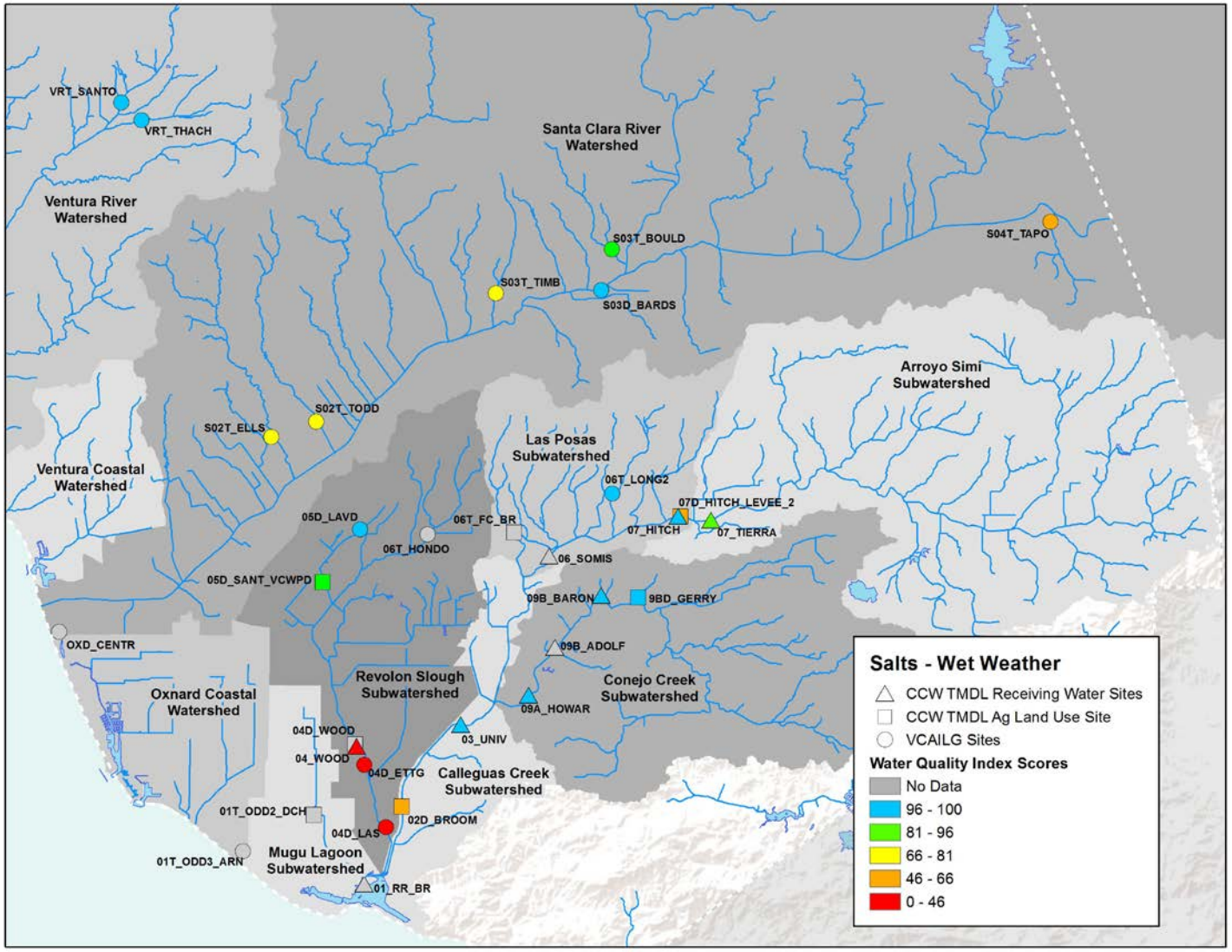


Figure 15. 2012-2015 Average WQI Scores for Salts during Wet Weather

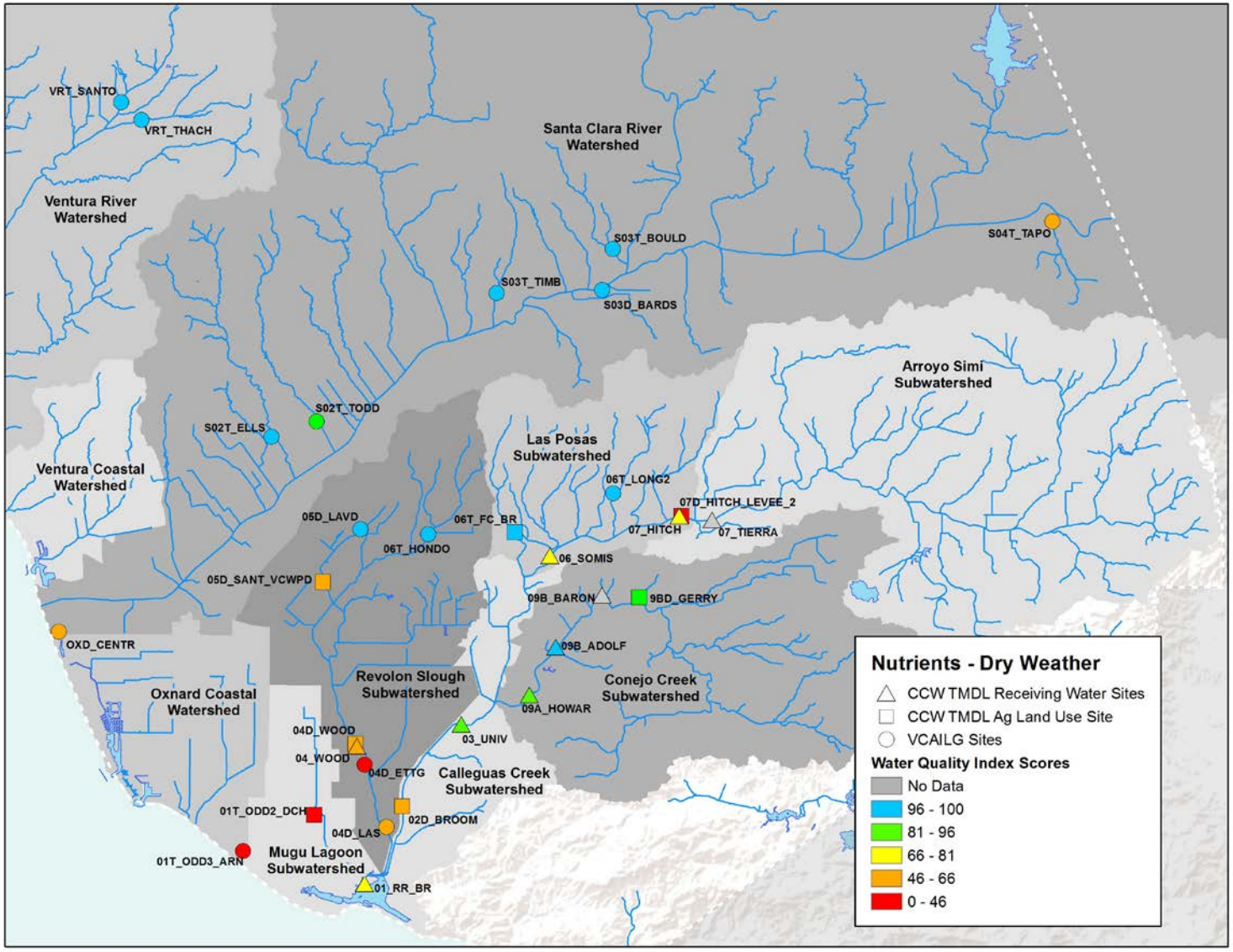


Figure 16. 2012-2015 Average WQI Scores for Nutrients during Dry Weather

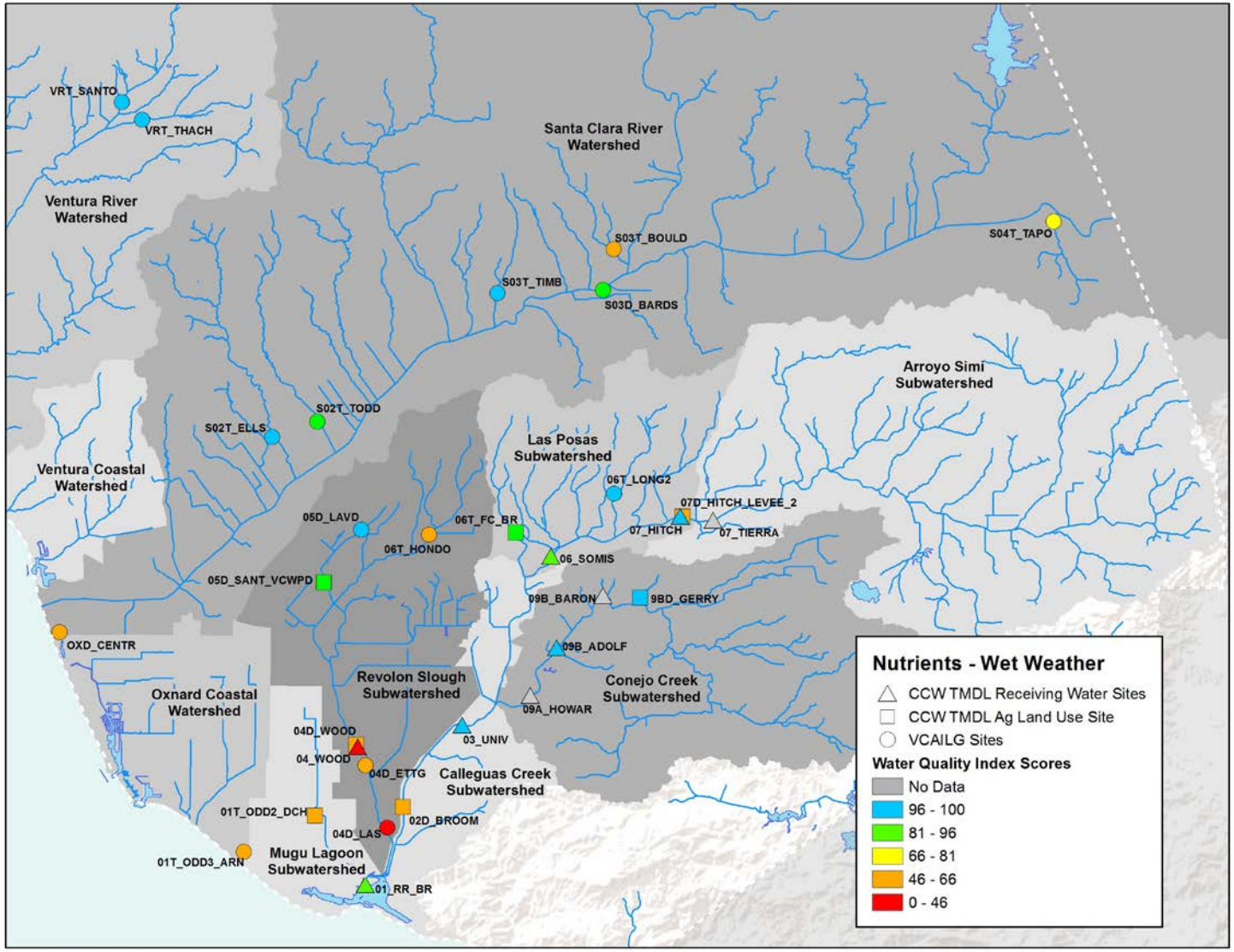


Figure 17. 2012-2015 Average WQI Scores for Nutrients during Wet Weather

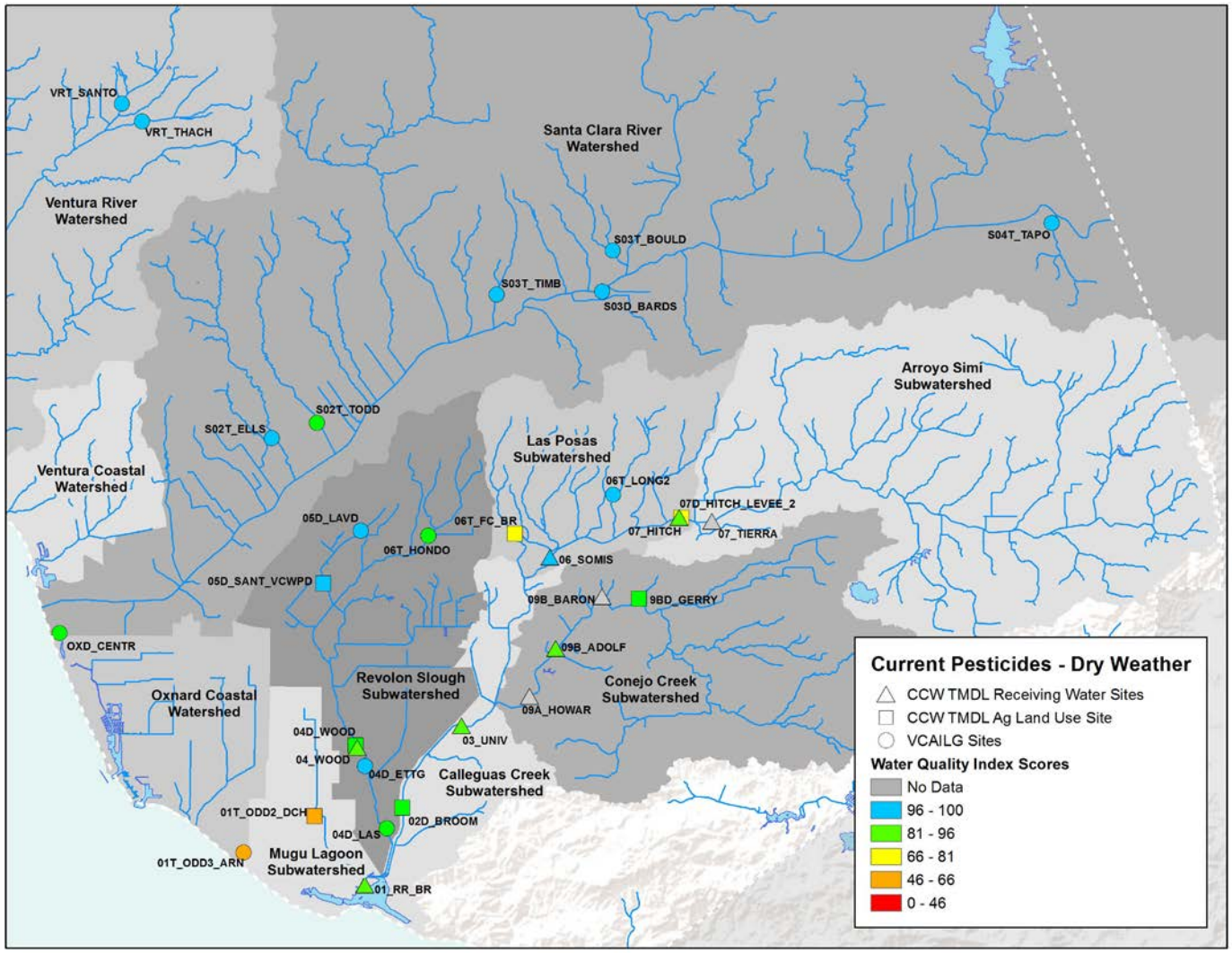


Figure 18. 2012-2015 Average WQI Scores for Current-Use Pesticides during Dry Weather

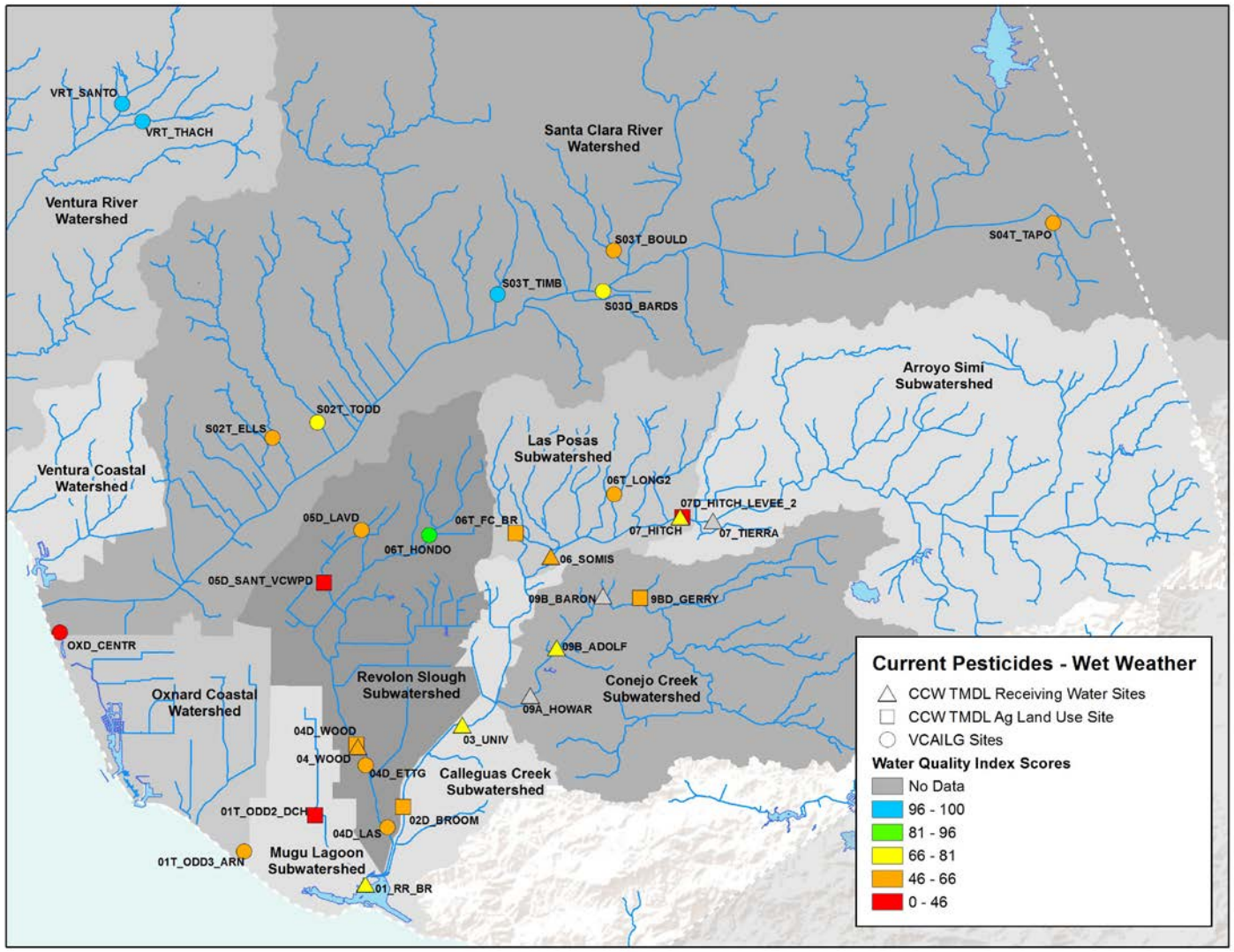


Figure 19. 2012-2015 Average WQI Scores for Current-Use Pesticides during Wet Weather

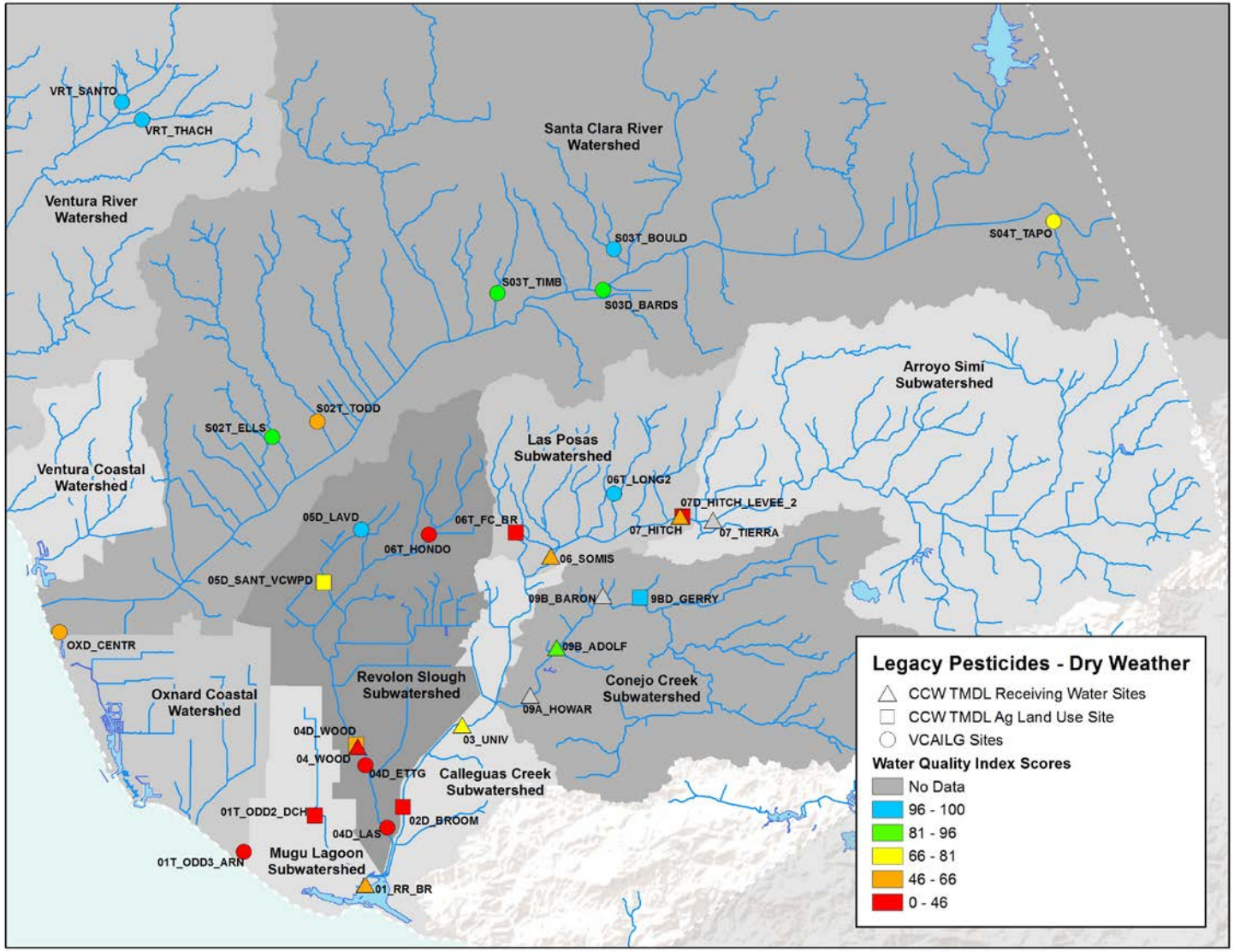


Figure 20. 2012-2015 Average WQI Scores for Legacy Pesticides during Dry Weather

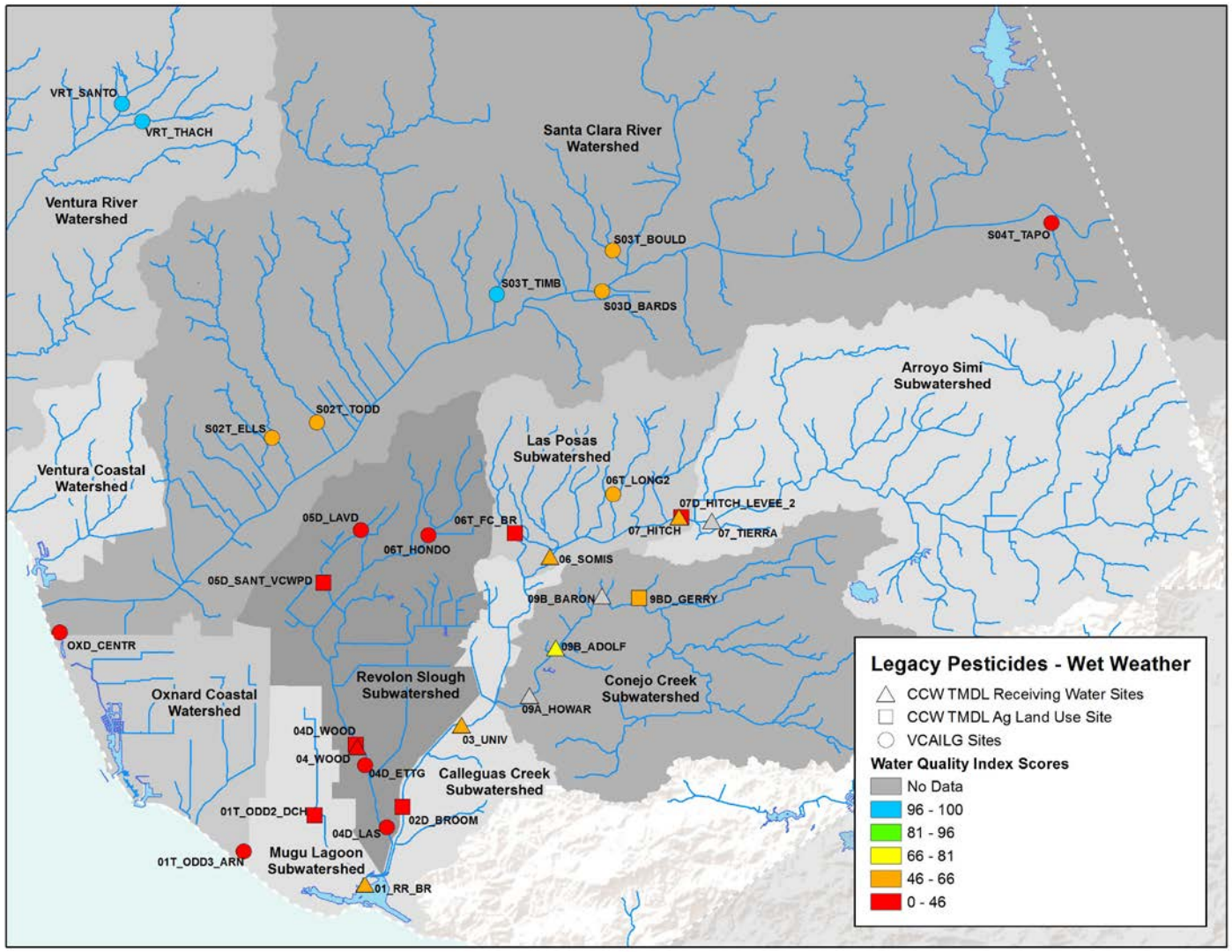


Figure 21. 2012-2015 Average WQI Scores for Legacy Pesticides during Wet Weather

Selected Comparisons of WQI Scores and BMP Adoption Rates

Preliminary data exploration was conducted to investigate whether BMP adoption rates are reflected by water quality at agricultural land use sites. The WQI analyte groups were designed so that they aligned logically with one or more BMP management categories. Scatterplots were prepared using BMP adoption rates calculated for the drainages of individual monitoring sites (using results of the 2015 online BMP survey) as the independent (horizontal) axis, and *Waiver averages* of WQI scores for same sites as the dependent (vertical) axis. Waiver average WQIs were used instead of annual WQI scores for two main reasons:

- BMP practices do not change quickly, so it is likely that BMPs reported as having been "in use" at the end of the previous and current Waivers (i.e., in 2010 or 2015) would likely have affected the quality of runoff for more than one year, and
- Year-to-year variation in rainfall, crop selections, water supply quality, and other factors that might affect runoff quality, would not necessarily be accompanied by year-to-year changes in BMPs.

For this WQMP, data exploration was conducted using only the dry weather WQIs. The resulting scatterplots are presented in Figure 22-Figure 26.

The first four scatterplots (Figure 22- Figure 24) illustrate how BMP adoption rates in monitoring site drainages shifted higher during the current Waiver. The overall phenomenon of increasing BMP utilization is illustrated better, and in more detail, in Table 97 by the third metric presented for each drainage area (change in adoption rates during the Waiver term). As is illustrated by the scatterplots in (Figure 22- Figure 24), the numeric range of water quality scores is similar between Waivers. However, inspection of raw scores for individual monitoring sites in the WQI time series tables above reveals many cases of improvement in water quality at the local and watershed level that are not well illustrated by the scatterplots.

Regardless of the trajectory, the presumed outcome of the iterative BMP process could be conceptualized as a shift in the data points in a given scatterplot over time to the upper right quadrant – eventually resulting in high values for both BMP adoption rates and pertinent water quality scores. This outcome has already been has largely achieved in the case of current-use pesticides during dry weather (see Figure 23), as is also reflected in WQI scores for both land use and receiving water sites in Table 105. Over time, it is reasonable to expect that WQI scores and BMP adoption rates will shift in concert for other pollutant categories.

Predictive relationships between individual BMP adoption rates and WQI scores were not revealed by the preliminary data exploration. This is not necessarily unexpected because the extent to which surveyed acreage reflects the total irrigated land in a drainage varies widely among the monitored drainages, and even in drainages with agricultural land use monitoring sites, total irrigated land can represent a small portion of total land cover (Table 109). WQI scores for agricultural land use monitoring sites represent commingled discharges from more than one land use.

In many cases, the scatterplots revealed dual tiers of high performing sites (with very good water quality) and lower performing sites (with poorer water quality) – each associated with a wide range of BMP adoption rates. This feature in the data is especially evident when nutrient or salt WQIs are displayed on the vertical axis. In order to investigate what factors might be driving this pattern, an overall WQI score was generated for each agricultural land use site for dry weather and wet weather by averaging the respective WQIs for all four analyte groups. Then, the sites were ranked according to either dry weather scores or wet weather scores, and the top ranked sites and bottom ranked sites were identified. The outcome of this exercise is presented in Table 110. Three important findings resulted from this exercise:

- Approximately the same sites were among either the top ranked or the bottom ranked sites for both dry and wet weather. In other words, sites tend to be ranked similarly for water quality during both dry and wet weather. This finding should be useful for planning BMP training and outreach; it should not be necessary to establish different priority areas to tackle both dry and wet weather water quality issues.

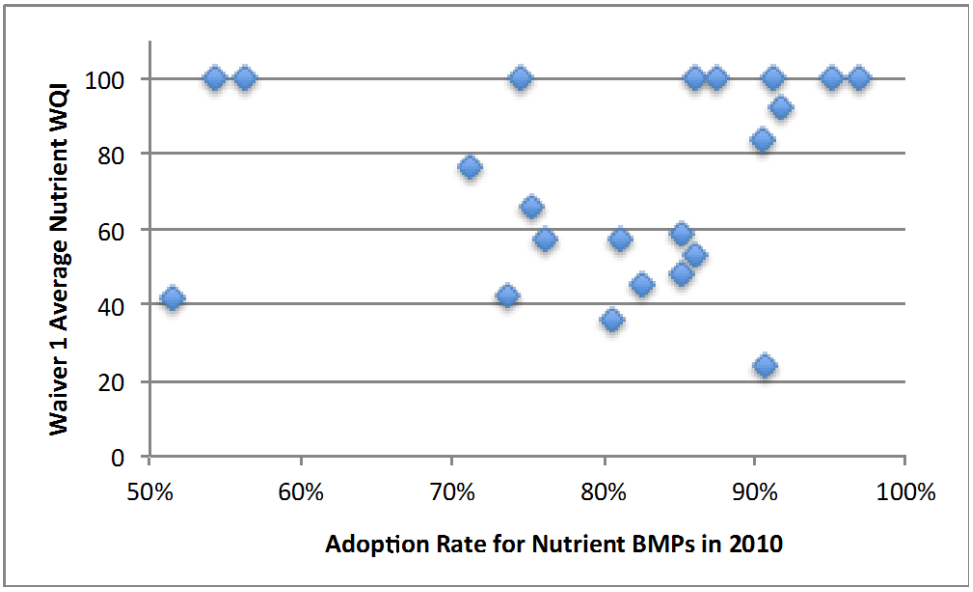
- Drainages dominated by orchards are clearly differentiated from drainages dominated by row crops in terms of water quality at their downstream monitoring sites. However, according to the BMP survey data for individual drainages, good water quality outcomes for orchard-dominated drainages are not the necessarily the result of consistent high adoption of irrigation management BMPs. Growers in the drainages of the monitoring sites with the best overall water quality report some of the highest – and some of the lowest – adoption rates for irrigation management BMPs. This detail does not mean that minimization of runoff is not an important factor supporting good water quality outcomes in these areas. Rather, it may mean that minimization of runoff can be achieved in some orchards without employing many of the BMPs included in the VCAILG online BMP surveys. Based on the information in Table 113, it would be reasonable to focus BMP training and outreach in all pollutant management categories toward growers of row crops.

- Overall water quality appears poorest at agricultural land use sites that drain directly to Mugu Lagoon or are in the Revolon Slough Watershed, with improvements warranted in the discharge of all of the analyte groups. In addition, based on data from 07D_HITCH_LEVEE_2, and on receiving water WQI scores for Arroyo Simi, it may also be a priority to improve management of salts, nutrients and current-use pesticides by growers of row crops in the Moorpark area.

Table 109. Comparison of Surveyed Acreage with Total Drainage Size and Total Irrigated Acreage for Monitored Drainages

Site ID	Size of Drainage Area (acres)	Total Irrigated Acres (VCAILG and non-member)	Surveyed Irrigated Acres		Percent of Total Irrigated Acres Surveyed		Percent of Whole Drainage Area Addressed by Survey	
			2014	2015	2014	2015	2014	2015
01T_ODD3_ARN	800	649	79	630	12%	97%	10%	79%
04D_ETTG	3,779	3400	2,078	1,469	61%	43%	55%	39%
04D_LAS	1,339	1058	971	790	92%	75%	73%	59%
05D_LAVD	877	555	219	236	39%	43%	25%	27%
05T_HONDO	3,928	1780	405	847	23%	48%	10%	22%
06T_LONG2	2,813	1351	884	633	65%	47%	31%	23%
OXD_CENTR	1,243	930	779	833	84%	90%	63%	67%
S02T_ELLS	9,015	872	836	646	96%	74%	9%	7%
S02T_TODD	5,748	510	481	435	94%	85%	8%	8%
S03D_BARDS	2,214	864	481	631	56%	73%	22%	29%
S03T_BOULD	3,764	1001	764	721	76%	72%	20%	19%
S03T_TIMB	2,183	480	322	412	67%	86%	15%	19%
S04T_TAPO	3,686	113	321	321	[a]	[a]	9%	9%
VRT_SANTO	7,220	553	459	407	83%	74%	6%	6%
VRT_THACH	6,003	808	674	260	83%	32%	11%	4%
01T_ODD2_DCH	1,564	1410	819	1,145	58%	81%	52%	73%
02D_BROOM	8,236	2361	1,953	936	83%	40%	24%	11%
04D_WOOD	470	359	364	247	101%	69%	77%	53%
05D_SANT_VCWPD	1,154	984	481	760	49%	77%	42%	66%
06T_FC_BR	2,602	1049	757	201	72%	19%	29%	8%
07D_HITCH_LEVEE_2	142	114	15	51	13%	45%	11%	36%
9BD_GERRY	447	238	231	194	97%	82%	52%	43%
S01D_MONAR	209	232	182	182	78%	78%	87%	87%
CIHD_VICT	99	92	0	0	0%	0%	0%	0%

[a] Total irrigated acreage needs to be updated to reflect the higher reported irrigated acreage by survey respondents



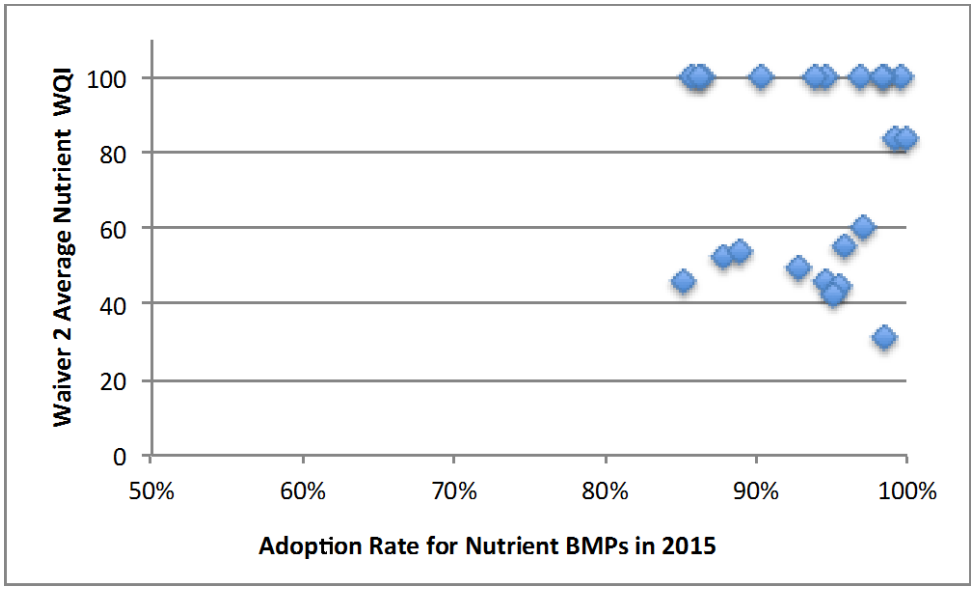


Figure 22. Relationship between Nutrient BMP Adoption Rates and Nutrient WQIs for Agricultural Land Use Sites at end of previous Waiver (upper panel) and end of current Waiver (lower panel). WQIs are for dry weather.

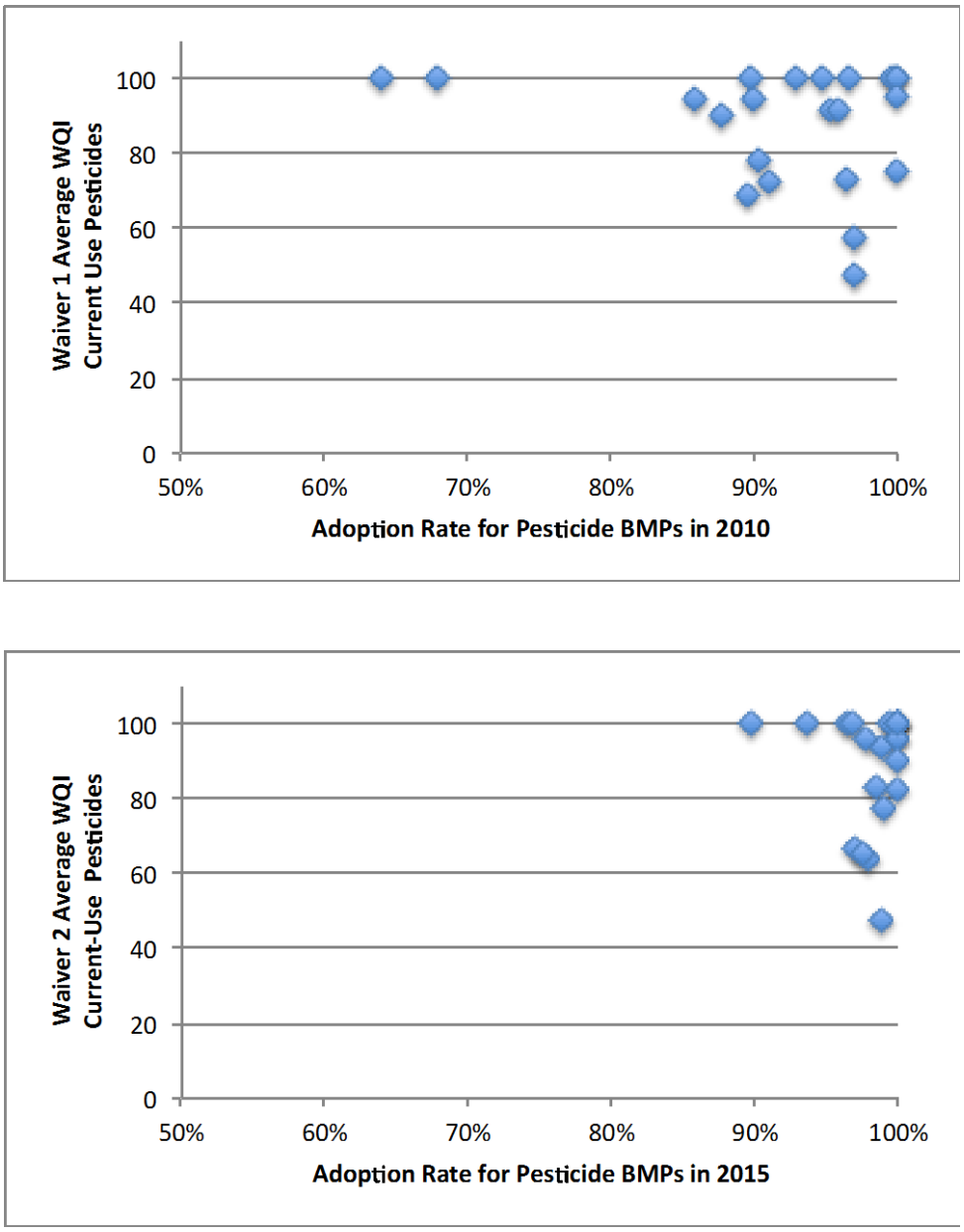
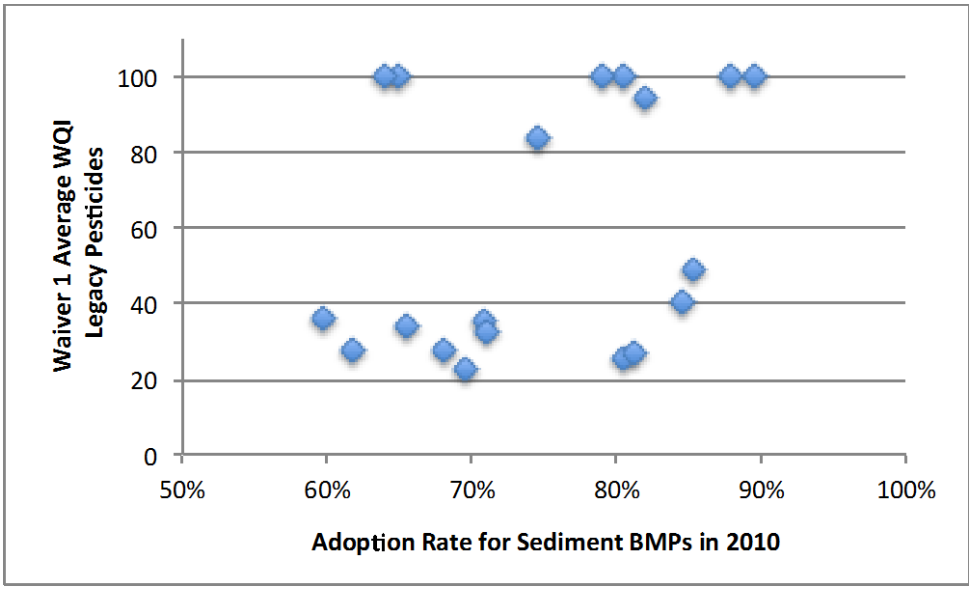


Figure 23. Relationship between Pesticide BMP Adoption Rates and Current-Use Pesticide WQIs for Agricultural Land Use Sites at end of previous Waiver (upper panel) and end of current Waiver (lower panel). WQIs are for dry weather.



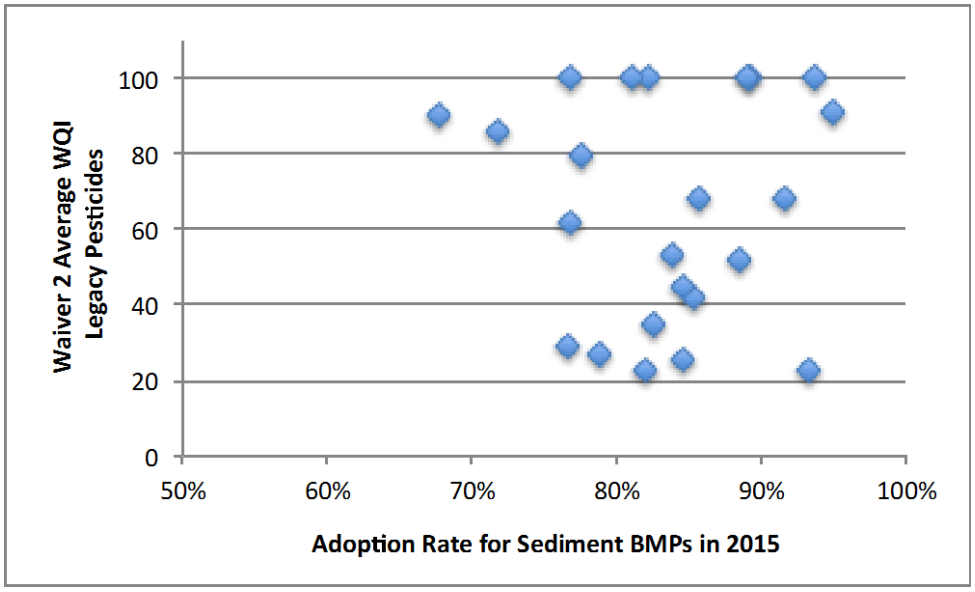


Figure 24. Relationship between Sediment BMP Adoption Rates and Legacy Pesticide WQIs for Agricultural Land Use Sites at end of previous Waiver (upper panel) and end of current Waiver (lower panel). WQIs are for dry weather.

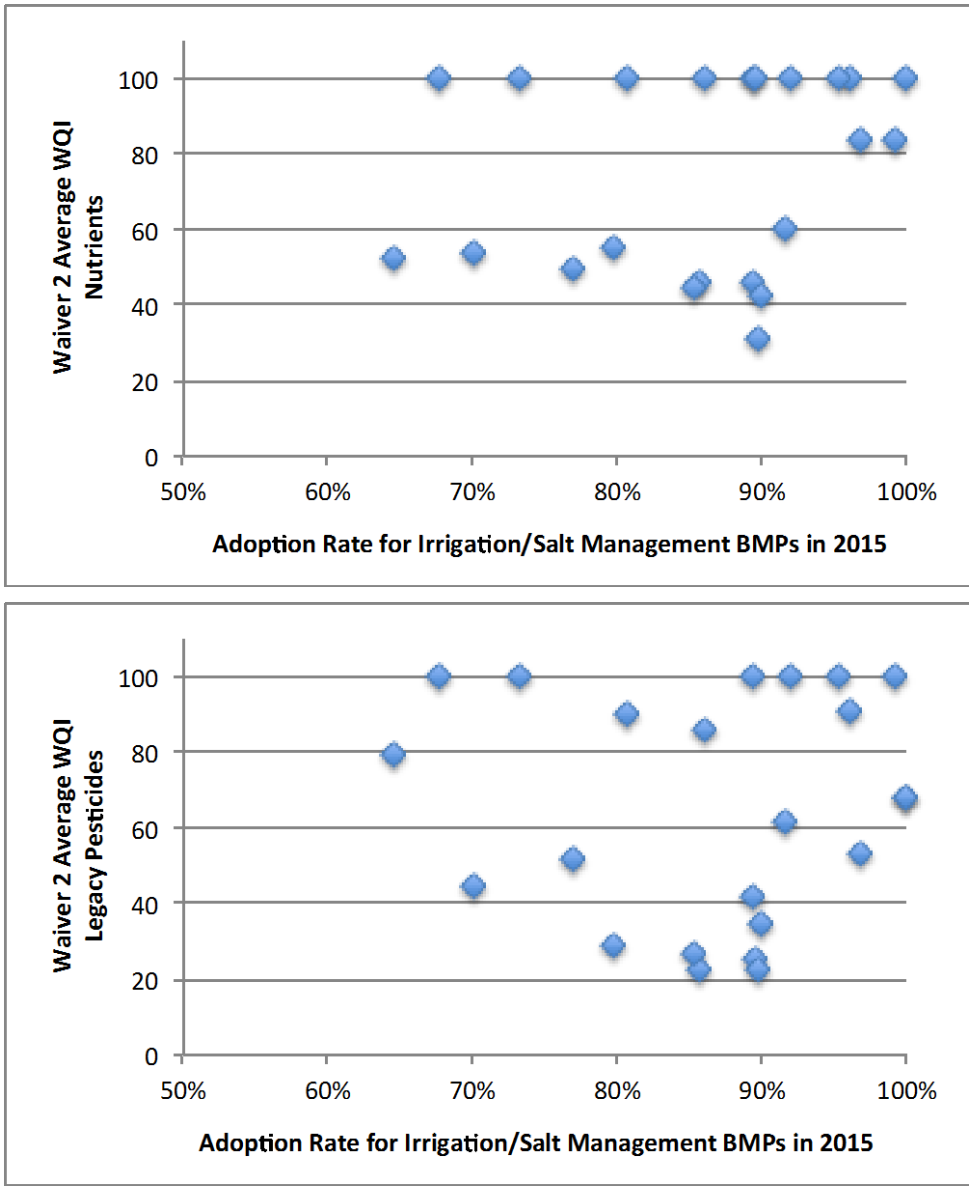


Figure 25. Relationship between Irrigation/Salt Management BMP Adoption Rates and WQIs for Nutrients (upper panel) or Legacy Pesticides (lower panel) for Agricultural Land Use Sites. WQIs are for dry weather.

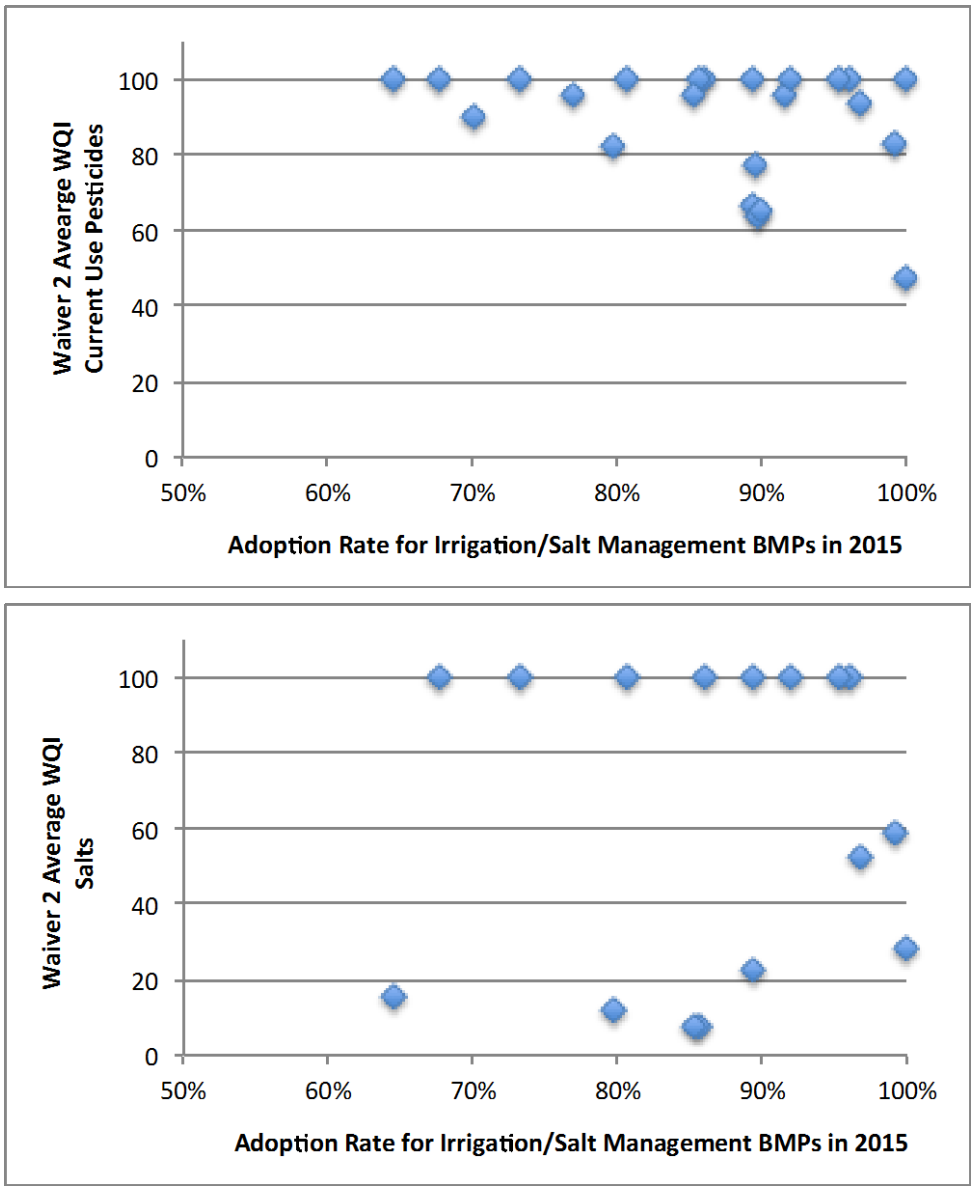


Figure 26. Relationship between Irrigation/Salt Management BMP Adoption Rates and WQIs for Current Use Pesticides (upper panel) or Salts (lower panel) for Agricultural Land Use Sites. WQIs are for dry weather.

Table 110. Ranking of Agricultural Land Use Sites based on Overall Average WQI scores for the Current Waiver. Top ranked third and lowest ranked third of sites are highlighted in green and red, respectively.

Monitoring Site	Watershed	Predominant Crop	Overall Average WQI (Mean of Analyte WQIs)	
			Dry Weather	Wet Weather
VRT_SANTO	Ventura River	Orchard	100.0	100.0
VRT_THACH	Ventura River	Orchard	100.0	100.0
06T_LONG2	Arroyo Las Posas	Orchard	100.0	77.2
05T_HONDO	Revolon Slough	Orchard	100.0	72.7
S03T_BOULD	Santa Clara River	Orchard	100.0	68.7
S02T_ELLS	Santa Clara River	Orchard	97.7	70.8
S03T_TIMB	Santa Clara River	Orchard	97.5	91.7
S03D_BARDS	Santa Clara River	Orchard	96.4	80.8
9BD_GERRY	Conejo Creek	Orchard/Sod	81.4	55.1
OXD_CENTR	McGrath Lake	Strawberries	72.5	40.2
S02T_TODD	Santa Clara River	Orchard	70.7	70.4
06T_FC_BR	Arroyo Las Posas	Orchard	67.5	61.3
05D_SANT_VCWPD	Revolon Slough	Orchard	65.7	50.7
02D_BROOM	Calleguas Creek	Orchard/Sod	62.8	61.7
S04T_TAPO	Santa Clara River	Row Crops	61.9	58.0
05D_LAVD	Revolon Slough	Orchard	61.0	56.1
01T_ODD2_DCH	Mugu Lagoon	Row Crops/Nursery	47.2	39.3
04D_WOOD	Revolon Slough	Row Crops	44.6	38.3
04D_LAS	Revolon Slough	Row Crops	44.2	33.4
07D_HITCH_LEVEE_2	Arroyo Simi	Row Crops	44.2	43.1
04D_ETTG	Revolon Slough	Row Crops	43.5	32.9
01T_ODD3_ARN	Mugu Lagoon	Row Crops/Sod	39.1	40.6

TARGETED OUTREACH PLAN

The data analysis conducted for this WQMP can be used to identify priorities for targeted outreach for the remainder of the implementation period of the current Conditional Waiver. This information is synthesized in Table 111. The results presented in Table 111 support prioritization of outreach to growers of row crops in three subwatersheds:

- Mugu Lagoon Subwatershed
- Revolon Slough Subwatershed
- Arroyo Simi Subwatershed

The proposed priorities in Table 111 do not address every problematic WQI grade observed in the network of monitoring stations, nor every under-utilized BMP category for specific subwatersheds. However, the priority drainages appear to have issues with multiple pollutants and consistent poor water quality at the agricultural land use monitoring sites available in them. For the remainder of the current WQMP implementation period, VCAILG will focus resources and staff time supporting additional BMP implementation by growers in these subwatersheds, while continuing to participate in the educational opportunities that are open to all VCAILG members to satisfy their education requirements in the Waiver. The components of the proposed targeted outreach plan are summarized below.

Table 111. Synthesis of Data to Support Priorities for Targeted Outreach

Data Leveraged	WQI Scores	WQI Scores	Watershed Breakdown of BMP Adoption Rates	BMP/WQI Scatterplots	Pesticide Use Evaluation
Associated Decision Points	**Priority Watersheds**	**Priority Pollutant Categories**	**Most Under-Utilized BMP Categories (Current Adoption Rate)**	**Priority Crop Category**	**Specific Crop/Pesticide Issues**
Proposed Priorities for Targeted Outreach	Mugu Lagoon Subwatershed	Nutrients (Dry & Wet Weather) Current Use Pesticides (Dry & Wet Weather) Legacy Pesticides (Dry & Wet Weather) [a]	Irrigation & Salinity Management (85%) Sediment Management (83%) Use of Real Time Data (76%)	Row Crops	---
	Revolon Slough Subwatershed	Salts (Dry & Wet Weather) Nutrients (Dry & Wet Weather) Current Use Pesticides (Wet Weather) Legacy Pesticides (Dry & Wet Weather)	Irrigation & Salinity Management (86%) Sediment Management (85%) Use of Real Time Data (78%)	Row Crops	Chlorpyrifos applications on cabbage and lemons may be linked to exceedances
	Arroyo Simi Subwatershed [b]	Salts (Dry Weather) Nutrients (Dry Weather) Current Use Pesticides (Wet Weather) Legacy Pesticides (Dry & Wet Weather)	Sediment Management (85%) Use of Real Time Data (78%)	Row Crops	----

[a] Salt objectives do not apply in Mugu Lagoon

[b] The only agricultural land use monitoring site in this subwatershed is 07D_HITCH_LEVEE_2, which has a very small drainage area. Consequently, there is uncertainty regarding whether agricultural runoff is likely to be an important contributor to the receiving water quality

BMP Implementation Support

During the implementation period for the this WQMP, VCAILG will provide BMP implementation support to members primarily through a $2.1 million Agricultural Water Use Efficiency Program, funded through Proposition 84 (Prop 84) monies. This project will be managed collaboratively by:

- Ventura County Watershed Protection District
- Farm Bureau of Ventura County (VCAILG)
- Fox Canyon Groundwater Management Agency
- University of California Cooperative Extension
- Ventura County Resource Conservation District (VCRCD)

The project was proposed and approved in response to the following factors:

- On January 17, 2014, the Governor of the State of California proclaimed a state of emergency due to drought conditions and called on Californians to reduce their water usage by 20 percent.
- On March 1, 2014, Governor Brown signed into law emergency drought legislation that declares that California is experiencing an unprecedented dry period and that there is a shortage of water for its citizens, local governments, agriculture, environment and other uses.
- On April 11, 2014, the Fox Canyon Groundwater Management Agency (FCGMA) enacted Emergency Ordinance E in order to protect the quantity and quality of groundwater supplies within the territory of the Agency and to prevent a worsening of conditions. The ordinance requires agricultural operators to reduce groundwater use based on an Irrigation Allowance Index which, at its simplest, is a measure of how efficient crops are irrigated.
- During this drought, water elevations in the coastal and near-coastal aquifers have dropped to near sea level in the Oxnard Plain Forebay, and further below sea level in the Oxnard Plain, Pleasant Valley and West Las Posas Basins. As water levels continue to drop to historic lows, undesirable conditions such as seawater intrusion, migration of poor quality water from marine sediments and other sources, and land subsidence may occur. These threats to groundwater, once established, are very difficult to reverse.
- Agricultural groundwater use in Ventura County is estimated to be more than 160,000 acre-feet per year (AFY). Efficient use of groundwater will save water and energy, reduce runoff and protect water quality.

This project builds on the results of the Ventura County Resource Conservation District (VCRCD) Mobile Irrigation Lab (MIL) program. The May 2015 WQMP described in detail the activities and accomplishments of the MIL program, which was developed under a previous Proposition 84 Agricultural Water Quality Grant Program. Like the earlier effort, the project team will work with landowners and farmers to improve water quality by limiting irrigation runoff and decreasing nutrient leaching, energy use, and water use. While available county-

wide, initial outreach efforts will focus on agricultural operations in the critically-stressed basins to maximize results. Once sites are selected, staff will evaluate irrigation systems effectiveness (sprinklers, microsprinklers and drip), pumps, and energy usage at the field level. A report of results will then be provided to the grower, including recommendations on technology and practices to improve distribution uniformity, energy savings, seasonal irrigation efficiency, and irrigation scheduling. Optimizing irrigation systems and their performance can have several benefits. In relation to water quality, potential benefits include: decreased amount of water applied, decreased nutrient leaching, decreased tailwater runoff, decreased fertilizer and/or pesticide applications.

As each report is site specific, this project is will match a variety of existing conditions with improvements and strategies to maximize multi-benefit results. To ensure that the improvements are implemented, the grant will reimburse up to 60% of the total cost of the physical items recommended, including pressure compensating emitters and filters, soil moisture sensors, irrigation software, drip and micro irrigation systems, valves, emitters/nozzles, irrigation controllers, and irrigation timers. Participants will also agree to maintain improvements and report results over the next ten years to validate the project's findings.

The funding level is anticipated to assist approximately 65 agricultural operations and upgrade 3,250 acres of irrigated farmland over the next two years. Based on the water saving results from the previous project, 1,820 acre-feet per year (AFY) is expected to be avoided with 910 megawatt hours of reduced energy use per year and an associated reduction in carbon dioxide emissions of 328 metric tons per year. In addition to these physically quantified benefits, other positive outcomes expected include reduced nitrogen loading due to less runoff (approximately 171 lbs/day/acre), reduced salt application from groundwater irrigation (approximately 5,444,166 pounds per year), reduced subsidence potential and educational and technology transfer benefit.

Previous MIL Program Accomplishments that Inform the Next Grant Project

In 2014, approximately 50 irrigation evaluations were performed on over 1,500 acres, primarily orchards and strawberry grower properties towards the end of the year. This exceeded the grant minimum requirement of 48 evaluations per year. The final average Low Quarter Distribution Uniformity (lqDU) for the 4 farms that are part of the cost share program was 0.94. The lqDU measures how uniformly the water is applied to an area being watered. The higher the lqDU value, the better the performance of the system. The MIL program has a target performance level of 0.85 lqDU. The growers that are part of the cost share program, the watershed their farms are located in, the BMPs implemented, the crop types addressed, and the estimated water use reductions are presented in Table 112. Four growers assisted in the cost-share program resulting in a water use reduction of approximately 200 acre feet per year. Not every farmer participating in the program seeks cost-share funding, though they may improve their system or install moisture meters to assist with irrigation scheduling as a response to the evaluation results. To capture and document these BMPs, MIL staff continues to follow-up with program participants to track improvement results.

During the program, VCRCD participated in continual outreach by hosting two educational events in coordination with VCAILG where over 200 growers attended. VCRCD also attended various grower meetings and events where over 500 growers were informed of the MIL program. Involvement in monthly meetings ensured that over 2,000 watershed stakeholders were informed about the MIL program and services provided. To advertise MIL services, posters were created

and displayed at several locations which included the Farm Bureau, the Agricultural Commissioners' office, United Water Conservation District, Casitas Water District, Camrosa Water District, and the Calleguas Municipal Water District as well as businesses which sell irrigation hardware and fertilizer throughout the county. The number of posters displayed throughout Ventura County exceeded the grant requirement of 10 locations.

Table 112. Cost Share Program Summary Information for 2014

Watershed	Irrigation BMPs Implemented	Crop Type	Estimated Water Use Reduction (AF/year)
Calleguas Creek	Irrigation system upgrades	Lemon	155
Calleguas Creek	Irrigation system upgrades	Lemon	5.3
Santa Clara River	Micro-irrigation and irrigation water management	Avocado	19.8
Calleguas Creek	Irrigation Water Management	Lemon	18

Activities For the New Round of Funding

Similar to the earlier effort, the following specific activities will be conducted collaboratively by the grant funding partners:

Advertising and outreach: Expected benefits promoted through videos, newspaper articles, water district mailings, Farm Bureau publications, partner websites, and through stakeholder meetings to recruit growers into the project. Educational workshops will also publicize project results as a way to promote increased water use efficiency and water saving technology.

Farm Selection: Targeted outreach including identification of growers in the specific areas that are most in need of improving water efficiency, survey development and deployment and team evaluation of applicants to the program. Based on the results of the WQMP and the designation of Oxnard Plain and Pleasant Valley Basins as critically stressed, operations in the Mugu Lagoon, Revolon Slough and Arroyo Simi subwatersheds will be initially targeted for participation as the most likely to reduce water use and protect water quality.

Initial Water Use Efficiency Evaluations: Site specific analysis including DU evaluations of participating growers to determine most efficacious BMP's for each situation and technical assistance and recommendations for design improvements.

Equipment Purchase and Installation: Grower will purchase, install and adopt BMP's as recommended and submit invoices for 60% reimbursement through the grant funding.

Post BMP Evaluations: Following installation of BMP's, post check of efficiency will be conducted including instruction on use of new equipment, if needed.

Further BMP Survey Data Evaluation

VCAILG does not currently plan to conduct another on-line BMP survey until the requirements in the next Waiver are established. However, the existing BMP survey database can be further mined, where appropriate, to provide additional focus to outreach efforts in the near term. For example, now that the 2015 BMP survey responses have been binned by major watersheds, it is possible to look for specific patterns in BMP use (or planned use) by greater numbers of growers in pertinent areas (previously, the adoption metrics were only available for the drainages of the agricultural land use monitoring sites). The May 2015 WQMP included identification of the ten top-ranked BMPs in terms of planned future implementation (for the County as a whole). The list is included below in Table 113. Most of the BMPs in the list involve irrigation or sediment management, and two of them concern use of real-time data. These BMP categories are also the categories that were identified as the least utilized in the priority watersheds in Table 111. Implementation support for several the BMPs in Table 113 is consistent with the scope of the recently awarded Prop 84 grant. The BMP database now allows for verification of BMP priorities within the newly identified priority subwatersheds, to support the actions taken with the grant funding.

Table 113. Top-Ranked BMPs Identified As Planned for Future Implementation

BMP	Management Category	Action Category	Planned Future Adoption		Current Adoption Rate (2015)	Description
			Reported in 2014	Reported in 2015		
1	Irrigation & Salinity Management	Cropped Area Action	23%	24%	66%	Sprinkler irrigation runoff is captured or kept on the property.
6	Irrigation & Salinity Management	Real Time Data/Testing	19%	18%	74%	Soil moisture is measured using any of the following: sensors, tensiometers, probes, irrigation monitoring service
27	Sediment Management	Uncropped Area Action	12%	16%	79%	Ditch banks are protected from erosion with vegetation, rock placement or geotextiles.
14	Nutrient Management	Testing	14%	16%	72%	Fertilizer levels in fertigation water are tested to ensure that injectors are correctly calibrated.
7	Irrigation & Salinity Management	Real Time Data/Testing	16%	15%	79%	Flow meters are used to measure actual water use and are coupled with known crop use values or other measurements to match irrigation to plant needs.
11	Irrigation & Salinity Management	Testing	14%	13%	72%	Salt leaching is performed only when necessary, as determined by measuring soil solution electrical conductivity (EC).
28	Sediment Management	Uncropped Area Action	20%	13%	72%	One or more of the following is in place to treat runoff before it leaves the property: grassed waterways, vegetated filter strips, sediment traps. tailwater recycling systems.
23	Sediment Management	Cropped Area Action	12%	13%	29%	Soil amendments, such as polyacrylamide (PAM), are used to reduce sediment movement and retain water.
2	Irrigation & Salinity Management	Testing	17%	11%	80%	At least every 5 years, the irrigation system is tested for distribution uniformity by monitoring water delivery or pressure differences within a block.
4	Irrigation & Salinity Management	Cropped Area Action	10%	10%	88%	Pressure regulators or pressure compensating emitters are used.

NEXT STEPS IN THE WQMP PROCESS

The WQMP implementation process (Figure 12) guides the iterative approach to identify and address water quality benchmark exceedances. Table 114 correlates steps identified in the WQMP implementation process flow chart to specific actions to be taken by VCAILG. It is anticipated that a 2015-2020 Conditional Waiver will be adopted in early 2016 with potentially modified requirements and guidance for what should be included in a WQMP. Therefore, implementation goals for the remainder of the current Conditional Waiver term will focus on use of the new Prop 84 grant to provide BMP assistance in the target subwatersheds identified through the data analysis herein. An extensive number of opportunities to gain education credits were offered during the course of the 2010 Waiver. These programs will resume in accordance with the new Waiver that is adopted and may also be guided by the results of the survey and monitoring data analysis.

Table 114. WQMP Implementation Tasks and Timeline*

Flow Chart Step	Task	Implementation Actions and Timeline
Gather source information and compile current management practices	Evaluate web-survey data	Analysis of the first two years of web-based survey results was included in May 2015 WQMP.
	Compile BMP information from VCRCD MIL and NRCS	Included in the May 2015 WQMP; update annually as available
	Complete a pesticide use evaluation	**Included in this WQMP**; update annually
Analyze monitoring data, source information, and current management practice information	***Develop appropriate approaches for spatial comparison of BMP survey data and water quality monitoring data***	***Included in this WQMP***
Develop outreach plan based on monitoring data and survey results	***Create outreach plan***	***Included in this WQMP***
	Contact VCAILG members through a yearly direct mailing with BMP and WQ data results	A VCAILG water quality newsletter will be sent to members monthly to inform members of needed action.
Implement BMPs and track implementation	BMP implementation by VCAILG members	Ongoing. *A new Prop 84 Grant was acquired for BMP assistance*. *VCAILG will partner with the MIL Program to provide BMP Implementation assistance in the targeted subwatersheds*.
	Tracking of BMPs by collaborating agencies	NRCS and the MIL both provide BMP implementation assistance and funding. NRCS has set application and funding cycles, whereas the MIL accepts cost share requests anytime during the grant period.
	Tracking of BMPs through the web-based BMP survey	VCAILG members will be re-surveyed for properties they own or manage based on the schedule and requirements set forth in the 2015 Waiver.

Flow Chart Step	Task	Implementation Actions and Timeline
Evaluate monitoring data for continued benchmark exceedances or improvement trends	Compare monitoring results to standard water quality and TMDL LA benchmarks	Submitted in all Annual Monitoring Reports
Evaluate BMP implementation to determine next steps	Evaluate the level of new BMP implementation since October 2010	Detailed analysis using data from the first two years of web-based survey results was included in the May 2015 WQMP. ***A new watershed-based breakdown of BMP adoption rates is included in this WQMP***. Additional BMP survey data analysis will be conducted in the near term, as needed, to support implementation of the Prop 84 grant-funded targeted outreach plan.
	Update and revise WQMP as appropriate based on an assessment of progress made and requirements of the 2015 Waiver	***Additional analysis of the results of the web-based surveys and an outreach plan based, in part, on the new analysis are included in this WQMP.***

Bold italic text corresponds to VCAILG actions that were completed between the submittal of the May 2015 WQMP and this WQMP.