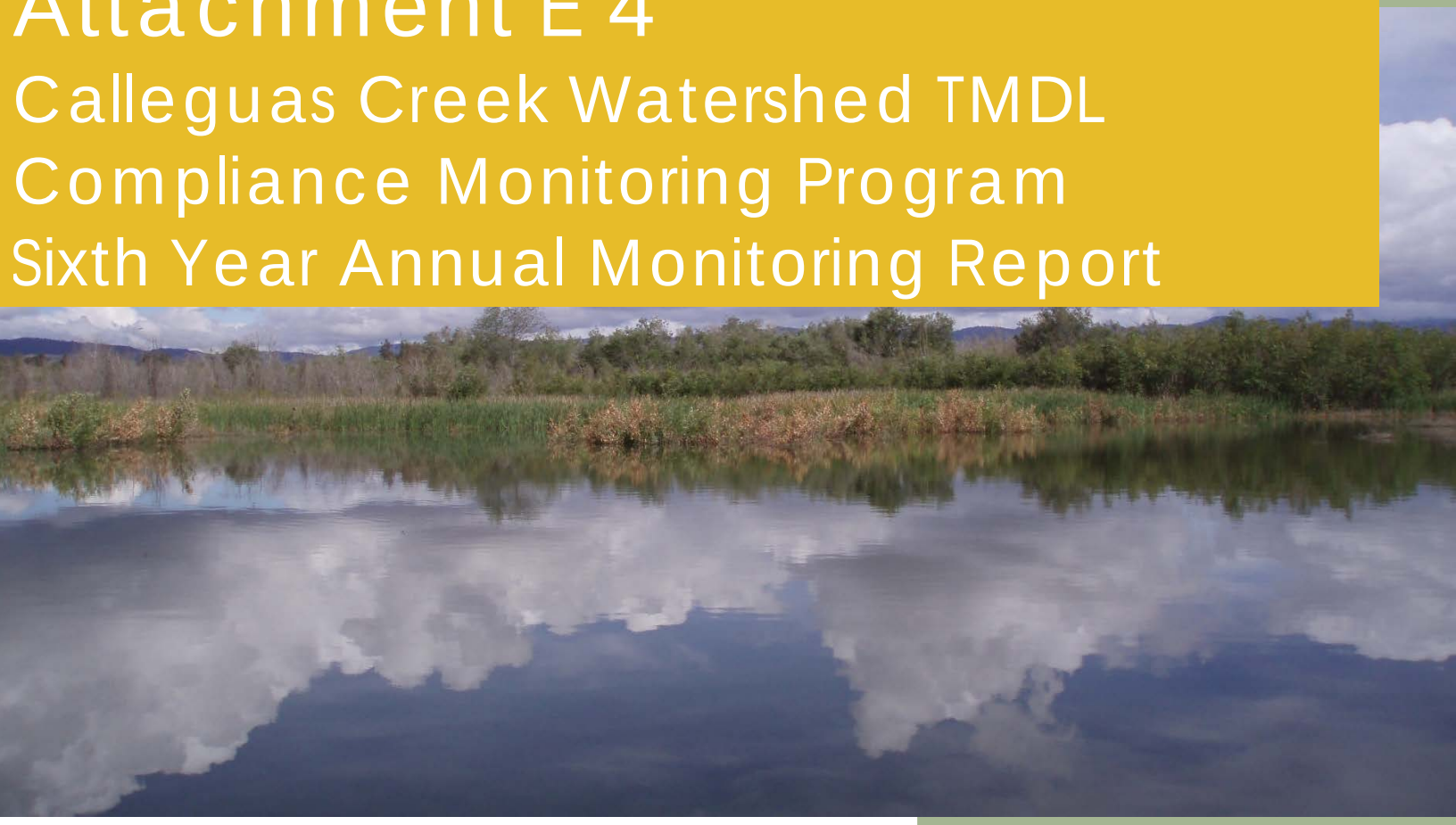
Ventura Countywide Stormwater Quality Management Program

2014-2015 Permit Year

Ventura Countywide Stormwater Quality Management Program Annual Report

Attachment E 4

Calleguas Creek Watershed TMDL Compliance Monitoring Program Sixth Year Annual Monitoring Report



Camarillo
County of Ventura
Fillmore
Moorpark
Ojai
Oxnard
Port Hueneme
Santa Paula
Simi Valley
Thousand Oaks
Ventura
Ventura County Watershed Protection District

December 14, 2015

DECEMBER 15, 2014

Calleguas Creek Watershed TMDL Compliance Monitoring Program

Sixth Year Annual Monitoring Report

Monitoring and Reporting Program for the Nitrogen and Related Effects; Organochlorine Pesticides, Polychlorinated Biphenyls and Siltation; Toxicity; Salts; and Metals and Selenium Total Maximum Daily Loads

submitted to:

LOS ANGELES REGIONAL WATER QUALITY CONTROL BOARD

prepared by:

LARRY WALKER ASSOCIATES

on behalf of the:

STAKEHOLDERS IMPLEMENTING TMDLS IN THE CALLEGUAS CREEK WATERSHED

LARRY WALKER ASSOCIATES

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Executive Summary

TOTAL MAXIMUM DAILY LOADS

There are six Total Maximum Daily Loads (TMDLs) currently effective and being implemented in the Calleguas Creek Watershed. They include:

- Nitrogen Compounds and Related Effects in Calleguas Creek (Nitrogen or Nutrients TMDL)
- Organochlorine (OC) Pesticides, Polychlorinated Biphenyls (PCBs) and Siltation in Calleguas Creek, its Tributaries, and Mugu Lagoon (OC Pesticides TMDL)
- Toxicity, Chlorpyrifos, and Diazinon in the Calleguas Creek, its Tributaries and Mugu Lagoon (Toxicity TMDL)
- Metals and Selenium in Calleguas Creek, its Tributaries, and Mugu Lagoon (Metals TMDL)
- Revolon Slough and Beardsley Wash Trash TMDL (Trash TMDL)[1]
- Boron, Chloride, Sulfate and TDS (Salts) in the Calleguas Creek, its Tributaries and Mugu Lagoon (Salts TMDL)

To address the monitoring requirements of the TMDLs, the Calleguas Creek Watershed TMDL Compliance Monitoring Program (CCWTMP) was established and a Quality Assurance Project Plan (QAPP) developed and approved by the Los Angeles Regional Water Quality Control Board (Regional Water Board) Executive Officer. The QAPP currently addresses monitoring requirements for the Nitrogen, OC Pesticides, Toxicity, and Metals TMDLs. The QAPP is being revised and will be submitted by the end of the year to incorporate the monitoring requirements for the Salts TMDL as well as recommended changes in this and previous annual monitoring reports. The Trash TMDL is addressed through a separate monitoring plan and annual monitoring report. The primary purpose of this report is to document the sixth year monitoring efforts and results of the CCWTMP for the four TMDLs currently included in the QAPP as well as the Salts TMDL.[2]

PROJECT ORGANIZATION

The CCWTMP is a coordinated effort with the various responsible parties that make up the Stakeholders Implementing TMDLs in the Calleguas Creek Watershed (Stakeholders). Stakeholders identified in the TMDLs have developed a Memorandum of Agreement (MOA) that outlines an agreement to implement the CCWTMP.

The stakeholders to the MOA for which this report fulfills the TMDL monitoring requirements are as follows:

[1] Information related to the Revolon Slough and Beardsley Wash Trash TMDL is not part of this report. The Trash TMDL annual report was submitted to the Regional Water Board on December 15, 2014.

[2] The required start of monitoring for the Salts TMDL was September 9, 2012.

- **POTWs**: consisting of Camrosa Water District, Camarillo Sanitary District, Ventura County Waterworks District No. 1, and the Cities of Simi Valley and Thousand Oaks;
- **Urban Dischargers**: consisting of the Cities of Simi Valley, Thousand Oaks, Camarillo, Moorpark and Oxnard, Ventura County Watershed Protection District, and the County of Ventura Public Works Agency;
- **Agricultural Dischargers**: consisting of the entities represented by the Ventura County Agricultural Irrigated Lands Group (VCAILG) within the Calleguas Creek Watershed, a subdivision of the Farm Bureau of Ventura County; and
- **Other Dischargers**: consisting of the U.S. Department of Navy and Caltrans.

MONITORING EVENT SUMMARIES

Sampling events required by the Nitrogen, OC Pesticides, Toxicity, and Metals TMDLs during the sixth year of TMDL monitoring included four dry-weather events (Events 39, 40, 41, and 43) and one wet weather event (Event 42). Grab samples for salts were obtained during these events, but were not used directly to determine compliance at receiving water sites.[3] Although efforts were made to sample two wet weather events, sufficient rainfall across the watershed area did not occur during the monitoring year. This is the second monitoring year during which samples from only one wet weather event were collected due to the lack of sufficient rainfall in the monitoring area. A summary of Events 39 through 43 is included in Table ES-1.

Table ES - 1. Summary of Year 6 Monitoring Events

Event	Type	Date	Mugu Lagoon			Freshwater Sites		
			Water Quality	Sediment	Tissue	Water Quality & Toxicity	Sediment Quality & Toxicity	Tissue
39	Dry	Aug 2013	X			X	X	X
40	Dry	Nov 2013	X			X		
41	Dry	Feb 2014	X			X		
42	Wet	Feb 2014	X			X		
43	Dry	May 2014	X			X		

COMPLIANCE SUMMARY

For the most part, the CCW is in compliance with the applicable interim or final WLAs and LAs currently in effect for the Nutrients, OC Pesticides, Toxicity, Salts, and Metals TMDLs. The following observations summarize the compliance status with these TMDL allocations:

- No exceedances of the interim WLAs or LAs for OC Pesticides or PCBs occurred this monitoring year.
- Exceedances of numeric targets for Nitrate-N and Nitrate-N + Nitrite-N were observed in Mugu Lagoon, Revolon Slough, Beardsley Wash, Calleguas Creek, Arroyo Las Posas,

[3] Grab samples for salts at receiving water compliance sites are used to develop statistical relationships between specific conductivity (EC) and salt constituents, which are in turn used to convert high-density EC data from continuous monitors in the field to time series of salt concentrations.

and Arroyo Simi. Most of the exceedances occurred during dry events. No exceedances of final nutrient WLAs were measured at any POTW.

- Three exceedances of the final receiving water MS4 WLAs for chlorpyrifos were measured at receiving water sites during the storm event in 2014, but not at the MS4 land use locations. However, there were no exceedances of the interim LAs. In addition, there were no exceedances of the final diazinon MS4 WLAs and interim LAs or any exceedances of the final WLAs for chlorpyrifos or diazinon at any POTW.
- Exceedances of both the interim LA and MS4 WLA for total selenium were measured at the 04_WOOD receiving water monitoring station in Revolon Slough during the four dry weather sampling events.
- Toxicity was observed at some locations in the watershed and Toxicity Identification Evaluations (TIEs) were initiated for all samples, meeting the requirements in the QAPP. As a result, the Stakeholders are in compliance with the toxicity WLAs and LAs per the requirements of the TMDL.
- In general, receiving water sites were in compliance with interim LAs and MS4 WLAs established by the Salts TMDL; the only exception being exceedances in total dissolved solids, sulfate, and boron measured at 04_WOOD in the Revolon Slough watershed. POTWs are in compliance with interim salts WLAs, with the exception of the Camarillo Water Reclamation Plant (WRP), which experienced exceedances of chloride, sulfate, and TDS. The exceedances of interim salts WLAs for the Camarillo WRP have resulted from increased influent salt concentrations due to water conservation and a shift in the composition of the water supplied within the service area. Since the process for addressing salts is a watershed effort involving significant capital investments, the Camarillo WRP has received a time schedule order to adjust the interim limits for TDS and sulfate. During the period of this annual report, application of interim limits for chloride was stayed by State Board Order 2003-0019. As a result, the interim limits in the TMDL are not the currently applicable interim limits for the Camarillo WRP discharge.

MONITORING PROGRAM CHANGES

The QAPP is currently being updated to incorporate the Salts TMDL monitoring approach. At this time the QAPP will be updated for all constituents to reflect the recommendations identified in prior annual reports and reflect monitoring adjustments that have been implemented due to field conditions. The revised QAPP will be submitted to the Los Angeles Regional Water Quality Control Board by the end of 2014.

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Introduction and Program Background

INTRODUCTION

In the Calleguas Creek Watershed (CCW), the following six total maximum daily loads (TMDLs) are currently effective and include monitoring requirements in the implementation plans:

- Nitrogen Compounds and Related Effects in Calleguas Creek (Nitrogen or Nutrients TMDL)
- Organochlorine (OC) Pesticides, Polychlorinated Biphenyls (PCBs) and Siltation in Calleguas Creek, its Tributaries, and Mugu Lagoon (OC Pesticides TMDL)
- Toxicity, Chlorpyrifos, and Diazinon in the Calleguas Creek, its Tributaries and Mugu Lagoon (Toxicity TMDL)
- Metals and Selenium in Calleguas Creek, Its Tributaries, and Mugu Lagoon (Metals TMDL)
- Revolon Slough and Beardsley Wash Trash TMDL (Trash TMDL) [1]
- Boron, Chloride, Sulfate and TDS (Salts) in the Calleguas Creek, its Tributaries and Mugu Lagoon (Salts TMDL)

To address the monitoring requirements of the TMDLs, the Calleguas Creek Watershed TMDL Compliance Monitoring Program (CCWTMP) was established and a Quality Assurance Project Plan (QAPP) developed and approved by the Los Angeles Regional Water Quality Control Board (Regional Water Board) Executive Officer. The QAPP currently addresses monitoring requirements for the Nitrogen, OC Pesticides, Toxicity, and Metals TMDLs only. The Trash TMDL is addressed through a separate monitoring plan and annual monitoring report.

The QAPP is being revised to incorporate the monitoring requirements for the Salts TMDL. A monitoring approach (Salts Plan) for the Salts TMDL was submitted by the Stakeholders Implementing TMDLs in the Calleguas Creek Watershed (Stakeholders) to the Regional Water Board in June 2009, which was conditionally approved in September 2011. Compliance monitoring for the Salts TMDL was required starting September 9, 2012.

The primary purpose of this report is to document the sixth year monitoring efforts (July 2013 to June 2014) and results of the CCWTMP for the four TMDLs currently included in the QAPP and the second year of compliance monitoring for the Salts TMDL. The report includes summaries of the sampling events, data summaries, trends analysis, and a compliance assessment. The report is divided into the following sections:

- Introduction and Program Background
- Monitoring Program Structure
- Monitoring Data Summary
- Data Trends

[1] Information related to the Revolon Slough and Beardsley Wash Trash TMDL is not part of this report. The Trash TMDL annual report will be submitted to the Regional Water Board on December 15, 2014.

- Compliance Analysis and Discussion
- Revisions and Recommendations

In addition, there are several appendices included with this report and several attachments (electronic data files) associated with this report, including:

- Appendices (text documents)
    - Appendix A: Monitoring Event Summaries for Toxicity, OC Pesticides, Nutrients, Metals, and Salts TMDLs
    - Appendix B: Calibration Event Summary for Salts TMDL
    - Appendix C: Salts Rating Curves and Surrogate Relationships
    - Appendix D: Toxicity Testing and Toxicity Identification Evaluations Summary
    - Appendix E: Laboratory Quality Assurance/Quality Control Results and Discussion
- Attachments (electronic data files)
    - Attachment 1: Toxicity Data
    - Attachment 2: Monitoring Data
    - Attachment 3: Salts Mean Daily Flows: July 2013 to June 2014
    - Attachment 4: Chain-of-Custody Forms

PROJECT ORGANIZATION

The CCWTMP is a coordinated effort where the various responsible parties identified in the TMDLs have developed a Memorandum of Agreement (MOA) that outlines an agreement to implement the CCWTMP. The responsible parties identified in the organizational structure have formally joined together to fulfill their monitoring requirements as outlined in the Basin Plan Amendments (BPAs) for the four TMDLs included in the QAPP and Salts.

The CCWTMP is intended to fulfill the monitoring requirements for only those stakeholders that are part of the MOA and/or identified by the participants of the MOA. The stakeholders to the MOA for which this report fulfills the TMDL monitoring requirements are as follows:

- **POTWs**: consisting of Camrosa Water District, Camarillo Sanitary District, Ventura County Waterworks District No. 1, and the Cities of Simi Valley and Thousand Oaks;
- **Urban Dischargers**: consisting of the Cities of Simi Valley, Thousand Oaks, Camarillo, Moorpark and Oxnard, Ventura County Watershed Protection District, and the County of Ventura Public Works Agency;
- **Agricultural Dischargers**: consisting of the entities represented by the Ventura County Agricultural Irrigated Lands Group (VCAILG) within the Calleguas Creek Watershed, a subdivision of the Farm Bureau of Ventura County; and
- **Other Dischargers**: consisting of the U.S. Department of the Navy and the California Department of Transportation (Caltrans).

Per the MOA, a Management Committee, consisting of one representative each from the POTWs, Urban Dischargers and Other Dischargers groups, and two representatives from the Agricultural Dischargers group, oversees the CCWTMP and makes decisions to assure the CCWTMP is carried out in a timely, accountable fashion.

Prior to the initiation of the first required sampling event in 2008, the Stakeholders contracted the day-to-day management of the CCWTMP activities and field sampling activities. The following contractors performed the following tasks during the sixth year monitoring effort:

- **General Project Management** - Larry Walker Associates, Inc. (LWA)
- **Field Monitoring Activities**
    - **Mugu Lagoon Water Quality Sampling** - MBC Applied Environmental Sciences (MBC)
    - **Freshwater Water Quality/Sediment Sampling** - Kinnetic Laboratories, Inc. (KLI), Fugro West, Inc. (Fugro), LWA
    - **Freshwater Fish Tissue** – Cardno ENTRIX
    - **Bird Egg Collection** – Naval Base Ventura County Environmental Staff
- **Water, Sediment, and Tissue Chemistry Analysis** - Physis Environmental Laboratories, Inc. (Physis)
- **Salts Chemistry Analysis** - Fruit Growers Laboratory, Inc. (FGL) and Physis
- **Toxicity Analysis** - Pacific Eco Risk Laboratories (PacEco)

The aforementioned contractors performed all the management activities and sampling efforts covered by this annual report. All field contractors are the same as used in last year's sampling efforts. As the monitoring program moves forward this list of contractors may continue to be amended to reflect new contractors hired on to perform required or new duties per the decision of the Stakeholders in the CCW.

WATERSHED BACKGROUND

Calleguas Creek drains an area of approximately 343 square miles from the Santa Susana Pass in the east to Mugu Lagoon in the southwest. 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 watershed, which is elongated along an east-west axis, is approximately thirty miles long and fourteen miles wide. The Santa Susana Mountains, South Mountain, and Oak Ridge form the northern boundary of the watershed; the southern boundary is formed by the Simi Hills and Santa Monica Mountains. Figure 1 depicts the CCW and Table 1 presents the reaches of the CCW as identified in the TMDLs covered by the CCWTMP.

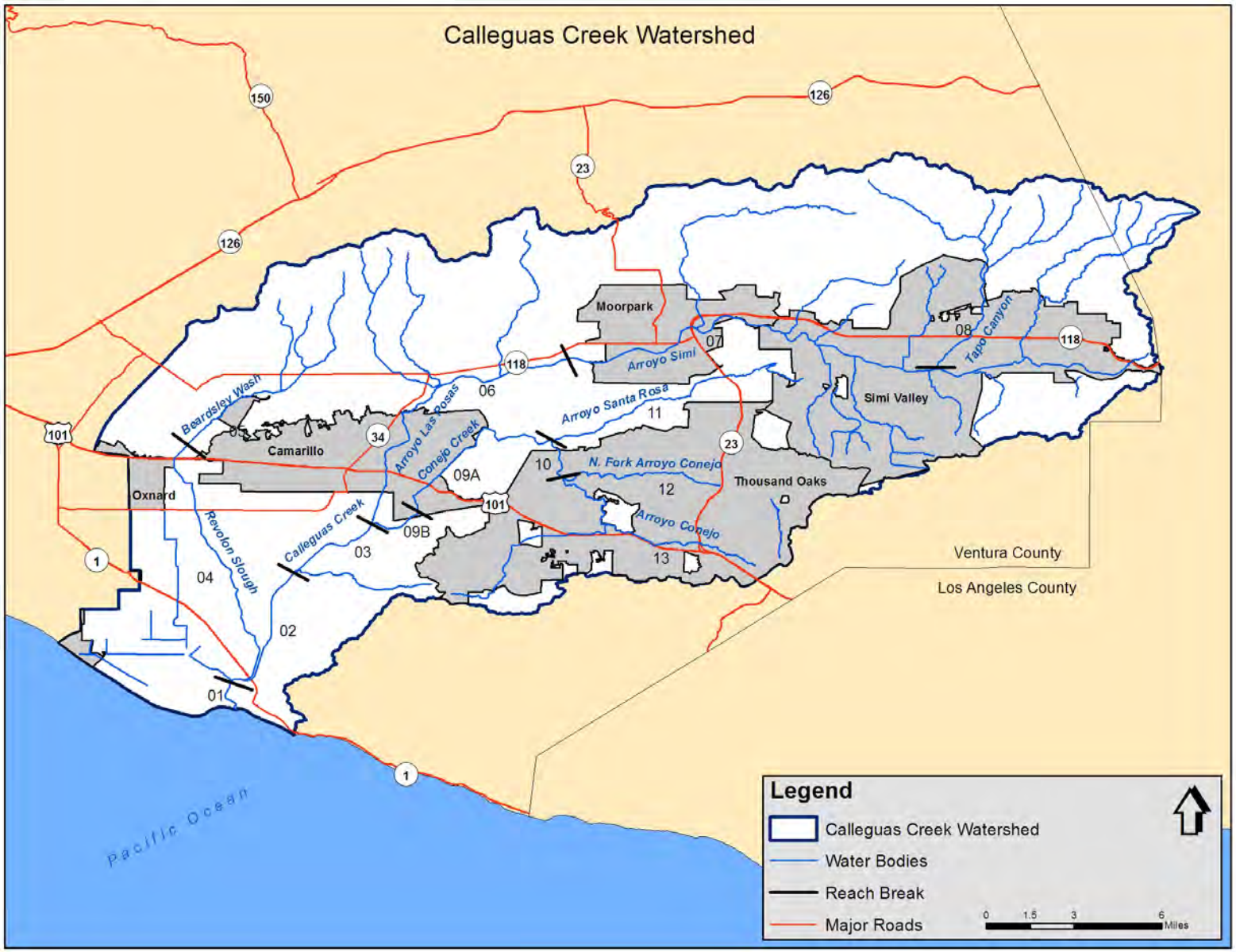


Figure 1. Calleguas Creek Watershed

Table 1. Description of Calleguas Creek Watershed Reaches

Reach No.	Reach Name	Subwatershed	Geographic Description
1	Mugu Lagoon	Mugu	Lagoon fed by Calleguas Creek
2	Calleguas Creek (Estuary to Potrero Rd.)	Calleguas	Downstream (south) of Potrero Rd
3	Calleguas Creek (Potrero Rd. to Conejo Creek)	Calleguas	Potrero Rd. upstream to confluence with Conejo Creek
4	Revolon Slough	Revolon	Revolon Slough from confluence with Calleguas Creek to Central Ave
5	Beardsley Channel	Revolon	Revolon Slough upstream of Central Ave.
6	Arroyo Las Posas	Las Posas	Confluence with Calleguas Creek to Hitch Road
7	Arroyo Simi	Arroyo Simi	End of Arroyo Las Posas (Hitch Rd) to headwaters in Simi Valley.
8	Tapo Canyon Creek	Arroyo Simi	Confluence w/ Arroyo Simi up Tapo Canyon to headwaters
9B [1]	Conejo Creek (Camrosa Diversion to Arroyo Santa Rosa)	Conejo	Extends from the confluence with Arroyo Santa Rosa downstream to the Conejo Creek Diversion.
9A [1]	Conejo Creek (Calleguas Creek to Camrosa Diversion)	Conejo	Extends from Conejo Creek Diversion to confluence with Calleguas Creek.
10	Hill Canyon reach of Conejo Creek	Conejo	Confluence with Arroyo Santa Rosa to confluence with N. Fork; and N. Fork to just above Hill Canyon WTP
11	Arroyo Santa Rosa	Conejo	Confluence with Conejo Creek to headwaters
12	North Fork Conejo Creek	Conejo	Confluence with Conejo Creek to headwaters
13	Arroyo Conejo (South Fork Conejo Creek)	Conejo	Confluence with N. Fork to headwaters —two channels

1. In the 2012 updates to the Los Angeles Region Basin Plan, the reach designations for 9A and 9B were switched.

MONITORING QUESTIONS

The purpose of the CCWTMP is to direct the monitoring activities conducted to meet the requirements of the TMDLs effective for the CCW, excluding the Trash TMDL. The goals of the CCWTMP include:

- To determine compliance with numeric targets, waste load and load allocations, and interim load reduction milestones.
- To test for sediment toxicity at sediment monitoring stations.
- To identify causes of unknown toxicity.
- To generate additional land use runoff data to better understand pollutant sources and proportional contributions from various land use types.

- To monitor the effect of implementation actions by urban, POTW, and agricultural dischargers on in-stream water, sediment, fish tissue quality, and watershed balances (salts).
- To implement the program consistent with other regulatory actions within the CCW.

The CCWTMP is intended to answer the following monitoring questions to meet the goals of the program:

- Are numeric targets and allocations met at the locations indicated in the TMDLs?
- Are conditions improving?
- What is the contribution of constituents of concern from various land use types?

MONITORING PROGRAM DESCRIPTION

The CCWTMP was developed to address all necessary TMDL monitoring requirements and answer the monitoring questions mentioned previously using the following monitoring elements.

Required Monitoring Elements

The following environmental monitoring elements are required by the TMDLs' BPAs and are included in the CCWTMP:

- General water and sediment quality constituents;
- Water column and sediment toxicity;
- Metals and selenium in water, sediment, fish tissue, and bird eggs;
- Organic compounds in water, sediment, and fish tissue; and,
- Nitrogen and phosphorus compounds in water.
- Continuous salt concentrations and flow (the latter only at Salts TMDL receiving water compliance sites)

Table 2 lists the constituents for which analyses are conducted. Table 2 also provides a summary of sampled constituent groups and sampling frequency. The QAPP outlines, in detail, the justification of the process design, specific methodologies (both field and analytical), and quality assurance/quality control (QA/QC) procedures.

Table 2. Constituents and Monitoring Frequency for CCWTMP (varies by site)

Constituent	Frequency
Chronic Aquatic Toxicity	Quarterly + Two wet events
General Water Quality Constituents (GWQC)	Quarterly based on location + Two wet events
Flow, pH, Temperature, Dissolved Oxygen, Conductivity, Total Suspended Solids (TSS), Hardness (at freshwater sites where metals samples are collected), and Dissolved Organic Carbon (at saltwater sites where metals samples are collected)	
Nutrients	Quarterly
Ammonia Nitrogen, Nitrate Nitrogen, Nitrite Nitrogen, Organic Nitrogen, Total Kjehdahl Nitrogen (TKN), Total Phosphorus, Orthophosphate-P	
Organic Constituents In Water	Quarterly + Two wet events
OC Pesticides [1] and PCBs [2], OP [3], Triazine [4], and Pyrethroid [5] Pesticides	
Metals and Selenium In Water [6]	Quarterly + Two wet events [7]
Copper, Mercury, Nickel, Zinc, and Selenium [8]	
Salts	
Electrical Conductivity (EC) and Discharge	Receiving water: Continuous (via in-situ sensors for EC and depth) plus monthly grabs for EC and discharge for sensor calibration
Total Dissolved Solids (TDS), Sulfate, Chloride, Boron	Receiving water: Continuous (derived from EC/salt relationships) Other sites: Quarterly + Two wet events
Chronic Sediment Toxicity	Annually (Every three years in Lagoon)
General Sediment Quality Constituents (GSQC)	Annually (Every three years in Lagoon)
Total Ammonia, Percent Moisture, Grain Size Analysis, Total Organic Carbon (TOC)	
Organic Constituents In Sediment	Annually (Every three years in Lagoon)
OC Pesticides[1] and PCBs[2], OP Pesticides[3], and Pyrethroids[5]	

Table 2. Constituents and Monitoring Frequency for CCWTMP (varies by site) - continued

Additional Constituents For Mugu Lagoon Sediment	Every three years
Metals[9]	
Tissue	Annually (Every three years in Lagoon)
Percent Lipids, OC Pesticides[1] and PCBs[10], OP Pesticides[3], and Metals[11]	

1. OC Pesticides considered: aldrin, alpha-BHC, beta-BHC, gamma-BHC (lindane), delta-BHC, chlordane-alpha, chlordane-gamma, 2,4'-DDD, 2,4'-DDE, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, endosulfan I and II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, and toxaphene
2. PCBs in water and sediment considered: Aroclors identified in the CTR (1016, 1221, 1232, 1242, 1248, 1254, and 1260).
3. OP Pesticides considered: chlorpyrifos, diazinon, and malathion. Chlorpyrifos is the only OP pesticide that will be measured in tissue, as it is the only OP listed in tissue.
4. Triazine Pesticides considered: atrazine, prometryn, and simazine. Analysis of triazines ceased during year 3 following the recommendation being included in the Revisions and Recommendations section of both the year 1 and year 2 annual reports.
5. Pyrethroid Pesticides considered: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, and permethrin
6. Copper, mercury, nickel, selenium and zinc will be measured as dissolved and total recoverable.
7. Per the Metals TMDL BPA requires that "In-stream water column samples will be collected monthly for analysis of general water quality constituents (GWQC) and, copper, mercury, nickel, selenium, and zinc for the first year. After the first year, the Executive Officer will review the monitoring report and revise the monitoring frequency as appropriate." Monthly monitoring will be suspended until such time as the Executive Officer has reviewed the monitoring report and considered revisions to the monitoring frequency. Until the Executive Officer has considered the frequency, metals will be collected quarterly in conjunction with the other TMDLs.
8. Monitoring at sites in Mugu Lagoon other than at the Ronald Reagan Bridge for metals is an optional element.
9. Includes arsenic, cadmium, copper, lead, mercury, nickel, selenium and zinc. Arsenic, lead, and cadmium are included in addition to constituents required in the Metals TMDL as they have been found in previous sediment studies conducted in Mugu Lagoon to exceed guideline values used to interpret the relationship between sediment chemistry and biological impacts.
10. PCBs in tissue considered: individual congers.
11. Mercury and Selenium will be measured in fish tissue and bird eggs.

Optional Monitoring Elements

The QAPP outlines the optional monitoring efforts, all of which are considered above and beyond what is necessary to meet the requirements of the BPAs and answer the monitoring questions.

Table 3 lists the constituents and analyses that are considered optional for the CCWTMP. Monitoring for the constituents and conducting the analyses are not BPA requirements but are important to meeting general program goals and answering program questions. Table 3 also provides a general sampling frequency for each constituent group.

Table 3. Optional Constituents and Monitoring Frequency for CCWTMP (varies by site)

Constituent	Frequency
Organic Constituents in Water – Grain Size Fractions [1]	One wet event annually
OC Pesticides and PCBs, OP, Triazine [2], and Pyrethroid Pesticides	
Organic Constituents in Sediment – Grain Size Fractions [1]	Annually (Every three years in Mugu Lagoon)
OC Pesticides and PCBs, OP, Triazine [2], and Pyrethroid Pesticides	
Additional Constituents for Mugu Lagoon Sediment	Every three years [3]
Macrobenthic community assessment	
Sediment Toxicity – Embryo *Mytilus edulis* or *Crassostrea gigas*	

1. Please see Table 2 for a list of individual constituents in each suite.
2. Analysis of triazines ceased during year three following the recommendation being included in the Revisions and Recommendations section of both the year one and year two annual reports.
3. Mugu Lagoon assessments were conducted during the first and fourth years of monitoring.

Special Studies

The Nitrogen, Toxicity, OC Pesticides, Salts, and Metals TMDL Implementation Plans identify required and optional special studies to investigate a range of issues. No specific special studies results are incorporated into this annual report summary at this time as the results of all special studies conducted to date have been submitted as separate reports. Data gathered during special study specific sampling may also be utilized to further answer not only the special studies questions, but also be applied to the overall CCWTMP goals and questions identified previously in this report.

Monitoring Program Structure

As outlined previously, the CCWTMP covers a broad range of TMDL monitoring requirements, including both required and optional efforts. The overall structure of these requirements per each event can be broken down into two categories: (1) compliance monitoring and (2) investigation monitoring. Compliance monitoring sites are typically located in receiving water bodies where 303(d) listings occur, and are considered points of compliance measurements. The investigational sites are located throughout the watershed, and include monitoring of drain outfalls. The purpose of these sites is not to measure compliance, but to assist with evaluating land use specific contributions of various constituents to the watershed.

The CCWTMP effort is also divided into two monitoring efforts: (1) required dry weather monitoring and (2) wet weather storm water monitoring. The following sections describe, in detail, the basis for each monitoring effort, starting with the definitions of the compliance monitoring sites and investigation monitoring sites. Specific monitoring efforts associated with each sample site are included, including the frequency of sampling by site for both dry weather and wet weather events. The sampling frequency and the constituents monitored for at the sites covered by the CCWTMP vary. A more detailed description of each topic covered can be found in the appropriate element of the QAPP, including standard operating procedures (SOPs) for field collection and sample handing techniques, and analytical procedures and protocols including minimum detection limit (MDL) and reporting limit (RL) requirements.

COMPLIANCE MONITORING

Compliance Monitoring for Toxicity, OC Pesticides, Metals, Nitrogen, and Salts TMDLs

For compliance monitoring to address the Toxicity, OC Pesticides, Metals and Nitrogen TMDLs, dry weather in-stream water column samples were collected quarterly for water column toxicity, general water quality constituents (GWQC), target organic constituents, metals, and nutrients. Target organic constituents for the OC Pesticides TMDL include the OC Pesticides and PCBs listed as a footnote in Table 2. Target organic constituents for the Toxicity TMDL include the OP and pyrethroid pesticides listed as a footnote in Table 2. Target metals for the Metals and Selenium TMDL are listed as a footnote in Table 2.

In-stream water column samples to measure compliance for the Toxicity, OC Pesticides, and Metals TMDLs are generally collected at the base of each of the subwatersheds used to assign waste load and load allocations, per the BPAs.[1] In-stream water column samples to measure compliance for the Nitrogen TMDL are generally collected at the base of each listed reach. Toxicity Identification Evaluations (TIEs) are conducted on toxic samples as outlined in the Toxicity Testing and TIE section of the QAPP and results of these are discussed in the Toxicity Testing and TIE Evaluations Summary section of this report.

In-stream water column grab samples for salts were also collected quarterly during dry weather and once during wet weather at the base of each of the subwatersheds specified in the Salts

[1] The QAPP includes an optional metals monitoring element to monitor additional sites in Mugu Lagoon.

TMDL.[2] The grab sample results are used to develop statistical relationships between salt constituents and EC. These relationships are used to convert high frequency EC-sensor data to time-series of salt concentrations. Compliance with interim dry weather salt allocations is determined using monthly mean salt concentrations for dry weather developed from the time-series of data.

Additionally, POTW effluent was monitored for compliance with the effluent limits presented in the Toxicity, OC Pesticides, Metals, and Salts TMDL BPAs. Currently, POTWs collect data required by each of their individual monitoring requirements. For additional TMDL constituents not currently sampled by the plants, CCWTMP crews perform sampling as necessary (efforts vary by plant and constituent group). All CCWTMP-required data for POTWs are compiled in this report.

All efforts were made to include two wet weather water sampling events for compliance monitoring for the OC Pesticides, Toxicity, Metals, and Salts TMDLs during targeted storm events between October and April. Due to the unusually dry conditions during the monitoring year, only one storm event was captured.

Streambed sediment samples, collected annually in the freshwater portion of the watershed, were collected during the first event of this monitoring year and analyzed for sediment toxicity, general sediment quality constituents (GSQC), and target organics. Sediment samples in Mugu Lagoon are only to be collected every three years per the approved QAPP. Samples were collected and reported in years one and four; the next sediment sampling in Mugu Lagoon will take place in year seven.

Similar to the sediment sampling frequency, fish tissue samples were collected in the freshwater portions of the watershed in August 2013, and will continue to be collected annually for the CCWTMP. Fish tissue and mussel samples were collected in Mugu Lagoon during the first and fourth years of monitoring and will continue to be collected every three years.

INVESTIGATION MONITORING

Investigation monitoring focuses on identifying the contribution of constituents of concern from various land uses in the watershed and areas where toxicity has been observed to occur in the past that are not addressed by compliance monitoring. These sites are meant to compliment compliance monitoring efforts, fill data gaps where identified, and assist in identification of sources of constituents that may be leading to non-compliant conditions. The following describes the various types of investigation sites sampled during this reporting period.

Land Use Discharge Investigation

Land use discharge samples are generally collected concurrently (on the same day when possible) with compliance monitoring at representative agricultural and urban discharge sites generally located in each of the subwatersheds and analyzed for selected GWQC, metals, and target organic constituents (constituents monitored per site varies based upon sub-watershed).

[2] The goal is to sample two wet weather events per monitoring year; however, only one storm was predicted that met the thresholds for monitoring.

Toxicity Investigation

As significant mortality had not occurred at the two sediment toxicity investigation sites during the first three years of the CCWTMP, ceasing investigation monitoring was recommended in the third year annual report. Toxicity testing at the investigation sites ceased until event 38, when it was resumed to support delisting of the identified reaches. Sediment toxicity investigation monitoring for delisting did not take place during year six sampling. However, the year-six samples were analyzed for a suite of constituents (general chemistry, general nutrients, metals, PCBs, OC pesticides, OP pesticides, and pyrethroid pesticides), particle size distribution, and total organic carbon.

Water column toxicity sampling for year six occurred during four events for each of the two investigation sites. However, toxicity testing could not be completed for Event 41 due to a laboratory issue with the test organisms. The normal annual sampling frequency for this investigation is provided in Table 6.

SAMPLING SITES

The QAPP details the justification and rationale for each of the sites sampled via the CCWTMP. Information on compliance monitoring sites, land use sites, and sample collection frequency is presented in Table 4 and Table 5. The general locations of the receiving water compliance monitoring sites (excluding Mugu Lagoon) for water, sediment, and fish tissue are presented in Figure 2 through Figure 4. The POTW effluent discharge sites are presented in Figure 5. The sampling sites in each figure are designated by sampled constituent group. The compliance monitoring sampling zones for sediment sampling and tissue sampling in Mugu Lagoon are shown in Figure 6 and Figure 7, respectively.

The non-Mugu Lagoon water and sediment toxicity investigation sampling sites coincide with current and previous sampling programs in the CCW. Water and sediment toxicity investigation sampling sites and sampling frequency are presented in Table 6, while the general locations of the water and sediment toxicity investigation sampling sites in the CCW are presented in Figure 8. Land use monitoring sites are shown in Figure 9.

The salt monitoring sites correspond with compliance sites or land use sites already included in the QAPP for monitoring related to other TMDLs (Figure 2) with two exceptions:

1. One of the salt compliance points is only used for salt monitoring (Conejo Creek at Baron Brothers Nursery), and thus is not currently described in the QAPP.
2. The continuous monitoring equipment (and the location of salt grab samples) for the Simi subwatershed was installed just downstream of the Tierra Rejada bridge, and is referred to as “07_TIERRA”.

The CCWTMP efforts summarized in the annual report correspond to the sites and locations listed below. As this program progresses, the number and location of sites may be revised if existing sites become inaccessible, if it is determined that alternative locations are needed, or if the number of land use stations needed to appropriately characterize discharges needs modification.

Table 4. CCWTMP Compliance Monitoring and Nutrient Investigation Sites Annual Sampling Frequency

Sub-Wat.	Site Id	Reach	Site Location	GPS Coordinates		Water [1, 2]						Sediment			Tissue [3]	
				Lat	Long	Tox	Pests/ PCBs	Nut	Metal	Salts	GWQC	Tox	Pests /PCBs	Metal	Pests/ PCBs	Metal [4]
Mugu Lagoon	01_RR_BR	1	Ronald Reagan St Bridge	34.1090	-119.0916	6	6	6	6	NA	6	NA	NA	NA	NA	NA
	01_BPT_3	1	Located In Eastern Arm	General site locations are provided as each site represents a generalized sample collection zone in which a sample will be collected.		NA	NA	NA	NA	NA	NA	Once Every Three Years				
	01_BPT_6	1	Located In Eastern Part Of Western Arm			NA	NA	NA	NA	NA	NA					
	01_BPT_14	1	Located In The Central Part Of The Western Arm			NA	NA	NA	NA	NA	NA					
	01_BPT_15	1	Located Between Estuary and Mouth of Lagoon			NA	NA	NA	NA	NA	NA					
	01_SG_74	1	Located In Western Part of Central Lagoon			NA	NA	NA	NA	NA	NA					
	Central Lagoon	1	Sampled In Central Lagoon			NA	NA	NA	NA	NA	NA				Once Every Three Years	
	Western Arm	1	Sampled In Western Arm Of The Lagoon			NA	NA	NA	NA	NA	NA					
Revolon Slough	04_WOOD [5]	4	Revolon Slough East Side Of Wood Road	34.1698	-119.0958	6	6	6	6	6	6	1	1	NA	1	1
	05_CENTR	5	Beardsley Wash at Central Avenue	34.2300	-119.1128	NA	NA	6	NA	NA	6	NA	NA	NA	NA	NA
Calleguas	02_PCH	2	Calleguas Creek NE Side of Hwy 1 Bridge	34.1119	-119.0818	NA	NA	4	NA	NA	4	NA	NA	NA	NA	NA
	03_UNIV	3	Calleguas Creek At Camarillo Street	34.1795	-119.0399	6	6	6	6	6	6	1	1	NA	1	NA
	03D_CAMR [6]	3	Camrosa Water Reclamation Plant	34.1679	-119.0530	4	4	4	4	4	4	NA	NA	NA	NA	NA
	9A_HOWAR [7]	9B [7]	Conejo Creek At Howard Road Bridge	34.1931	-119.0025	NA	NA	6	NA	6	NA	NA	NA	NA	NA	NA
	9AD_CAMA [7]	9B [7]	Camarillo Water Reclamation Plant	34.1938	-119.0017	4	4	4	4	4	4	NA	NA	NA	NA	NA
Conejo	9B_ADOLF [7]	9A [7]	Conejo Creek At Adolfo Road	34.2137	-118.9894	6	6	6	NA	NA	6	NA	1	NA	1	NA

Sub-Wat.	Site Id	Reach	Site Location	GPS Coordinates		Water [1, 2]						Sediment			Tissue [3]	
				Lat	Long	Tox	Pests/ PCBs	Nut	Metal	Salts	GWQC	Tox	Pests /PCBs	Metal	Pests/ PCBs	Metal [4]
Conejo	10_GATE	10	Conejo Creek Hill Canyon Below N Fork	34.2178	-118.9281	NA	NA	6	NA	NA	6	NA	NA	NA	NA	NA
	10D_HILL	10	Hill Canyon Wastewater Treatment Plant	34.2113	-118.9218	4	4	4	4	4	4	NA	NA	NA	NA	NA
	12_PARK	12	Conejo Creek North Fork above Hill Canyon	34.2144	-118.915	NA	NA	4	NA	NA	4	NA	NA	NA	NA	NA
	13_BELT	13	Conejo Creek S Fork Behind Belt Press Building	34.2078	-118.9194	NA	NA	4	NA	NA	4	NA	NA	NA	NA	NA
	9B_BARON [7]	9A [7]	Conejo Creek at Baron Brothers Nursery	34.2365	-118.9643	NA	NA	NA	NA	6	NA	NA	NA	NA	NA	NA
Las Posas	06_SOMIS	6	Arroyo Las Posas Off Somis Road	34.2540	-118.9925	6	6	6	NA	NA	6	NA	1	NA	1	NA
	06D_MOOR [6]	6	Ventura County Wastewater Treatment Plant	34.2697	-118.9357	4	4	4	4	4	4	NA	NA	NA	NA	NA
Arroyo Simi	07_HITCH	7	Arroyo Simi East Of Hitch Boulevard	34.2716	-118.9234	6	6	6	NA	NA	6	NA	1	NA	1	NA
	07_TIERRA	7	Arroyo Simi downstream from Tierra Rejada Blvd.	34.2701	-118.9058	NA	NA	NA	NA	6	NA	NA	NA	NA	NA	NA
	07_MADER	7	Arroyo Simi at Madera Ave.	34.2778	-118.7958	NA	NA	6	NA	NA	6	NA	NA	NA	NA	NA
	07D_SIMI	7	Simi Valley Water Quality Control Plant	34.2848	-118.8128	4	4	4	4	4	4	NA	NA	NA	NA	NA

NA – Not Analyzed

Tox – Samples will be analyzed for toxicity and OP and pyrethroid pesticides as listed in Table 2. Toxicity in water will not be analyzed at 01_RR_BR or at the POTWs.

Pests/PCBs – Samples will be analyzed for OC pesticides and PCBs as listed in Table 2. Chlorpyrifos will be analyzed in tissue at 04_WOOD as it is on the 303(d) list for this reach.

Nut – Samples will be analyzed for Nutrients as listed in Table 2.

Metal – Samples will be analyzed for Metals as listed in Table 2.

GWQC – Samples will be analyzed for General Water Quality Constituents as listed in Table 2.

1. Sites listed for 6 sampling events per monitoring year refers to 4 quarterly dry events and the attempt to sample 2 additional wet events..
2. Grab samples for salts at compliance sites are not directly used to determine compliance with salts WQOs, but are used to develop statistical relationships between EC and salt constituents (Appendix C).
3. Tissue samples will be collected in the same location as water and sediment samples. Samples may be collected elsewhere if no fish are found at pre-established sample stations.
4. Bird egg samples will be collected and analyzed for mercury and selenium in the Mugu Lagoon subwatershed.
5. TIEs will not be performed at 04_WOOD.
6. The Camrosa Water Reclamation Plant and the Ventura County Wastewater Treatment Plant are not currently discharging. However, these sites are included in case they must be sampled at a later date.
7. 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.

Table 5. CCWTMP Land Use Monitoring Sites and Sample Frequency

Sub-Wat.	Site ID	Reach	Site Type [1]	Site Location	GPS Coordinates		Pests/ PCBs	Nutrients	Metal	Salts	GWQC
					Lat	Long					
Mugu Lagoon	01T_ODD2_DCH	1	Ag	Duck Pond/Mugu/Oxnard Drain #2 S. of Hueneme Rd	34.1395	-119.1185	6	6	6	NA	6
Revolon Slough	04D_WOOD	4	Ag	Agricultural Drain on E. Side of Wood Rd N. of Revolon	34.1708	-119.0963	6	6	6	6	6
	05D_SANT_ VCWPD	5	Ag	Santa Clara Drain at VCWPD Gage 781 prior to confluence with Beardsley Channel	34.2426	-119.1137	6	6	6	NA	6
	04D_VENTURA	4	Urban	Camarilo Hills Drain at Ventura Blvd and Las Posas Rd at VCWPD Gage 835	34.2162	-119.0685	6	NA	6	6	6
Calleguas	02D_BROOM	2	Ag	Discharge to Calleguas Creek at Broome Ranch Rd.	34.1433	-119.0713	6	6	6	NA	6
Conejo	9BD_GERRY [2]	9A [2]	Ag	Drainage ditch crossing Santa Rosa Rd at Gerry Rd	34.2358	-118.9446	6	6	6	6	6
	9BD_ADOLF [2]	9A [2]	Urban	Urban storm drain passing under N. side of Adolfo Rd approximately 300 meters from Reach 9B	34.2148	-118.9951	6	NA	6	6	6
	13_SB_HILL	13	Urban	South Branch Arroyo Conejo on S. Side of W Hillcrest	34.1849	-118.9075	6	NA	NA	6	6
Las Posas	06T_FC_BR	6	Ag	Fox Canyon at Bradley Rd - just north of Hwy 118	34.2646	-119.0111	6	6	NA	NA	6
Arroyo Simi	07D_HITCH_ LEVEE_2	7	Ag	2nd corrugated pipe discharging on north side of Arroyo Simi flood control levee off of Hitch Blvd just beyond 1st power pole.	34.2716	-118.9219	6	6	NA	6	6
	07D_CTP	7	Urban	Flood control channel in Country Trail Park	34.2646	-118.9075	6	NA	NA	6	6
	07T_DC_H	7	Urban	Dry Canyon at Heywood Street	34.2683	-118.7600	6	NA	NA	NA	6

Ag = Agricultural Land Use Site Urban = Urban Land Use Site NA – Not Analyzed

1. Specific constituents analyzed under each category are listed in Table 2.
2. 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.

Table 6. Toxicity Investigation Monitoring Sites and Sampling Frequency

Subwatershed	Site ID	Reach	Site Location	GPS Coordinates Lat	GPS Coordinates Long	Tox	Pests/PCBs	GWQC
Sediment Toxicity Investigation [1]								
Calleguas	02_PCH	2	Calleguas Creek Northeast Side Of Highway 1 Bridge	34.1119	-119.0818	1	1	1
	9A_HOWAR [2]	9B [2]	Conejo Creek At Howard Road Bridge	34.1931	-119.0025	1	1	1
Water Toxicity Investigation [1, 3]								
Conejo	10_GATE	10	Conejo Creek Hill Canyon Below North Fork Of Conejo Creek	34.2178	-118.9281	5	5	5
	13_BELT	13	Conejo Creek South Fork Behind Hill Canyon Belt Press Building	34.2078	-118.9194	4	4	4

Tox – Samples will be analyzed for toxicity, OP, and pyrethroid pesticides in water and toxicity, OP, and pyrethroid pesticides in sediment as listed in Table 2.
Pests/PCBs – Samples will be analyzed for OC pesticides and PCBs as listed in Table 2.
GWQC – Samples will be analyzed for General Water Quality Constituents as listed in Table 2.

1. This table depicts the normal toxicity investigation sampling frequency. During year 5, this investigation was put on hold and then re-started as described in text.
2. 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.
3. Includes two wet events per site; except during years when there is insufficient rainfall to trigger sampling.

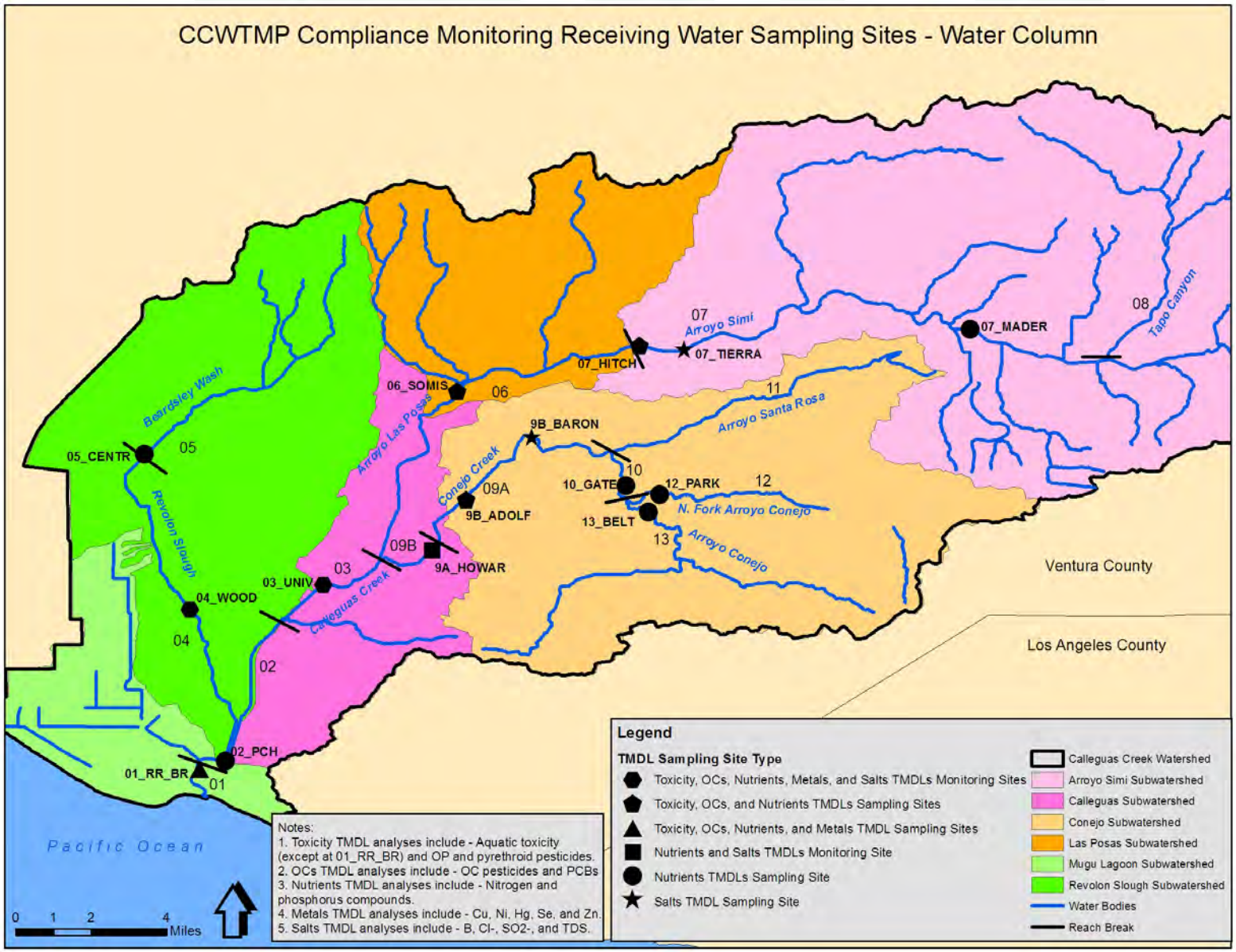


Figure 2. CCWTMP Compliance Monitoring Sampling Sites – Receiving Water

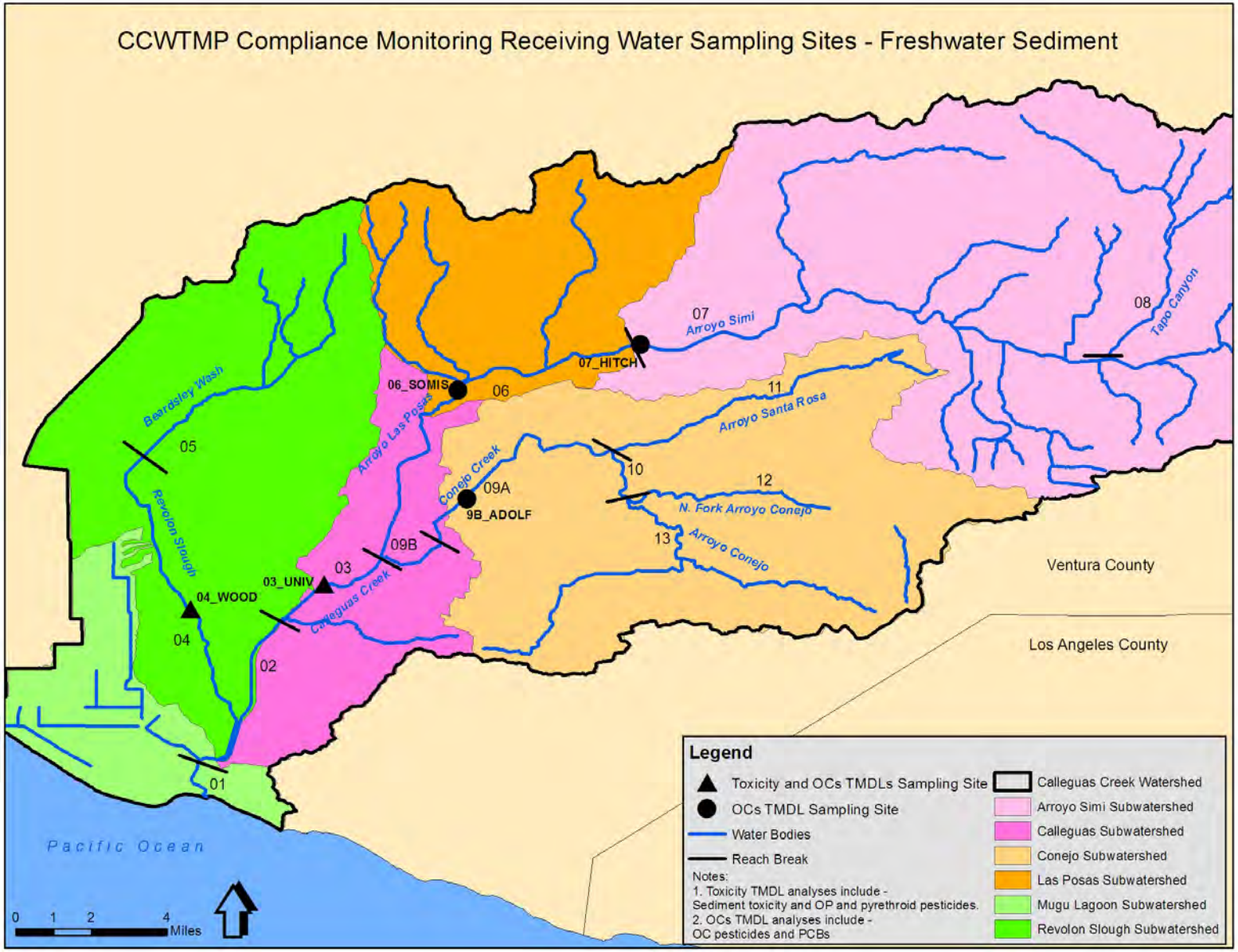


Figure 3. CCWMTP Compliance Monitoring Receiving Water Sampling Sites – Freshwater Sediment

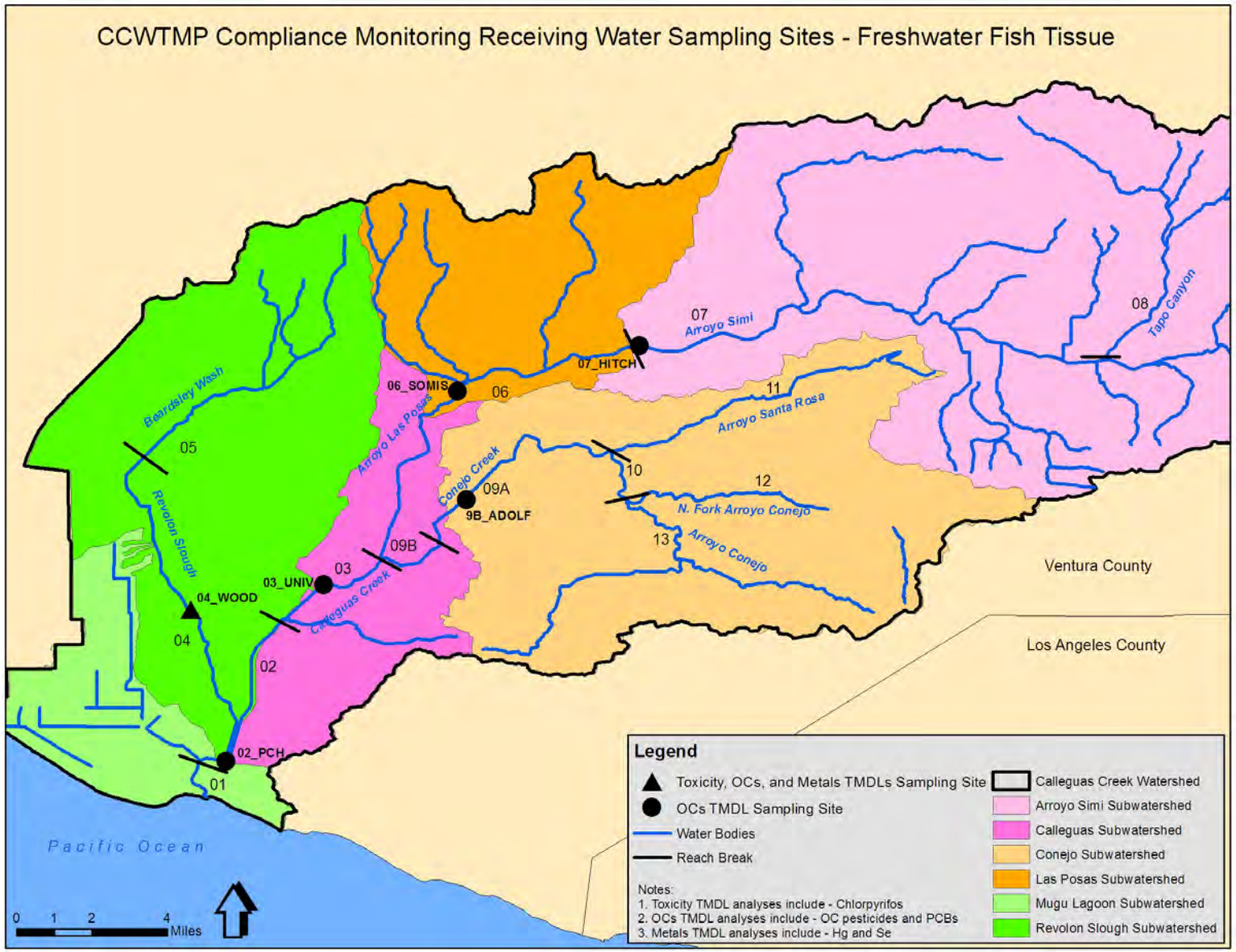


Figure 4. CCWMTP Compliance Monitoring Sampling Sites – Freshwater Fish Tissue

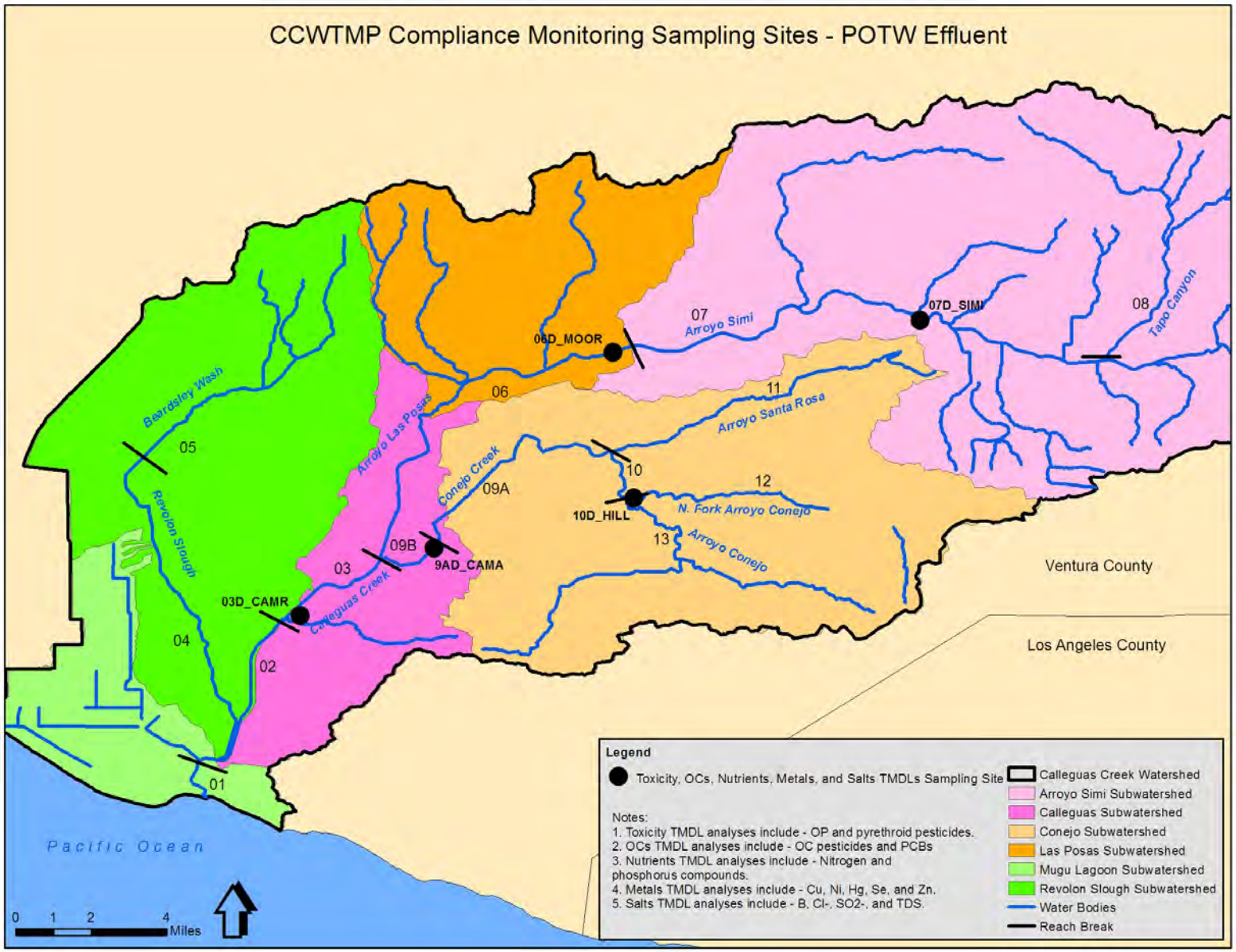


Figure 5. CCWMTP Compliance Monitoring Sampling Sites – POTW Effluent

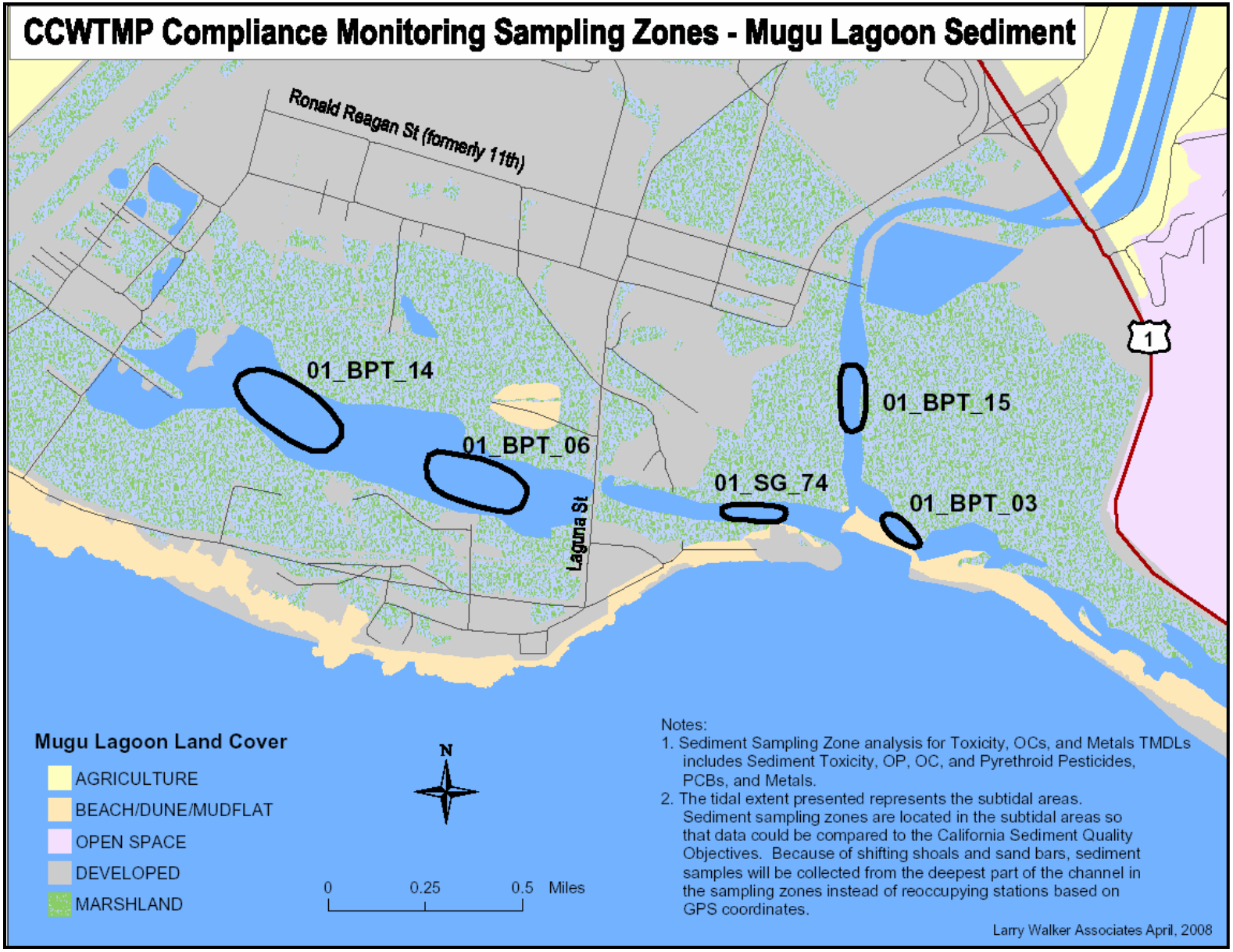


Figure 6. CCWMTP Compliance Monitoring Sampling Zones – Mugu Lagoon Sediment

Figure 7. CCWTMP Compliance Monitoring Sampling Zones – Mugu Lagoon Tissue

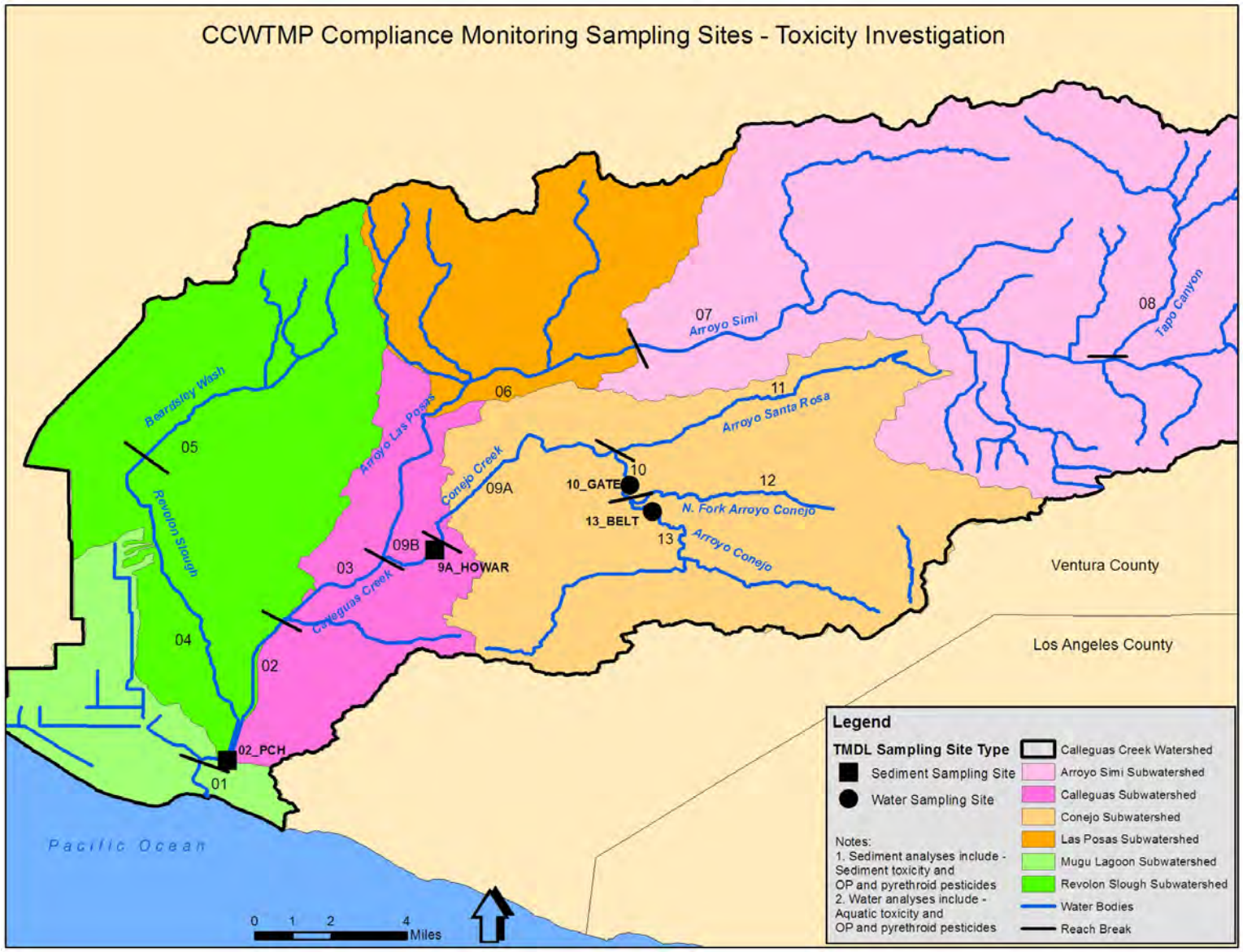


Figure 8. CCWTMP Toxicity Investigation Receiving Water Sampling Sites – Water and Sediment

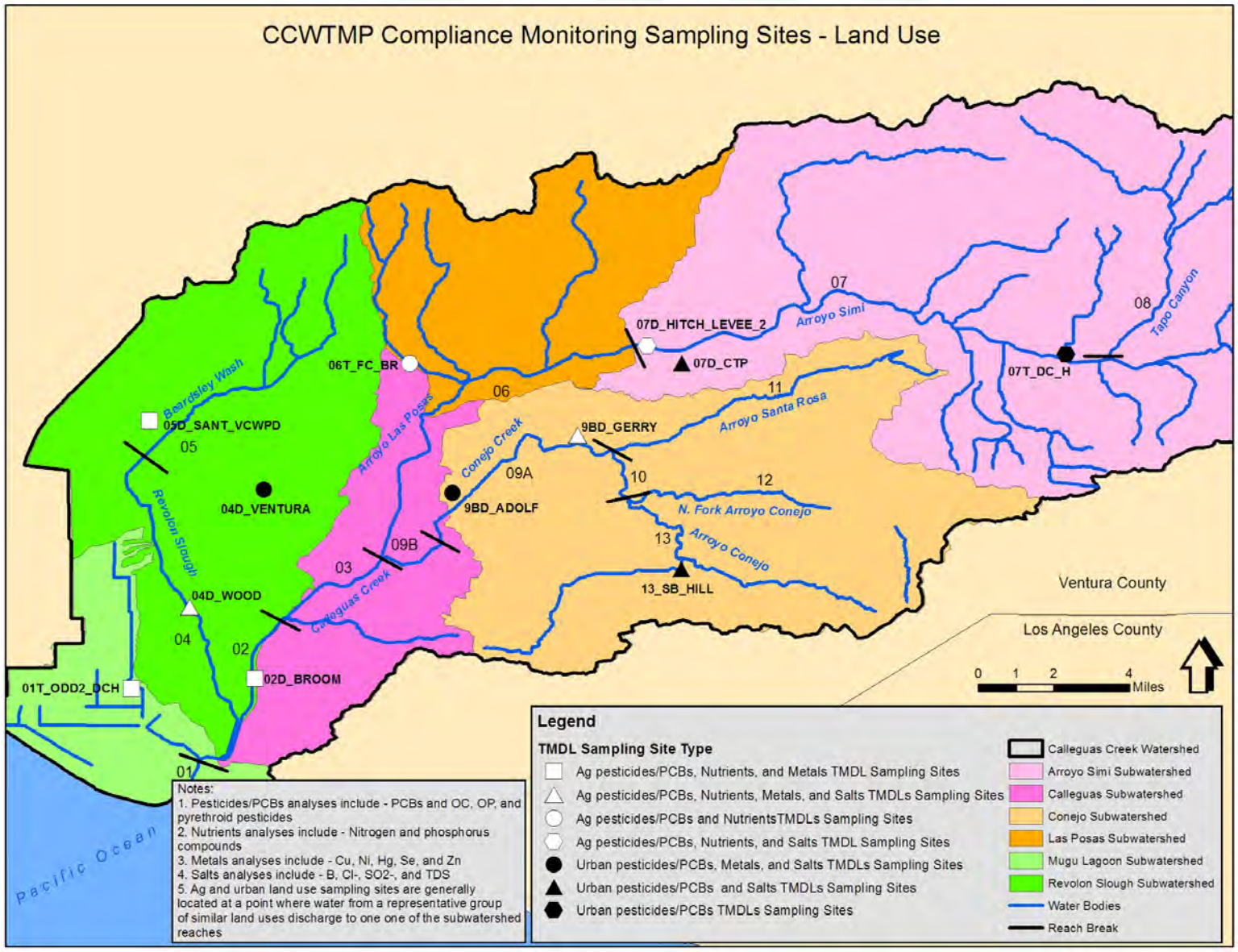


Figure 9. CCWTMP Land Use Sampling Sites

Monitoring Data Summary

To summarize the CCW TMDL monitoring data, box plots have been created for site and constituent combinations representing the data gathered over the entire monitoring program. The data being presented includes all constituents with TMDL limits for water or sediment at the sites where the constituents were analyzed. Where TMDL limits are effective, those thresholds have been identified for the sites where they apply. As appropriate, data for constituents with specific dry or wet weather limits are presented separately. Data collected during year six, which is the reporting period for this document, has been overlain on the box plots as circles. This was done to allow for easy comparison between recent data and what have been collected overall. The sixth year data are presented in tabular form below each box plot. Each figure of box plots presents data from either receiving water sites or land use sites. The receiving water sites are color coded by subwatershed as shown in Table 7. Land use and POTW sites are displayed together and grouped by type as presented in Table 8.

Fish tissue data are not displayed as box plots. Fish tissue data are presented in tables due to the small number of samples and to preserve the species information associated with each sample.

Toxicity data and TIE results are summarized in Appendix D. Summaries of the 2013-14 monitoring events are included as Appendix A.

Some TMDL constituents were never, or rarely detected (less than 2 percent detection rate) and therefore, did not warrant a data summary. The constituents, which were never detected, include:

In Water:

- Endosulfan II
- Endrin

In Sediment:

- Endrin
- BHC, gamma

Rarely detected constituents in water are as follows:

- Aldrin (four detects, none this year)
- Dieldrin (three detects, one this year)
- Endosulfan I (three detects, none this year)
- BHC, gamma (three detects, none this year)
- Total PCBs (five detects, three this year)

Rarely detected constituents in sediment are as follows:

- Dieldrin (one detect, none this year)

Table 7. Receiving Water Sites Color Coded by Subwatershed

Subwatershed	Reach	Site ID
Mugu Lagoon	Reach 1	01_BPT_14
	Reach 1	01_BPT_15
	Reach 1	01_BPT_3
	Reach 1	01_BPT_6
	Reach 1	01_RR_BR
	Reach 1	01_SG_74
Calleguas	Reach 2	02_PCH
	Reach 3	03_UNIV
	Reach 9B [1]	09A_HOWAR [1]
Revolon Slough	Reach 4	04_WOOD
	Reach 5	05_CENTR
Las Posas	Reach 6	06_SOMIS
Arroyo Simi	Reach 7	07_HITCH
	Reach 7	07_MADER
Conejo	Reach 9A [1]	09B_ADOLF [1]
	Reach 9A [1]	09B_BARON [1]
	Reach 10	10_GATE
	Reach 12	12_PARK
	Reach 13	13_BELT

1. 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 site naming conventions, the original reach designations have been maintained.

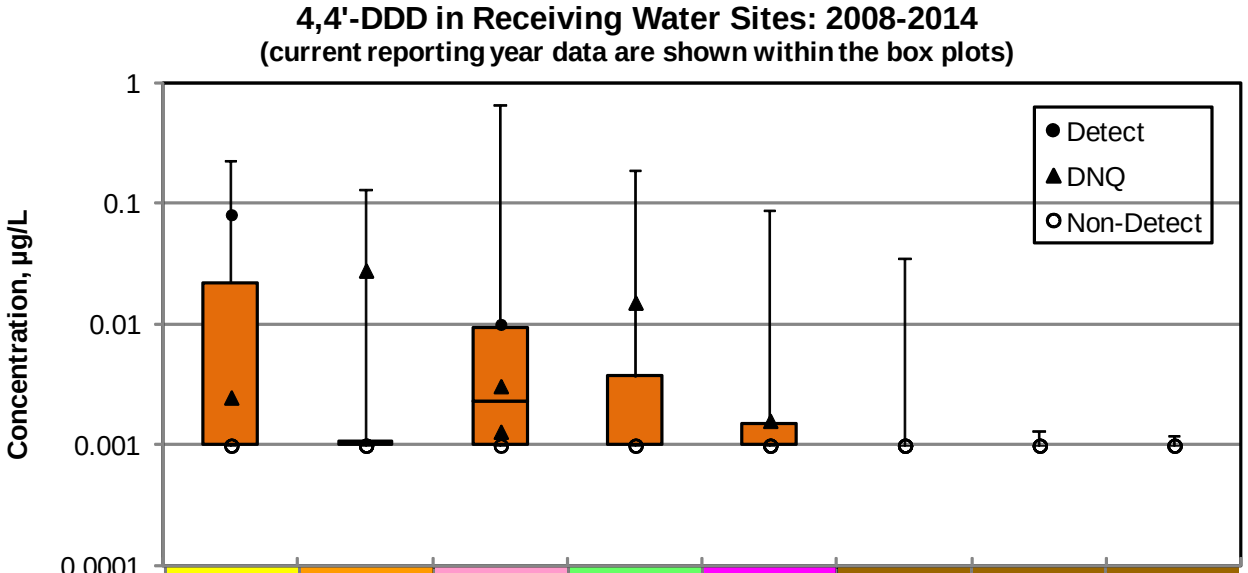
Table 8. Land Use and POTW Sites Color Coded by Type

Urban Land Use (MS4) Sites:	
Reach 4	04D_VENTURA
Reach 7	07D_CTP
Reach 7	07T_DC_H
Reach 9A [1]	09BD_ADOLF [1]
Reach 13	13_SB_HILL
Ag Land Use Sites:	
Reach 1	01T_ODD2_DCH
Reach 2	02D_BROOM
Reach 4	04D_WOOD
Reach 5	05D_SANT_VCWPD
Reach 6	06T_FC_BR
Reach 7	07D_HITCH_LEVEE_2
Reach 9A [1]	09BD_GERRY [1]
POTW Sites:	
Reach 7	07D_SIMI
Reach 9B [1]	09AD_CAMA [1]
Reach 10	10D_HILL

1. 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 site naming conventions, the original reach designations have been maintained.

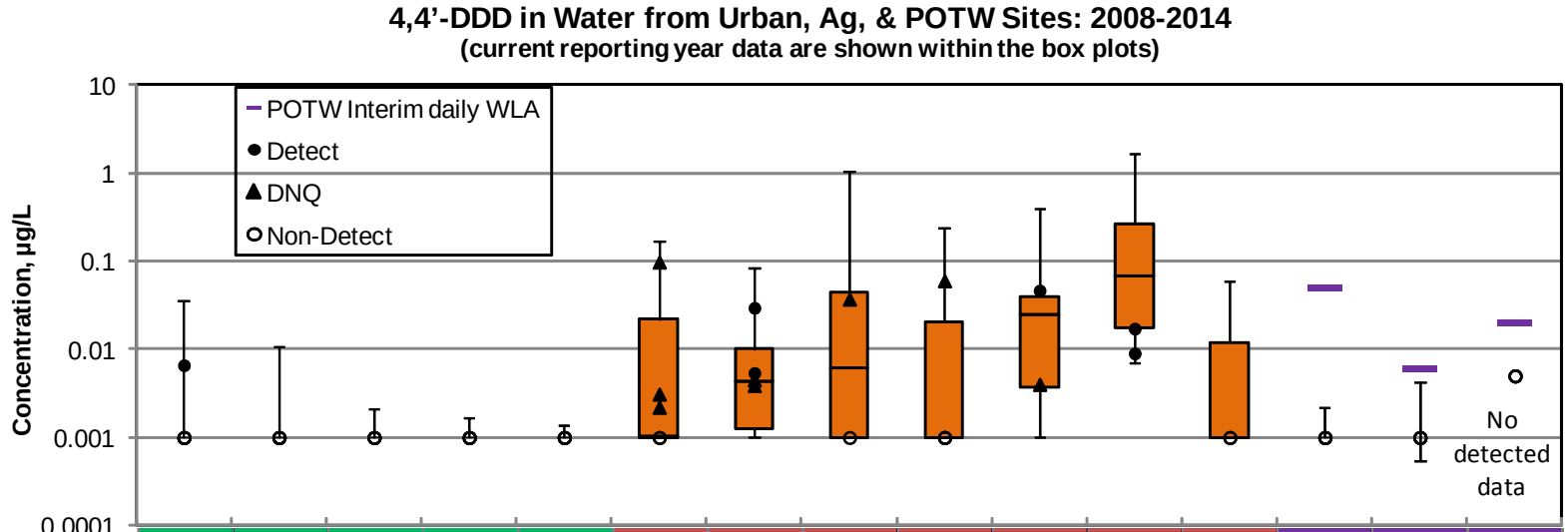
OC PESTICIDES TMDL DATA SUMMARY

The following figures present OC pesticides data in both water and sediment. Presently, only the POTWs have effective interim limits in water but water data for all sites is provided since the TMDL specifies final targets for OC pesticides in water. Effective interim allocations for agriculture and waste load allocations for urban dischargers are provided in the appropriate OC pesticides in sediment figures. Bolded values in the tables within each figure indicate the concentration was above the applicable limits for that constituent. Italicized values in the tables within each figure indicate the concentration was detected but not quantifiable (DNQ). Values in the tables within each figure with a "<" preceding it, indicate the constituent was not detected (ND) at the method detection limit (MDL) for that constituent.



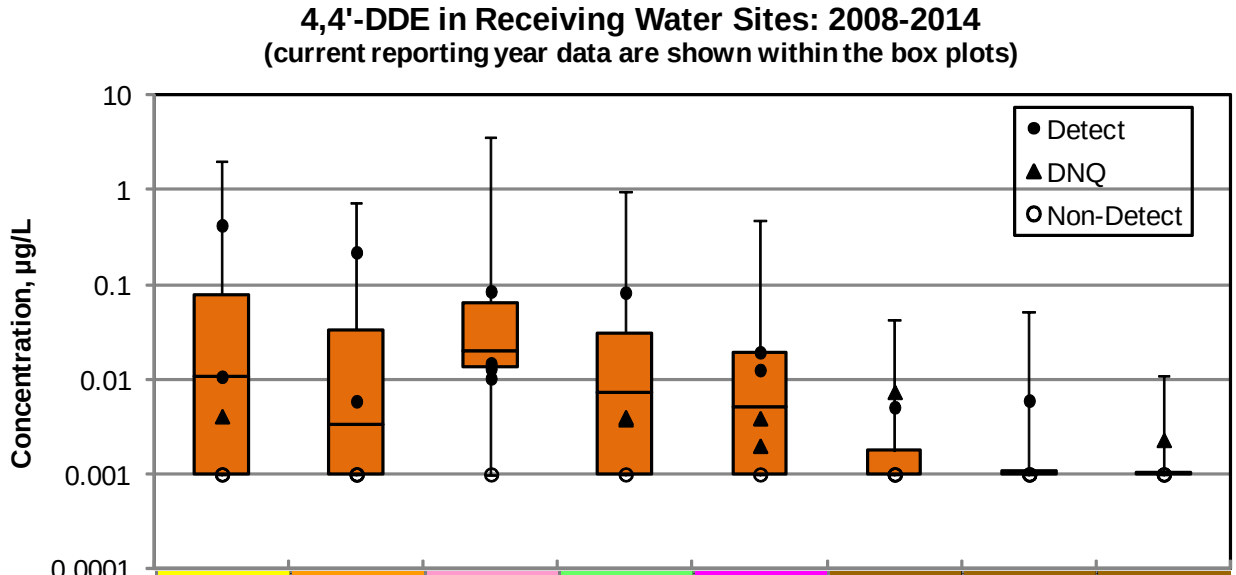
Date	Type	Event	01_RR_BR	03_UNIV	04_WOOD	06_SOMIS	07_HITCH	09B_ADOLF	10_GATE	13_BELT
Aug-13	Dry	39	<0.001	<0.001	*0.0013*	<0.001	<0.001	<0.001	<0.001	<0.001
Nov-13	Dry	40	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001
Feb-14	Dry	41	<0.001	<0.001	*0.0031*	<0.001	<0.001	<0.001	<0.001	
Feb-14	Storm	42	0.082	*0.0282*	0.0101	*0.0153*	<0.001	<0.001	<0.001	<0.001
May-14	Dry	43	*0.0025*	<0.001	<0.001		*0.0016*	<0.001	<0.001	<0.001

Figure 10. 4,4'-DDD Water Column Concentrations in Receiving Water Sites: 2008-2014



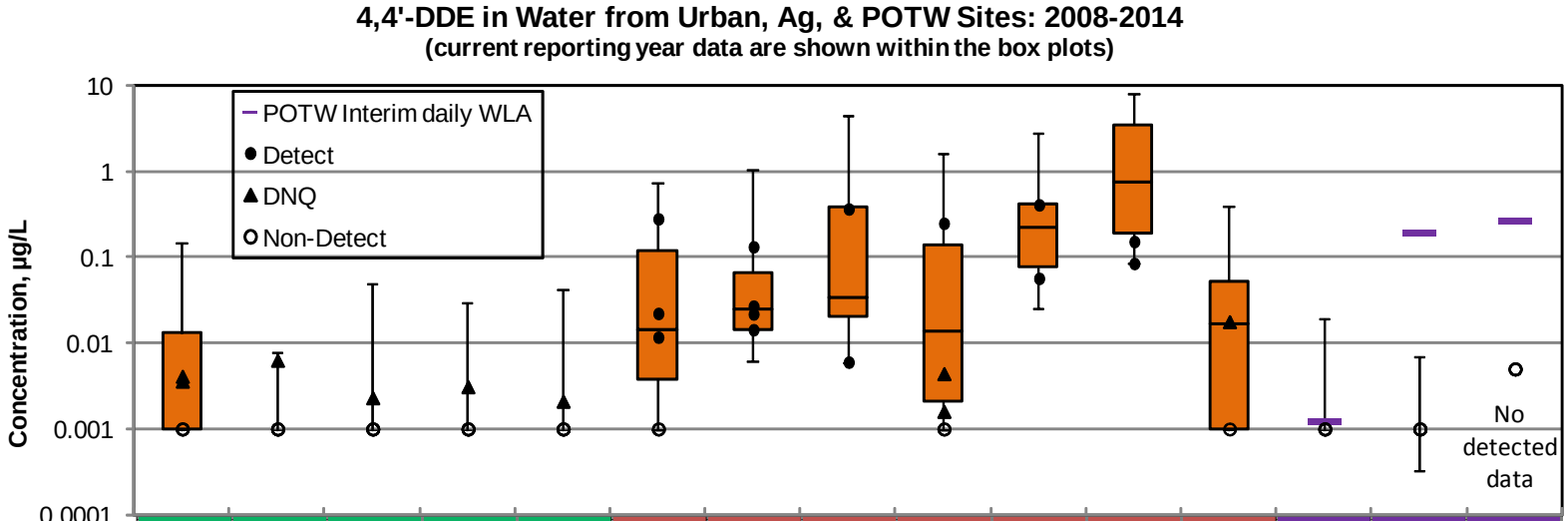
Date	Type	Event	04D_VENTURA	07D_CTP	07T_DC_H	09BD_ADOLF	13_SB_HILL	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	06T_FC_BR	07D_HITCH_LEVEE_2	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			<0.001				<0.001	<0.001	<0.005
Nov-13	Dry	40	0.0066	<0.001	<0.001	<0.001	<0.001	*0.0022*	*0.0045*	<0.001	<0.001	0.0466			<0.001	<0.001	<0.005
Feb-14	Dry	41	<0.001	<0.001	<0.001	<0.001	<0.001	*0.0031*	0.0054		<0.001				<0.001	<0.001	<0.005
Feb-14	Storm	42	<0.001	<0.001	<0.001	<0.001	<0.001	*0.0979*	0.0296	*0.0372*	*0.06*	*0.004*	0.0172	<0.001			
May-14	Dry	43	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*0.0039*		<0.001		0.009	<0.001	<0.001	<0.001	<0.005

Figure 11. 4,4'-DDD Water Column Concentrations in Urban, Ag, and POTW Sites: 2008-2014



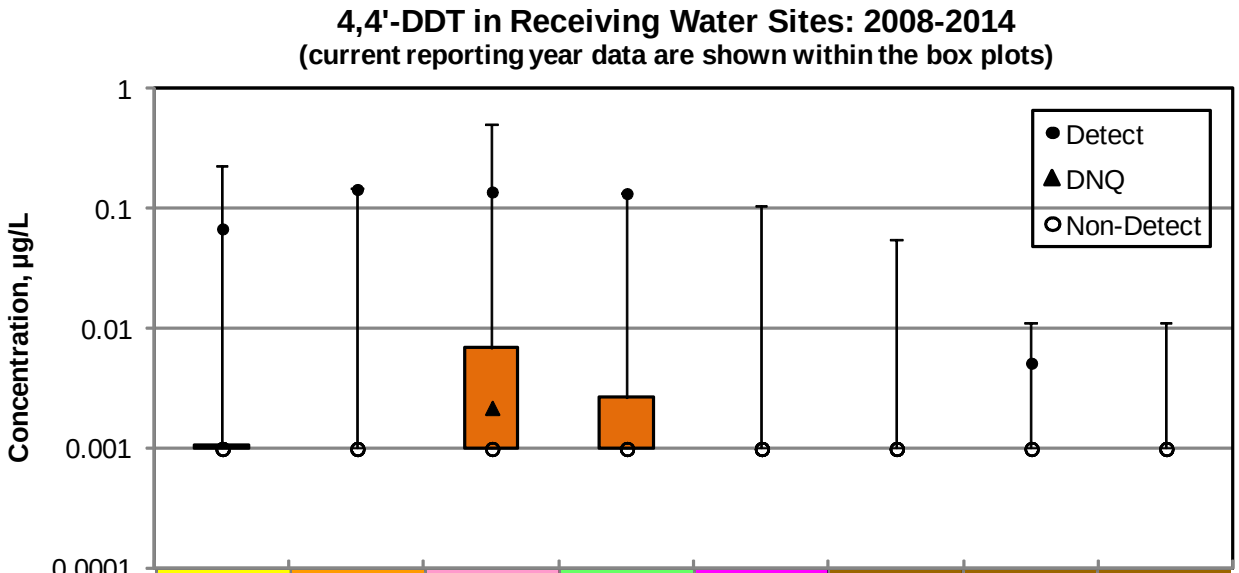
Date	Type	Event	01_RR_BR	03_UNIV	04_WOOD	06_SOMIS	07_HITCH	09B_ADOLF	10_GATE	13_BELT
Aug-13	Dry	39	<0.001	<0.001	0.0103	*0.0038*	<0.001	<0.001	<0.001	<0.001
Nov-13	Dry	40	<0.001	<0.001	0.013	<0.001	*0.002*	<0.001		<0.001
Feb-14	Dry	41	*0.0041*	0.0059	0.0148	*0.004*	*0.0039*	0.0051	0.006	
Feb-14	Storm	42	0.4233	0.2197	0.0851	0.0827	0.0194	*0.0074*	<0.001	*0.0023*
May-14	Dry	43	0.0107	<0.001	<0.001		0.0126	<0.001	<0.001	<0.001

Figure 12. 4,4'-DDE Water Column Concentrations in Receiving Water Sites: 2008-2014



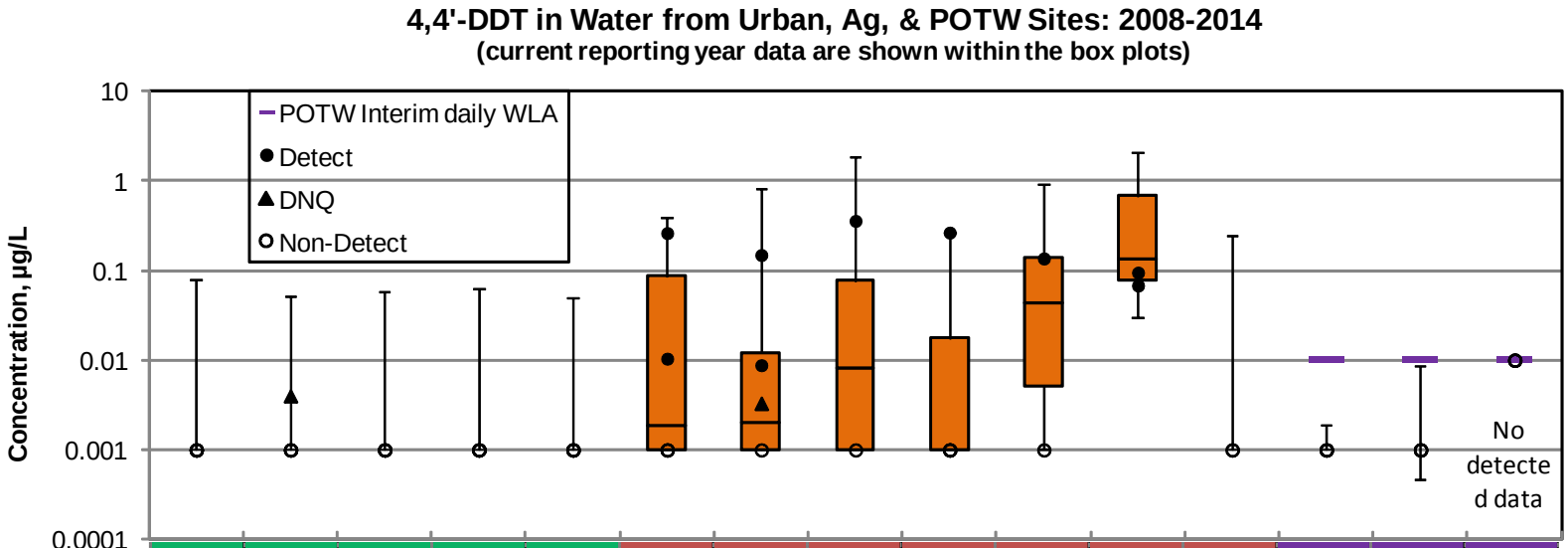
Date	Type	Event	04D_VENTURA	07D_CTP	07T_DC_H	09BD_ADOLF	13_SB_HILL	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	06T_FC_BR	07D_HITCH_LEVEE_2	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			<0.001				<0.001	<0.001	<0.005
Nov-13	Dry	40	*0.0036*	<0.001	<0.001	<0.001	<0.001	0.0117	0.0269	0.006	*0.0044*	0.4061			<0.001	<0.001	<0.005
Feb-14	Dry	41	<0.001	<0.001	<0.001	<0.001	<0.001	0.0221	0.0218		*0.0016*				<0.001	<0.001	<0.005
Feb-14	Storm	42	*0.0041*	*0.0063*	*0.0023*	*0.0031*	*0.0021*	0.2792	0.1322	0.3637	0.2477	0.0566	0.1519	*0.0177*			
May-14	Dry	43	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0143		<0.001		0.0845	<0.001	<0.001	<0.001	<0.005

Figure 13. 4,4'-DDE Water Column Concentrations in Urban, Ag, and POTW Sites: 2008-2014



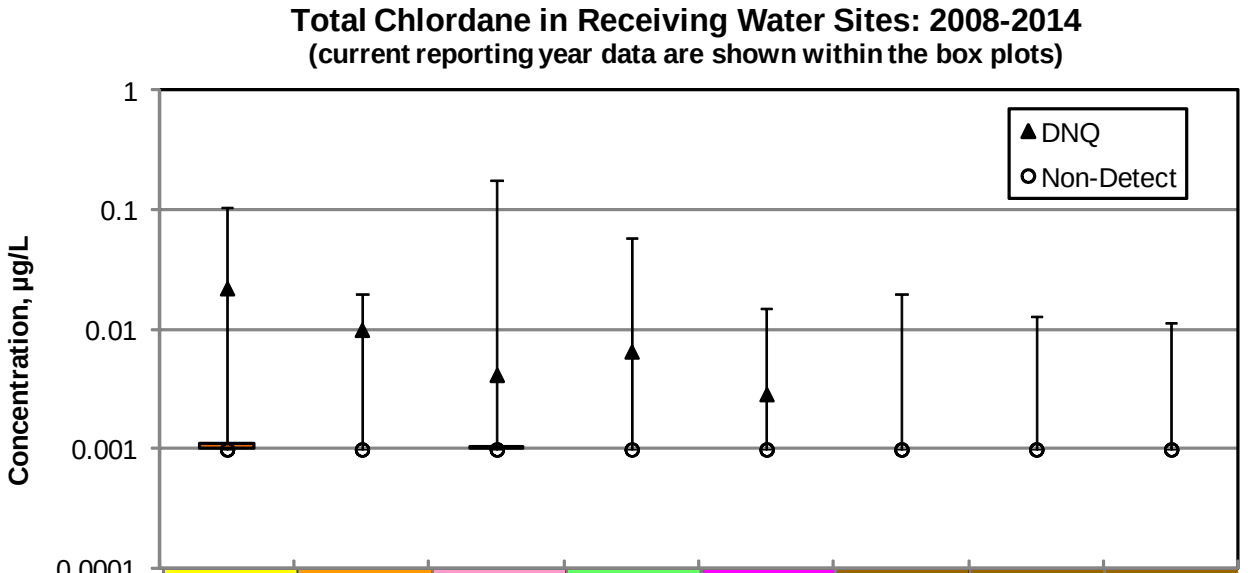
Date	Type	Event	01_RR_BR	03_UNIV	04_WOOD	06_SOMIS	07_HITCH	09B_ADOLF	10_GATE	13_BELT
Aug-13	Dry	39	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nov-13	Dry	40	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001
Feb-14	Dry	41	<0.001	<0.001	*0.0022*	<0.001	<0.001	<0.001	<0.001	
Feb-14	Storm	42	0.0687	0.1466	0.1395	0.1355	<0.001	<0.001	0.0052	<0.001
May-14	Dry	43	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001

Figure 14. 4,4'-DDT Water Column Concentrations in Receiving Water Sites: 2008-2014



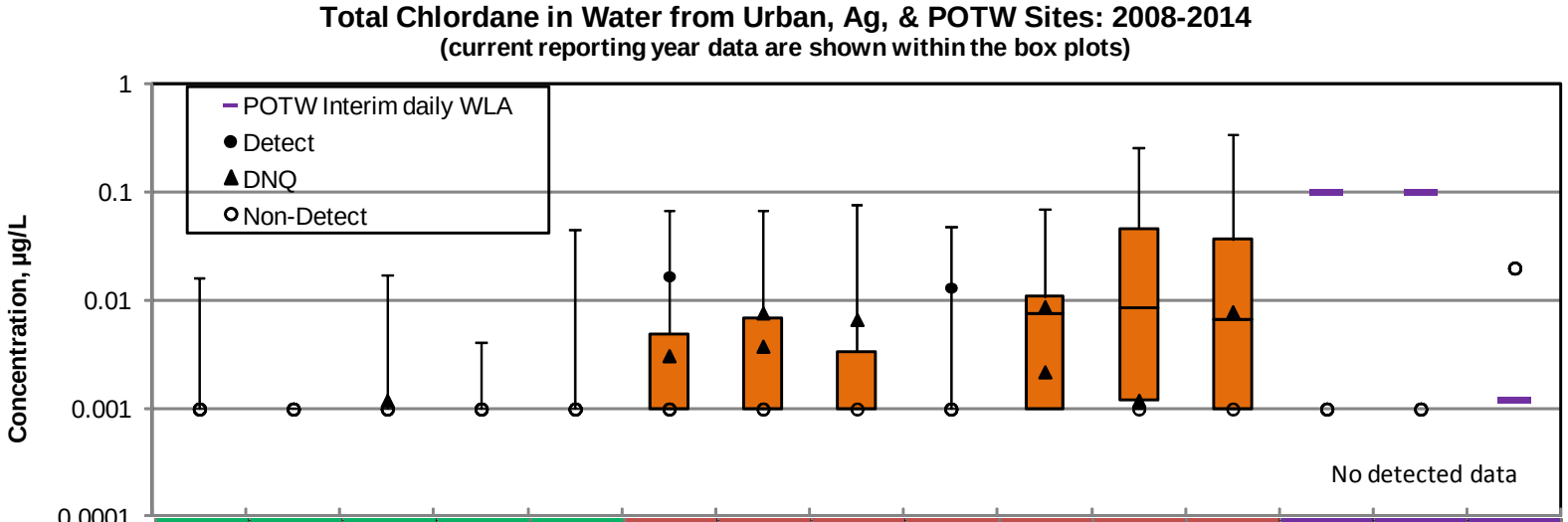
Date	Type	Event	04D_VENTURA	07D_CTP	07T_DC_H	09BD_ADOLF	13_SB_HILL	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	06T_FC_BR	07D_HITCH_LEVEE_2	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			<0.001				<0.001	<0.001	<0.01
Nov-13	Dry	40	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.1365			<0.001	<0.001	<0.01
Feb-14	Dry	41	<0.001	<0.001	<0.001	<0.001	<0.001	0.0104	*0.003*		<0.001				<0.001	<0.001	<0.01
Feb-14	Storm	42	<0.001	*0.004*	<0.001	<0.001	<0.001	0.2615	0.1491	0.358	0.265	<0.001	0.0949	<0.001			
May-14	Dry	43	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0088		<0.001		0.0681	<0.001	<0.001	<0.001	<0.01

Figure 15. 4,4'-DDT Water Column Concentrations in Urban, Ag, and POTW Sites: 2008-2014



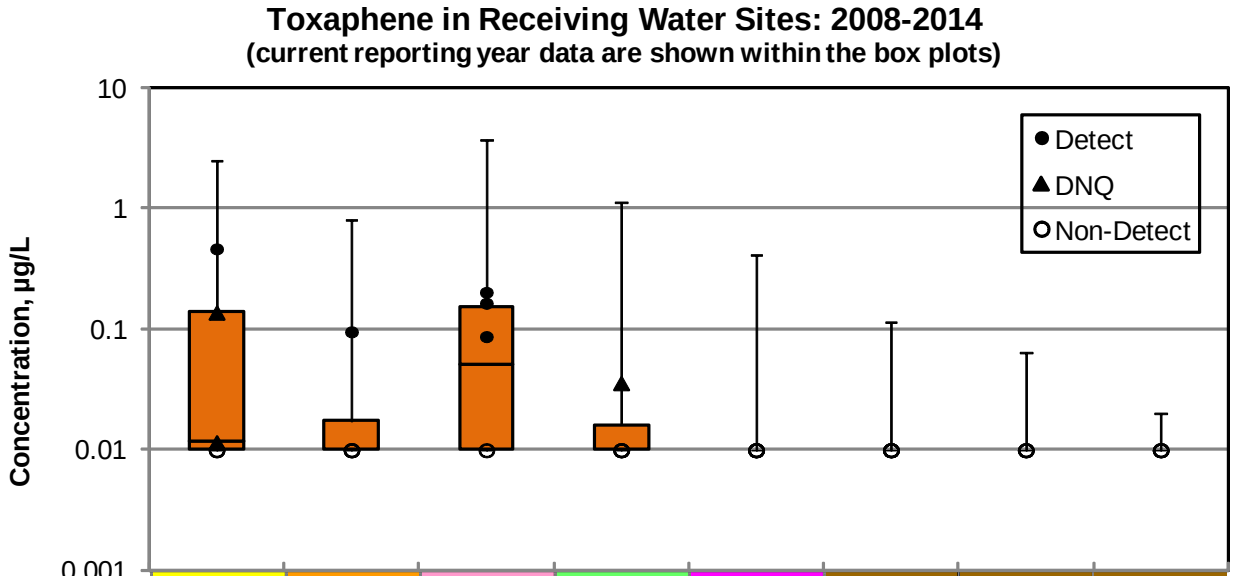
Date	Type	Event	01_RR_BR	03_UNIV	04_WOOD	06_SOMIS	07_HITCH	09B_ADOLF	10_GATE	13_BELT
Aug-13	Dry	39	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nov-13	Dry	40	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001
Feb-14	Dry	41	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Feb-14	Storm	42	*0.0223*	*0.0100*	*0.0042*	*0.0066*	*0.0029*	<0.001	<0.001	<0.001
May-14	Dry	43	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001

Figure 16. Total Chlordane Water Column Concentrations in Receiving Water Sites: 2008-2014



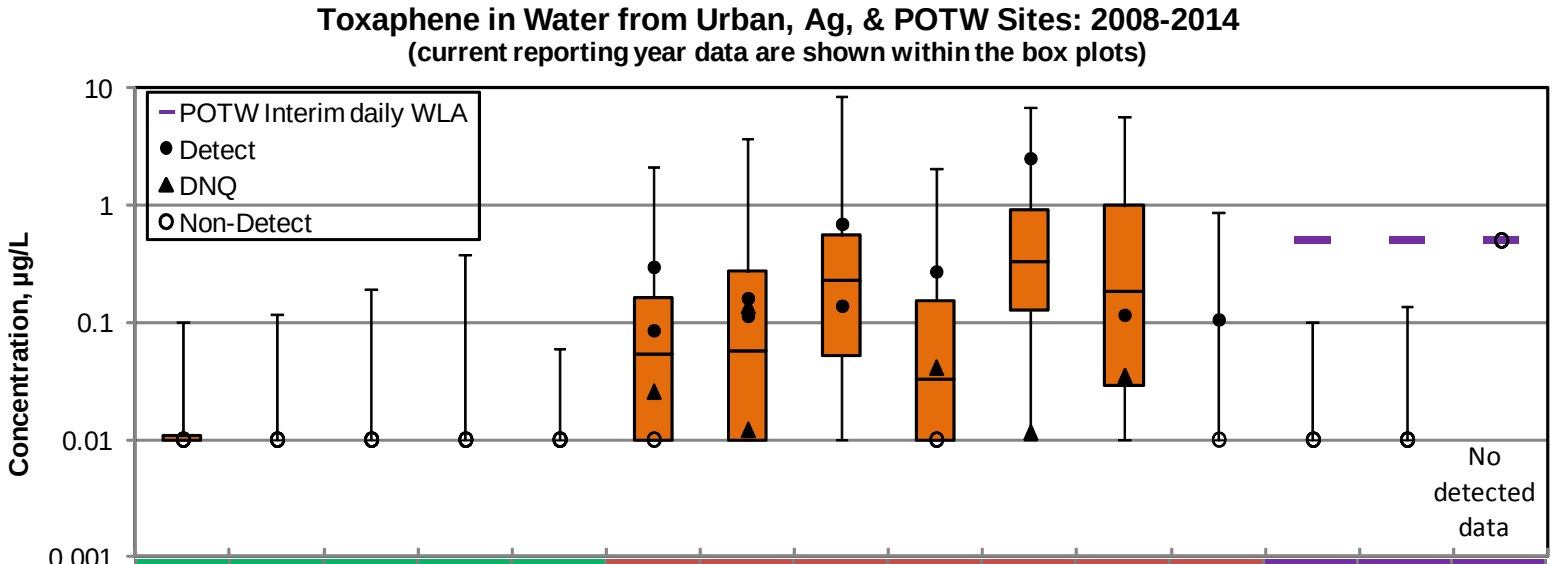
Date	Type	Event	04D_VENTURA	07D_CTP	07T_DC_H	09BD_ADOLF	13_SB_HILL	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	06T_FC_BR	07D_HITCH_LEVEE_2	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			<0.001				<0.001	<0.001	<0.02
Nov-13	Dry	40	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*0.0022*			<0.001	<0.001	<0.02
Feb-14	Dry	41	<0.001	<0.001	<0.001	<0.001	<0.001	*0.0031*	*0.0038*		<0.001				<0.001	<0.001	<0.02
Feb-14	Storm	42	<0.001	<0.001	*0.0012*	<0.001	<0.001	0.0168	*0.0077*	*0.0067*	0.0132	*0.0088*	*0.0012*	*0.0079*			
May-14	Dry	43	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001		<0.001	<0.001	<0.001	<0.001	<0.02

Figure 17. Total Chlordane Water Column Concentrations in Urban, Ag, and POTW Sites: 2008-2014



Date	Type	Event	01_RR_BR	03_UNIV	04_WOOD	06_SOMIS	07_HITCH	09B_ADOLF	10_GATE	13_BELT
Aug-13	Dry	39	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nov-13	Dry	40	<0.01	<0.01	0.0874	<0.01	<0.01	<0.01		<0.01
Feb-14	Dry	41	*0.0116*	<0.01	0.204	<0.01	<0.01	<0.01	<0.01	
Feb-14	Storm	42	*0.138*	0.0957	0.165	*0.04*	<0.01	<0.01	<0.01	<0.01
May-14	Dry	43	0.466	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01

Figure 18. Toxaphene Water Column Concentrations in Receiving Water Sites: 2008-2014



Date	Type	Event	04D_VENTURA	07D_CTP	07T_DC_H	09BD_ADOLF	13_SB_HILL	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	06T_FC_BR	07D_HITCH_LEVEE_2	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01				<0.01	<0.01	<0.5
Nov-13	Dry	40	<0.01	<0.01	<0.01	<0.01	<0.01	0.085	0.159	0.137	<0.01	2.488			<0.01	<0.01	<0.5
Feb-14	Dry	41	<0.01	<0.01	<0.01	<0.01	<0.01	*0.026*	0.112		*0.041*				<0.01	<0.01	<0.5
Feb-14	Storm	42	<0.01	<0.01	<0.01	<0.01	<0.01	0.295	*0.138*	0.686	0.269	*0.012*	*0.035*	0.105			
May-14	Dry	43	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	*0.012*		<0.01		0.115	<0.01	<0.01	<0.01	<0.5

Figure 19. Toxaphene Water Column Concentrations in Urban, Ag, and POTW Sites: 2008-2014

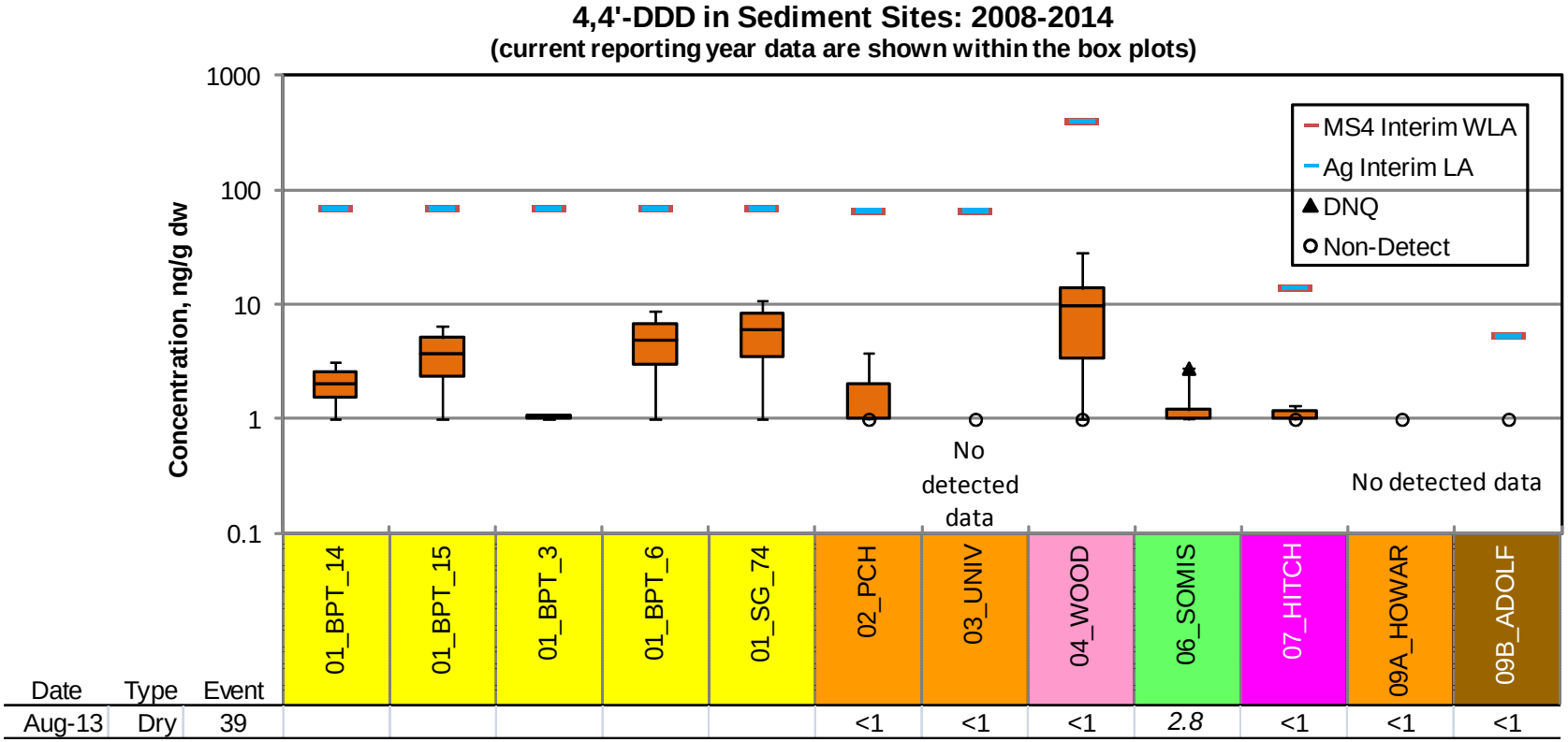


Figure 20. 4,4'-DDD Sediment Concentrations in Receiving Water Sites: 2008-2014

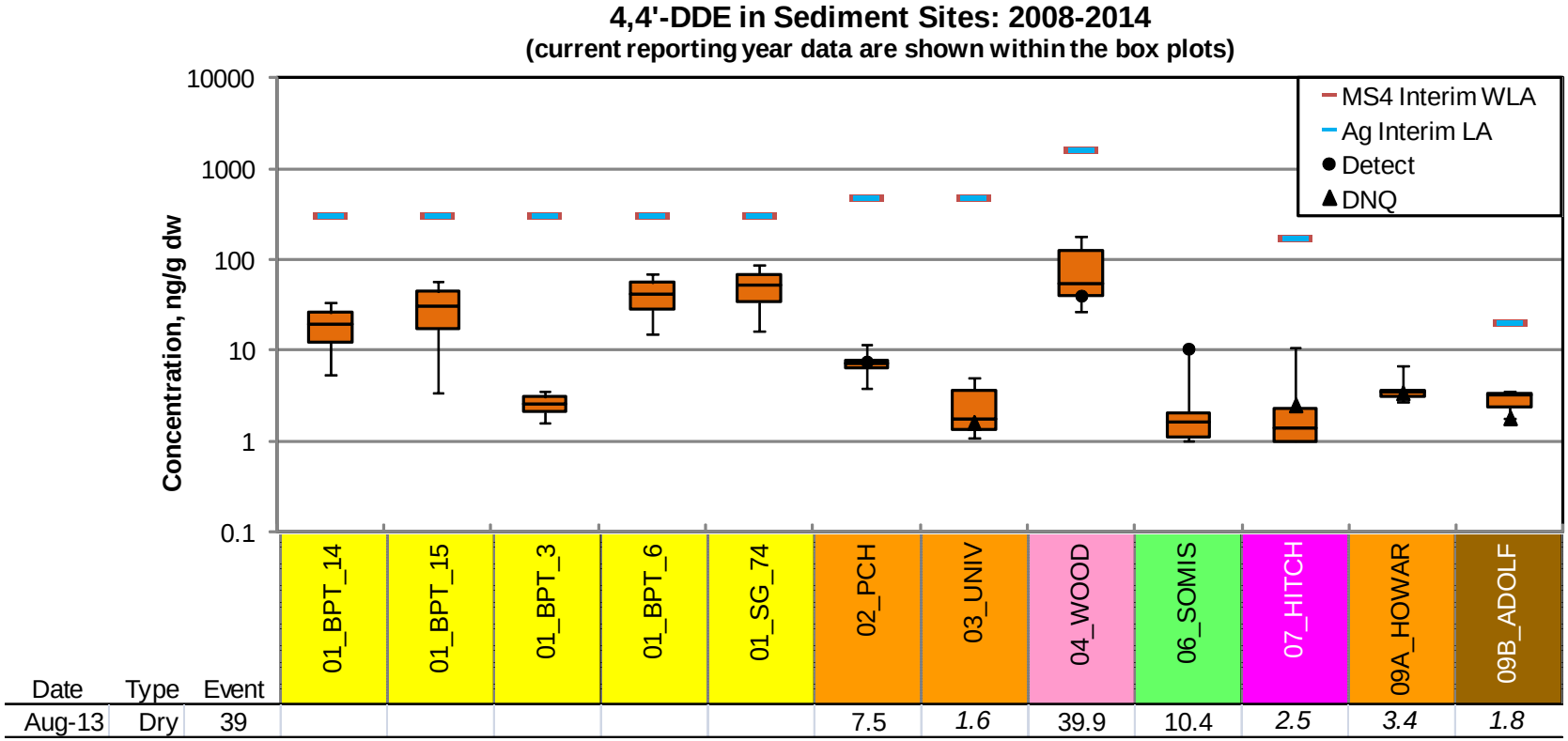


Figure 21. 4,4'-DDE Sediment Concentrations in Receiving Water Sites: 2008-2014

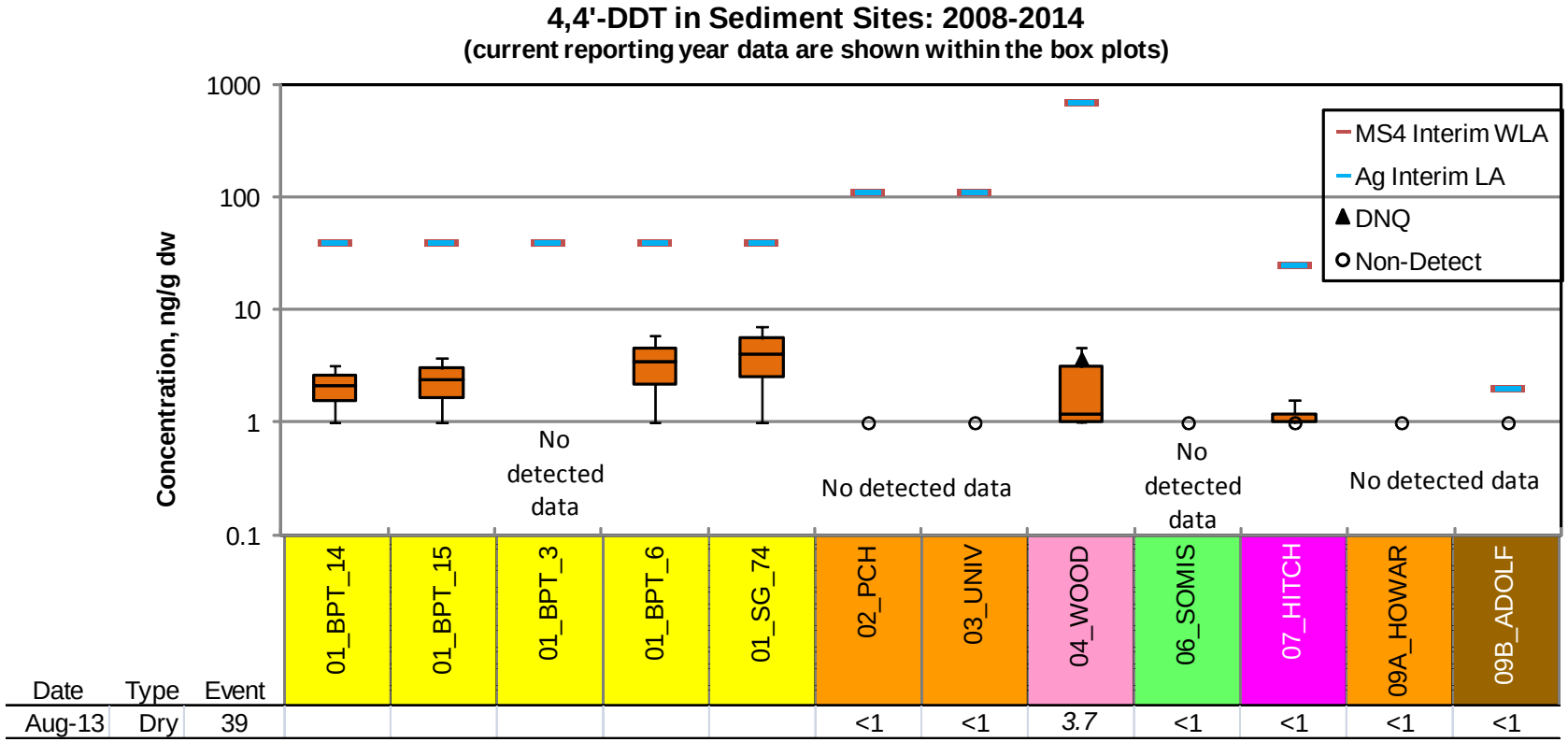


Figure 22. 4,4'-DDT Sediment Concentrations in Receiving Water Sites: 2008-2014

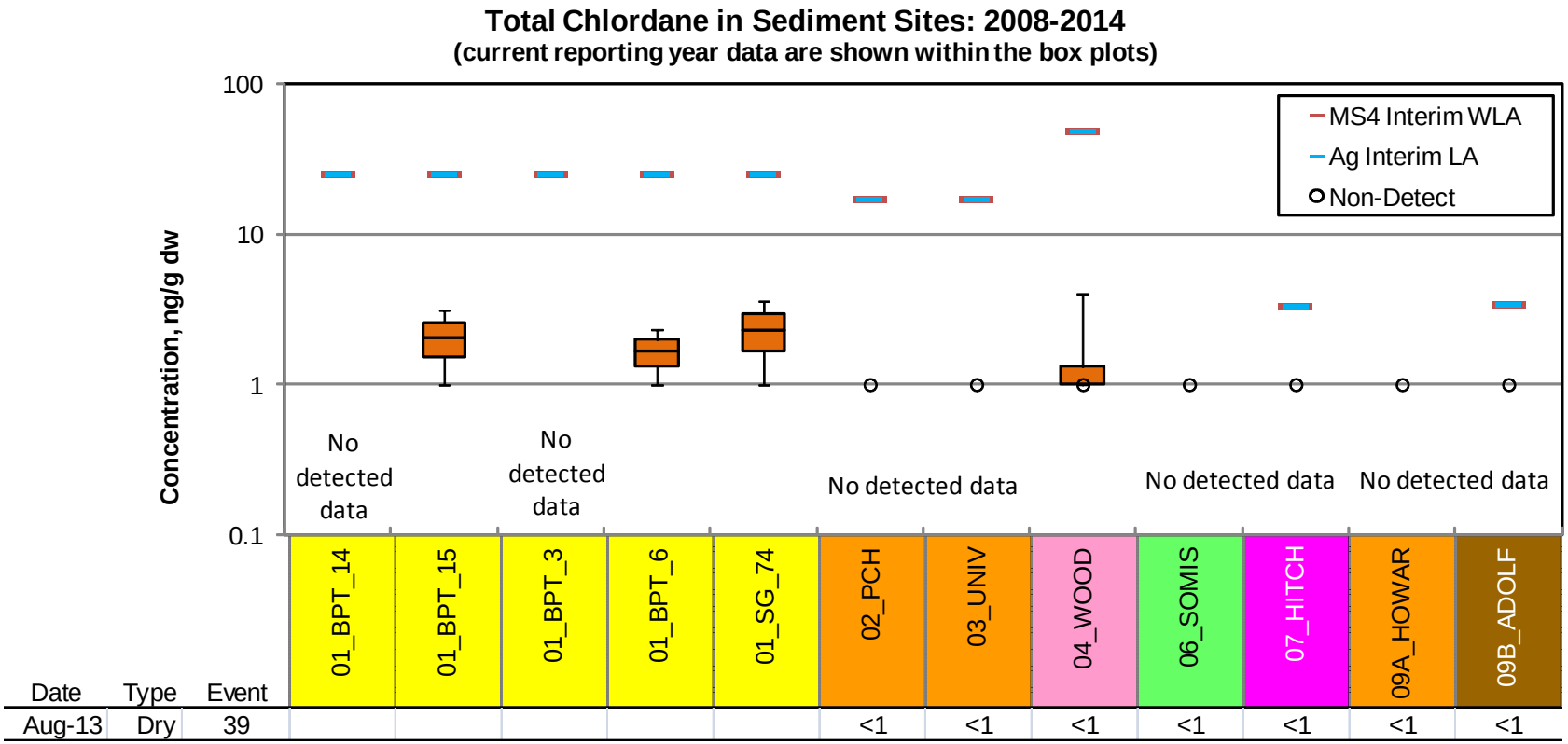


Figure 23. Total Chlordane Sediment Concentrations in Receiving Water Sites: 2008-2014

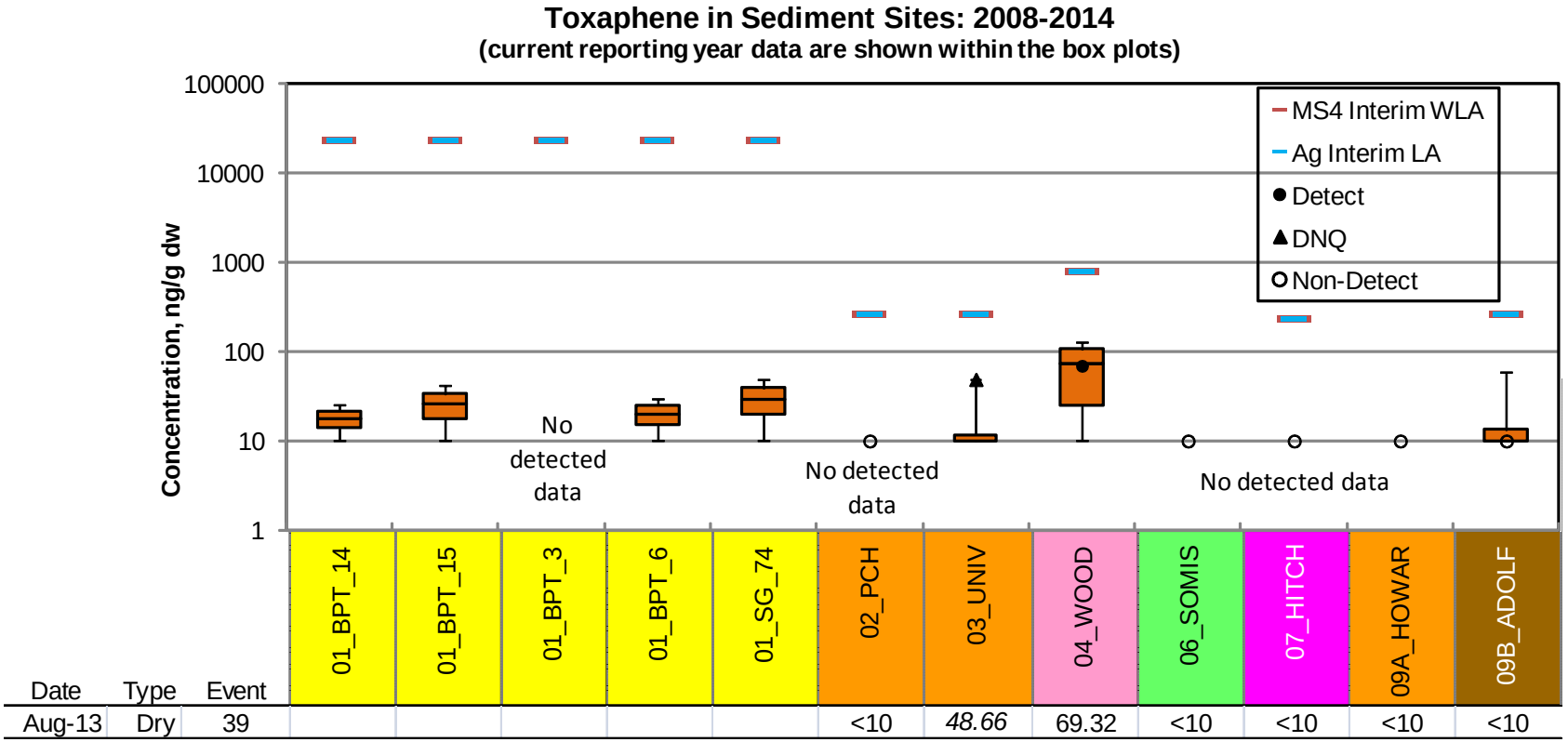
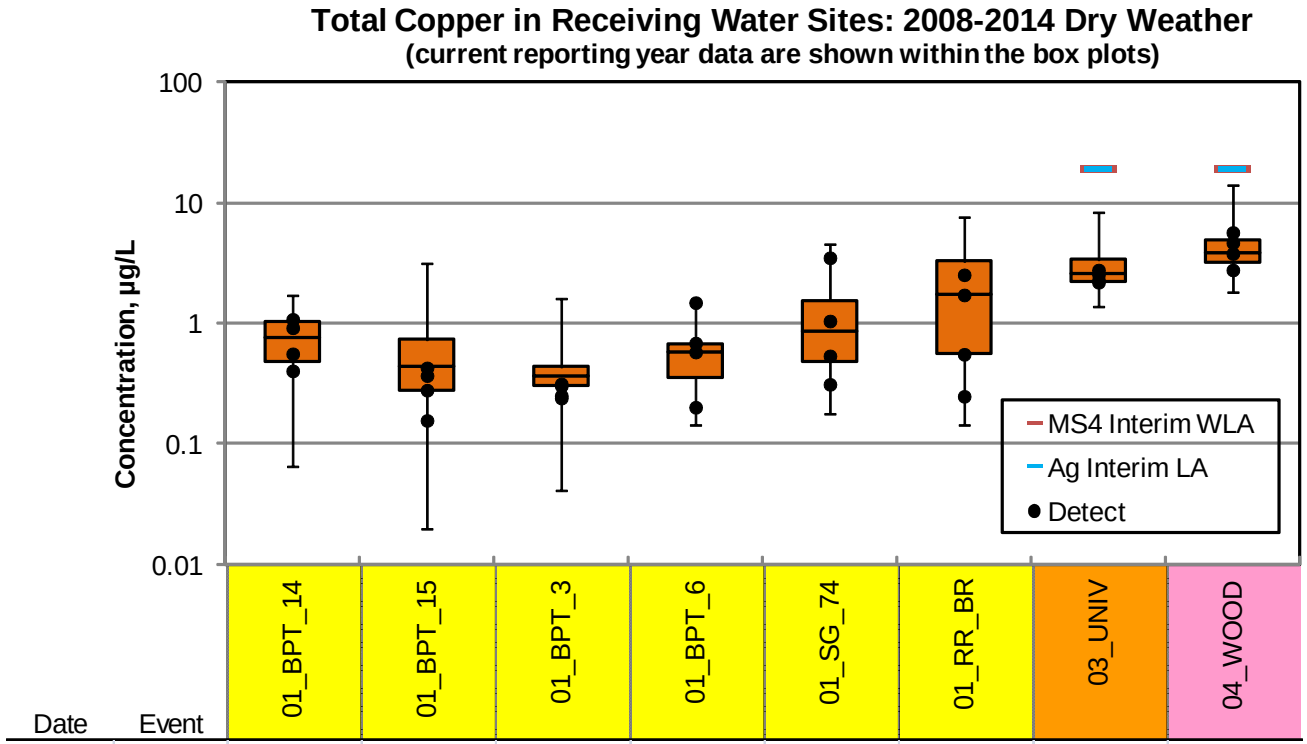


Figure 24. Toxaphene Sediment Concentrations in Receiving Water Sites: 2008-2014

METALS TMDL DATA SUMMARY

The following figures present metals water quality data from receiving water, agricultural, urban, and POTW monitoring sites. Currently effective total metals interim load allocations and waste load allocations differ for wet and dry weather, therefore the data for each of these conditions is provided separately. Interim POTW waste load allocations for total mercury are in load form and are therefore calculated and presented in the compliance section of the report. The Metals TMDL specifies final targets for both dissolved copper and zinc. Dissolved concentrations for these two metals have been plotted for reference. Bolded values in the tables within each figure indicate the concentration was above the applicable limits for that constituent. Italicized values in the tables within each figure indicate the concentration was DNQ. Values in the tables within each figure with a "<" preceding them, indicate the constituent was ND at the MDL for that constituent.



Date	Event	01_BPT_14	01_BPT_15	01_BPT_3	01_BPT_6	01_SG_74	01_RR_BR	03_UNIV	04_WOOD
Aug-13	39	0.561	0.157	0.252	0.202	0.539	0.249	2.282	4.683
Nov-13	40	0.405	0.429	0.304	1.491	3.516	0.556	2.2	3.804
Feb-14	41	1.084	0.37	0.241	0.58	0.313	1.726	2.78	5.694
May-14	43	0.922	0.28	0.315	0.688	1.049	2.537	2.554	2.781

Figure 25. Total Copper Dry Weather Concentrations in Receiving Water Sites: 2008-2014

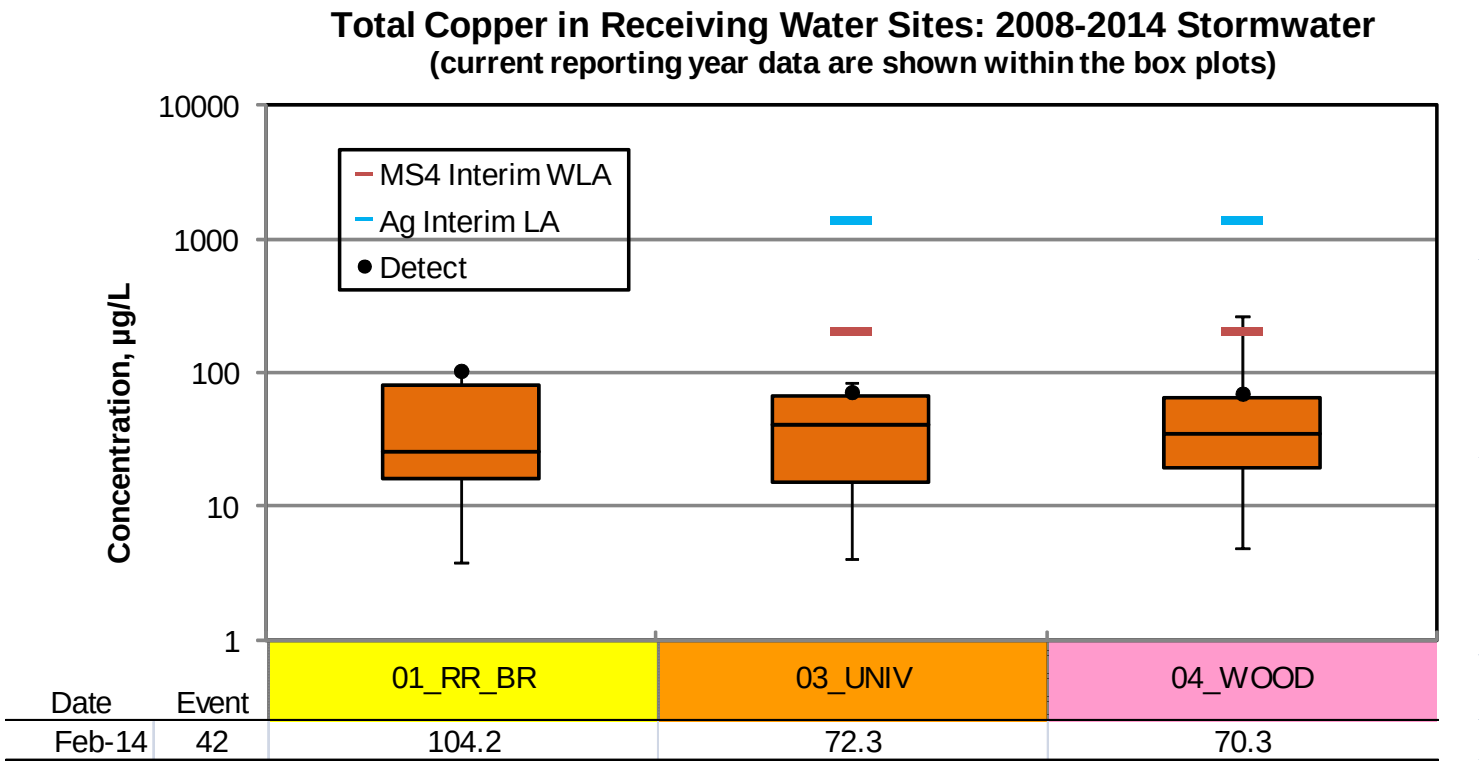
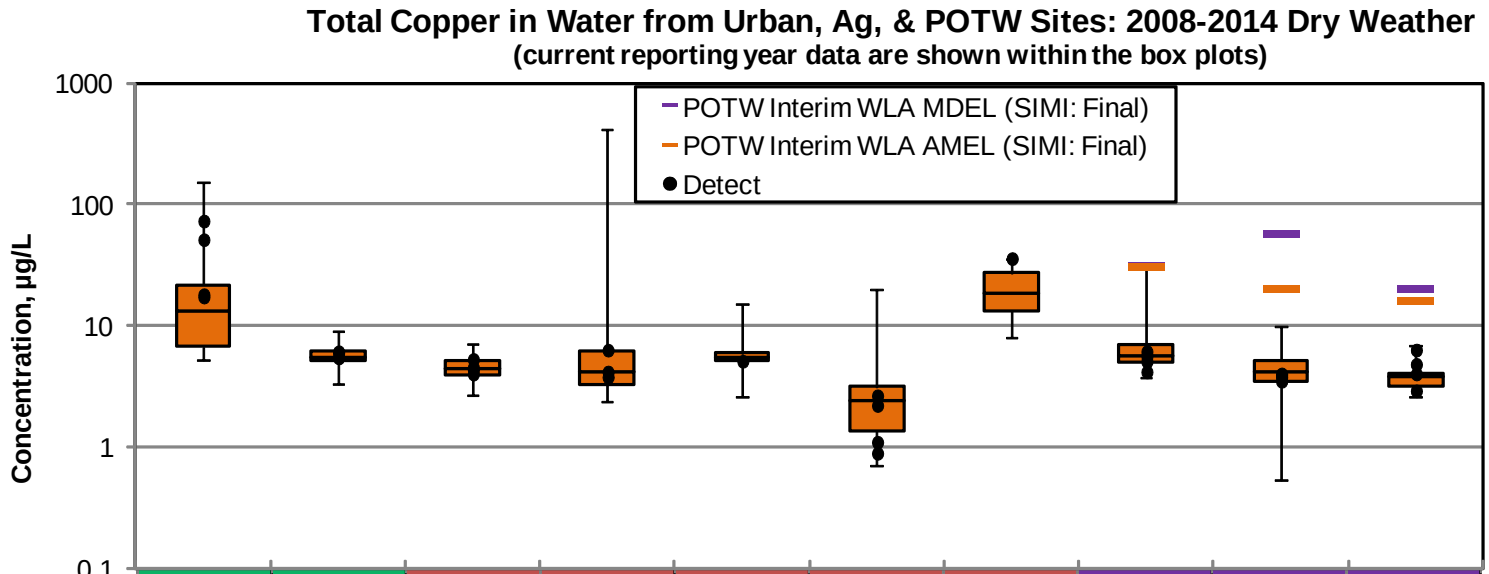


Figure 26. Total Copper Stormwater Concentrations in Receiving Water Sites: 2008-2014



Date	Event	04D_VENTURA	09BD_ADOLF	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	39	51.163	6.1	3.99			0.887		6.109	3.482	6.3
Nov-13	40	72.879	5.954	5.267	6.283	5.089	2.644		5.066	3.752	4.8
Feb-14	41	17.225	5.424	4.344	4.146		1.093		4.158	3.998	4
May-14	43	18.006	5.535	4.521	3.767		2.201	35.772	5.618	3.872	2.9

Figure 27. Total Copper Dry Weather Concentrations in Urban, Ag, and POTW Sites: 2008-2014

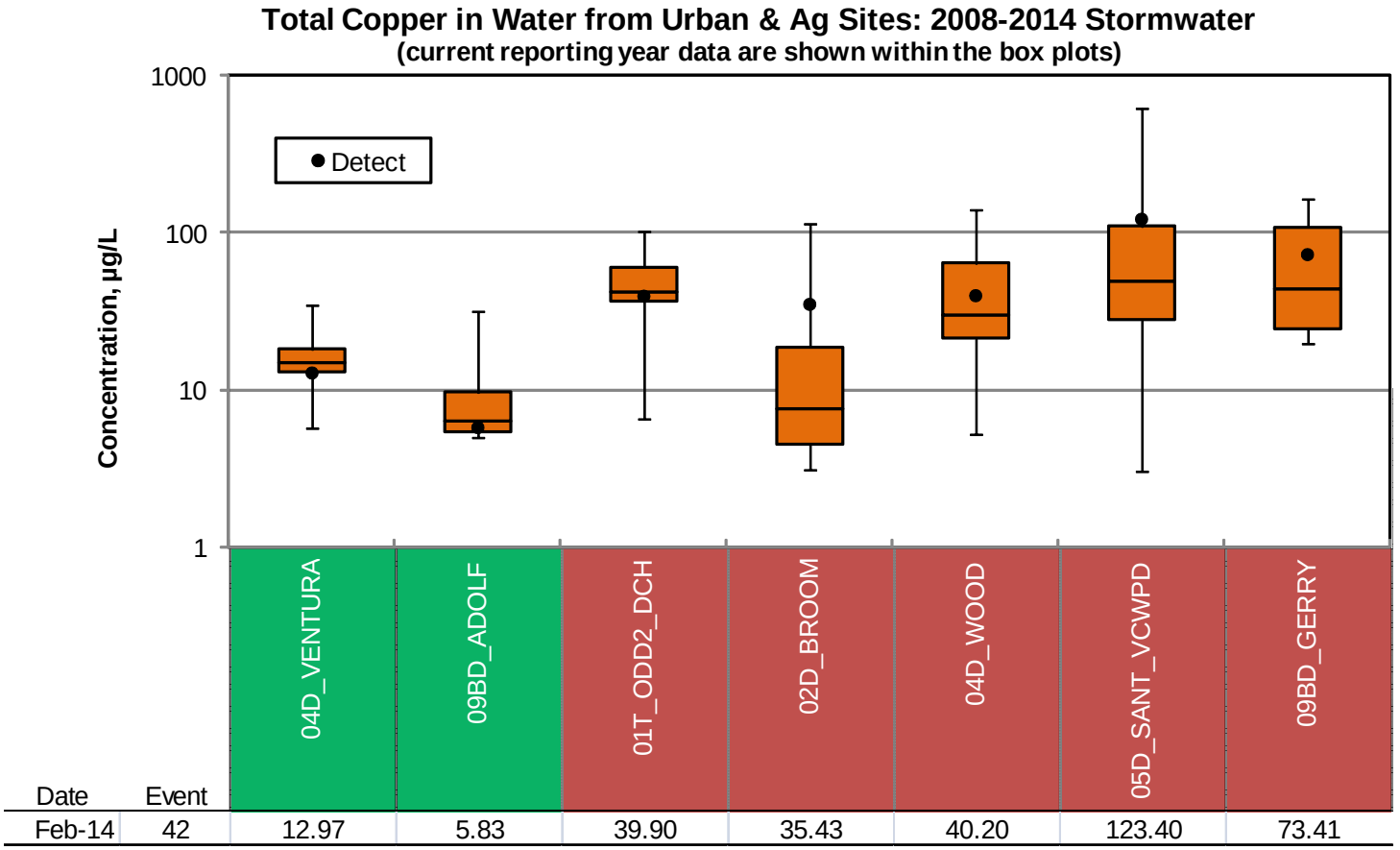
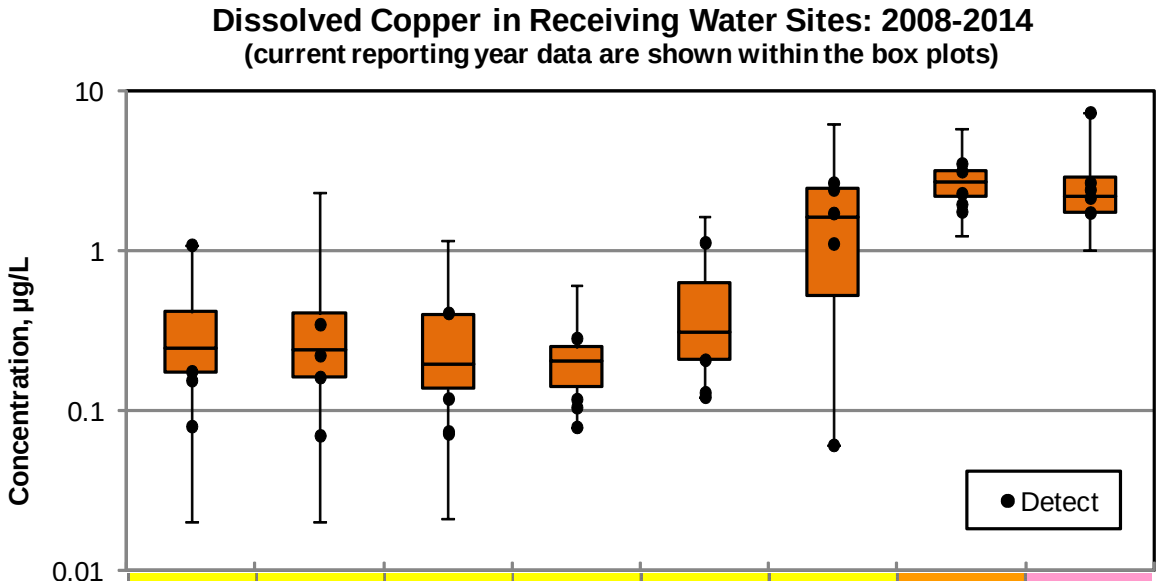
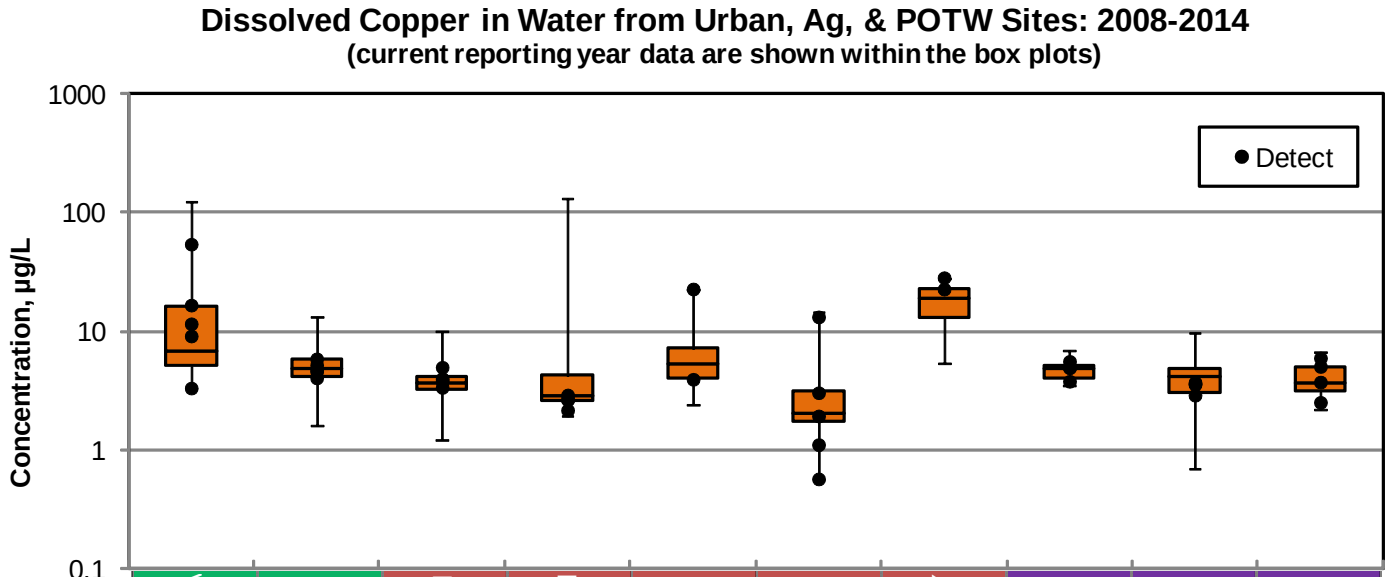


Figure 28. Total Copper Wet Weather Concentrations in Urban and Ag Sites: 2008-2014



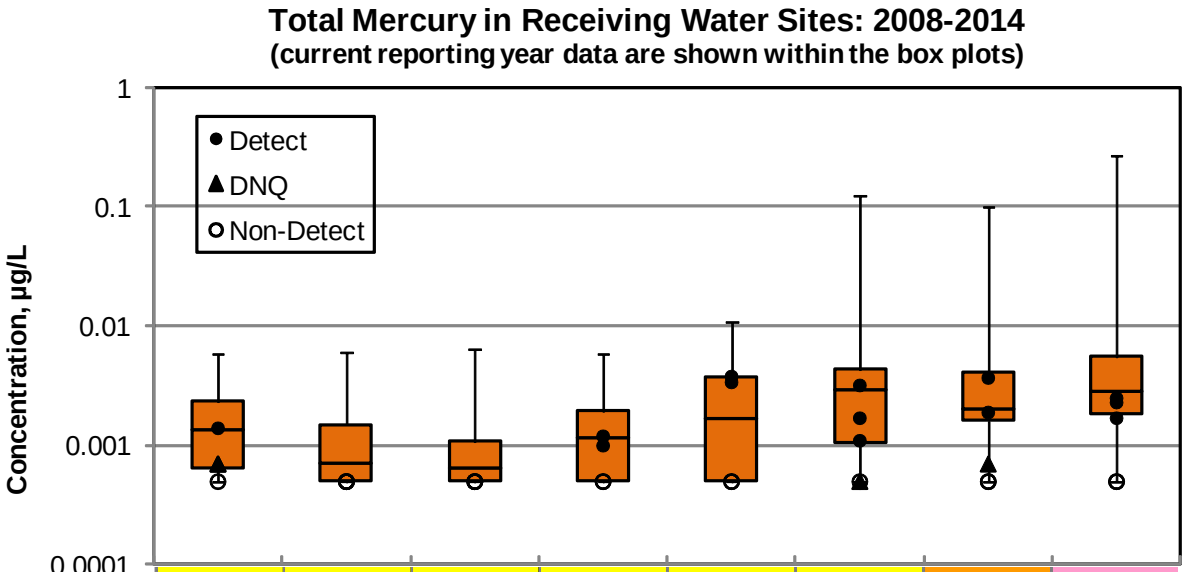
Date	Type	Event	01_BPT_14	01_BPT_15	01_BPT_3	01_BPT_6	01_SG_74	01_RR_BR	03_UNIV	04_WOOD
Aug-13	Dry	39	0.16	0.22	0.072	0.11	0.12	2.67	1.76	2.67
Nov-13	Dry	40	0.080	0.16	0.12	0.12	0.21	0.061	3.51	2.15
Feb-14	Dry	41	0.18	0.070	0.074	0.079	0.13	1.11	1.96	1.73
Feb-14	Storm	42						2.42	3.15	7.33
May-14	Dry	43	1.09	0.35	0.41	0.28	1.13	1.72	2.29	2.42

Figure 29. Dissolved Copper Concentrations in Receiving Water Sites: 2008-2014



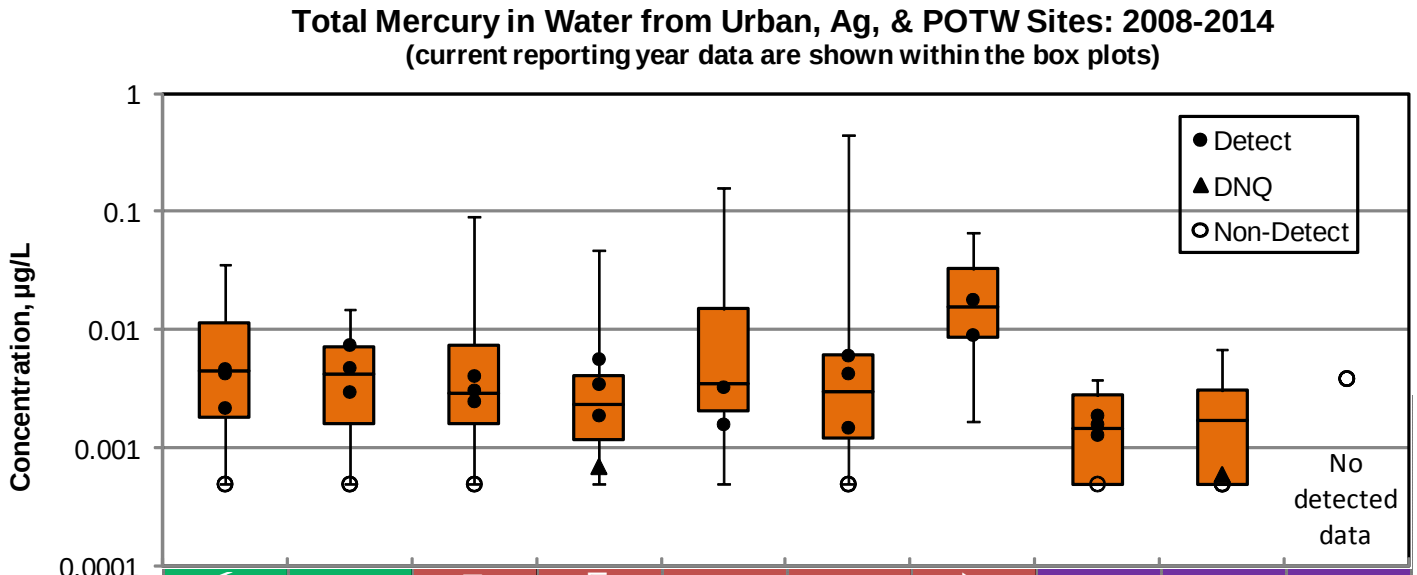
Date	Type	Event	04D_VENTURA	09BD_ADOLF	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	3.29	5.14	3.34			0.57		5.52	2.87	5.90
Nov-13	Dry	40	53.4	5.79	3.75	2.15	3.90	3.01		4.89	3.67	5.00
Feb-14	Dry	41	11.43	4.66	3.86	2.63		1.10		3.76	3.54	3.70
Feb-14	Storm	42	9.03	4.01	4.93	2.88	22.4	13.1	22.4			
May-14	Dry	43	16.4	4.56	3.96	2.63		1.92	27.9	4.88	3.57	2.50

Figure 30. Dissolved Copper Concentrations in Urban, Ag, and POTW Sites: 2008-2014



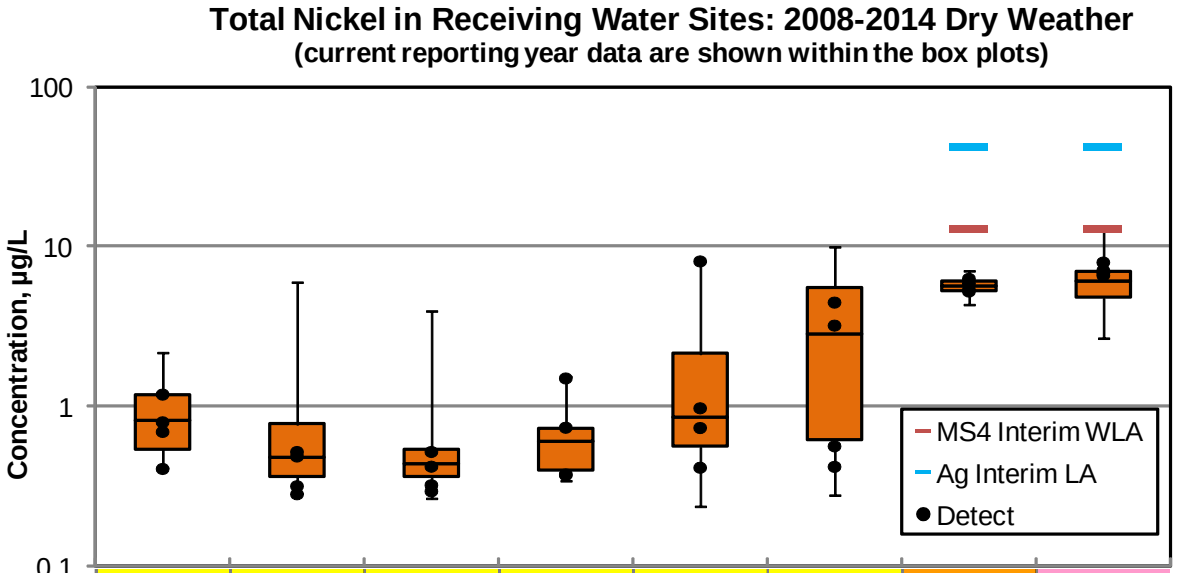
Date	Type	Event	01_BPT_14	01_BPT_15	01_BPT_3	01_BPT_6	01_SG_74	01_RR_BR	03_UNIV	04_WOOD
Aug-13	Dry	39	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Nov-13	Dry	40	*0.0007*	<0.0005	<0.0005	0.001	0.0034	*0.0005*	*0.0007*	0.0023
Feb-14	Dry	41	*0.0007*	<0.0005	<0.0005	<0.0005	<0.0005	0.0011	<0.0005	<0.0005
Feb-14	Storm	42						0.0017	0.0019	0.0025
May-14	Dry	43	0.0014	<0.0005	<0.0005	0.0012	0.0038	0.0032	0.0037	0.0017

Figure 31. Total Mercury Concentrations in Receiving Water Sites: 2008-2014



Date	Type	Event	04D_VENTURA	09BD_ADOLF	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	<0.0005	<0.0005	<0.0005			<0.0005		<0.0005	<0.0005	<0.0039
Nov-13	Dry	40	0.0022	0.003	0.0041	0.0057	0.0016	0.0015		0.0016	<0.0005	<0.0039
Feb-14	Dry	41	<0.0005	<0.0005	<0.0005	*0.0007*		<0.0005		0.0013	*0.0006*	<0.0039
Feb-14	Storm	42	0.0047	0.0075	0.0025	0.0019	0.0033	0.0061	0.0091			
May-14	Dry	43	0.0043	0.0048	0.0031	0.0035		0.0043	0.0181	0.0019	<0.0005	<0.0039

Figure 32. Total Mercury Concentrations in Urban and Ag Sites: 2008-2014



Date	Event	01_BPT_14	01_BPT_15	01_BPT_3	01_BPT_6	01_SG_74	01_RR_BR	03_UNIV	04_WOOD
Aug-13	39	0.8126	0.3244	0.3289	0.3803	0.7491	0.4286	6.4	6.7
Nov-13	40	0.4154	0.4972	0.4295	1.5278	8.2161	0.5757	5.33	8.09
Feb-14	41	0.7076	0.2886	0.3011	0.3841	0.4227	3.2635	5.46	6.93
May-14	43	1.2118	0.5306	0.5311	0.7523	0.9942	4.5486	5.97	7.21

Figure 33. Total Nickel Dry Weather Concentrations in Receiving Water Sites: 2008-2014

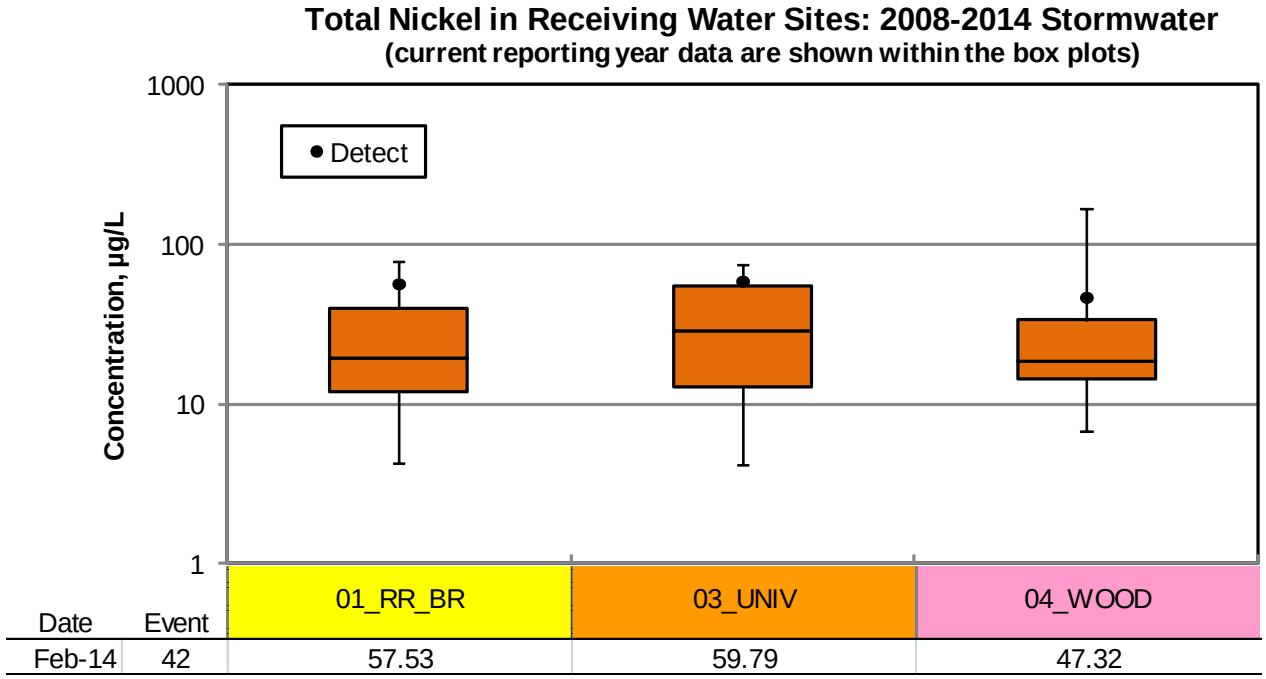
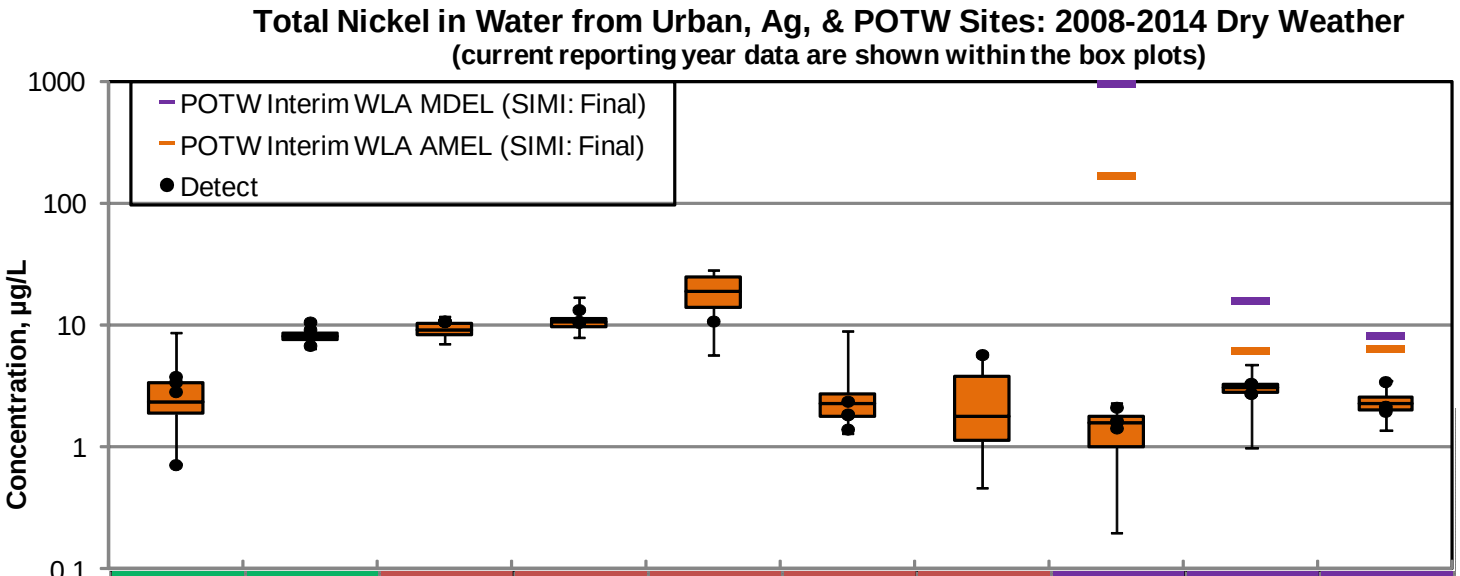


Figure 34. Total Nickel Stormwater Concentrations in Receiving Water Sites: 2008-2014



Date	Event	04D_VENTURA	09BD_ADOLF	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	39	0.73	8.5	10.97			1.43		2.16	3.39	2.2
Nov-13	40	3.47	10.77	10.95	10.68	10.97	2.42		1.64	3.34	2.1
Feb-14	41	3.86	9.35	10.87	13.61		1.9		1.68	2.81	3.5
May-14	43	2.9	6.93	10.89	10.93		1.87	5.83	1.46	2.8	2

Figure 35. Total Nickel Dry Weather Concentrations in Urban, Ag, and POTW Sites: 2008-2014

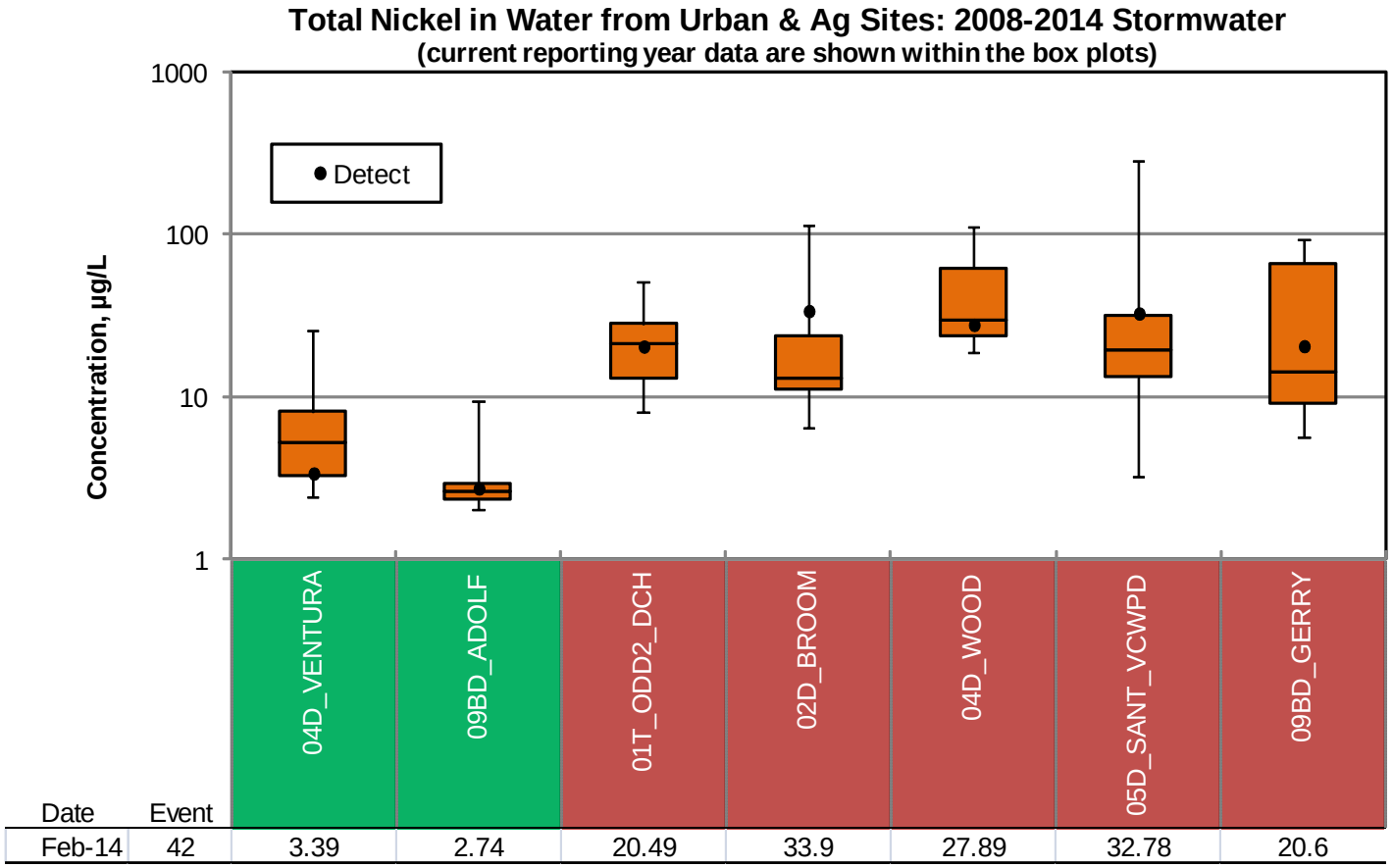
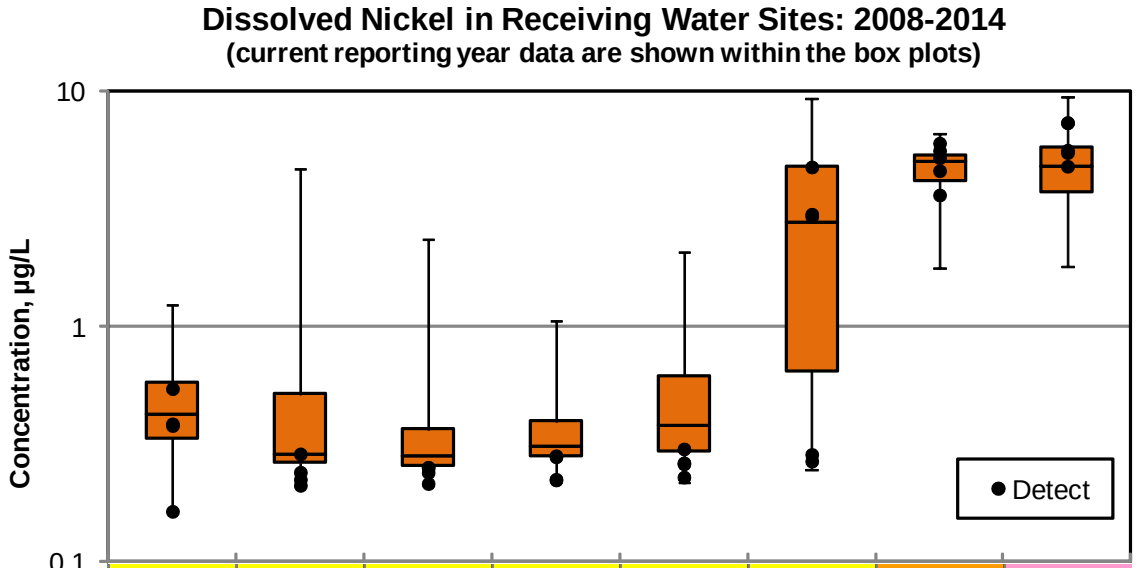
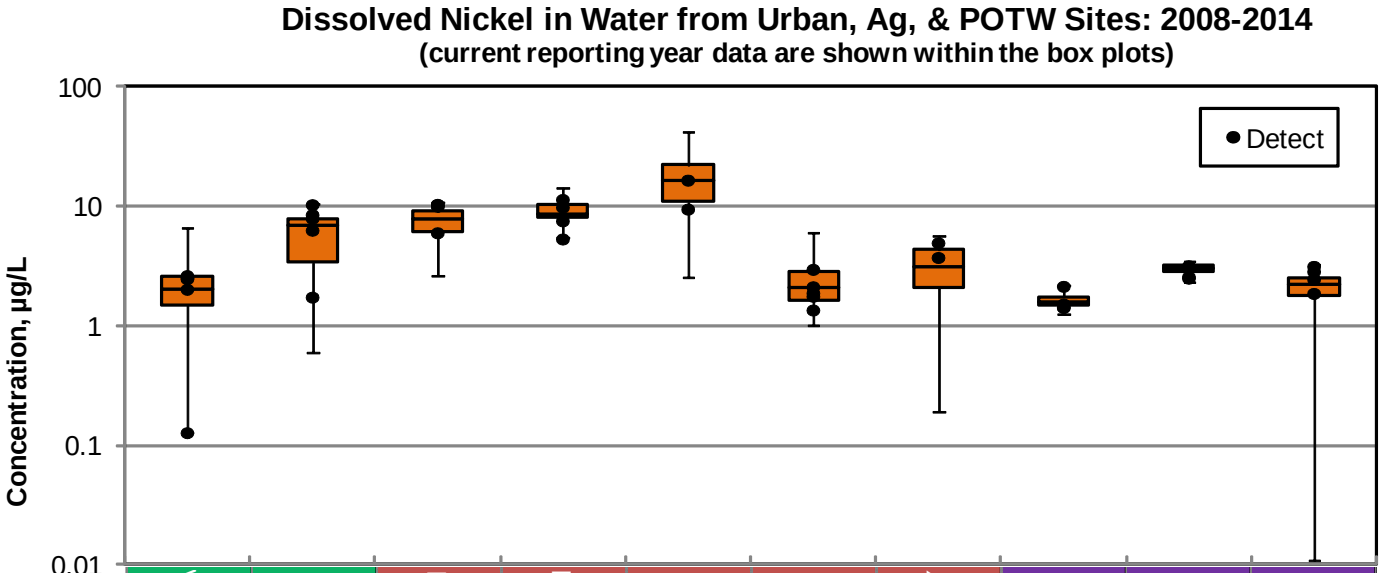


Figure 36. Total Nickel Stormwater Concentrations in Urban and Ag Sites: 2008-2014



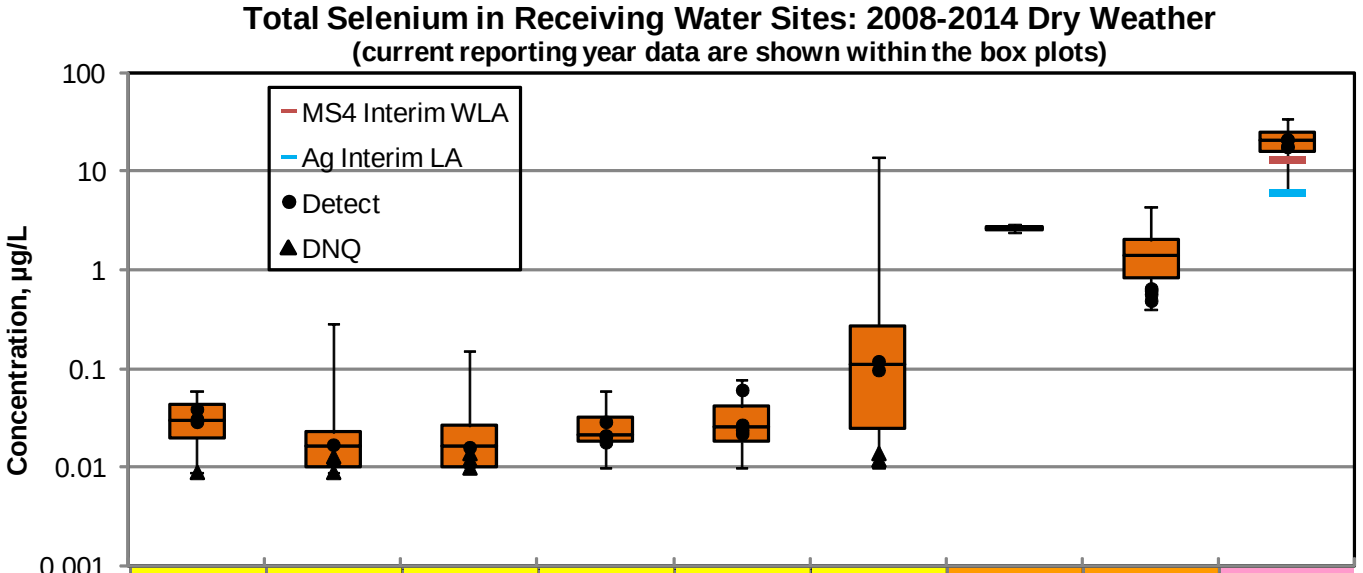
Date	Type	Event	01_BPT_14	01_BPT_15	01_BPT_3	01_BPT_6	01_SG_74	01_RR_BR	03_UNIV	04_WOOD
Aug-13	Dry	39	0.38	0.22	0.22	0.22	0.26	0.27	6.01	5.61
Nov-13	Dry	40	0.16	0.24	0.24	0.28	0.26	0.29	5.21	7.35
Feb-14	Dry	41	0.39	0.21	0.25	0.22	0.23	2.94	4.59	5.48
Feb-14	Storm	42						4.76	3.62	4.79
May-14	Dry	43	0.54	0.29	0.25	0.28	0.30	3.00	5.58	7.33

Figure 37. Dissolved Nickel Concentrations in Receiving Water Sites: 2008-2014



Date	Type	Event	04D_VENTURA	09BD_ADOLF	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	0.13	8.07	10.2			1.38		2.18	3.24	2.90
Nov-13	Dry	40	2.06	10.5	10.3	7.69	9.65	2.16		1.55	3.16	2.50
Feb-14	Dry	41	2.58	8.67	10.5	11.6		1.92		1.45	2.55	3.20
Feb-14	Storm	42	2.68	1.77	6.11	5.42	16.9	3.02	3.80			
May-14	Dry	43	2.52	6.42	10.6	10.0		1.80	5.04	1.46	2.63	1.90

Figure 38. Dissolved Nickel Concentrations in Urban, Ag, and POTW Sites: 2008-2014



Date	Event	01_BPT_14	01_BPT_15	01_BPT_3	01_BPT_6	01_SG_74	01_RR_BR	02_PCH	03_UNIV	04_WOOD
Aug-13	39	0.031	*0.012*	*0.01*	0.018	0.022	*0.012*		0.65	**17.7**
Nov-13	40	*0.009*	*0.013*	*0.014*	0.029	0.061	*0.014*		0.49	**17.8**
Feb-14	41	0.029	*0.009*	*0.012*	0.021	0.027	0.097		0.57	**21.0**
May-14	43	0.039	0.017	0.016	0.021	0.024	0.119		0.62	**21.0**

Figure 39. Total Selenium Dry Weather Concentrations in Receiving Water Sites: 2008-2014

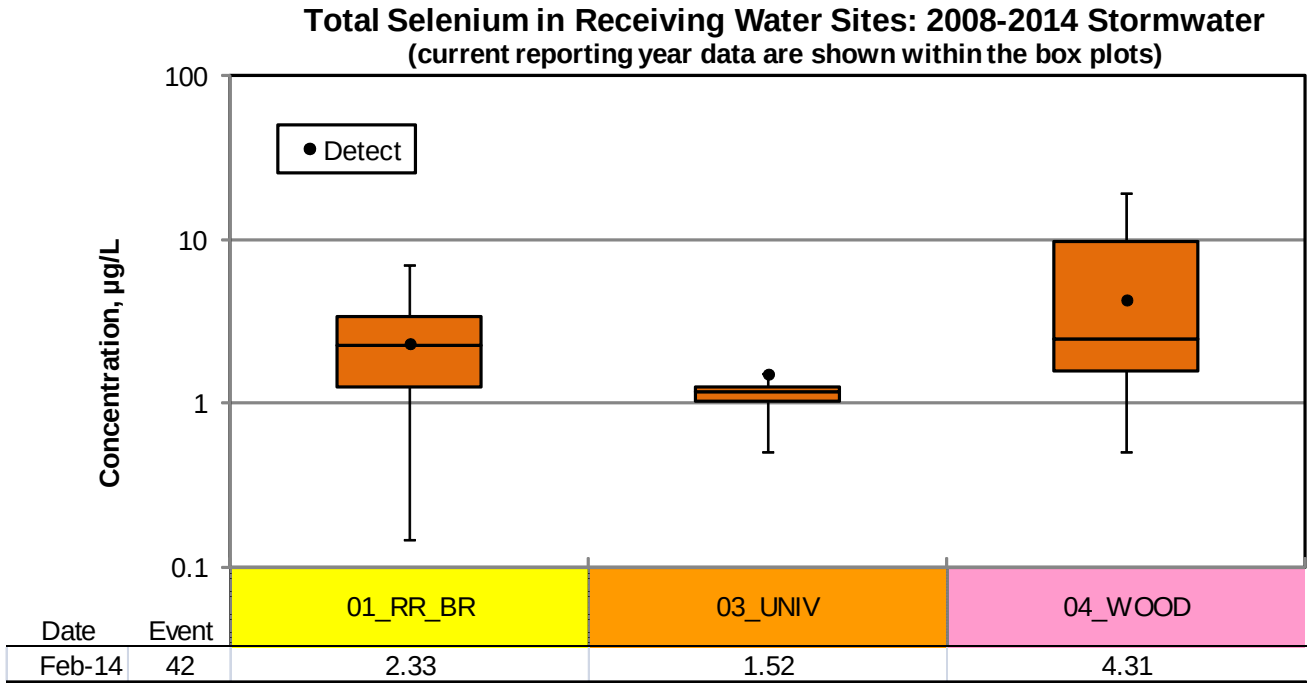
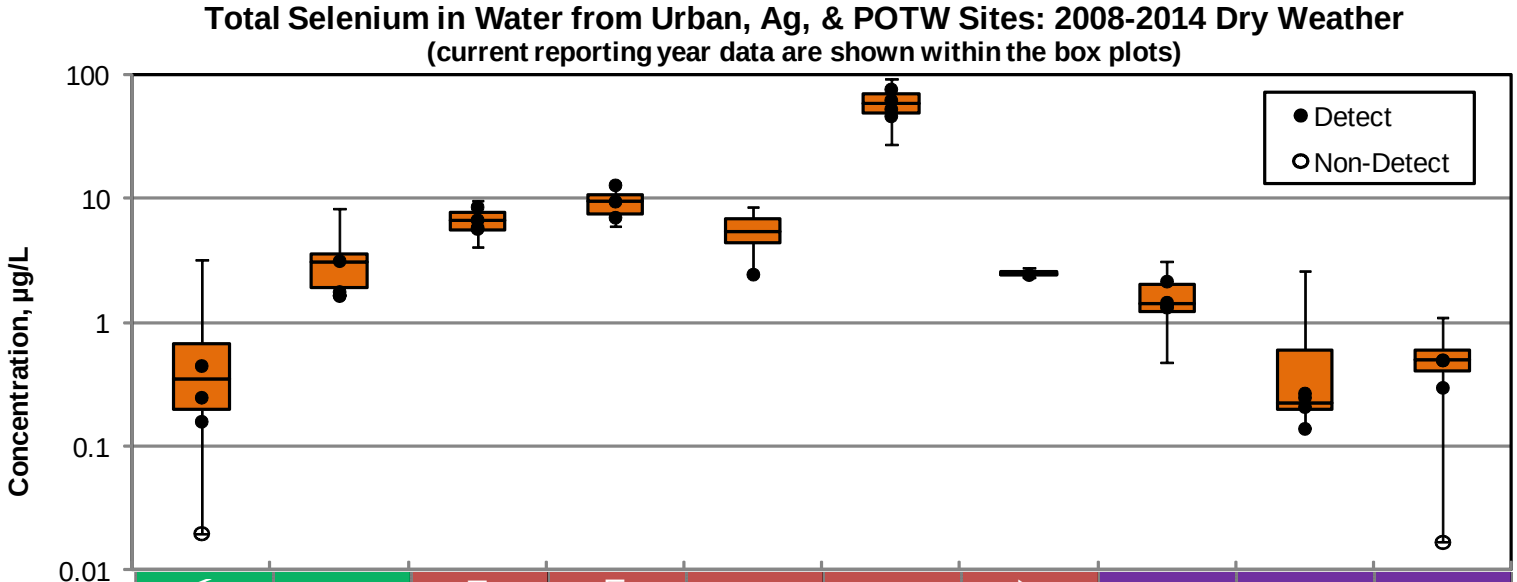


Figure 40. Total Selenium Stormwater Concentration in Receiving Water Sites: 2008-2014



Date	Event	04D_VENTURA	09BD_ADOLF	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	39	<0.020	1.65	5.74			46.51		1.38	0.21	<0.017
Nov-13	40	0.16	3.16	5.85	7.08	2.46	62.6		1.46	0.14	0.3
Feb-14	41	0.25	1.67	8.6	12.9		53.03		2.16	0.27	0.5
May-14	43	0.45	1.78	6.77	9.53		76.56	2.44	1.33	0.25	0.5

Figure 41. Total Selenium Dry Weather Concentrations in Urban, Ag, and POTW Sites: 2008-2014

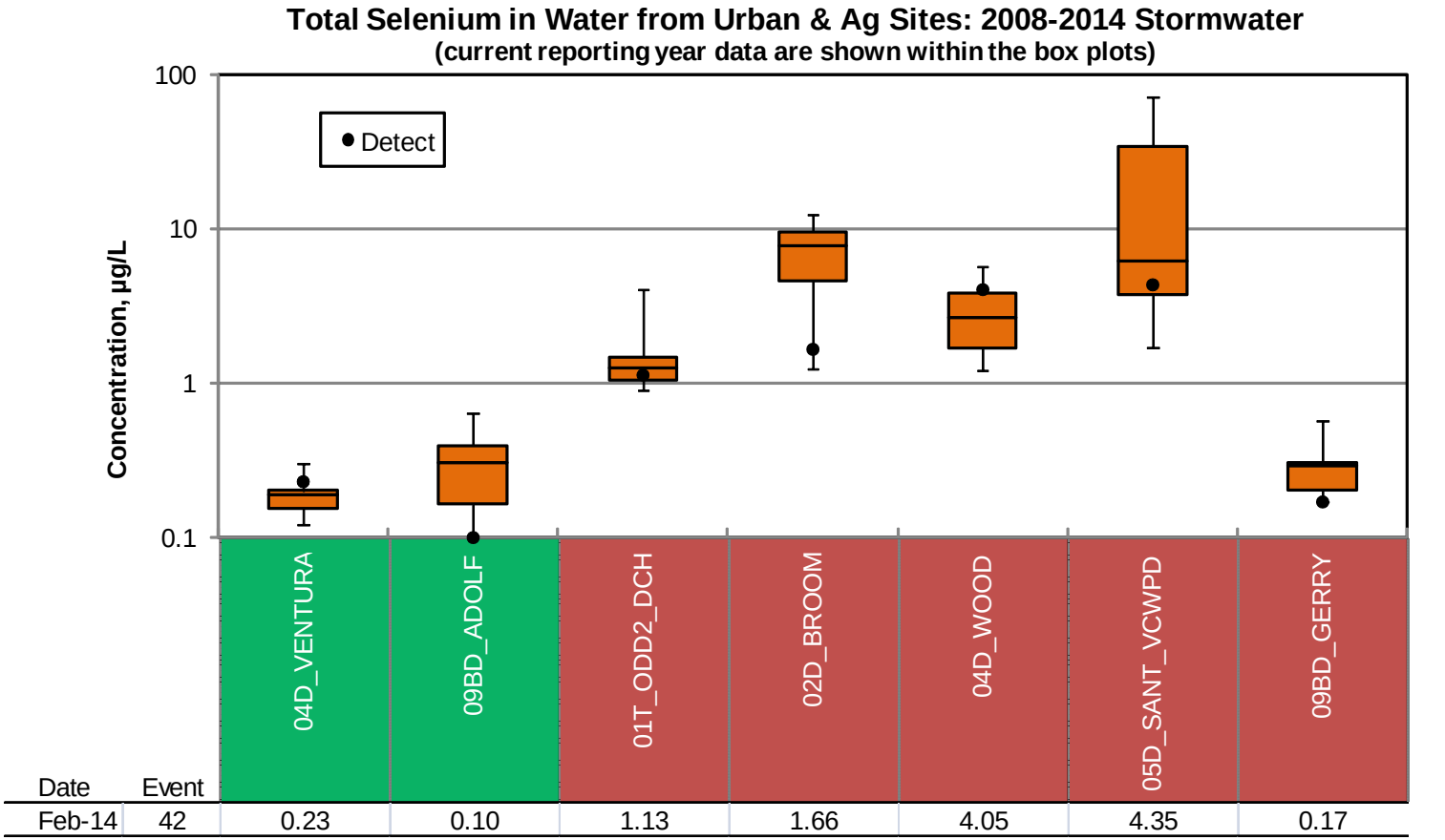
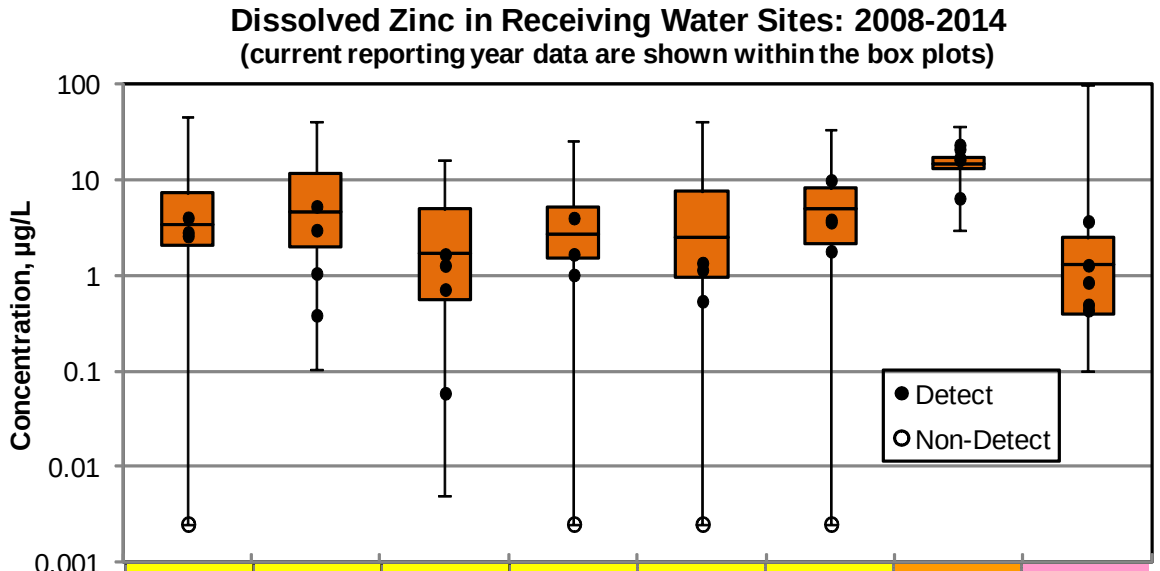
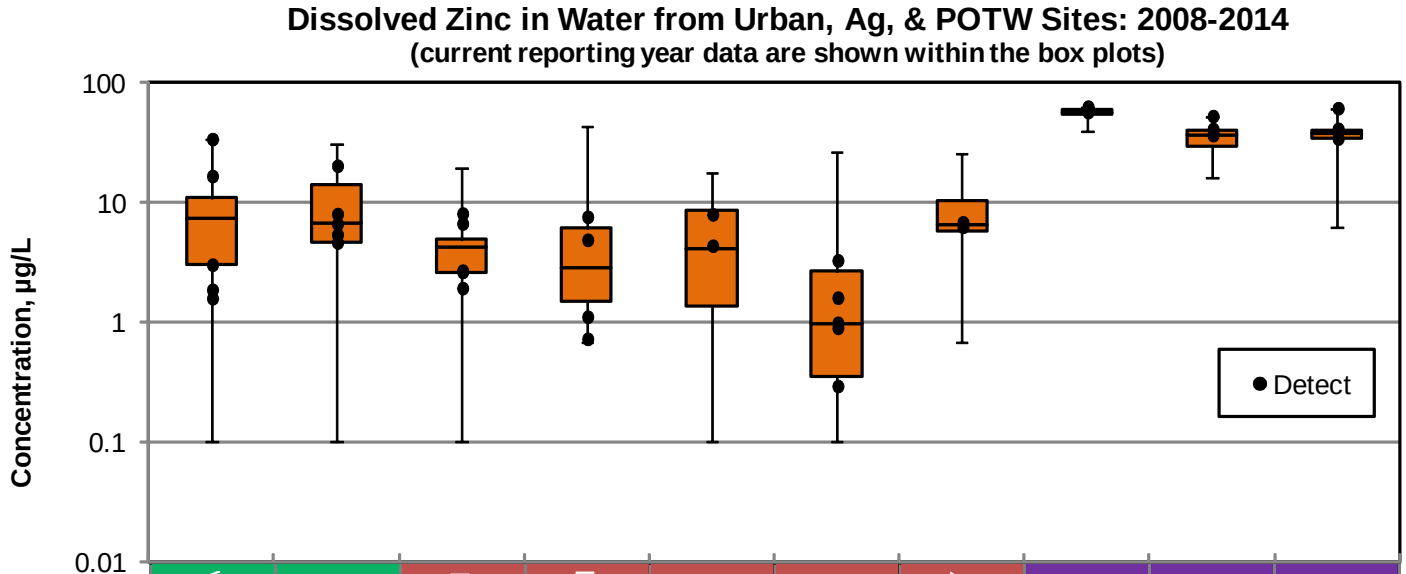


Figure 42. Total Selenium Stormwater Concentrations in Urban and Ag Sites: 2008-2014



Date	Type	Event	01_BPT_14	01_BPT_15	01_BPT_3	01_BPT_6	01_SG_74	01_RR_BR	03_UNIV	04_WOOD
Aug-13	Dry	39	<0.0025	2.9556	0.0583	<0.0025	<0.0025	<0.0025	16.03	0.43
Nov-13	Dry	40	2.7994	5.2434	1.6458	1.6511	1.3391	9.7821	20.75	0.84
Feb-14	Dry	41	3.9815	0.3809	1.2631	3.9557	0.5345	3.7898	23	0.49
Feb-14	Storm	42						3.58	6.37	3.64
May-14	Dry	43	2.5692	1.0437	0.7071	1.006	1.1334	1.7787	16.95	1.27

Figure 43. Dissolved Zinc Concentrations in Receiving Water Sites: 2008-2014

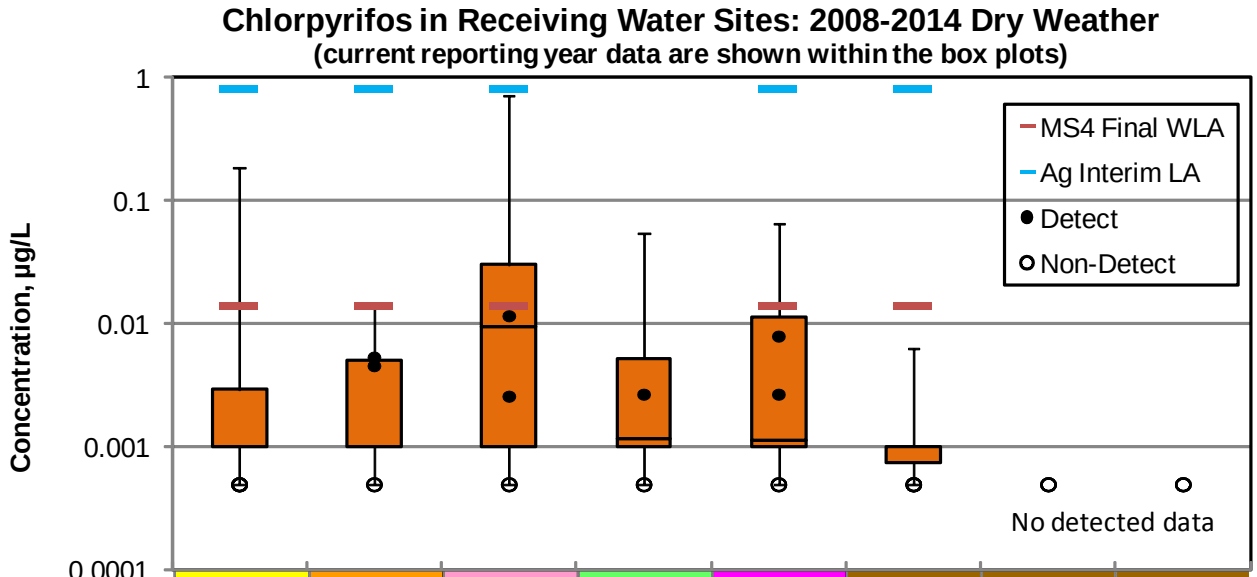


Date	Type	Event	04D_VENTURA	09BD_ADOLF	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	1.57	6.59	8.03			0.29		62.8	36.3	41.0
Nov-13	Dry	40	1.85	4.60	1.91	0.72	7.89	0.89		57.9	40.9	39.0
Feb-14	Dry	41	3.00	5.36	2.61	1.10		0.98		59.1	52.4	61.0
Feb-14	Storm	42	33.6	20.1	6.63	4.84	4.32	3.26	6.22			
May-14	Dry	43	16.5	7.96	2.67	7.53		1.59	6.78	56.5	37.1	34.0

Figure 44. Dissolved Zinc Concentrations in Urban, Ag, and POTW Sites: 2008-2014

TOXICITY TMDL

For the Toxicity TMDL, urban dischargers' final WLAs are effective as well as interim LAs for agricultural dischargers. The compliance points for these allocations are in the receiving waters at the base of the subwatersheds and are shown on the box plots for the appropriate site locations. Data for chlorpyrifos and diazinon has been separated into dry weather and stormwater since the allocations differ for the two conditions. Bolded values in the tables within each figure indicate the concentration was above the applicable limits for that constituent. Italicized values in the tables within each figure indicate the concentration was DNQ. Values in the tables within each figure with a "<" preceding them, indicate the constituent was ND at the MDL for that constituent.



Date	Event	01_RR_BR	03_UNIV	04_WOOD	06_SOMIS	07_HITCH	09B_ADOLF	10_GATE	13_BELT
Aug-13	39	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Nov-13	40	<0.0005	<0.0005	0.0026	<0.0005	<0.0005	<0.0005		<0.0005
Feb-14	41	<0.0005	0.0054	0.0117	0.0027	0.008	<0.0005	<0.0005	
May-14	43	<0.0005	0.0046	<0.0005		0.0027	<0.0005	<0.0005	<0.0005

Figure 45. Chlorpyrifos Dry Weather Concentrations in Receiving Water Sites: 2008-2014

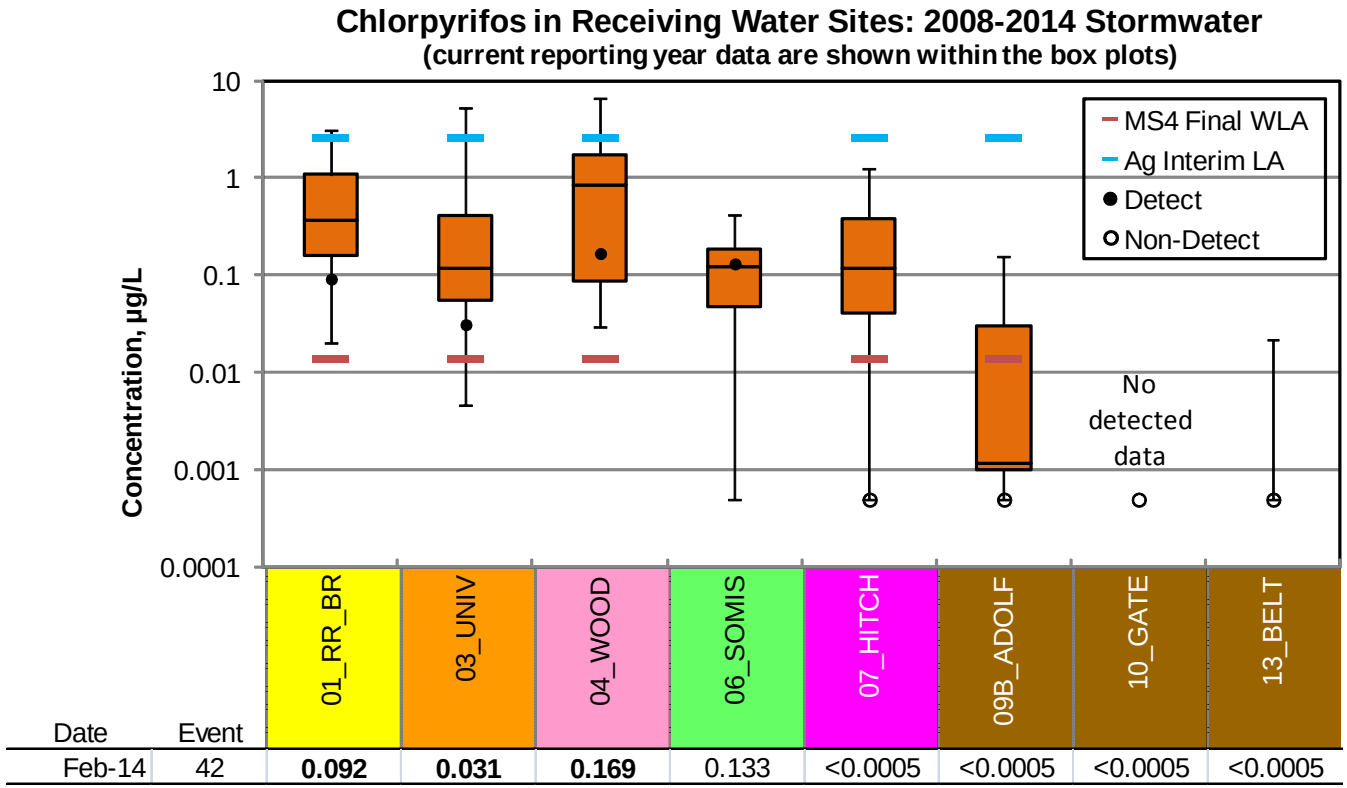
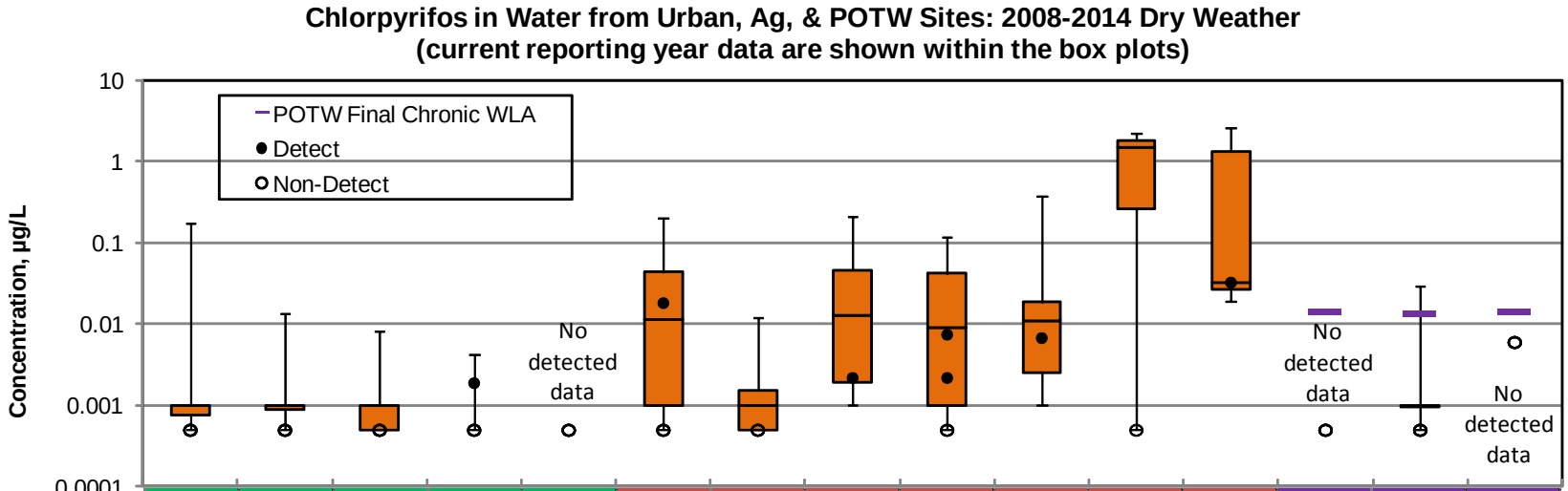


Figure 46. Chlorpyrifos Stormwater Concentrations in Receiving Water Sites: 2008-2014



Date	Event	04D_VENTURA	07D_CTP	07T_DC_H	09BD_ADOLF	13_SB_HILL	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	06T_FC_BR	07D_HITCH_LEVEE_2	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	39	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			<0.0005				<0.0005	<0.0005	<0.006
Nov-13	40	<0.0005	<0.0005	<0.0005	0.0019	<0.0005	<0.0005	<0.0005	0.0022	0.0075	0.0068			<0.0005	<0.0005	<0.006
Feb-14	41	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0183	<0.0005		0.0022				<0.0005	<0.0005	<0.006
May-14	43	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		<0.0005		<0.0005	0.0327	<0.0005	<0.0005	<0.006

Figure 47. Chlorpyrifos Dry Weather Concentrations in Urban, Ag, and POTW Sites: 2008-2014

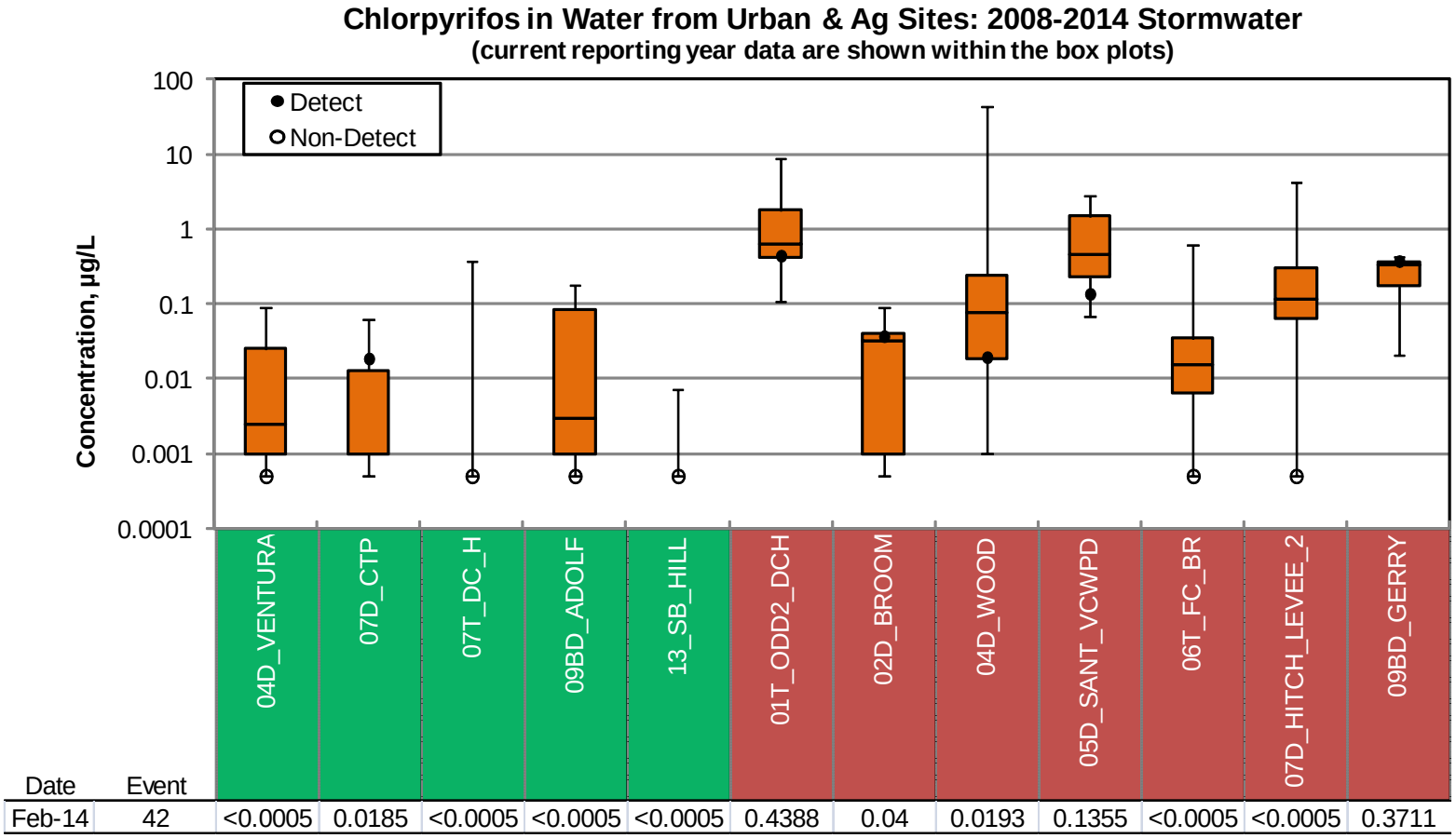
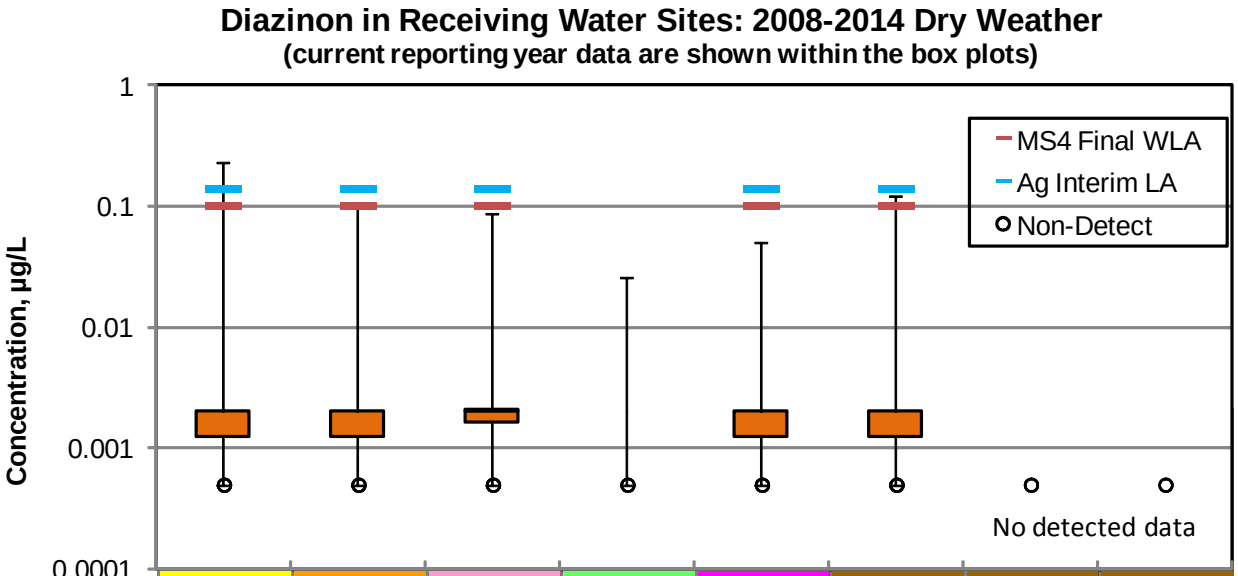


Figure 48. Chlorpyrifos Stormwater Concentrations in Urban and Ag Sites: 2008-2014



Date	Event	01_RR_BR	03_UNIV	04_WOOD	06_SOMIS	07_HITCH	09B_ADOLF	10_GATE	13_BELT
Aug-13	39	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Nov-13	40	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		<0.0005
Feb-14	41	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
May-14	43	<0.0005	<0.0005	<0.0005		<0.0005	<0.0005	<0.0005	<0.0005

Figure 49. Diazinon Dry Weather Concentrations in Receiving Water Sites: 2008-2014

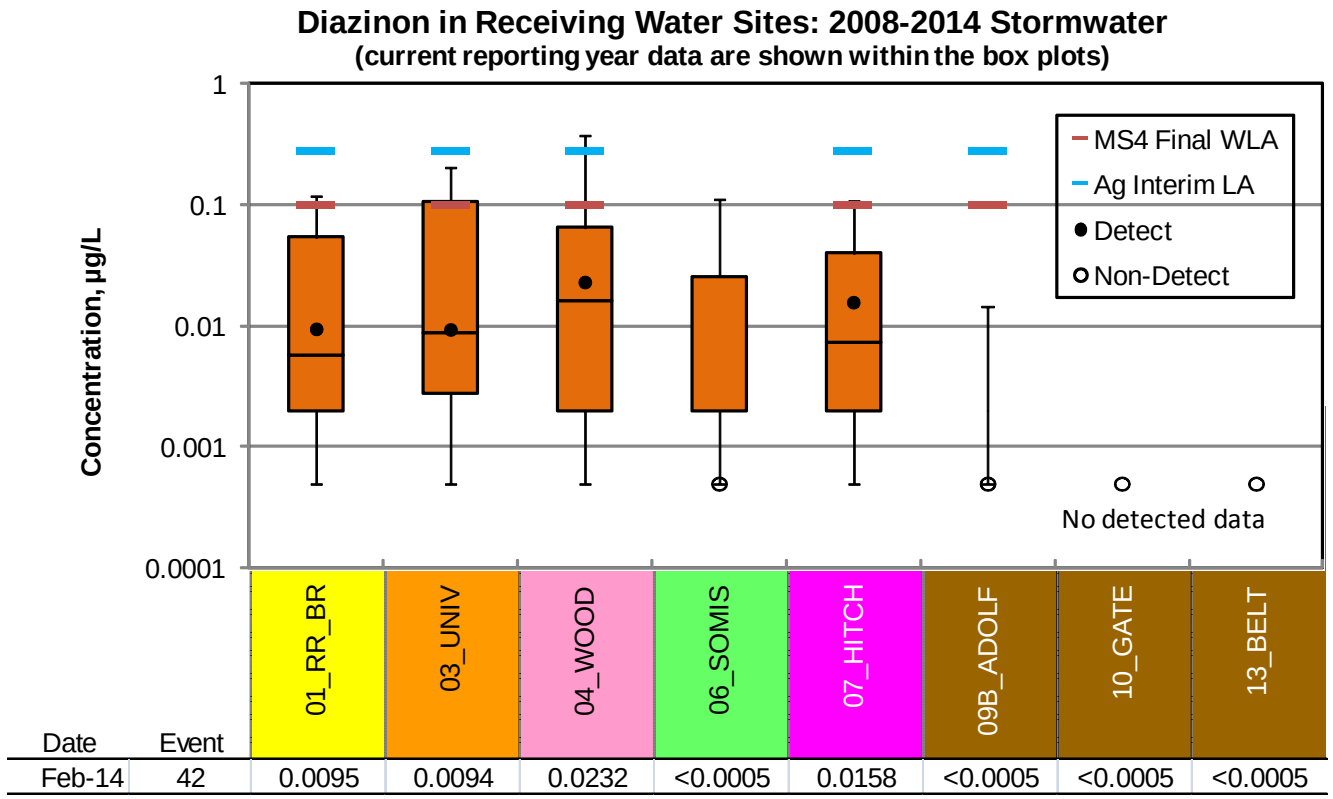
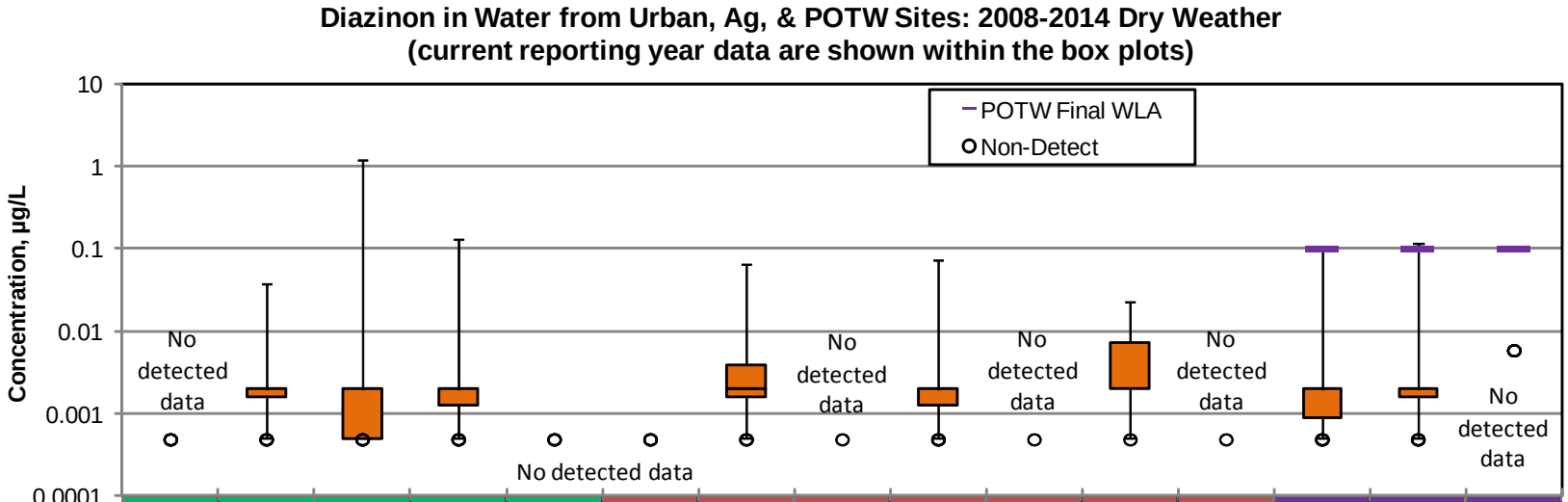


Figure 50. Diazinon Stormwater Concentrations in Receiving Water Sites: 2008-2014



Date	Event	04D_VENTURA	07D_CTP	07T_DC_H	09BD_ADOLF	13_SB_HILL	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	06T_FC_BR	07D_HITCH_LEVEE_2	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	39	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			<0.0005				<0.0005	<0.0005	<0.006
Nov-13	40	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			<0.0005	<0.0005	<0.006
Feb-14	41	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		<0.0005				<0.0005	<0.0005	<0.006
May-14	43	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		<0.0005		<0.0005	<0.0005	<0.0005	<0.0005	<0.006

Figure 51. Diazinon Dry Weather Concentrations in Urban, Ag, and POTW Sites: 2008-2014

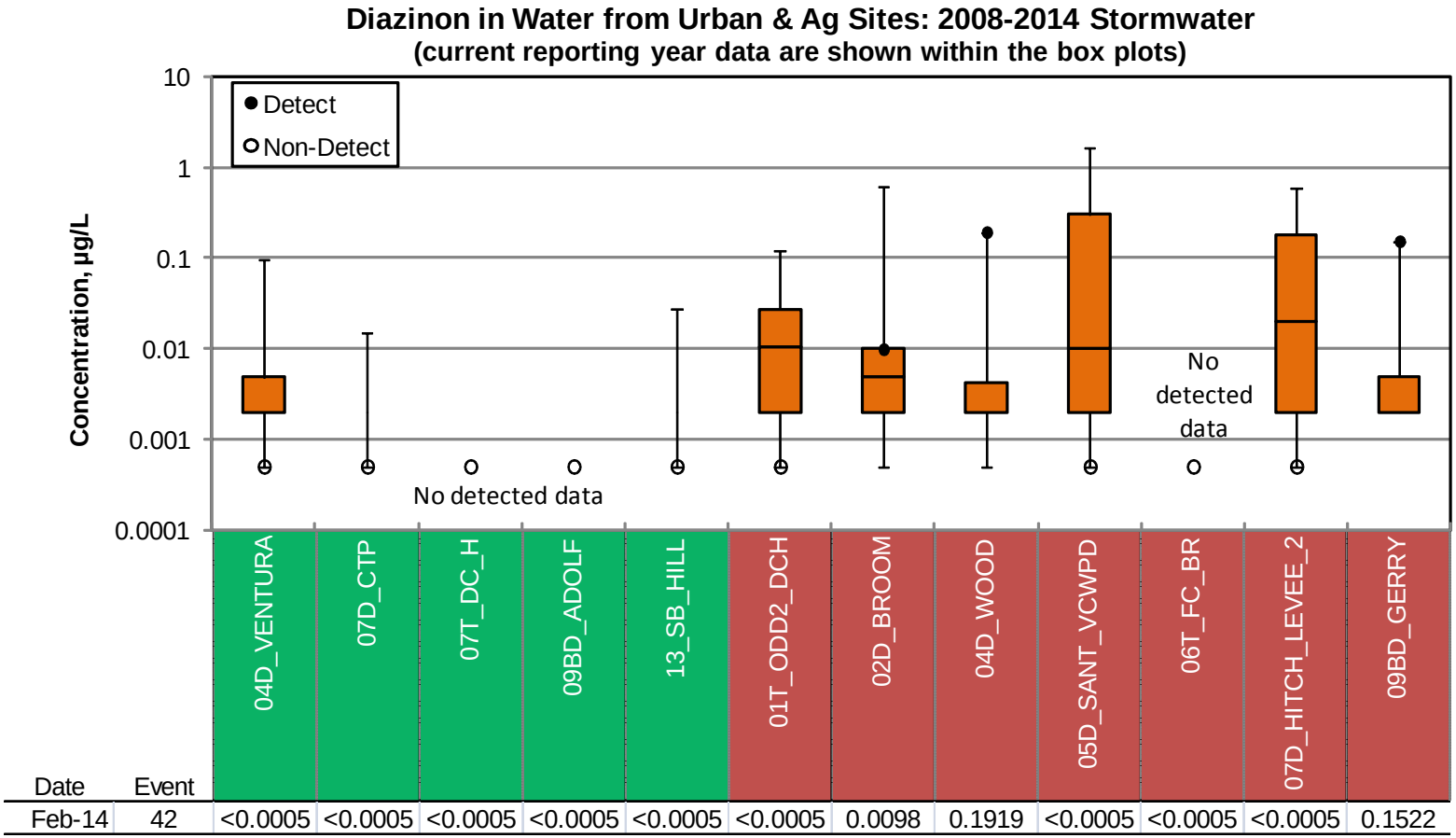
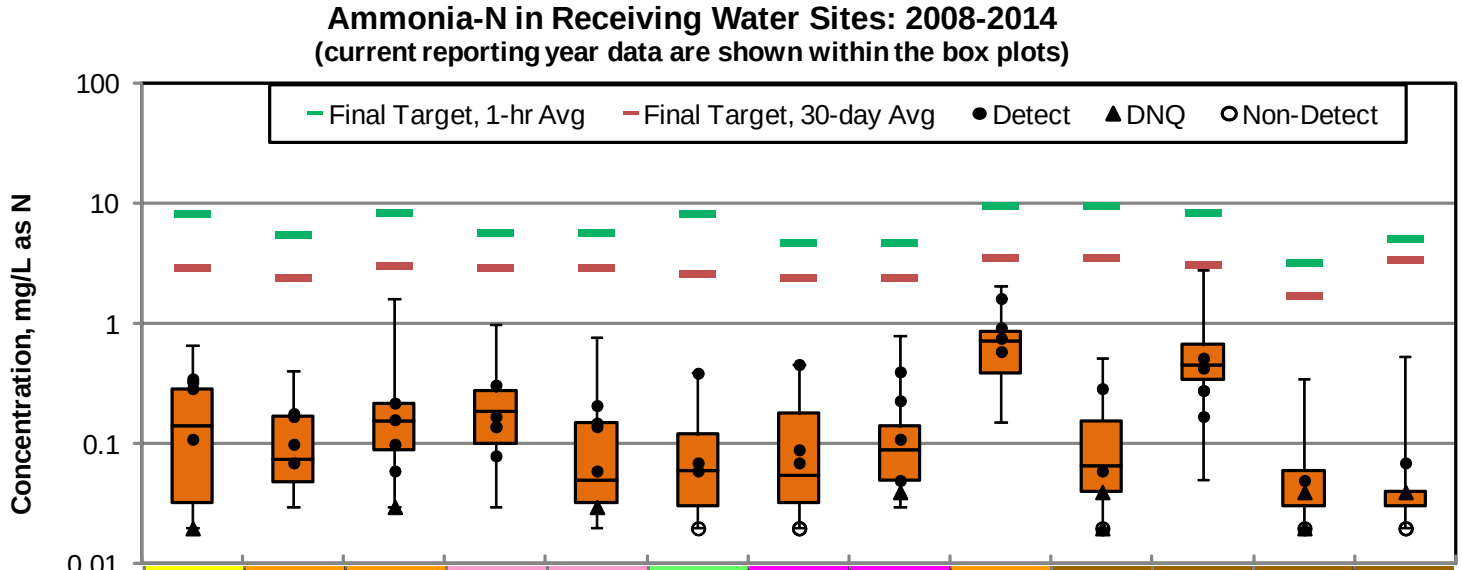


Figure 52. Diazinon Stormwater Concentrations in Urban and Ag Sites: 2008-2014

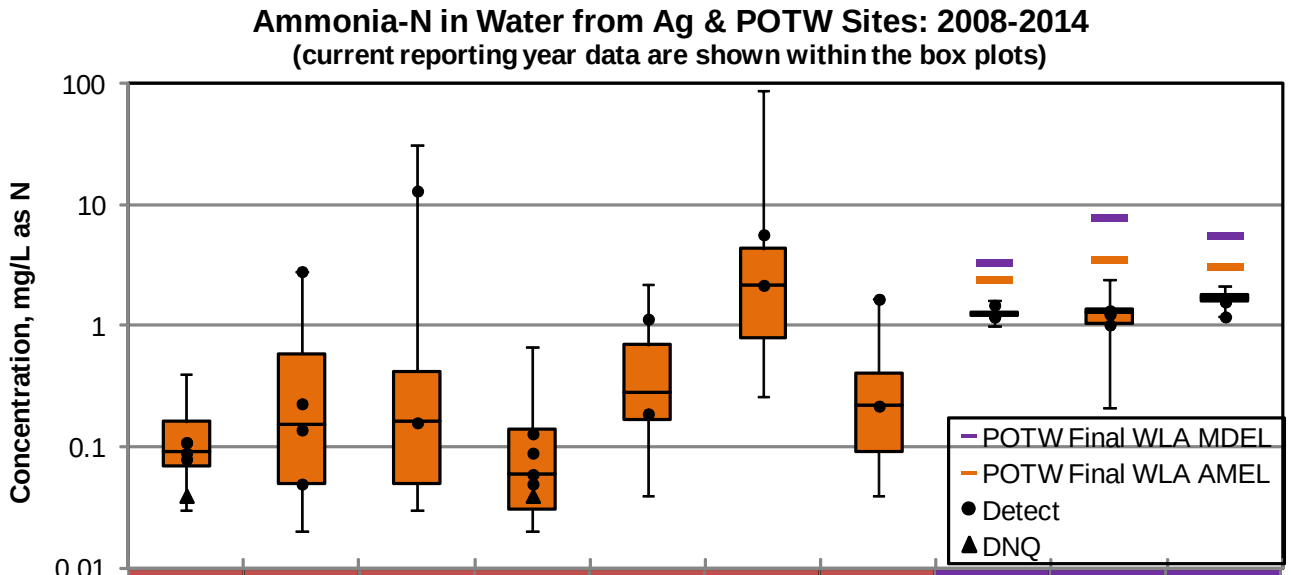
NUTRIENTS TMDL

Final targets and allocations are effective for the Nutrients TMDL. The applicable targets for each monitoring site are presented in the figures below. Bolded values in the tables within each figure indicate the concentration was above the applicable limits for that constituent. Italicized values in the tables within each figure indicate the concentration was DNQ. Values in the tables within each figure with a "<" preceding them, indicate the constituent was ND at the MDL for that constituent.



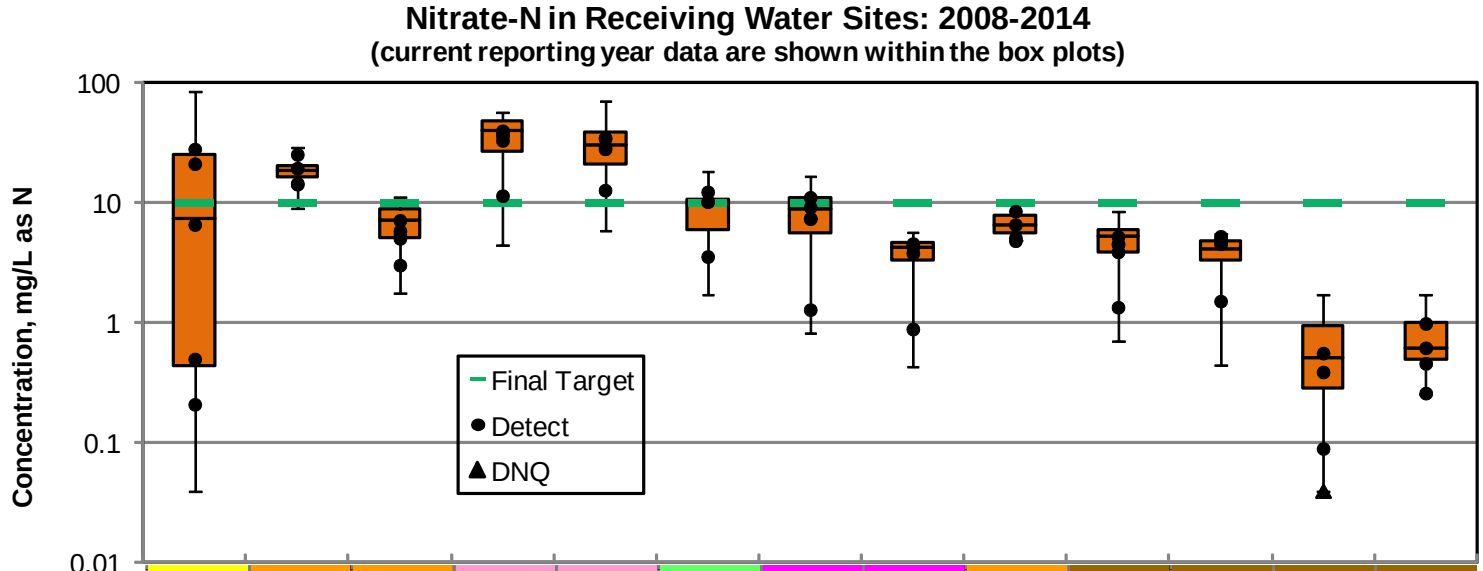
Date	Type	Event	01_RR_BR	02_PCH	03_UNIV	04_WOOD	05_CENTR	06_SOMIS	07_HITCH	07_MADER	09A_HOWAR	09B_ADOLF	10_GATE	12_PARK	13_BELT
Aug-13	Dry	39	0.35	0.18	0.06	0.31	*0.03*	0.07	0.07	0.05	0.76	*0.04*	0.52	<0.02	*0.04*
Nov-13	Dry	40	*0.02*	0.1	0.16	0.17	0.21	0.06	0.09	*0.04*	0.59	0.06	0.43	0.05	0.07
Feb-14	Dry	41	0.11	0.17	0.1	0.14	0.06	<0.02	<0.02	0.23	0.93	*0.02*	0.28	*0.02*	<0.02
Feb-14	Storm	42	0.33		0.22	0.14	0.15	0.39	0.46	0.4		0.29	0.17		
May-14	Dry	43	0.29	0.07	*0.03*	0.08	0.14		<0.02	0.11	1.63	<0.02	0.28	*0.04*	<0.02

Figure 53. Ammonia-N Concentrations in Receiving Water Sites: 2008-2014



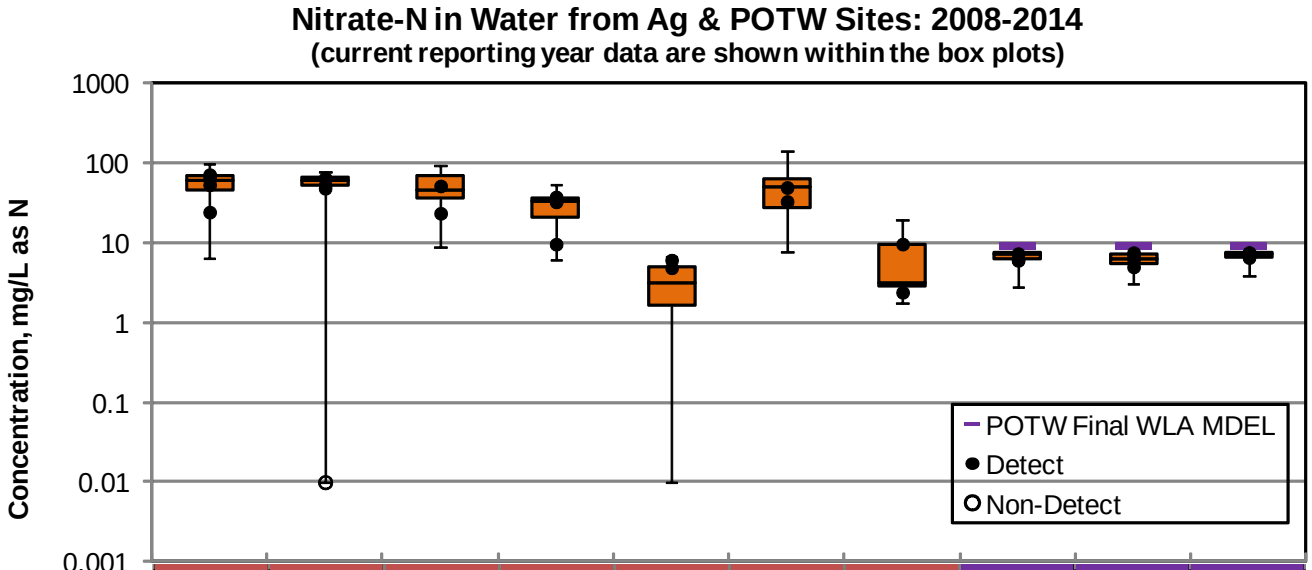
Date	Type	Event	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	06T_FC_BR	07D_HITCH_LEVEE_2	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	0.08			*0.04*				1.2	1.03	1.6
Nov-13	Dry	40	0.09	2.84	13.14	0.06	0.19			1.2	1.35	1.6
Feb-14	Dry	41	*0.04*	0.05		0.05				1.5	1.29	1.2
Feb-14	Storm	42	0.11	0.14	0.16	0.13	1.15	2.19	0.22			
May-14	Dry	43	0.11	0.23		0.09		5.72	1.68		1.26	1.7

Figure 54. Ammonia-N Concentrations in Ag and POTW Sites: 2008-2014



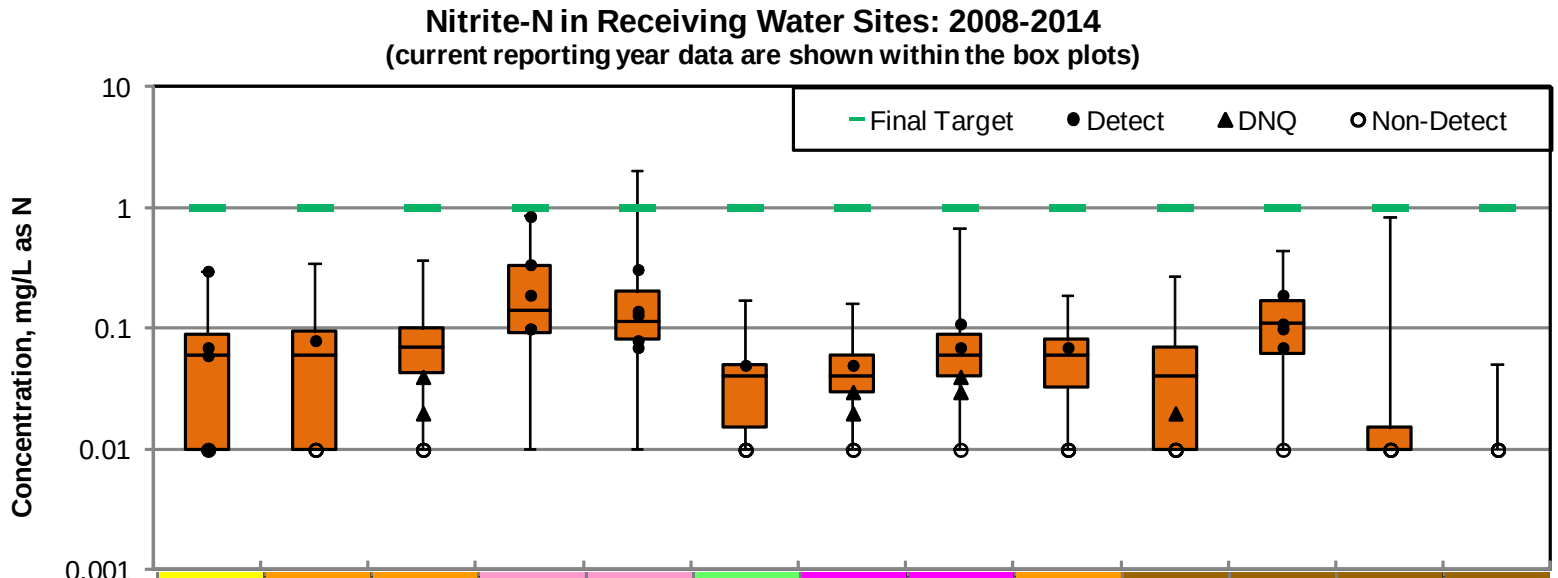
Date	Type	Event	01_RR_BR	02_PCH	03_UNIV	04_WOOD	05_CENTR	06_SOMIS	07_HITCH	07_MADER	09A_HOWAR	09B_ADOLF	10_GATE	12_PARK	13_BELT
Aug-13	Dry	39	0.21	**14.5**	5.06	**38.9**	**34.8**	**12.4**	7.4	4.34	4.83	4.56	5.01	*0.04*	0.46
Nov-13	Dry	40	0.5	**14.3**	5.85	**36.3**	**28.2**	**10.3**	7.41	4.58	6.58	4.52	4.56	0.56	0.99
Feb-14	Dry	41	**21.2**	**19.5**	7.16	**33.1**	**28.9**	**10.2**	9.23	4.38	8.52	5.24	4.67	0.39	0.62
Feb-14	Storm	42	6.6		3.03	**11.5**	**12.8**	3.57	1.29	0.89		1.35	1.52		
May-14	Dry	43	**28.1**	**25.3**	5.46	**39.8**	**34.4**		**11.1**	3.82	5.13	3.91	5.27	0.09	0.26

Figure 55. Nitrate-N Concentrations in Receiving Water Sites: 2008-2014



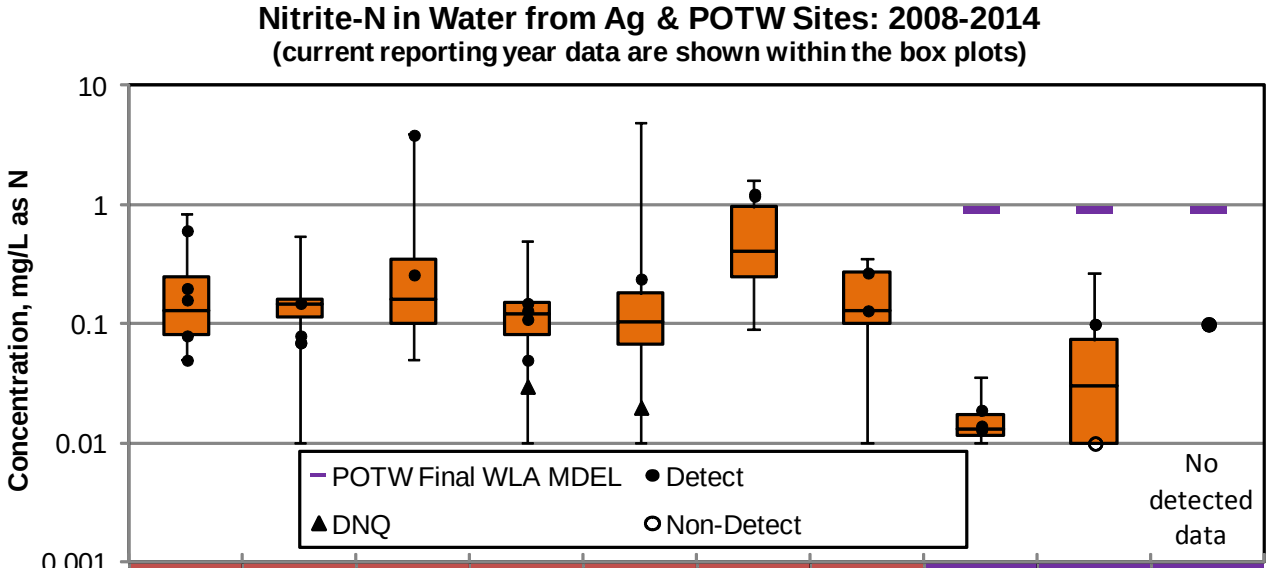
Date	Type	Event	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	06T_FC_BR	07D_HITCH_LEVEE_2	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	53.1			32.5				7.30	4.97	7.50
Nov-13	Dry	40	69.1	48.0	23.4	37.4	4.85			6.10	6.25	6.50
Feb-14	Dry	41	71.0	64.6		33.8				6.00	7.50	7.50
Feb-14	Storm	42	24.1	<0.01	51.4	9.58	6.06	49.1	2.39			
May-14	Dry	43	62.6	52.7		33.7		32.9	9.61		7.00	7.20

Figure 56. Nitrate-N Concentrations in Ag and POTW Sites: 2008-2014



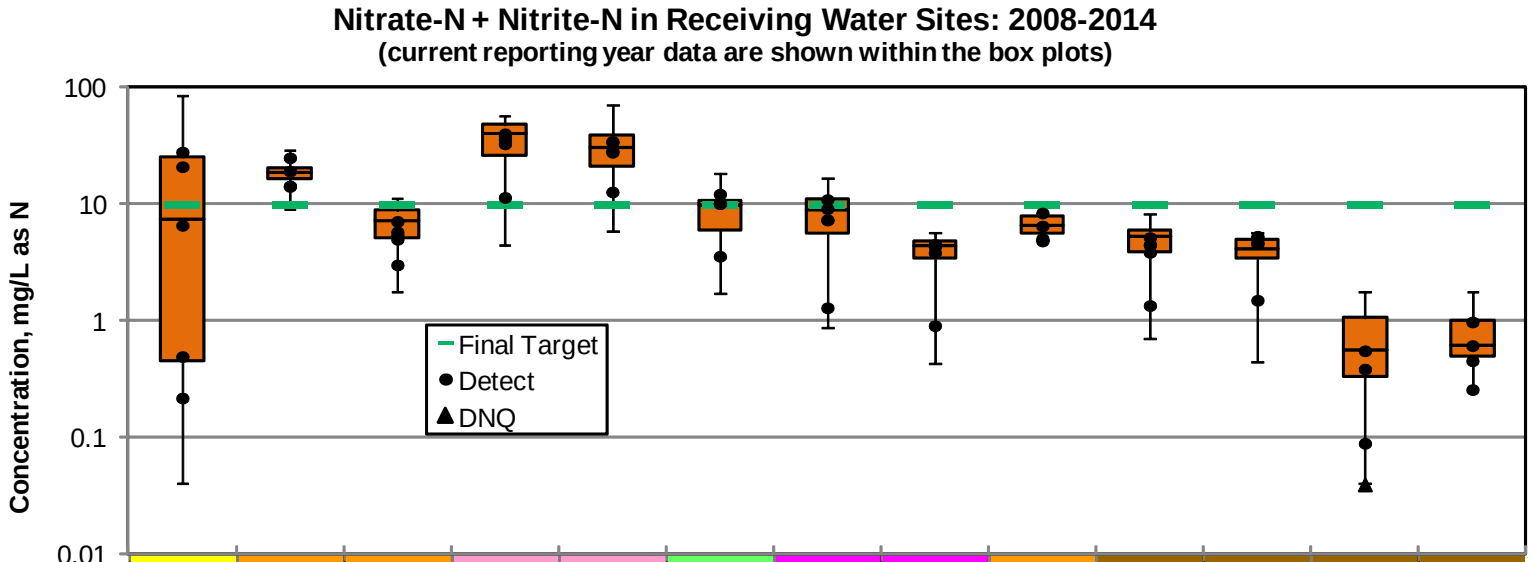
Date	Type	Event	01_RR_BR	02_PCH	03_UNIV	04_WOOD	05_CENTR	06_SOMIS	07_HITCH	07_MADER	09A_HOWAR	09B_ADOLF	10_GATE	12_PARK	13_BELT
Aug-13	Dry	39	0.01	<0.01	<0.01	0.34	0.14	<0.01	0.05	0.11	0.07	<0.01	0.19	<0.01	<0.01
Nov-13	Dry	40	<0.01	0.08	<0.01	0.1	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	0.07	<0.01	<0.01
Feb-14	Dry	41	0.06	<0.01	*0.04*	0.19	0.08	<0.01	*0.03*	*0.04*	<0.01	<0.01	0.1	<0.01	<0.01
Feb-14	Storm	42	0.07		*0.02*	0.1	0.13	0.05	*0.02*	*0.03*		*0.02*	<0.01		
May-14	Dry	43	0.3	<0.01	<0.01	0.85	0.31		<0.01	0.07	<0.01	<0.01	0.11	<0.01	<0.01

Figure 57. Nitrite-N Concentrations in Receiving Water Sites: 2008-2014



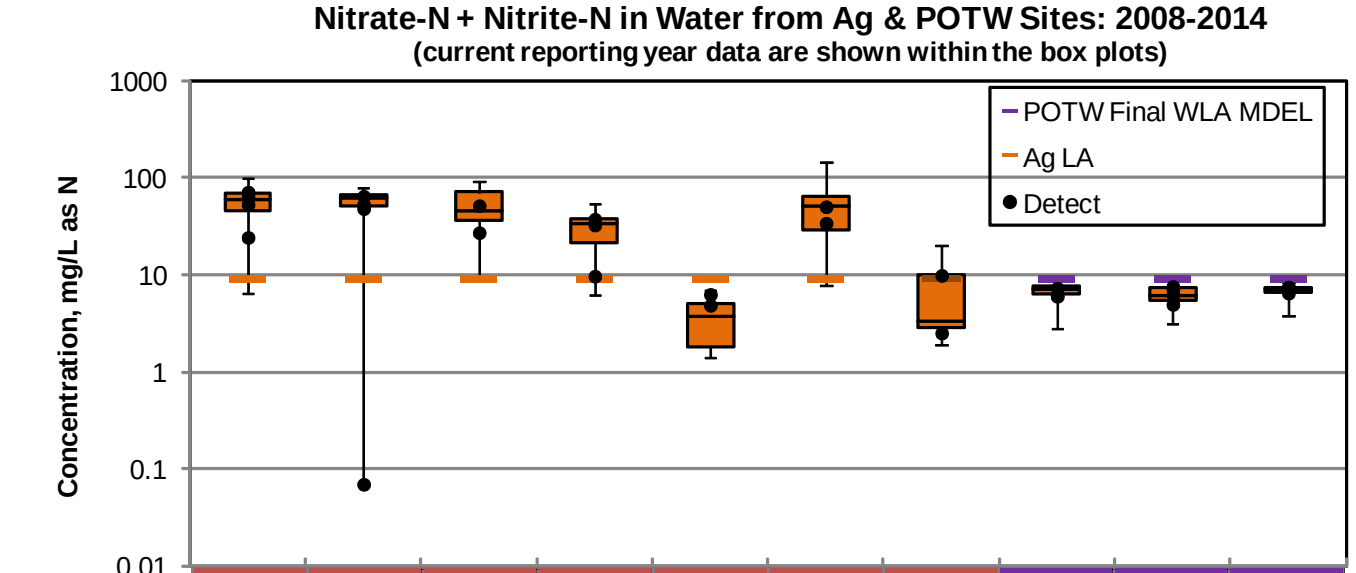
Date	Type	Event	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	06T_FC_BR	07D_HITCH_LEVEE_2	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	39	0.2			0.11				0.014	<0.01	<0.1
Nov-13	Dry	40	0.05	0.08	3.87	*0.03*	*0.02*			0.013	<0.01	<0.1
Feb-14	Dry	41	0.08	0.07		0.05				0.019	0.1	<0.1
Feb-14	Storm	42	0.16	0.07	0.26	0.13	0.24	1.24	0.13			
May-14	Dry	43	0.61	0.15		0.15		1.19	0.27		0.1	<0.1

Figure 58. Nitrite-N Concentrations in Ag and POTW Sites: 2008-2014



Date	Type	Event	01_RR_BR	02_PCH	03_UNIV	04_WOOD	05_CENTR	06_SOMIS	07_HITCH	07_MADER	09A_HOWAR	09B_ADOLF	10_GATE	12_PARK	13_BELT
Aug-13	Dry	39	0.22	**14.5**	5.06	**39.2**	**34.9**	**12.4**	7.45	4.45	4.90	4.56	5.20	*0.04*	0.46
Nov-13	Dry	40	0.50	**14.4**	5.85	**36.4**	**28.2**	**10.3**	7.41	4.58	6.58	4.52	4.63	0.56	0.99
Feb-14	Dry	41	**21.3**	**19.5**	7.20	**33.3**	**29.0**	**10.2**	9.26	4.42	8.52	5.24	4.77	0.39	0.62
Feb-14	Storm	42	6.67		3.05	**11.6**	**12.9**	3.6	1.31	0.92		1.37	1.52		
May-14	Dry	43	**28.4**	**25.3**	5.46	**40.7**	**34.7**		**11.1**	3.89	5.13	3.91	5.38	0.09	0.26

Figure 59. Nitrate-N + Nitrite-N Concentrations in Receiving Water Sites: 2008-2014

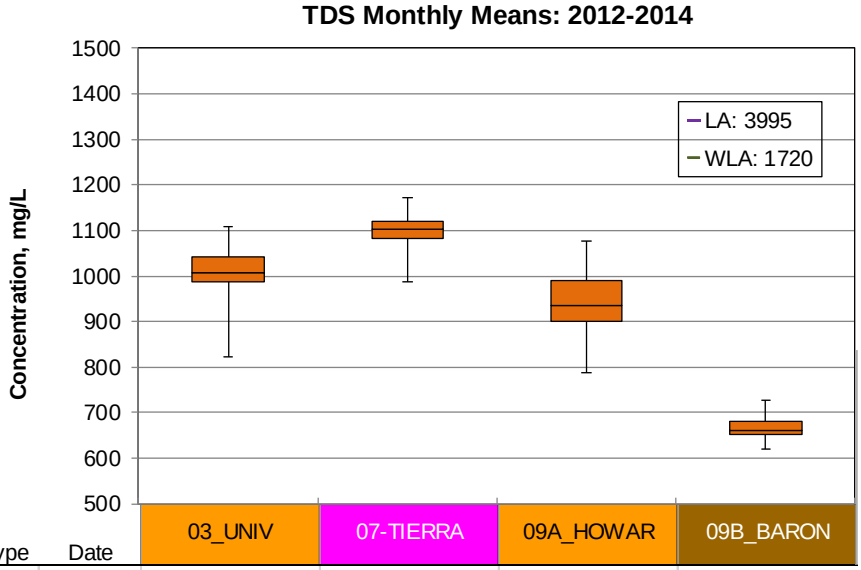


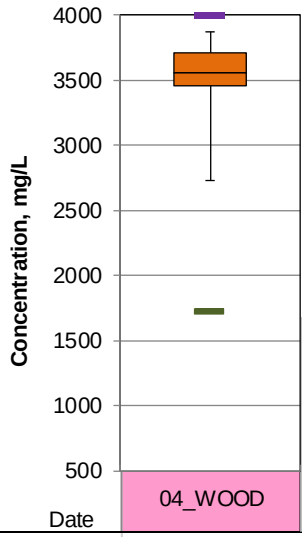
Date	Type	01T_ODD2_DCH	02D_BROOM	04D_WOOD	05D_SANT_VCWPD	06T_FC_BR	07D_HITCH_LEVEE_2	09BD_GERRY	07D_SIMI	09AD_CAMA	10D_HILL
Aug-13	Dry	**53.3**			**32.6**				7.3	5.0	7.5
Nov-13	Dry	**69**	**48.1**	**27.2**	**37.5**	4.9			6.1	6.3	6.5
Feb-14	Dry	**71.1**	**64.6**		**33.9**				6.0	7.6	7.5
Feb-14	Storm	**24**	0.07	**51.7**	**9.7**	6.3	**50.4**	2.5			
May-14	Dry	**63.3**	**52.9**		**33.8**		**34.0**	**9.9**		7.1	7.2

Figure 60. Nitrate-N + Nitrite-N Concentrations in Ag and POTW Sites: 2008-2014

SALTS TMDL

For the Salts TMDL, compliance with interim dry weather salt allocations is determined using monthly mean salt concentrations for dry weather developed from the time-series of data collected at receiving water sites. Bolded values in the tables within each figure indicate the concentration was above the interim MS4 WLA and the interim LA for that constituent. Italicized values in the tables within each figure indicate the concentration was above the interim MS4 WLA for that constituent.

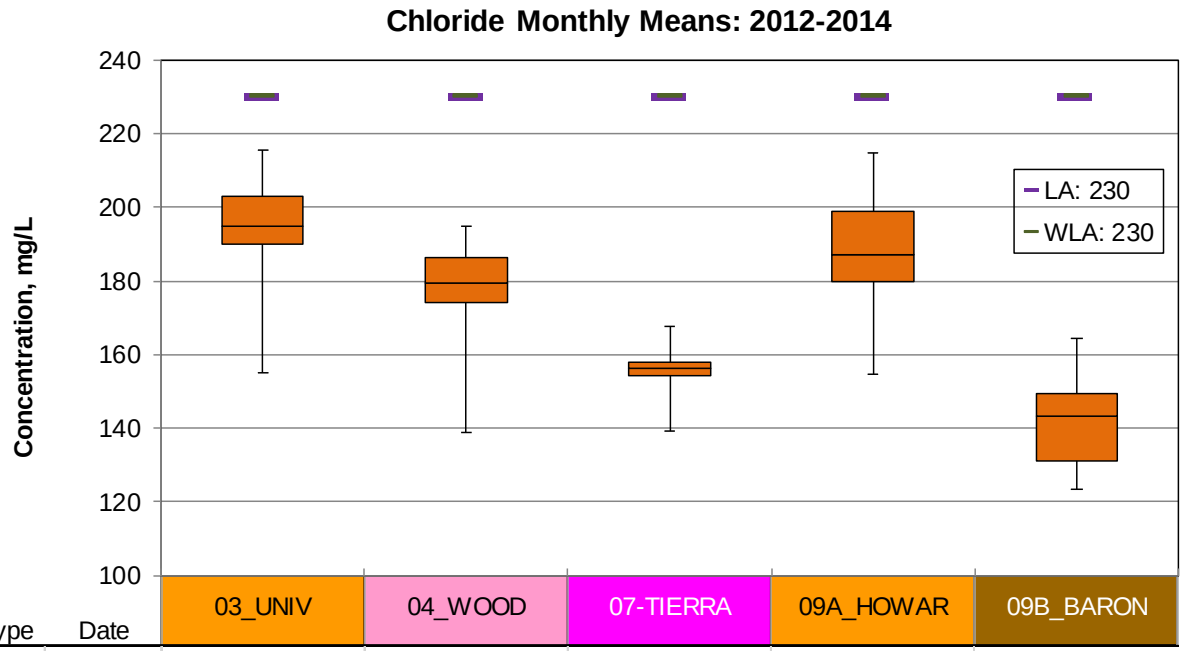




Type	Date	03_UNIV	07-TIERRA	09A_HOWAR	09B_BARON
Dry	Jul-12	1012			
Dry	Aug-12	991			656
Dry	Sep-12	978	1058	879	652
Dry	Oct-12	955	992	862	659
Dry	Nov-12	965	1042	875	661
Dry	Dec-12	821	988	787	621
Dry	Jan-13	924	1121	863	683
Dry	Feb-13	990	1080	918	688
Dry	Mar-13	1005	1111	922	674
Dry	Apr-13	994	1109	912	668
Dry	May-13	1110	1096	1077	657
Dry	Jun-13	1086	1122	1040	651
Dry	Jul-13	1021	1090	942	651
Dry	Aug-13	1059	1091	1009	651
Dry	Sep-13	1085	1082	1034	643
Dry	Oct-13	1060	1094	1000	657
Dry	Nov-13	1038	1101	977	653
Dry	Dec-13	1049	1112	992	664
Dry	Jan-14	1030	1107	980	669
Dry	Feb-14	1001	1106	934	679
Dry	Mar-14	962	1171	897	728
Dry	Apr-14	996	1173	928	726
Dry	May-14	1007	1170	936	707
Dry	Jun-14	1007	1154	934	699

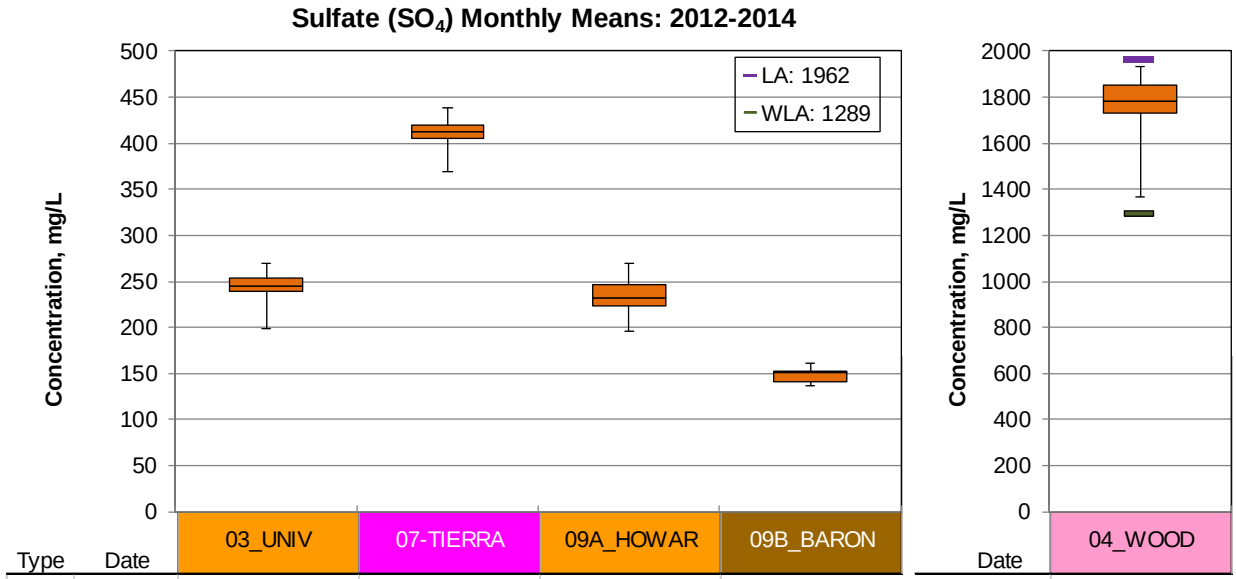
Date	04_WOOD
Jul-12	*3704*
Aug-12	*3707*
Sep-12	*3591*
Oct-12	*2730*
Nov-12	*3483*
Dec-12	*3747*
Jan-13	*3591*
Feb-13	*3722*
Mar-13	*3393*
Apr-13	*3505*
May-13	*3506*
Jun-13	*3873*
Jul-13	*3689*
Aug-13	*3713*
Sep-13	*3858*
Oct-13	*2940*
Nov-13	*3368*
Dec-13	*3392*
Jan-14	*3365*
Feb-14	*3525*
Mar-14	*3628*
Apr-14	*3525*
May-14	*3488*
Jun-14	*3767*

Figure 61. TDS Monthly Means for Receiving Water Sites Collected During Dry Weather



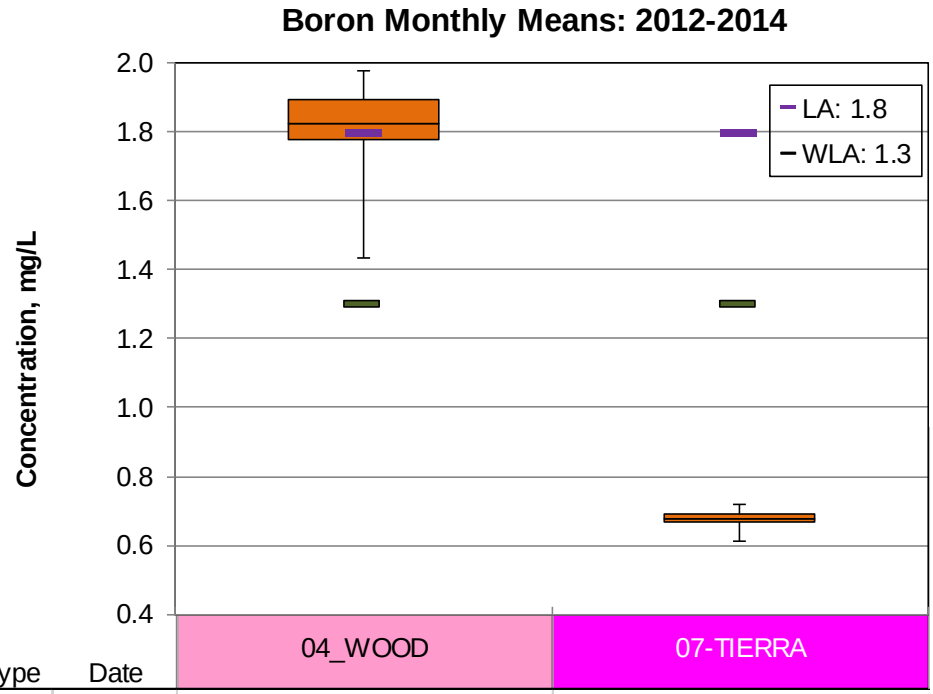
Type	Date	03_UNIV	04_WOOD	07-TIERRA	09A_HOWAR	09B_BARON
Dry	Jul-12	195	185			
Dry	Aug-12	191	186			130
Dry	Sep-12	188	180	149	174	129
Dry	Oct-12	183	139	140	170	131
Dry	Nov-12	185	175	147	173	131
Dry	Dec-12	155	187	139	155	123
Dry	Jan-13	177	180	158	171	136
Dry	Feb-13	191	186	152	182	136
Dry	Mar-13	194	171	157	183	134
Dry	Apr-13	191	176	156	181	133
Dry	May-13	216	176	154	215	130
Dry	Jun-13	211	193	158	207	129
Dry	Jul-13	199	187	156	189	145
Dry	Aug-13	207	188	156	203	146
Dry	Sep-13	213	195	154	209	143
Dry	Oct-13	207	151	156	201	147
Dry	Nov-13	202	171	157	196	146
Dry	Dec-13	205	173	159	200	149
Dry	Jan-14	201	171	158	197	150
Dry	Feb-14	195	179	158	187	152
Dry	Mar-14	186	184	167	179	165
Dry	Apr-14	194	179	168	186	164
Dry	May-14	196	177	167	188	159
Dry	Jun-14	196	191	165	187	157

Figure 62. Chloride Monthly Means for Receiving Water Sites Collected During Dry Weather



Type	Date	03_UNIV	07-TIERRA	09A_HOWAR	09B_BARON	Date	04_WOOD
Dry	Jul-12	246				Jul-12	*1850*
Dry	Aug-12	241			152	Aug-12	*1851*
Dry	Sep-12	238	395	219	151	Sep-12	*1793*
Dry	Oct-12	232	370	215	153	Oct-12	*1365*
Dry	Nov-12	235	389	218	154	Nov-12	*1740*
Dry	Dec-12	199	368	196	143	Dec-12	*1871*
Dry	Jan-13	224	420	215	159	Jan-13	*1793*
Dry	Feb-13	241	404	229	161	Feb-13	*1859*
Dry	Mar-13	244	416	230	157	Mar-13	*1695*
Dry	Apr-13	242	415	228	155	Apr-13	*1750*
Dry	May-13	270	410	270	152	May-13	*1751*
Dry	Jun-13	264	420	261	151	Jun-13	*1934*
Dry	Jul-13	248	407	234	138	Jul-13	*1850*
Dry	Aug-13	257	407	251	138	Aug-13	*1862*
Dry	Sep-13	264	404	258	136	Sep-13	*1935*
Dry	Oct-13	258	409	249	139	Oct-13	*1475*
Dry	Nov-13	252	411	243	138	Nov-13	*1690*
Dry	Dec-13	255	416	247	140	Dec-13	*1702*
Dry	Jan-14	251	414	244	141	Jan-14	*1688*
Dry	Feb-14	243	413	232	144	Feb-14	*1768*
Dry	Mar-14	234	438	223	153	Mar-14	*1820*
Dry	Apr-14	242	439	231	153	Apr-14	*1768*
Dry	May-14	245	438	233	149	May-14	*1750*
Dry	Jun-14	245	432	232	148	Jun-14	*1889*

Figure 63. Sulfate Monthly Means for Receiving Water Sites Collected During Dry Weather



Type	Date	04_WOOD	07-TIERRA
Dry	Jul-12	**1.89**	
Dry	Aug-12	**1.89**	
Dry	Sep-12	**1.83**	0.65
Dry	Oct-12	*1.43*	0.61
Dry	Nov-12	*1.78*	0.65
Dry	Dec-12	**1.91**	0.61
Dry	Jan-13	**1.83**	0.69
Dry	Feb-13	**1.90**	0.67
Dry	Mar-13	*1.74*	0.69
Dry	Apr-13	*1.79*	0.69
Dry	May-13	*1.79*	0.68
Dry	Jun-13	**1.97**	0.69
Dry	Jul-13	**1.89**	0.67
Dry	Aug-13	**1.91**	0.67
Dry	Sep-13	**1.98**	0.66
Dry	Oct-13	*1.52*	0.67
Dry	Nov-13	*1.74*	0.68
Dry	Dec-13	*1.75*	0.68
Dry	Jan-14	*1.73*	0.68
Dry	Feb-14	**1.81**	0.68
Dry	Mar-14	**1.86**	0.72
Dry	Apr-14	**1.81**	0.72
Dry	May-14	*1.79*	0.72
Dry	Jun-14	**1.93**	0.71

Figure 64. Boron Monthly Means for Receiving Water Sites Collected During Dry Weather

TISSUE DATA

Tissue data is provided in the following tables for both Mugu Lagoon and freshwater monitoring locations. These types of samples are only collected in Mugu Lagoon every three years; therefore data from years one and four are reported. For all tables, only those constituents that have been detected in at least one sample have been included.

Mugu Lagoon Tissue Data

Table 9. Mugu Lagoon – Central Lagoon Tissue Data [1]

Constituent	Units	8/21/2008 Composite Mussel Sample	8/21/2008 Whole Fish Composite Sample Top Smelt (*Atherinops affinis*)	8/18/2011 Composite Mussel Sample
Lipids in Mussel/Fish Tissue				
Percent Lipids	%	0.95	4.13	1.72
Organic Constituents in Mussel/Fish Tissue				
OC Pesticides				
2,4'-DDD	ng/g ww	7.5	ND	DNQ
2,4'-DDT	ng/g ww	ND	11.7	9.4
4,4'-DDD	ng/g ww	13.4	20.9	ND
4,4'-DDE	ng/g ww	125	406	118
4,4'-DDT	ng/g ww	ND	41.7	ND
Toxaphene	ng/g ww	94.4	294	DNQ
PCBs				
All Aroclors	ng/g ww	ND	ND	ND
Metals & Selenium in Mussel/Fish Tissue				
Total Mercury	µg/g ww	ND	0.02	0.0039
Total Selenium	µg/g ww	0.43	0.57	0.83

1. Only constituents with detected values are included in the table.

Table 10. Mugu Lagoon – Western Arm Tissue Data [1]

Constituent	Units	8/19/2008 Composite Mussel Sample	8/19/2008 Composite Bait Fish Sample Top Smelt (*Atherinops affinis*)	8/19/2008 Flat Fish Fillet Sample Diamond Turbot (*Hypsopsetta guttulata*)	8/19/2008 Whole Perch Fish Sample Shiner Surfperch (*Cymatogaster aggregate*)	8/18/2011 Composite Mussel Sample
Lipids in Mussel/Fish Tissue						
Percent Lipids	%	1.24	1.96	0.44	2.77	1.01
Organic Constituents in Mussel/Fish Tissue						
OC Pesticides						
Chlordane-alpha	ng/g ww	ND	ND	ND	12.7	ND
Chlordane-gamma	ng/g ww	ND	ND	ND	DNQ	ND
2,4'-DDD	ng/g ww	ND	ND	ND	9.2	DNQ
2,4'-DDE	ng/g ww	ND	ND	ND	ND	DNQ
2,4'-DDT	ng/g ww	ND	ND	ND	ND	DNQ
4,4'-DDD	ng/g ww	6.6	26.8	ND	139	ND
4,4'-DDE	ng/g ww	44	147	51	664	105
4,4'-DDT	ng/g ww	ND	ND	ND	79.4	ND
Toxaphene	ng/g ww	ND	ND	ND	117	ND
PCBs						
Aroclor 1254	ng/g ww	ND	ND	ND	55	ND
Metals & Selenium in Mussel/Fish Tissue						
Total Mercury	µg/g ww	DNQ	DNQ	DNQ	DNQ	0.012
Total Selenium	µg/g ww	0.37	0.51	0.92	0.52	0.48

1. Only constituents with detected values are included in the table.

Freshwater Tissue Data

Table 11. Calleguas Creek – University Drive CSUCI (03_UNIV) Fish Tissue Data Years 1-6 [1]

Date	Fish		Lipids	OC Pesticides [2]								PCBs [2]
			Percent Lipids	Chlordane -alpha	Chlordane -gamma	2,4'-DDD	2,4'-DDE	2,4'-DDT	4,4'-DDD	4,4'-DDE	4,4'-DDT	Toxaphene	Aroclor 1254
			%	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
8/6/08	Arroyo Chub	Whole Fish	4.7	DNQ	ND	ND	6.6	ND	ND	373	ND	ND	ND
9/3/09		Comp. #1	4.2	25	11	24	38	97	127	2422	13	6397	54
9/3/09		Comp. #2	5.7	20	13	28	38	102	116	2782	20	5675	55
9/3/09		Comp. #3	6.0	32	15	31	45	117	175	2951	18	4300	56
9/3/09	Black Bullhead	Carcass	2.5	43	22	22	13	ND	184	6980	469	6469	55
9/3/09		Fillet w/ Skin	1.3	29	13	12	ND	ND	90	3603	233	3283	32
9/3/09	Common Carp	Carcass #1	4.0	32	15	25	17	29	100	2209	240	4805	ND
9/3/09		Carcass #2	4.3	37	19	24	DNQ	16	112	2492	328	8510	21
9/3/09		Carcass #3	4.7	47	25	26	22	31	119	2744	466	ND	ND
9/3/09		Fillet w/ Skin #1	1.5	5.5	ND	DNQ	ND	10	21	413	46	ND	ND
9/3/09		Fillet w/ Skin #2	1.6	12	DNQ	13	ND	21	25	708	115	ND	ND
9/3/09		Fillet w/ Skin #3	1.9	7.5	DNQ	18	ND	33	45	772	140	ND	ND
9/3/10	Arroyo Chub	0-85 mm	4.3	DNQ	DNQ	ND	DNQ	DNQ	DNQ	167	16	ND	ND
9/3/10		86-112 mm	7.0	DNQ	DNQ	DNQ	12	30	44	1300	20	646	ND
9/3/10	Common Carp		4.3	DNQ	DNQ	DNQ	ND	DNQ	21	247	32	403	ND
8/25/11	Common Carp		1.9	DNQ	ND	DNQ	ND	8.5	ND	125	ND	DNQ	ND
8/30/12			1.5	ND	ND	ND	ND	ND	ND	175	ND	ND	ND
8/27/13	Whole Fish Composite Fathead Minnow Green Sunfish Common Carp		3.02	ND	ND	ND	ND	ND	ND	200.5	ND	ND	ND

1. Only constituents with detected values are included in the table.
2. Units are wet weight.

Table 12. Conejo Creek – Adolfo Road (9B_ADOLF) Fish Tissue Data Years 1 – 6 [1, 2]

Date	Fish		Lipids	OC Pesticides [3]								PCBs [3]
			Percent Lipids	Chlordane -alpha	Chlordane -gamma	2,4'-DDD	2,4'-DDE	2,4'-DDT	4,4'-DDD	4,4'-DDE	4,4'-DDT	Toxaphene	Aroclor 1254
			%	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
8/6/08	Common Carp		3.5	ND	ND	ND	ND	ND	ND	111	54	ND	ND
9/3/09	Arroyo chub	Comp. #1	8.6	19	8.2	10	22	54	47	694	14	3611	ND
9/3/09		Comp. #2	9.5	18	5.2	15	15	40	37	646	21	3213	56
9/3/09		Comp. #3	8.4	18	6.8	16	21	43	61	629	ND	2766	67
9/3/09	Common Carp	Carcass #1	2.5	21	6.0	15	ND	ND	27	754	ND	ND	54
9/3/09		Fillet w/ Skin #1	0.8	ND	ND	ND	ND	ND	10	190	ND	ND	ND
9/3/09		Carcass #2	4.8	49	24	18	ND	ND	170	3643	99	3566	93
9/3/09		Fillet w/ Skin #2	1.6	10	5.4	8.6	ND	ND	43	1019	30	ND	26
9/3/09		Carcass Comp. #3	4.0	27	15	19	12	131	58	1019	190	2544	70
9/3/09		Fillet Comp. w/ Skin #3	1.8	DNQ	ND	25	ND	57	37	274	86	ND	ND
9/3/10	Arroyo chub	0-85 mm	4.9	DNQ	ND	DNQ	DNQ	11	21	626	17	487	ND
9/3/10		86-112 mm	6.6	DNQ	DNQ	ND	DNQ	DNQ	DNQ	137	14	ND	ND
8/25/11	Common carp		2.4	DNQ	DNQ	ND	ND	DNQ	ND	49	ND	DNQ	ND
8/27/13	Largemouth Bass		1.28	ND	ND	ND	ND	ND	ND	85.7	ND	ND	ND

1. Only constituents with detected values are included in the table.
2. No fish were caught at this site during year five.
3. Units are wet weight.

Table 13. Arroyo Simi – Hitch Boulevard (07_HITCH) Fish Tissue Data Years 1 – 6 [1, 2]

Date	Fish			Lipids	OC Pesticides [3]								PCBs [3]
				Percent Lipids	Chlordane -alpha	Chlordane -gamma	2,4'-DDD	2,4'-DDE	2,4'-DDT	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aroclor 1254
				%	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
8/6/08	Arroyo Chub	Composite		8.3	ND	ND	ND	DNQ	ND	ND	521	ND	ND
9/3/09	Arroyo Chub	Composite #1	43-60mm	9.5	DNQ	ND	20	ND	52	233	955	ND	ND
9/3/09		Composite #1	65-90mm	10.6	ND	ND	5.3	DNQ	12	15.8	365	ND	ND
9/3/09		Composite #2	43-60mm	9.7	DNQ	ND	33	ND	749	437	1183	ND	ND
9/3/09		Composite #2	65-90mm	10.5	DNQ	ND	32	14.6	74	195	1648	26	28
9/3/09		Composite #3	43-60mm	8.3	DNQ	ND	26	ND	45	343	967	ND	ND
9/3/09		Composite #3	65-90mm	11.3	6.6	ND	27	ND	57	110	1275	38	ND
9/3/10		Arroyo Chub		7.8	ND	ND	DNQ	DNQ	19	19.2	673	DNQ	ND
8/28/13	Whole Fish Composite Largemouth Bass Goldfish			11.98	ND	ND	ND	ND	ND	ND	ND	ND	ND

1. Only constituents with detected values are included in the table.
2. No fish were caught at this site during years 4 or 5.
3. Units are wet weight.

Table 14. Arroyo Las Posas – Somis Road (06_SOMIS) Fish Tissue Data Years 1 – 6 [1, 2]

Date	Fish			Lipids	OC Pesticides [3]							PCBs [3]
				Percent Lipids	Chlordane -alpha	Chlordane -gamma	2,4'-DDD	2,4'-DDE	2,4'-DDT	4,4'-DDD	4,4'-DDE	Toxaphene	Aroclor 1254
				%	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
8/6/08	Arroyo Chub	Composite		2.7	ND	ND	ND	ND	ND	ND	492	ND	ND
9/3/09	Arroyo Chub	Composite #1	29-51mm	6.7	11	DNQ	37	ND	ND	646	1918	ND	34
9/3/09		Composite #1	53-97mm	4.6	DNQ	ND	62	ND	ND	535	1967	2821	36
9/3/09		Composite #2	29-51mm	6.8	9.0	DNQ	55	ND	ND	1158	2203	ND	31
9/3/09		Composite #2	53-97mm	6.2	12	5.9	28	16	43	128	2313	3054	44
9/3/09		Composite #3	29-51mm	5.7	10	DNQ	30	11	122	157	2124	ND	56
9/3/09		Composite #3	53-97mm	5.3	10	DNQ	12	ND	36	258	2258	2103	32

1. Only constituents with detected values are included in the table.
2. No fish were caught at this site during years 3, 4, 5, or 6.
3. Units are wet weight.

Table 15. Revolon Slough – Wood Road (04_WOOD) Fish Tissue Data Years 1 – 6 [1, 2]

Date	Fish		Lipids	OC Pesticides [3]								PCBs [3]
			Percent Lipids	Chlordane -alpha	Chlordane -gamma	2,4'-DDD	2,4'-DDE	2,4'-DDT	4,4'-DDD	4,4'-DDE	4,4'-DDT	Toxaphene	Aroclor 1254
			%	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
8/7/08	Common Carp	Comp. Fillet, no skin	3.0	ND	ND	27	ND	14	85	1194	21	349	ND
8/7/08	Common Carp	Comp. Fillet w/ skin	2.1	5.3	ND	18	7.4	DNQ	40	615	13	259	ND
9/3/09	Common Carp	Carcass	12.1	91	62	129	25	ND	1210	11100	904	25800	28
9/3/09	Common Carp	Fillet w/ Skin #1	2.8	35	21	55	17	ND	262	4210	328	6630	ND
9/3/09	Common Carp	Carcass	9.6	102	60	205	76	ND	1070	9590	367	17000	51
9/3/09	Common Carp	Fillet w/ Skin #2	3.3	47	31	110	31	ND	371	4790	168	5930	DNQ
9/3/09	Common Carp	Carcass	9.0	117	66	185	64	ND	1100	7750	411	14300	54
9/3/09	Common Carp	Fillet w/ Skin #3	2.7	54	33	77	39	50	378	4000	239	5480	20
9/3/09	Arroyo Chub	Comp. #1	8.7	41	27	133	77	191	878	6320	57	14700	24
9/3/09	Arroyo Chub	Comp. #1	9.0	38	24	82	73	222	689	5630	36	19900	DNQ
9/3/09	Arroyo Chub	Comp. #2	6.9	33	16	88	65	168	568	5580	52	17900	ND
8/25/11	Common carp		2.6	9.3	5.5	15	DNQ	67	ND	819	8.5	206	ND
9/4/12	Common carp		5.6	ND	ND	ND	ND	116	ND	1750	ND	ND	ND
8/27/13	Whole Fish Composite Common carp Fathead Minnow		6.3	ND	ND	ND	ND	ND	84.3	1984.1	ND	1611.1	ND

1. Only constituents with detected values are included in the table.
2. No fish were caught at this site during years 3.
3. Units are wet weight.

Table 16. Revolon Slough – Wood Road (04_WOOD) Metals Fish Tissue Data Years 1 – 6 [1, 2]

Date	Fish		Lipids	Metals [3]	
			Percent Lipids	Total Mercury	Total Selenium
			%	ng/g	ng/g
8/7/08	Common Carp	Comp. Fillet, no skin	3.0	DNQ	1.34
8/7/08		Comp. Fillet w/ skin	2.1	DNQ	2.29
9/3/09	Common Carp	Carcass #1	12.1	DNQ	1.49
9/3/09		Fillet w/ Skin #1	2.8	DNQ	1.64
9/3/09		Carcass #2	9.6	DNQ	1.97
9/3/09		Fillet w/ Skin #2	3.3	DNQ	2.1
9/3/09		Carcass #3	9.0	DNQ	1.37
9/3/09		Fillet w/ Skin #3	2.7	0.02	1.74
9/3/09	Arroyo Chub	Comp. #1	8.7	0.02	1.56
9/3/09		Comp. #1	9.0	0.02	1.77
9/3/09		Comp. #2	6.9	0.02	1.42
8/25/11	Common carp		2.6	0.0036	2.69
9/4/12	Common carp		5.6	0.011	1.89
8/27/13	Whole Fish Composite Common carp Fathead Minnow		6.3	0.013	1.95

1. Only constituents with detected values are included in the table.
2. No fish were caught at this site during year 3.
3. Units are wet weight.

TOXICITY DATA

The following is a summary of the toxicity results to date for water column and sediment at the freshwater sampling sites. Table 17 displays significant water column mortality test results for six years of CCWTMP events, including both dry and storm (bolded text) events. Significant mortality found in freshwater sediments is shown in Table 18.

Toxicity was frequently identified at the 04_WOOD site during the first two monitoring years in water column samples and in each of the four sediment samples. The stakeholders have chosen to invest resources into source control efforts to address sources potentially contributing to the toxicity issue. This is being accomplished through the implementation of the Agricultural Water Quality Management Plan (AWQMP) developed by the Ventura County Agricultural Irrigated Lands Group (VCAILG) as part of the Conditional Waiver for Irrigated Agricultural Lands (Ag Waiver).

During dry weather water column sampling, toxicity has been identified historically at all sampled sites except 13_BELT. There was one occurrence of dry weather water column toxicity during the sixth year of monitoring. Toxicity has been identified during wet weather monitoring at all sites, except for 10_GATE and 13_BELT. However, no wet weather toxicity occurred during the storm event for sixth year monitoring (Event 42).

Water column TIEs have been initiated as described previously, and outcomes of these efforts have had limited success in identifying the true cause of toxicity. While not identifying the specific constituents causing toxicity, the TIEs have identified:

- Organic compounds are likely contributors to ambient water toxicity.
- Compounds similar to organophosphorus (OP) pesticides are continually being identified as possible contributors to the observed toxicity.

The results of future CCWTMP toxicity testing will continue to assist in the identification of when and where conditions are toxic in the Calleguas Creek watershed, and help the stakeholders better target areas in the watershed that show continual toxicity and focus limited resources to address the problems. It is important to note that instances of observed mortality in water samples have generally been decreasing since the beginning of the CCWTMP. There were nine instances of significant mortality in water column samples during the first year of monitoring, with eight occurrences in the second year, three in the third year, five in the fourth year, two in the fifth year, and one in the sixth year.

Table 17. Water Column Toxicity for All Monitoring Events and Sites
(Significant mortality denoted by "X", bolded events are wet weather events)

CCWMTP Year	Events	Site ID						
		04_WOOD	9B_ADOLF	03_UNIV	10_GATE	06_SOMIS	13_BELT	07_HITCH
Year 1	1	X						
	2	X						
	3	**X**	**X**	**X**				**X**
	4	X						
	5	**X**						**X**
	6							
Year 2	9							
	12	X						
	14	**X**		**X**		**X**		
	16	**X**		**X**				**X**
	17							
	20			X				
Year 3	22							
	23							
	24	**X**						
	25							
	26	**X**						**X**
	27							
Year 4	28					X		
	29		X		X			
	30	**X**						
	31							
	32			**X**				
	33							
Year 5 [1]	34							
	35							
	36	**X** [2]						
	37			X [3]				
	38							
Year 6	39	X [2]						
	40				[4]			
	41		[6]	[6]	[6]	[6]	[5]	[6]
	42							
	43							

1. 10_GATE and 13_BELT are also toxicity investigation monitoring sites. During year 5 these sites were only sampled during event 38.
2. A TIE was not initiated at this site. TIEs conducted during previous monitoring years identified organic compounds such as pesticides as the likely cause of the toxicity. TIEs have been suspended while efforts are taken to reduce the source of the toxicity.
3. A Phase I TIE was conducted for this site. While the TIE did not conclusively identify a source of toxicity, the results were indicative of organic compounds. The corresponding water quality sample detected the OP pesticide chlorpyrifos at a concentration of 0.083 µg/L. This level is above the wasteload allocation for stormwater discharges but below the agricultural discharger's interim load allocation and above the final numeric target.
4. Toxicity testing was not performed at the 10_GATE site for Event 40.
5. Toxicity testing was not performed at the 10_BELT site for Event 41.
6. Successful toxicity testing for sites with conductivity less than 3000 µS/cm could not be completed for Event 41 due to a decline in the *C. dubia* laboratory culture. Sites include: 9B_ADOLF, 03_UNIV, 10_GATE, 06_SOMIS, and 07_HITCH.

Table 18. Sediment Toxicity for All CCWTMP Freshwater Monitoring Events and Sites
(Significant mortality denoted by "X")

CCWMTP Year	Events	Site ID			
		04_WOOD	02_PCH [1]	03_UNIV	9A_HOWAR [1]
Year 1	1	X			
Year 2	9	X			
Year 3	22	X			
Year 4	28	X	X	X	
Year 5	34	X	NS	X	NS
Year 6	39	X	NS	X [2]	NS

NS – Not Sampled; sites were not sampled during the corresponding monitoring year.
1. 02_PCH and 9A_HOWAR are toxicity investigation monitoring sites.
2. A TIE targeted for organics was performed for the 03_UNIV site due to a greater than 50 percent reduction in *H. azteca* survival.

As per the third year annual monitoring report recommendation, toxicity investigation monitoring was ceased during year five. Therefore, sediment toxicity sampling at 02_PCH and 9A_HOWAR did not take place during the two most recent monitoring years. Water column toxicity sampling did not take place at 10_GATE for Event 40 or 13_BELT for Event 41. There was significant toxicity at the 04_WOOD site and the 03_UNIV site during Event 39 sediment sampling. A TIE was not performed for the 04_WOOD site as there was less than a 50 percent reduction in survival relative to the control. However, sediment porewater and bulk sediment TIEs targeted for organics were performed for the 03_UNIV site. The results of the sediment porewater TIE suggest there are multiple compounds (organics and/or ammonia) contributing to sediment porewater toxicity. The results of the bulk sediment TIE suggest there are multiple compounds contributing to bulk sediment toxicity including non-polar organics and to a lesser extent, metals. However, the bulk sediment TIE results suggest that ammonia is not a cause of bulk sediment toxicity. This may also suggest that ammonia is not a cause of sediment porewater toxicity as the pH of porewater increases as it is removed from the sediment, which increases toxicity (i.e., the increase in pH accounts for the toxicity rather than the ammonia concentration).

Compliance Analysis and Discussion

COMPLIANCE COMPARISON

As outlined in the QAPP, data applicable to compliance targets or allocations is reviewed in this report. The following tables list the applicable compliance measures that are covered by the sixth year of monitoring. For the compliance assessment, two types of assessment procedures were used depending on whether or not the final compliance dates for the TMDL were applicable during the monitoring year.

For TMDLs for which no final allocations or targets are currently effective (OC Pesticides, Metals, and Salts TMDLs), the following compliance comparisons were conducted:

1. Applicable receiving water data at the compliance locations (base of each subwatershed) were compared to the interim load and waste load allocations.

2. If an exceedance of an interim load and/or waste load allocation was observed, the contributing land use data were assessed to evaluate the potential cause of the exceedance.
3. POTW effluent data were compared to the relevant interim waste load allocations.

For the Nitrogen TMDL the following compliance comparisons were conducted:

1. For POTWs, the final waste load allocations are currently effective. As a result, effluent monitoring results were compared to the final allocations for the analysis.
2. For agricultural dischargers and other non-point sources, load allocations are currently effective. Since agricultural dischargers are the only entities with allocations other than POTWs, compliance is assessed by comparing receiving water results against TMDL numeric targets.

For the Toxicity TMDL, the following compliance comparisons were conducted:

1. For POTWs, the final waste load allocations are currently effective. As a result, effluent monitoring results were compared to the final allocations for the analysis.
2. For MS4 dischargers, the final waste load allocations are currently effective. As a result, applicable receiving water data at the compliance locations (base of each subwatershed) were compared to the final waste load allocations. If an exceedance of the final waste load allocation was found, the contributing urban land use data were assessed to evaluate whether the MS4 was potentially causing the exceedance.
3. For agricultural dischargers, the final load allocations are not yet effective. As a result, applicable receiving water data at the compliance locations (base of each subwatershed) were compared to the interim load allocations. If an exceedance of an interim load allocation was observed, the contributing agricultural land use data were assessed to evaluate whether agricultural discharges were potentially causing the exceedance.
4. In cases where the applicable interim load allocations or final waste load allocations have different values for acute (1-hour) toxicity and chronic (4-day) toxicity, the acute toxicity allocations were used for assessing wet weather data and the chronic toxicity allocations were used for assessing dry-weather data.

The following tables compare the applicable allocations based on the compliance procedure outlined above for each of the TMDLs. Some constituents sampled under the CCWTMP do not have applicable allocations and/or targets and are not included in the compliance analysis.

COMPLIANCE AT RECEIVING WATER SITES

Table 19. OC Pesticides, PCBs, & Siltation in Sediment

Site & Constituent	Units	Interim WLA & LA [1]	Event 39 Aug-2013
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	7.5
4,4'-DDT	ng/g dw	110	ND
Dieldrin	ng/g dw	3	ND
PCBs [3]	ng/g dw	3800	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	ND
4,4'-DDE	ng/g dw	1600	39.9
4,4'-DDT	ng/g dw	690	DNQ
Dieldrin	ng/g dw	5.7	ND
PCBs [3]	ng/g dw	7600	ND
Toxaphene	ng/g dw	790	69.3
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	3800	ND
Toxaphene	ng/g dw	260	DNQ
Conejo Creek – Adolfo Road (9B_ADOLF)			
Total Chlordane [2]	ng/g dw	3.4	ND
4,4'-DDD	ng/g dw	5.3	ND
4,4'-DDE	ng/g dw	20	DNQ
4,4'-DDT	ng/g dw	2	ND
Dieldrin	ng/g dw	3	ND
PCBs [3]	ng/g dw	3800	ND
Toxaphene	ng/g dw	260	ND

Table 20. OC Pesticides, PCBs, & Siltation in Sediment (continued)

Site & Constituent	Units	Interim WLA & LA [1]	Event 39 Aug-2013
Arroyo Las Posas – Somis Road (06_SOMIS)			
Total Chlordane [2]	ng/g dw	3.3	ND
4,4'-DDD	ng/g dw	290	DNQ
4,4'-DDE	ng/g dw	950	10.4
4,4'-DDT	ng/g dw	670	ND
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	DNQ
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

ND=not detected; DNQ=detected not quantifiable

1. Interim waste load allocation for stormwater permittees and interim load allocations 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).

Table 21. Nitrogen Compounds in Water

Site & Constituent	Units	Target [1]	Event 39 Dry Aug-2013	Event 40 Dry Nov-2013	Event 41 Dry Feb-2014	Event 42 Wet Feb-2014	Event 43 Dry May-2014
Mugu Lagoon – Ronald Reagan Bridge (01_RR_BR)							
Ammonia-N	mg/L	8.1 [2]	0.35	DNQ	0.11	0.33	0.29
Nitrate-N	mg/L	10	0.21	0.5	**21.19**	6.6	**28.08**
Nitrite-N	mg/L	1	0.01	ND	0.06	0.07	0.3
Nitrate-N + Nitrite-N	mg/L	10	0.22	0.5	**21.25**	6.67	**28.38**
Revolon Slough – Wood Road (04_WOOD)							
Ammonia-N	mg/L	5.7 [2]	0.31	0.17	0.14	0.14	0.08
Nitrate-N	mg/L	10	**38.9**	**36.31**	**33.13**	**11.47**	**39.81**
Nitrite-N	mg/L	1	0.34	0.1	0.19	0.1	0.85
Nitrate-N + Nitrite-N	mg/L	10	**39.24**	**36.41**	**33.32**	**11.57**	**40.66**
Beardsley Wash – Central Avenue (05_CENTR)							
Ammonia-N	mg/L	5.7 [2]	DNQ	0.21	0.06	0.15	0.14
Nitrate-N	mg/L	10	**34.75**	**28.16**	**28.88**	**12.76**	**34.37**
Nitrite-N	mg/L	1	0.14	0.07	0.08	0.13	0.31
Nitrate-N + Nitrite-N	mg/L	10	**34.89**	**28.23**	**28.96**	**12.89**	**34.68**
Calleguas Creek – Hwy 1 Bridge (02_PCH)							
Ammonia-N	mg/L	5.5 [2]	0.18	0.1	0.17	NR	0.07
Nitrate-N	mg/L	10	**14.53**	**14.32**	**19.45**	NR	**25.34**
Nitrite-N	mg/L	1	ND	0.08	ND	NR	ND
Nitrate-N + Nitrite-N	mg/L	10	**14.53**	**14.4**	**19.45**	NR	**25.34**
Calleguas Creek – University Drive CSUCI (03_UNIV)							
Ammonia-N	mg/L	8.4 [2]	0.06	0.16	0.1	0.22	DNQ
Nitrate-N	mg/L	10	5.06	5.85	7.16	3.03	5.46
Nitrite-N	mg/L	1	ND	ND	0.04J	0.02J	ND
Nitrate-N + Nitrite-N	mg/L	10	5.06	5.85	7.2	3.05	5.46
Conejo Creek – Howard Road Bridge (9A_HOWAR)							
Ammonia-N	mg/L	9.5 [2]	0.76	0.59	0.93	NR	1.63
Nitrate-N	mg/L	10	4.83	6.58	8.52	NR	5.13
Nitrite-N	mg/L	1	0.07	ND	ND	NR	ND
Nitrate-N + Nitrite-N	mg/L	10	4.9	6.58	8.52	NR	5.13

Table 22. Nitrogen Compounds in Water (continued)

Site & Constituent	Units	Target [1]	Event 39 Dry Aug-2013	Event 40 Dry Nov-2013	Event 41 Dry Feb-2014	Event 42 Wet Feb-2014	Event 43 Dry May-2014
Conejo Creek – Adolfo Road (9B_ADOLF)							
Ammonia-N	mg/L	9.5 [2]	DNQ	0.06	DNQ	0.29	ND
Nitrate-N	mg/L	10	4.56	4.52	5.24	1.35	3.91
Nitrite-N	mg/L	1	ND	ND	ND	0.02J	ND
Nitrate-N + Nitrite-N	mg/L	10	4.56	4.52	5.24	1.37	3.91
Conejo Creek – Hill Canyon Below N Fork (10_GATE)							
Ammonia-N	mg/L	8.4 [2]	0.52	0.43	0.28	0.17	0.28
Nitrate-N	mg/L	10	5.01	4.56	4.67	1.52	5.27
Nitrite-N	mg/L	1	0.19	0.07	0.1	ND	0.11
Nitrate-N + Nitrite-N	mg/L	10	5.2	4.63	4.77	1.52	5.38
Conejo Creek – North Fork Above Hill Canyon (12_PARK)							
Ammonia-N	mg/L	3.2 [2]	ND	0.05	DNQ	NR	DNQ
Nitrate-N	mg/L	10	0.04J	0.56	0.39	NR	0.09
Nitrite-N	mg/L	1	ND	ND	ND	NR	ND
Nitrate-N + Nitrite-N	mg/L	10	0.04J	0.56	0.39	NR	0.09
Conejo Creek – S Fork Behind Belt Press Build (13_BELT)							
Ammonia-N	mg/L	5.1 [2]	DNQ	0.07	ND	NR	ND
Nitrate-N	mg/L	10	0.46	0.99	0.62	NR	0.26
Nitrite-N	mg/L	1	ND	ND	ND	NR	ND
Nitrate-N + Nitrite-N	mg/L	10	0.46	0.99	0.62	NR	0.26
Arroyo Las Posas – Somis Road (06_SOMIS)							
Ammonia-N	mg/L	8.1 [2]	0.07	0.06	ND	0.39	NS
Nitrate-N	mg/L	10	**12.35**	**10.27**	**10.24**	3.57	NS
Nitrite-N	mg/L	1	ND	ND	ND	0.05	NS
Nitrate-N + Nitrite-N	mg/L	10	**12.35**	**10.27**	**10.24**	3.62	NS
Arroyo Simi – Hitch Boulevard (07_HITCH)							
Ammonia-N	mg/L	4.7 [2]	0.07	0.09	ND	0.46	ND
Nitrate-N	mg/L	10	7.4	7.41	9.23	1.29	**11.11**
Nitrite-N	mg/L	1	0.05	ND	0.03J	0.02J	ND
Nitrate-N + Nitrite-N	mg/L	10	7.45	7.41	9.26	1.31	**11.11**

Table 23. Nitrogen Compounds in Water (continued)

Site & Constituent	Units	Target [1]	Event 39 Dry Aug-2013	Event 40 Dry Nov-2013	Event 41 Dry Feb-2014	Event 42 Wet Feb-2014	Event 43 Dry May-2014
Arroyo Simi – Madera Avenue (07_MADER)							
Ammonia-N	mg/L	4.7 [2]	0.05	DNQ	0.23	0.4	0.11
Nitrate-N	mg/L	10	4.34	4.58	4.38	0.89	3.82
Nitrite-N	mg/L	1	0.11	ND	0.04J	0.03J	0.07
Nitrate-N + Nitrite-N	mg/L	10	4.45	4.58	4.42	0.92	3.89

NS=no sample, dry; NR=not required; ND=not detected; DNQ=detected not quantifiable; J=estimated DNQ values for Nitrite-N, shown for the purpose of calculating the Nitrite-N + Nitrate-N sum and comparing it against the Nitrate-N + Nitrite-N target.

1. Load allocations for Nitrate-N + Nitrite-N are in effect for agricultural and other non-point sources. To evaluate compliance, monitoring results at receiving water compliance sites were compared against TMDL numeric targets (R4-2008-009).
2. One-hour average.

Results in **bold red type** exceed numeric TMDL target.

Table 24. Toxicity, Diazinon, and Chlorpyrifos in Water

Site & Constituent	Units	Dry WLA [1]	Dry Interim LA [2]	Event 39 Dry Aug-2013	Event 40 Dry Nov-2013	Event 41 Dry Feb-2014	Event 43 Dry May-2014	Wet WLA [1]	Wet Interim LA [2]	Event 42 Wet Feb-2014
Mugu Lagoon – Ronald Reagan Bridge (01_RR_BR)										
Chlorpyrifos	µg/L	0.014	0.81	ND	ND	ND	ND	0.014	2.57	**0.0924**
Diazinon	µg/L	0.1	0.138	ND	ND	ND	ND	0.1	0.278	0.0095
Revolon Slough – Wood Road (04_WOOD)										
Chlorpyrifos	µg/L	0.014	0.81	ND	0.0026	0.0117	ND	0.014	2.57	**0.1691**
Diazinon	µg/L	0.1	0.138	ND	ND	ND	ND	0.1	0.278	0.0232
Calleguas Creek – University Drive CSUCI (03_UNIV)										
Chlorpyrifos	µg/L	0.014	0.81	ND	ND	0.0054	0.0046	0.014	2.57	0.0314
Diazinon	µg/L	0.1	0.138	ND	ND	ND	ND	0.1	0.278	0.0094
Conejo Creek – Adolfo Road (9B_ADOLF)										
Chlorpyrifos	µg/L	0.014	0.81	ND	ND	ND	ND	0.014	2.57	ND
Diazinon	µg/L	0.1	0.138	ND	ND	ND	ND	0.1	0.278	ND
Arroyo Las Posas – Somis Road (06_SOMIS)										
Chlorpyrifos	µg/L	0.014	0.81	ND	ND	0.0027	NS	0.014	2.57	**0.1325**
Diazinon	µg/L	0.1	0.138	ND	ND	ND	NS	0.1	0.278	ND
Arroyo Simi – Hitch Boulevard (07_HITCH)										
Chlorpyrifos	µg/L	0.014	0.81	ND	ND	0.008	0.0027	0.014	2.57	ND
Diazinon	µg/L	0.1	0.138	ND	ND	ND	ND	0.1	0.278	0.0158

ND=not detected; NS=no sample collected due to site being dry.

1. Final Dry and Wet Weather WLAs for Stormwater Dischargers effective as of March 24, 2008 (R4-2005-009).
2. Interim Dry and Wet Weather Load Allocations for Irrigated Agriculture; effective until March 24, 2016 (R4-2005-009).

Results in **bold purple type** exceed the final WLA, but not the interim LA.

Table 25. Metals and Selenium in Water

Constituent	Units	Dry Interim WLA [1]	Dry Interim LA [2]	Event 39 Dry Aug-2013	Event 40 Dry Nov-2013	Event 41 Dry Feb-2014	Event 43 Dry May-2014	Wet Interim WLA [1]	Wet Interim LA [2]	Event 42 Wet Feb-2014	Annual Average [3]
Revolon Slough – Wood Road (04_WOOD)											
Total Copper	µg/L	19	19	4.68	3.80	5.69	2.78	204	1390	70.28	
Total Nickel	µg/L	13	42	6.7	8.09	6.93	7.21	74 [4]	74 [4]	47.32	
Total Selenium	µg/L	13	6	**17.72**	**17.77**	**20.98**	**20.98**	290 [4]	290 [4]	4.31	
Total Mercury [5]	lbs/yr	1.7	2					4	4.8		0.012
Calleguas Creek – University Drive CSUCI (03_UNIV)											
Total Copper	µg/L	19	19	2.28	2.2	2.78	2.55	204	1390	72.31	
Total Nickel	µg/L	13	42	6.40	5.33	5.46	5.97	74 [4]	74 [4]	59.79	
Total Selenium	µg/L	--	--	0.65	0.49	0.57	0.62	--	--	1.52	
Total Mercury [5]	lbs/yr	3.3	3.9					10.5	12.6		0.035

1. Interim Dry Weather WLAs for Stormwater Dischargers; effective until March 2022 (R4-2006-0012)
2. Interim Dry Weather LAs for Irrigated Agriculture; effective until March 2022 (R4-2006-0012)
3. Mercury allocation 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.
4. No wet weather exceedances of these constituents were observed in the TMDL analysis so no interim limits were assigned for the TMDL. For comparison purposes the wet weather targets are included in the table.
5. Interim WLA and LAs are expressed as annual loads. Total annual flow for 07/01/12 to 06/31/13 into Mugu Lagoon from Calleguas Creek and Revolon Slough is calculated as 4,926 Mgal/yr. As such, the interim WLA and LA shown correspond to the flow range of 0 to 15,000 to Mgal/yr, per R4-2006-0012.

Results in **bold red type** exceed applicable interim WLA and LA.

Table 26. Monthly Mean Salts Concentrations

	Units	Interim Limit		Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
		WLA	LA												
Revolon Slough – Wood Road (04_WOOD)															
Total Dissolved Solids	mg/L	1720	3995	**3689**	**3713**	**3858**	**2940**	**3368**	**3392**	**3365**	**3525**	**3628**	**3525**	**3488**	**3767**
Chloride	mg/L	230	230	187	188	195	151	171	173	171	179	184	179	177	191
Sulfate	mg/L	1289	1962	**1850**	**1862**	**1935**	**1475**	**1690**	**1702**	**1688**	**1768**	**1820**	**1768**	**1750**	**1889**
Boron	mg/L	1.3	1.8	**1.89**	**1.91**	**1.98**	**1.52**	**1.74**	**1.75**	**1.73**	**1.81**	**1.86**	**1.81**	**1.79**	**1.93**
Calleguas Creek – University Drive CSUCI (03_UNIV)															
Total Dissolved Solids	mg/L	1720	3995	1021	1059	1085	1060	1038	1049	1030	1001	962	996	1007	1007
Chloride	mg/L	230	230	199	207	213	207	202	205	201	195	186	194	196	196
Sulfate	mg/L	1289	1962	248	257	264	258	252	255	251	243	234	242	245	245
Conejo Creek – Howard Road Bridge (9A_HOWAR)															
Total Dissolved Solids	mg/L	1720	3995	942	1009	1034	1000	977	992	980	934	897	928	936	934
Chloride	mg/L	230	230	189	203	209	201	196	200	197	187	179	186	188	187
Sulfate	mg/L	1289	1962	234	251	258	249	243	247	244	232	223	231	233	232
Conejo Creek – Baron Brothers Nursery (9B_BARON)															
Total Dissolved Solids	mg/L	1720	3995	651	651	643	657	653	664	669	679	728	726	707	699
Chloride	mg/L	230	230	145	146	143	147	146	149	150	152	165	164	159	157
Sulfate	mg/L	1289	1962	138	138	136	139	138	140	141	144	153	153	149	148
Arroyo Simi – Tierra Rejada Road (07_TIERRA)															
Total Dissolved Solids	mg/L	1720	3995	1090	1091	1082	1094	1101	1112	1107	1106	1171	1173	1170	1154
Chloride	mg/L	230	230	156	156	154	156	157	159	158	158	167	168	167	165
Sulfate	mg/L	1289	1962	407	407	404	409	411	416	414	413	438	439	438	432
Boron	mg/L	1.3	1.8	0.67	0.67	0.66	0.67	0.68	0.68	0.68	0.68	0.72	0.72	0.72	0.71

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.

Results in **bold red type** exceed both the applicable interim WLA and LA. Results in **bold purple type** exceed the interim WLA, but not the interim LA.

POTW COMPLIANCE

Table 27. Nitrogen Compounds – POTWs

POTW & Constituent	Units	Final WLA [1]	Event 39 Dry Aug-2013	Event 40 Dry Nov-2013	Event 41 Dry Feb-2014	Event 43 Dry May-2014
Camarillo Water Reclamation Plant (9AD_CAMA)						
Ammonia-N	mg/L	3.5 [2], 7.8 [3]	1.03	1.35	1.29	1.26
Nitrate-N	mg/L	9	4.97	6.25	7.5	7.0
Nitrite-N	mg/L	0.9	ND	ND	0.1	0.1
Nitrate-N + Nitrite-N	mg/L	9	4.97	6.25	7.6	7.1
Hill Canyon Wastewater Treatment Plant (10D_HILL)						
Ammonia-N	mg/L	3.1 [2], 5.6 [3]	1.6	1.6	1.2	1.7
Nitrate-N	mg/L	9	7.5	6.5	7.5	7.2
Nitrite-N	mg/L	0.9	ND	ND	ND	ND
Nitrate-N + Nitrite-N	mg/L	9	7.5	6.5	7.5	7.2
Simi Valley Water Quality Control Plant (07D_SIMI)						
Ammonia-N	mg/L	2.4 [2], 3.3 [3]	1.2	1.2	1.5	1.0
Nitrate-N	mg/L	9	7.3	6.1	6.0	6.0
Nitrite-N	mg/L	0.9	0.014	0.013	0.019	0.06
Nitrate-N + Nitrite-N	mg/L	9	7.31	6.11	6.02	6.06

ND=constituent not detected at the MDL.

1. The effective date for these WLAs was July 16, 2007 (R4-2008-009)
2. WLAs as Average Monthly Effluent Limit
3. WLAs as Maximum Daily Effluent Limit

Table 28. OC Pesticides, PCBs, and Siltation - POTWs

POTW & Constituent	Units	Interim WLA [1]	Event 39 Dry Aug-2013	Event 40 Dry Nov-2013	Event 41 Dry Feb-2014	Event 43 Dry May-2014
Camarillo Water Reclamation Plant (9AD_CAMA)						
Total Chlordane [2]	ng/L	100	ND	ND	ND	ND
4,4'-DDD	ng/L	6	ND	ND	ND	ND
4,4'-DDE	ng/L	188	ND	ND	ND	ND
4,4'-DDT	ng/L	10	ND	ND	ND	ND
Dieldrin	ng/L	10	ND	ND	ND	ND
PCBs [3]	ng/L	31	ND	ND	ND	ND
Toxaphene	ng/L	500	ND	ND	ND	ND
Hill Canyon Wastewater Treatment Plant (10D_HILL)						
Total Chlordane [2]	ng/L	1.2	ND	ND	ND	ND
4,4'-DDD	ng/L	20	ND	ND	ND	ND
4,4'-DDE	ng/L	260	ND	ND	ND	ND
4,4'-DDT	ng/L	10	ND	ND	ND	ND
Dieldrin	ng/L	10	ND	ND	ND	ND
PCBs [3]	ng/L	500	ND	ND	ND	ND
Toxaphene	ng/L	500	ND	ND	ND	ND
Simi Valley Water Quality Control Plant (07D_SIMI)						
Total Chlordane [2]	ng/L	100	ND	ND	ND	ND
4,4'-DDD	ng/L	50	ND	ND	ND	ND
4,4'-DDE	ng/L	1.2	ND	ND	ND	ND
4,4'-DDT	ng/L	10	ND	ND	ND	ND
Dieldrin	ng/L	10	ND	ND	ND	ND
PCBs [3]	ng/L	500	ND	ND	ND	ND
Toxaphene	ng/L	500	ND	ND	ND	ND

ND=constituent not detected at the MDL.

1. Interim daily WLAs are effective until March 14, 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).

Table 29. Toxicity, Chlorpyrifos, and Diazinon - POTWs

POTW & Constituent	Units	Final WLA [1]	Event 39 Dry Aug-2013	Event 40 Dry Nov-2013	Event 41 Dry Feb-2014	Event 43 Dry May-2014
Camarillo Water Reclamation Plant (9AD_CAMA)						
Chlorpyrifos	µg/L	0.0133	ND	ND	ND	ND
Diazinon	µg/L	0.1	ND	ND	ND	ND
Hill Canyon Wastewater Treatment Plant (10D_HILL)						
Chlorpyrifos	µg/L	0.014	ND	ND	ND	ND
Diazinon	µg/L	0.1	ND	ND	ND	ND
Simi Valley Water Quality Control Plant (07D_SIMI)						
Chlorpyrifos	µg/L	0.014	ND	ND	ND	ND
Diazinon	µg/L	0.1	ND	ND	ND	ND

ND=constituent not detected at MDL.
1. The effective date for these WLAs was March 16, 2008 (R4-2005-009).

Table 30. Metals and Selenium - POTWs

POTW & Constituent	Units	Daily Max WLA	Monthly Avg WLA	WLA	Event 39 Dry Aug-2013	Event 40 Dry Nov-2013	Event 41 Dry Feb-2014	Event 43 Dry May-2014
Camarillo Water Reclamation Plant (9AD_CAMA)								
Total Copper	µg/L	57.0 [1]	20.0 [1]	--	3.5	3.8	4.0	3.9
Total Nickel	µg/L	16.0 [1]	6.2 [1]	--	3.39	3.34	2.81	2.8
Total Mercury [3]	lbs/month [4]	--	--	0.03 [1]	0.0002	0.0001	0.0003	0.0001
Hill Canyon Wastewater Treatment Plant (10D_HILL)								
Total Copper	µg/L	20.0 [1]	16.0 [1]	--	6.3	4.8	4.0	2.9
Total Nickel	µg/L	8.3 [1]	6.4 [1]	--	2.2	2.1	3.5	2.0
Total Mercury [3]	lbs/month [4]	--	--	0.23 [1]	0.0044	0.0043	0.0041	0.0045
Simi Valley Water Quality Control Plant (07D_SIMI)								
Total Copper	µg/L	31.0 [2]	30.5 [2]	--	6.1	5.1	4.2	5.6
Total Nickel	µg/L	960 [2]	169 [2]	--	2.2	1.6	1.7	1.5
Total Mercury [3]	lbs/month [4]	--	--	0.18 [1]	0.0005	0.0032	0.0025	0.0042

1. Interim WLA; effective until March 26, 2017 (R4-2006-012)
2. Final WLA; effective date was March 26, 2007 (R4-2006-012)
3. For total mercury concentrations reported as not detected (ND); one half of the method detection limit was used to calculate the monthly loads
4. During load calculation, the average monthly flow for each POTW was multiplied by the number of days in the month corresponding to when the sample was collected to get a total monthly flow. The total monthly flow was multiplied by the concentration of total mercury to yield the monthly total mercury load in pounds.

Table 31. Salts - POTWs

POTW & Constituent	Units	Monthly Avg Interim WLA	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
Camarillo Water Reclamation Plant (9AD_CAMA) [1]														
Boron	mg/L	N/A	0.6	0.53	0.53	0.55	0.53	0.53	0.48	0.64	0.5	0.55	0.58	0.48
Chloride	mg/L	216	**241**	**240**	**247**	**240**	**243**	**239**	**231**	**259**	**227**	**240**	**225**	**224**
Sulfate	mg/L	283	**351**	**326**	**292**	**348**	**326**	**295**	253	**320**	**330**	**327**	254	212
Total Dissolved Solids	mg/L	1012	**1170**	**1124**	1010	974	**1152**	**1080**	**1034**	**1036**	930	**1150**	**1084**	**1146**
Hill Canyon Wastewater Treatment Plant (10D_HILL)														
Boron	mg/L	N/A	0.5	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.5
Chloride	mg/L	189	138	137	134	136	138	173	147	146	153	156	149	149
Sulfate	mg/L	N/A	80	86	87	88	85	82	84	85	99	130	123	116
Total Dissolved Solids	mg/L	N/A	530	543	535	540	546	555	519	546	578	627	616	610
Simi Valley Water Quality Control Plant (07D_SIMI)														
Boron	mg/L	N/A	0.45	0.5	0.51	0.46	0.49	0.47	0.46	0.45	0.47	0.46	0.46	0.46
Chloride	mg/L	183	149	149	144	132	129	138	136	131	137	135	136	136
Sulfate	mg/L	298	161	167	159	157	165	169	162	177	236	238	210	207
Total Dissolved Solids	mg/L	955	658	675	657	652	654	671	653	671	665	759	681	699

N/A: "The 95th percentile concentration is below the Basin Plan objective so interim limits are not necessary."

Results in **bold red type** exceed applicable interim WLA.

1. Due to water conservation and alterations in the composition of the water supply available in the POTW service area, effluent salt concentrations have increased since the adoption of the TMDL. The increased salts concentrations are being addressed through a Time Schedule Order that provides for higher TDS and sulfate interim limits and a stay of interim limits for chloride (SWRCB WQO 2003-0019).

COMPLIANCE COMPARISON DISCUSSION

OC Pesticides, Toxicity, Metals, Nutrients, and Salts

The compliance analysis shown in Table 19 through Table 31 above demonstrates that for the most part, the CCW is in compliance with the applicable interim or final WLAs and LAs currently in effect for the Nutrients, OC Pesticides, Toxicity, Salts, and Metals TMDLs. The following observations summarize the compliance status with these load allocations:

- No exceedances of the interim WLAs or LAs for OC Pesticides or PCBs were observed at any location in the watershed.
- Exceedances of numeric targets for Nitrate-N and Nitrate-N + Nitrite-N were observed in Mugu Lagoon, Revolon Slough, Beardsley Wash, Calleguas Creek, Arroyo Las Posas, and Arroyo Simi. Most of the exceedances occurred during dry events. No exceedances of final nutrient WLAs were measured at any POTW compliance site.
- Three exceedances of the final MS4 WLA, but not the interim LA, for chlorpyrifos were measured at receiving water sites during the storm event in 2014. There were no exceedances of the diazinon WLA or LA. No exceedances of the final WLAs for chlorpyrifos or diazinon were recorded at any POTW.
- Exceedances of both the interim LA and final MS4 WLA for total selenium were measured at the 04_WOOD monitoring station in Revolon Slough during the four dry weather sampling events.
- Although toxicity was observed at some locations in the watershed, TIEs were initiated for all samples meeting the requirements in the QAPP. As a result, the Stakeholders are in compliance with the toxicity WLAs and LAs per the requirements of the TMDL.
- In general, receiving water sites were in compliance with interim LAs and MS4 WLAs established by the Salts TMDL; the only exception being exceedances in total dissolved solids, sulfate, and boron measured at 04_WOOD in the Revolon Slough watershed. POTWs are in compliance with interim salts WLAs, with the exception of Camarillo Water Reclamation Plant (WRP), which experienced exceedances of chloride, sulfate, and TDS. The exceedances of interim salts WLAs for the Camarillo WRP have resulted from increased influent salt concentrations due to water conservation and a shift in the composition of the water supplied within the service area. Since the process for addressing salts is a watershed effort involving significant capital investments, the Camarillo WRP has received a time schedule order to adjust the interim limits for TDS and sulfate. During the period of this annual report, application of interim limits for chlorine was stayed by State Board Order 2003-019. As a result, the interim limits in the TMDL are not the currently applicable interim limits for the Camarillo WRP discharge.

Nutrients

Exceedances of numeric targets for Nitrate-N and Nitrate-N + Nitrite-N were observed at sites in Mugu Lagoon, Revolon Slough, Beardsley Wash, Arroyo Las Posas, and Calleguas Creek. Nitrate-N exceedances are summarized in Table 32 below. The table focuses on Nitrate-N

results since Nitrate-N + Nitrite-N exceedances were caused by high Nitrate-N values. Nitrite-N was below the 1 mg/L target at all sites and events.

Table 32. Exceedances of Nitrate-N Numeric TMDL Target of 10 mg/L

Nitrogen TMDL Compliance Sites	Event 39 Aug-2013 Dry	Event 40 Nov-2013 Dry	Event 41 Feb-2014 Dry	Event 43 May-2014 Dry	Event 42 Feb-2014 Wet
01_RR_BR	No	No	**Yes**	**Yes**	No
04_WOOD	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
05_CENTR	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
02_PCH	**Yes**	**Yes**	**Yes**	**Yes**	NR
03_UNIV	No	No	No	No	No
9A_HOWAR	No	No	No	No	NR
9B_ADOLF	No	No	No	No	No
10_GATE	No	No	No	No	No
12_PARK	No	No	No	No	NR
13_BELT	No	No	No	No	NR
06_SOMIS	**Yes**	**Yes**	**Yes**	NS	No
07_HITCH	No	No	No	**Yes**	No
07_MADER	No	No	No	No	No

NR=not required
No signifies that monitoring results were below the Nitrate-N target during the monitoring event.
Yes signifies that monitoring results were above the Nitrate-N target during the monitoring event.

Nitrogen exceedances occurred primarily in areas of the watershed with agricultural inputs. Reaches downstream of POTW discharges are generally in compliance with the TMDL requirements and urban discharges were determined to be negligible during the TMDL analysis and therefore do not have TMDL allocations. The final nitrogen LAs for agriculture became effective in July 2010. The exceedances of the nitrogen LAs since that time have triggered the inclusion of nitrogen in the AWQMP required under the Ag Waiver that is currently being implemented in the CCW. Agricultural education courses have included various classes focused on nitrogen management; AWQMP implementation will continue to target nitrogen and include BMPs to address these exceedances. Compliance with the load allocations is determined through implementation of the AWQMP.

Chlorpyrifos

Further examination of the chlorpyrifos exceedances at receiving water sites was needed to assess whether urban dischargers caused the exceedance of the receiving water allocations. The WLAs for urban dischargers are assessed in the receiving water, while agricultural dischargers are not yet required to be in compliance with the chlorpyrifos final load allocations. Monitoring data at urban land use sites from each subwatershed for which an exceedance was observed was compared to the WLA to determine if MS4 discharges exceeded the allocation during the

monitoring event where elevated receiving water concentrations were observed.[1] If the urban land use data were below the WLA, the MS4 dischargers were considered to be in compliance with the WLAs. If the urban land use data were above the WLA, the MS4 could be contributing to the exceedance in the receiving water.

As shown in Table 33, there were three exceedances of chlorpyrifos targets at the receiving water sites. In all cases, urban land use data for the same event was less than the MS4 WLA for chlorpyrifos. Additionally, for the majority of the events shown in Table 33, chlorpyrifos was not detected at the urban land use sites indicating that it is unlikely MS4 discharges were the cause of the observed exceedances.

Table 33. Compliance and Land Use Sites Comparison to Determine MS4 Chlorpyrifos WLA Compliance

Sites Exceeding WLAs	Constituent	Event 39 Aug-2013 Dry	Event 40 Nov-2013 Dry	Event 41 Feb-2014 Dry	Event 42 Feb-2014 Wet	Event 43 May-2014 Dry
01_RR_BR	Chlorpyrifos				NA [1]	
04_WOOD	Chlorpyrifos				No	
06_SOMIS	Chlorpyrifos				NA [1]	

No= none of the MS4 land use site for the subwatershed exceeded the WLA during the monitoring event.
1. There are no urban land use monitoring sites in these reaches.
Blank cells indicate that a WLA exceedance did not occur at the compliance monitoring site during a particular event.

Selenium

Selenium concentrations in Revolon Slough at 04_WOOD exceeded the urban dischargers interim MS4 WLA and the agricultural dischargers interim LA during all four dry weather monitoring events. A summary of monitoring results for total selenium at sites in the Revolon Slough subwatershed is shown in Table 34 below. For discussion purposes both dry weather and wet weather monitoring results are included in the table.

Table 34. Selenium Monitoring Data (ug/L) in the Revolon Slough Subwatershed

		Dry Weather Events & Dates						Wet Weather Events & Dates	
		Interim		39	40	41	43		42
Site ID	Use	WLA [1]	LA [1]	Aug-13	Nov-13	Feb-14	May-14	Target [2]	Feb-14
04_WOOD	RW	13	6	**17.72**	**17.77**	**20.98**	**20.98**	290	4.31
04D_WOOD	Ag		6	NS	2.46	NS	NS	290	4.05
05D_SANT_VCWPD	Ag		6	**46.51**	**62.6**	**53.03**	**76.56**	290	4.35
04D_VENTURA	Urban	13		ND	0.16	0.25	0.45	290	0.23

1. Interim WLAs for stormwater permittees and interim LAs for agricultural dischargers are effective until March 2022 (R4-2006-012).
2. No wet weather exceedances were observed in the TMDL analysis so no interim limits were assigned for the TMDL. For comparison purposes, the wet weather targets were included in this table.
RW – Receiving water compliance site; Ag – Agricultural; Urban – Urban
NS – Not sampled, dry
Results in **bold type** exceed applicable interim WLA or interim LA.

[1] Refer to Table 5 for a list of land use sites in each subwatershed.

As noted in the table above, high levels of selenium were also observed at 05D_SANT_VCWPD, an agricultural use site in the upper reach of the subwatershed. As discussed in the TMDL, a primary source of selenium in Revolon Slough is considered to be rising groundwater levels and the interim allocations were to be considered in this context.

Salts

TDS and sulfate concentrations in Revolon Slough at 04_WOOD exceeded the urban dischargers' interim MS4 WLA during all twelve months of the monitoring period. Boron concentrations exceeded the urban dischargers' interim MS4 WLA and agricultural dischargers' interim LAs during seven of the twelve months during the monitoring period. In addition, boron concentrations exceeded only the urban dischargers' interim MS4 WLA during the remaining five months of the monitoring period. A summary of monitoring results for total dissolved solids, sulfate, and boron at sites in the Revolon Slough subwatershed are shown in Table 35 through Table 37 below.

Table 35. Total Dissolved Solids Monitoring Data (mg/L) in Revolon Slough

Site ID	Use	Interim Limits		Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
		WLA	LA												
04_WOOD [1]	RW	1720	3995	**3689**	**3713**	**3858**	**2940**	**3368**	**3392**	**3365**	**3525**	**3628**	**3525**	**3488**	**3767**
04D_WOOD [2]	Ag		3995		NS			1156			NS			NS	
04D_VENTURA [2]	Urban	1720			690			841			757			960	

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.

Table 36. Sulfate Monitoring Data (mg/L) in Revolon Slough

Site ID	Use	Interim Limits		Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
		WLA	LA												
04_WOOD [1]	RW	1289	1962	**1850**	**1862**	**1935**	**1475**	**1690**	**1702**	**1688**	**1768**	**1820**	**1768**	**1750**	**1889**
04D_WOOD [2]	Ag		1962		NS			1021			NS			NS	
04D_VENTURA [2]	Urban	1289			220			189			244			263	

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.

Table 37. Boron Monitoring Data (mg/L) in Revolon Slough

Site ID	Use	Interim Limits		Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
		WLA	LA												
04_WOOD [1]	RW	1.3	1.8	**1.89**	**1.91**	**1.98**	**1.52**	**1.74**	**1.75**	**1.73**	**1.81**	**1.86**	**1.81**	**1.79**	**1.93**
04D_WOOD [2]	Ag		1.8		NS			1.2			NS			NS	
04D_VENTURA [2]	Urban	1.3			0.24			0.39			0.25			0.41	

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

As noted in the previous tables, high levels of total dissolved solids, sulfate, and boron were measured at the 04D_WOOD monitoring site during the November 2013 quarterly event, when flow was present. However, measured concentrations did not exceed the interim agricultural LAs. This site represents agricultural discharge water quality in the Revolon Slough subwatershed. Samples were not taken during the August 2013, February 2014, and May 2014 sampling events due to no flow being present. 04D_VENTURA, which is an urban land use site in the upper Revolon Slough watershed, had concentrations consistently below the interim MS4 WLAs for TDS, sulfate, and boron. The unusually dry conditions in the watershed may be contributing to the higher salts concentrations observed in the receiving waters.

Revisions and Recommendations

The QAPP specifies that during the completion of each CCWTMP annual report, revisions to the standard procedures will be made, including: site relocation, ceasing monitoring efforts and/or deleting certain constituents from sample collection. Some revisions were recommended in the previous annual reports; however no response from the Regional Water Board has been received to date. In order to continue implementing the CCWTMP in an adaptive and cost effective manner, some of the previously requested revisions have been carried out. The following revisions to the QAPP include those previously requested in past annual reports, actions taken, and additional recommendations:

First Year Annual Report Recommendations and Actions

- The relocation of certain CCWTMP land use sites to match new locations of the Ventura County Stormwater Quality Management Program MS4 Stormwater sites, which are monitored by the VCWPD as Principal Permittee under the Ventura County MS4 Permit:
    - The relocations are still being evaluated by the Stakeholders and will be provided to the Regional Water Board as part of the updated QAPP.
- Cease sampling the Nitrogen TMDL investigation sites. These sites were selected to characterize land use discharges to meet a special study requirement in the TMDL. The monitoring was only scheduled to occur for one year[1], so this monitoring has now been completed.
    - Nutrient samples were collected from land use sites through the second year of monitoring, but ceased starting with year three.
    - Nutrient sampling of agricultural land use sites was re-started beginning with event 31 to assess compliance with the Conditional Ag Waiver (Order No. R4-2010-0186) and inform BMP implementation.
- Cease monthly monitoring of metals after the June 2010 monitoring event and return to quarterly for the remainder of the program. This completes one year of monitoring and prevents additional monitoring costs from being incurred while the data evaluation is occurring. Monthly monitoring can be reinitiated, if deemed necessary by the Regional Water Board based on the data review.
    - Monthly metals monitoring ended after the completion of event 21 in June 2010.
- The triazine herbicides atrazine, prometryn, and simazine were included in the monitoring program as they have been detected in toxic samples and have the potential to increase toxicity of OP pesticides.[2] However, triazine herbicides are not on the 303(d) list and have not been identified as contributing to or increasing toxicity in the CCW in

[1] Larry Walker Associates (LWA). 2004. Nonpoint Source Monitoring Workplan for the TMDL for Nitrogen Compounds and Related Effects in Calleguas Creek. July 16, 2004.

[2] Anderson, T. D. and Lydy, M. J. 2002. Increased toxicity to invertebrates associated with a mixture of atrazine and organophosphate insecticides. Environ. Tox. and Chem. V21, No. 7, 1507–1514.

either the historical data or in the recently collected data. As such, conducting analysis for triazine herbicides will be discontinued.

  - Triazine analysis continued through year two and the first two dry weather and first storm event of year three. Triazine sample collection has not been performed since the end of 2010.

- Cease conducting Toxicity Evaluation Investigations (TIEs) at the 04_WOOD site (Revolon Slough at Wood Road crossing) as detailed in the letter sent to the Regional Water Board on July 20, 2009 (Appendix D of CCWTMP First Year Annual Monitoring Report). Toxicity has been observed at this site and as outlined in the letter, the stakeholders would rather invest resources into implementation activities targeting load reductions.
  - TIEs at the 04_WOOD site were not initiated when water quality toxicity was observed during the second, third, fourth, and six years of monitoring. However, the frequency of toxicity has greatly decreased in recent years, with only one occurrence each in years three and four during wet weather and one during year six during dry weather.

Second Year Annual Report Recommendations and Actions

- Cease PCBs monitoring at all land use sites.
  - PCB analysis has continued since there is no cost savings in not obtaining these results.

Third Year Annual Report Recommendations and Actions

- Ending toxicity investigation monitoring. As outlined in the Toxicity Review section of this report, significant mortality has not occurred at either the two water column or two sediment toxicity investigation sites in the three years of the CCWTMP.
  - Although toxicity monitoring has not demonstrated ongoing toxicity at these sites that would warrant continued monitoring, toxicity monitoring was restarted and samples will be collected until sufficient data are available to support a delisting of these reaches.
- Revise the nitrogen TMDL monitoring to reflect a subwatershed approach consistent with the other TMDLs. The nitrogen TMDL was adopted many years before the remaining CCW TMDLs and required a different monitoring approach. Since the compliance deadlines for this TMDL have been reached and many of the TMDL reaches are in compliance, a revised monitoring approach that provides more consistency with the other TMDLs is warranted. Modifications to remove sites for reaches upstream of a subwatershed monitoring location are recommended. These changes are being addressed in the revised QAPP.

Fourth Year Annual Report Recommendations and Actions

- Cease quarterly monitoring in Mugu Lagoon. Metals and general chemistry are the only constituents being monitored during these events, and sufficient data is available to support delisting in the lagoon.

- Quarterly monitoring continues while the Stakeholders are evaluating the overall monitoring program. The revised QAPP will incorporate this change.

Recommended revisions from the first year annual report have been implemented as outlined above. The second year recommendation was not implemented since continuing to report PCB results requires no additional effort. Third and fourth year recommendations are being incorporated into the revised QAPP.

In addition to the recommendations presented above, the QAPP is being updated to incorporate the Salts TMDL monitoring approach. Additional modifications that reflect the most current lab methods and procedures for the field conditions are also part of the QAPP update process. Opportunities to further coordinate the monitoring efforts within the watershed are being investigated.

Appendix A:
Monitoring Event Summaries for Toxicity, OC Pesticides, Nutrients, Metals, and Salts

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 39: Quarterly and Sediment Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), and Fugro

Aug 21, 2013

- **Crew #1:** Greg Cotten (KLI), Justin Martos (Fugro)
- **Crew #2:** Amy Howk (KLI), Tim Nicely (Fugro)

Aug 22, 2013

- **Crew #1:** Greg Cotten (KLI), Tim Nicely (Fugro)
- **Crew #2:** Amy Howk (KLI), Justin Martos (Fugro)

Sampling Dates: **Receiving water and land use sites:** August 21st and 22nd, 2013

Sediment sampling: August 21st and 22nd, 2013

Sampling Type: Water Chemistry, Toxicity, and Salts TMDL, Sediment

SITES SAMPLED

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
01T_ODD2_DCH	8-22-13	X		X	X	X	
02_PCH	8-22-13	X			X		
03_UNIV	8-21-13	X	X	X	X	X	X
04_WOOD	8-21-13	X	X	X	X	X	X
04D_VENTURA	8-22-13	X		X		X	X
05_CENTR	8-22-13	X			X		
05D_SANT_VCWPD	8-22-13	X		X	X	X	
06_SOMIS	8-21-13	X	X		X	X	
07_MADER	8-22-13	X			X		
07_HITCH	8-21-13	X	X		X	X	
07_TIERRA	8-22-13	X					X
07D_CTP	8-22-13	X				X	X
07T DC H	8-22-13	X				X	
9A_HOWAR	8-21-13	X			X		X
9B_ADOLF	8-21-13	X	X		X	X	

Site ID	Sample Date	Constituents					
		General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
9BD_ADOLF	8-22-13	X		X		X	X
9B_BARON	8-22-13	X					X
10_GATE	8-21-13	X	X		X	X	
12_PARK	8-22-13	X			X		
13_BELT	8-21-13	X	X		X	X	
13_SB_HILL	8-22-13	X				X	X

SITES NOT SAMPLED

Site ID	Reason for Omission
02D_BROOM	Dry
04D_WOOD	Dry
06T_FC_BR	Dry
07D_HITCH_LEVEE2	Dry
9BD_GERRY	Dry

SEDIMENT SAMPLED

Site ID	Sediment Toxicity	Sediment Chemistry
02_PCH		X
03_UNIV	X	X
04_WOOD	X	X
06_SOMIS		X
07_HITCH		X
9A_HOWAR		X
9B_ADOLF		X

DEVIATIONS FROM QAPP

Site ID	Deviation
02_PCH	Flow was not measured due to strong tidal influence.
04_WOOD	The conductivity at the site (>3000 uS/cm) was greater than the accepted range for the designated test species (*Ceriodaphnia dubia*). The QAPP requires the use of *Americamysis bahia*. However, *Hylella azteca* is identified by SWAMP as an appropriate water test species when conductivity is greater than 3,000 us/cm and is currently utilized by the Ventura County Irrigated Lands Group which conducts monitoring in the watershed. To maintain consistency with an existing watershed program, the toxicity testing lab (Pacific EcoRisk) utilized *Hylella azteca* in place of *Americamysis bahia*.
04D_VENTURA	Intermediate container (Ziploc bag) used to fill sample bottles.
05D_SANT_VCWPD	Intermediate container (Ziploc bag) used to fill sample bottles.
06_SOMIS	Intermediate container (Ziploc bag) used to fill sample bottles.
07D_CTP	Intermediate container (Ziploc bag) used to fill sample bottles.
07T_DC_H	Intermediate container (Ziploc bag) used to fill sample bottles.
9BD_ADOLF	Intermediate container (Ziploc bag) used to fill sample bottles.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

- Salt samples at sites 07 TIERRA, 9B BARON, 04 WOOD, 03 UNIV and 9A HOWAR were taken next to the installed sensor.
- Sediment chemistry at tox sites: WOOD and UNIV were from samples collected alongside the bulk sediment collection and is not an aliquot of the tox sediment itself.

Prepared by:	Amy Howk, KLI	Date:	September 3, 2013
Approved by:	Greg Cotten, KLI	Date:	September 13, 2013
Approved by:	Michael Marson, LWA	Date:	September 16, 2013

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 39: Freshwater Tissue

Sampling Crew: Cardno ENTRIX: J. Mulder, M. Olesen

Sampling Date: August 27-28, 2013

Sampling Type: Tissue Chemistry - Freshwater

SITES SAMPLED

Site ID	Fish collected at Site?	Constituents			
		% Lipids	PCBs and OC Pesticides	Mercury and Selenium	Chlorpyrifos
04_WOOD	Yes	X	X	X	X
03_UNIV	Yes	X	X		
9B_ADOLF	Yes	X	X		
06_SOMIS	No	X	X		
07_HITCH	Yes	X	X		

SITES NOT SAMPLED

06_SOMIS

DEVIATIONS FROM QAPP

None

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

Prepared by:	Amy Storm, LWA	Date:	September 16, 2014
Approved by:	Michael Marson, LWA	Date:	September 18, 2014

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 39: Mugu Lagoon Water

Sampling Crew: MBC *Applied Environmental Sciences*: Wayne Dossett, James Nuñez, D.J. Schuessler

Sampling Date: 22 August 2013

Sampling Type: Water Chemistry

SITES SAMPLED

Site ID	Constituents						
	General Water Quality Parameters	**TOC**	**DOC**	**TSS**	**PCBs, OP, OC, and Pyrethroid Pesticides**	**Nutrients**	**Metals w/ Hg**
01_BPT_14 Central Western Arm	X		X	X			X
01_BPT_15 Central Lagoon	X		X	X			X
01_BPT_3 Eastern Arm	X		X	X			X
1_BPT_6 East Western Arm	X		X	X			X
01_RR_BR Ronald Reagan Bridge	X		X	X	X	X[1]	X
01_SG_74 Central Lagoon S. of Drain #7	X		X	X			X

1. TKN, Ammonia-N, Organic-N, Total Phosphorus, Nitrate-N, Nitrate-N, Orthophosphate-P.

SITES NOT SAMPLED

None

DEVIATIONS FROM QAPP

Station 01_SG_74 Central Lagoon S. of Drain #7 was accessed by land in compliance with the NBVC biologist's request that the field team conduct walk-in sampling at that station on a permanent basis to avoid harassment of harbor seals. The collection at this site was consistent with previous samples in the area. GPS coordinates of the sample collection locations are provided on the field log sheet.

FOLLOW UP ACTIONS

None

Prepared by:	David Vilas, MBC	Submittal Date:	26 August 2013
Approved by:	Michael Marson, LWA	Submittal Date:	August 26, 2013

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 40: Quarterly Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro

Crew #1: Greg Cotten (KLI), Jon Toal (KLI)
Crew #2: Tim Nicely (Fugro), Joe Reeves (Fugro), Gabriella Baeza-Costaneda (Fugro)

Sampling Dates: **Receiving water and land use sites:** November 5th and 6th, 2013

Sampling Type: Water Chemistry, Toxicity, and Salts

SITES SAMPLED

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
04D_WOOD	11/5/13	X		X	X	X	X
04_WOOD	11/5/13	X	X	X	X	X	X
04D_VENTURA	11/5/13	X		X		X	X
01T_ODD2_DCH	11/6/13	X		X	X	X	
02_PCH	11/5/13	X			X		
02D_BROOM	11/6/13	X		X	X	X	
03_UNIV	11/5/13	X	X	X	X	X	X
9B_BARON	11/5/13	X					X
9B_ADOLF	11/5/13	X	X		X	X	
9BD_ADOLF	11/5/13	X		X		X	X
9A_HOWAR	11/6/13	X			X		X
05D_SANT_VCWPD	11/5/13	X		X	X	X	
05_CENTR	11/6/13	X			X		
13_SB_HILL	11/6/13	X				X	X
10_GATE	11/6/13	X			X		
12_PARK	11/6/13	X			X		

Site ID	Sample Date	Constituents					
		General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
13_BELT	11/5/13	X	X		X	X	
06T_FC_BR	11/6/13	X			X	X	
06_SOMIS	11/5/13	X	X		X	X	
07_HITCH	11/5/13	X	X		X	X	
07_MADER	11/6/13	X			X		
07D_CTP	11/6/13	X				X	X
07T_DC_H	11/6/13	X				X	
07_TIERRA	11/5/13	X					X

SITES NOT SAMPLED

Site ID	Reason for Omission
07D_HITCH_LEVEE	Site was dry.
9BD_GERRY	Site was dry.

DEVIATIONS FROM QAPP

Site ID	Deviation
02_PCH	Flow was not measured due to tidal influence.
04_WOOD	The conductivity at the site (3,710 uS/cm) was greater than the accepted range for the designated test species (*Ceriodaphnia dubia*). The QAPP requires the use of *Americamysis bahia*. However, *Hylella azteca* is identified by SWAMP as an appropriate water test species when conductivity is greater than 3,000 us/cm and is currently utilized by the Ventura County Irrigated Lands Group which conducts monitoring in the watershed. To maintain consistency with an existing watershed program, the toxicity testing lab (Pacific EcoRisk) utilized *Hylella azteca* in place of *Americamysis bahia*.
04D_VENTURA	Intermediate container (Ziploc bag) used to fill sample bottles.
07D_CTP	Intermediate container (Ziploc bag) used to fill sample bottles.
06_SOMIS	Intermediate container (1L HDPE) used to fill sample bottles
9BD_ADOLF	Intermediate container (Ziploc bag) used to fill sample bottles.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

06T_FC_BR turbidity was above 2000 NTU, the field meters limit of accuracy. This analysis was added to the COC for measurement at Physis.

04D_WOOD dissolved oxygen was recorded as 2.14 mg/L and 21.3% Sat. T.Nicely (Fugro) reports the meter was deployed correctly and the probe was properly submerged.

Prepared by:	Greg Cotten, KLI	Date:	November 11th, 2013
Reviewed by:	Amy Howk, KLI	Date:	November 15th, 2013
Approved by:	Michael Marson, LWA	Date:	November 26th, 2013

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 40: Mugu Lagoon Water

Sampling Crew: MBC *Applied Environmental Sciences*: Wayne Dossett, D.J. Schuessler

Sampling Date: 5 November 2013

Sampling Type: Water Chemistry

SITES SAMPLED

Site ID	Constituents						
	General Water Quality Parameters	**TOC**	**DOC**	**TSS**	**PCBs, OP, OC, and Pyrethroid Pesticides**	**Nutrients**	**Metals w/ Hg**
01_BPT_14 Central Western Arm	X		X	X			X
01_BPT_15 Central Lagoon	X		X	X			X
01_BPT_3 Eastern Arm	X		X	X			X
1_BPT_6 East Western Arm	X		X	X			X
01_RR_BR Ronald Reagan Bridge	X		X	X	X[1]	X[2]	X
01_SG_74 Central Lagoon S. of Drain #7	X		X	X			X

1. Includes Triazines
2. TKN, Ammonia-N, Organic-N, Total Phosphorus, Nitrate-N, Nitrate-N, Orthophosphate-P.

SITES NOT SAMPLED

None

DEVIATIONS FROM QAPP

Station 01_SG_74 Central Lagoon S. of Drain #7 was accessed by land in compliance with the NBVC biologist's request that the field team conduct walk-in sampling at that station on a permanent basis to avoid harassment of harbor seals. The collection at this site was consistent with previous samples in the area. GPS coordinates of the sample collection locations are provided on the field log sheet.

FOLLOW UP ACTIONS

None

Prepared by:	David Vilas, MBC	Submittal Date:	7 November 2013
Approved by:	Amy Storm, LWA	Submittal Date:	17 November 2013

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 41: Quarterly Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro

Crew #1: KLI: Greg Cotten, Spencer Johnson
Crew #2: Fugro: Tim Nicely, Joe Reeves

Sampling Dates: **Receiving water and land use sites:** February 19th and 20th, 2014

Sampling Type: Water Chemistry, Toxicity, and Salts

SITES SAMPLED

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, Triazines and Pyrethroid Pesticides	Salts
04_WOOD	02/19	X	X	X	X	X	X
04D_VENTURA	02/19	X		X		X	X
01T_ODD2_DCH	02/19	X		X	X	X	
02_PCH	02/20	X			X		
02D_BROOM	02/19	X		X	X	X	
03_UNIV	02/19	X	X	X	X	X	X
9B_BARON	02/19	X					X
9B_ADOLF	02/19	X	X		X	X	
9BD_ADOLF	02/19	X		X		X	X
9A_HOWAR	02/20	X			X		X
05D_SANT_VCWPD	02/19	X		X	X	X	
05_CENTR	02/20	X			X		
13_SB_HILL	02/20	X				X	X
10_GATE	02/19	X	X		X	X	
12_PARK	02/19	X			X		
13_BELT	02/19	X			X		

Site ID	Sample Date	Constituents					
		General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, Triazines and Pyrethroid Pesticides	Salts
06_SOMIS	02/19	X	X		X	X	
07_HITCH	02/19	X	X		X	X	
07_MADER	02/20	X			X		
07D_CTP	02/20	X				X	X
07T_DC_H	02/20	X				X	
07_TIERRA	02/19	X					X

SITES NOT SAMPLED

Site ID	Reason for Omission
04D_WOOD	Site was dry.
06T_FC_BR	Site was dry.
07D_HITCH_LEVEE	Site was dry.
9BD_GERRY	Site was dry.

DEVIATIONS FROM QAPP

Site ID	Deviation
02_PCH	Flow was not measured due to tidal influence. Site was sampled near low tide to maximize watershed water. TSS container used as intermediate container.
04_WOOD	The conductivity at the site (3,420 uS/cm) was greater than the accepted range for the designated test species (*Ceriodaphnia dubia*). The QAPP requires the use of *Americamysis bahia*. However, *Hylella azteca* is identified by SWAMP as an appropriate water test species when conductivity is greater than 3,000 us/cm and is currently utilized by the Ventura County Irrigated Lands Group which conducts monitoring in the watershed. To maintain consistency with an existing watershed program, the toxicity testing lab (Pacific EcoRisk) utilized *Hylella azteca* in place of *Americamysis bahia*.
04D_VENTURA	Intermediate container (Ziploc bag) used to fill sample bottles.
07D_CTP	Intermediate container (Ziploc bag) used to fill sample bottles.
07T_DC_H	Intermediate container (Ziploc bag) used to fill sample bottles.
9BD_ADOLF	Intermediate container (Ziploc bag) used to fill sample bottles.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

None

Prepared by:	Greg Cotten, KLI	Date:	April 11, 2014
Reviewed by:	Amy Howk, KLI	Date:	April 14, 2014

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 41: Mugu Lagoon Water

Sampling Crew: MBC *Applied Environmental Sciences*: James Nuñez, D.J. Schuessler

Sampling Date: 3 February 2014

Sampling Type: Water Chemistry

SITES SAMPLED

Site ID	Constituents						
	General Water Quality Parameters	**TOC**	**DOC**	**TSS**	**PCBs, OP, OC, and Pyrethroid Pesticides**	**Nutrients**	**Metals w/ Hg**
01_BPT_14 Central Western Arm	X		X	X			X
01_BPT_15 Central Lagoon	X		X	X			X
01_BPT_3 Eastern Arm	X		X	X			X
1_BPT_6 East Western Arm	X		X	X			X
01_RR_BR Ronald Reagan Bridge	X		X	X	X	X[1]	X
01_SG_74 Central Lagoon S. of Drain #7	X		X	X			X

1. TKN, Ammonia-N, Organic-N, Total Phosphorus, Nitrate-N, Nitrate-N, Orthophosphate-P.

SITES NOT SAMPLED

None

DEVIATIONS FROM QAPP

Between 0.02 and 0.04 inches of rain fell in the study area in 24 hours previous to sampling, however, flow in Calleguas Creek was at baseline condition at the time of sampling. Station 01_SG_74 Central Lagoon S. of Drain #7 was accessed by land in compliance with the NBVC biologist's request that the field team conduct walk-in sampling at that station on a permanent basis to avoid harassment of harbor seals. The collection at this site was consistent with previous samples in the area. GPS coordinates of the sample collection locations are provided on the field log sheet.

FOLLOW UP ACTIONS

None

Prepared by:	David Vilas, MBC	Submittal Date:	4 February 2014
Approved by:	Michael Marson, LWA	Submittal Date:	February 5, 2014

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 42: Wet Weather Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro

Crew #1: Greg Cotten, Broc Johnson (KLI)
Crew #2: Amy Howk, Jon Toal (KLI)
Crew #3: Justin Martos, Tom Cromwell (Fugro)
Crew #4: Tim Nicely, Jeff Polis (Fugro)

Sampling Dates: **Receiving water and land use sites:** February 28, 2014

Sampling Type: Water Chemistry, Toxicity, and Salts

SITES SAMPLED

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
04D_WOOD	02-28-14	X		X	X	X	X
04_WOOD	02-28-14	X	X	X	X	X	X
04D_VENTURA	02-28-14	X		X		X	X
01T_ODD2_DCH	02-28-14	X		X	X	X	
02D_BROOM	02-28-14	X		X	X	X	
03_UNIV	02-28-14	X	X	X	X	X	X
9B_BARON	02-28-14	X					X
9B_ADOLF	02-28-14	X	X		X	X	
9BD_ADOLF	02-28-14	X		X		X	X
9BD_GERRY	02-28-14	X		X	X	X	X
9A_HOWAR	02-28-14	X					X
05D_SANT_VCWPD	02-28-14	X		X	X	X	
05_CENTR	02-28-14	X			X		
13_SB_HILL	02-28-14	X				X	X
10_GATE	02-28-14	X	X		X	X	

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
13_BELT	02-28-14	X	X			X	
06T_FC_BR	02-28-14	X			X	X	
06_SOMIS	02-28-14	X	X		X	X	
07D_HITCH_LEVEE2	02-28-14	X			X	X	X
07_HITCH	02-28-14	X	X		X	X	
07_MADER	02-28-14	X			X		
07D_CTP	02-28-14	X				X	X
07T_DC_H	02-28-14	X				X	
07_TIERRA	02-28-14	X					X

SITES NOT SAMPLED

Site ID	Reason for Omission
	All sites sampled.

DEVIATIONS FROM QAPP

Site ID	Deviation
9BD_GERRY	Intermediate container (Ziploc bag) used to fill sample bottles.
06_SOMIS	Intermediate container (bucket) used to fill sample bottles from bridge.
05D_SANT_VCWPD	Intermediate container (TSS bottle) used to fill sample bottles.
05_CENTR	Intermediate container (TSS bottle) used to fill sample bottles.
9BD_ADOLF	Intermediate container (TSS bottle) used to fill sample bottles.

FOLLOW UP ACTIONS

None

ADDITIONAL COMMENTS

The following sites' flow were estimated or had incomplete measurements due to high conditions: 07_TIERRA, 07_MADER, 07D_CTP, 07_HITCH, 9B_BARON, 9A_HOWAR, 10_GATE, 13_BELT, 13_SB_HILL, 9B_ADOLF, 05D_SANT_VCWPD, 05_CENTR, 03_UNIV, 04_WOOD, 04D_VENTURA, 02D_BROOM

Water quality meters

- Team 2's meter screen failed after their 2nd site. Grabs were taken at the sites after the screen failed. These grabs were stored on ice and measured less than 7 hours later by meter 3760 which passed post calibration testing. These sites are: 9B_BARON, 9BD_GERRY, 10_GATE, and 13_BELT. The sites measured before the screen failure were: 13_SB_HILL and 9A_HOWAR. The meter easily passed initial calibration and apparently functioned normally up to the point of screen failure.
- Team 1's turbidity sensor failed initial calibration. Grab samples were collected and measured with meter 3760 within 7hrs 30 minutes of sample time. These sites were: 07T_DCH, 07_MADER, 07D_CTP, 07_TIERRA, 07D_HITCH_LEVEE2, 07_HITCH.

Analytical additions: Turbidity measured by lab because exceeded meter capabilities (>1000 NTU): 07_HITCH, 06T_FC_BR, 06_SOMIS, 05D_SANT_VCWPD, 05_CENTR, 03_UNIV, 04_WOOD, 01T_ODD2_DCH,

Meter assignments:

Team 1 (KLI): Hach Quanta #2692

Team 2 (KLI): YSI Sonde # 6920 w/ handheld readout

Team 3 (Fugro): Hach Quanta #3760

Team 4 (Fugro): Hach Quanta #3755

Prepared by:	Greg Cotten, KLI	Date:	March 18, 2014
Reviewed by:	Amy Howk, KLI	Date:	March 24, 2014
Reviewed by:	Michael Marson, LWA	Date:	April 03, 2014

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 43: Quarterly Sampling

Sampling Crews: Kinnetic Laboratories, Inc. (KLI), Fugro

Crew #1: Greg Cotten (KLI), Amy Howk (KLI)
Crew #2: Tim Nicely (Fugro), Joe Reeves (Fugro)

Sampling Dates: **Receiving water and land use sites:** May 28th and 29th, 2014

Sampling Type: Water Chemistry, Toxicity, and Salts

SITES SAMPLED

Site ID		Constituents					
	Sample Date	General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
04_WOOD	5-29-14	X	X	X	X	X	X
04D_VENTURA	5-28-14	X		X		X	X
01T_ODD2_DCH	5-28-14	X		X	X	X	
02_PCH	5-29-14	X			X		
02D_BROOM	5-28-14	X		X	X	X	
03_UNIV	5-29-14	X	X	X	X	X	X
9B_BARON	5-28-14	X					X
9B_ADOLF	5-29-14	X	X		X	X	
9BD_ADOLF	5-28-14	X		X		X	X
9BD_GERRY	5-28-14	X		X	X	X	X
9A_HOWAR	5-28-14	X			X		X
05D_SANT_VCWPD	5-28-14	X		X	X	X	
05_CENTR	5-29-14	X			X		
13_SB_HILL	5-28-14	X				X	X
10_GATE	5-29-14	X	X		X	X	
12_PARK	5-28-14	X			X		
13_BELT	5-29-14	X	X		X	X	

Site ID	Sample Date	Constituents					
		General Parameters	Toxicity	Metals	Nutrients	PCBs, OP, OC, and Pyrethroid Pesticides	Salts
07D_HITCH_LEVEE	5-28-14	X			X	X	X
07_HITCH	5-29-14	X	X		X	X	
07_MADER	5-28-14	X			X		
07D_CTP	5-28-14	X				X	X
07T_DC_H	5-28-14	X				X	
07_TIERRA	5-28-14	X					X

SITES NOT SAMPLED

Site ID	Reason for Omission
04D_WOOD	Site was dry.
06T_FC_BR	Site was dry.
06_SOMIS	Site was dry.

DEVIATIONS FROM QAPP

Site ID	Deviation
02_PCH	Flow was not measured due to tidal influence. Site was sampled near low tide to maximize watershed water.
04D_VENTURA	Intermediate container (Ziploc bag©) used to fill sample bottles.
07D_CTP	Intermediate container (Ziploc bag) used to fill sample bottles.
07D_HITCH_LEVEE2	Intermediate container (Ziploc bag) used to fill sample bottles.
07T_DC_H	Intermediate container used to fill sample bottles.
9BD_ADOLF	Intermediate container (Ziploc bag) used to fill sample bottles.

ADDITIONAL COMMENTS

05D_SANT_VCWPD: Site was being scraped by county ‘skip loader’ upon first site visit. Water was turbid and not usual conditions so it wasn’t sampled. Crew returned 3 hours later and determined it had apparently returned to base flow conditions and water quality ‘looked clear with even flow.’ Location was sampled at this time.

05_CENTR was sampled by field crew. Just after chemistry samples but before field meter measurements were taken, ‘flow and turbidity increased, obviously due to upstream work…’. Lab was not able to reconcile the turbidity measurement as usual because the grab sample wouldn’t have reflected it.

FOLLOW UP ACTIONS

None

Prepared by:	Greg Cotten, KLI	Date:	June 09, 2014
Reviewed by:	Amy Howk, KLI	Date:	June 20,2014
Approved by:	Michael Marson, LWA	Date:	July 18, 2014

Calleguas Creek Watershed TMDL Monitoring Program
Post Event Summary
Event 43: Mugu Lagoon Water

Sampling Crew: MBC *Applied Environmental Sciences*: James Nuñez, Wayne Dossett

Sampling Date: 13 May 2014

Sampling Type: Water Chemistry

SITES SAMPLED

Site ID	Constituents						
	General Water Quality Parameters	**TOC**	**DOC**	**TSS**	**PCBs, OP, OC, and Pyrethroid Pesticides**	**Nutrients**	**Metals w/ Hg**
01_BPT_14 Central Western Arm	X		X	X			X
01_BPT_15 Central Lagoon	X		X	X			X
01_BPT_3 Eastern Arm	X		X	X			X
1_BPT_6 East Western Arm	X		X	X			X
01_RR_BR Ronald Reagan Bridge	X		X	X	X	X[1]	X
01_SG_74 Central Lagoon S. of Drain #7	X		X	X			X

1. TKN, Ammonia-N, Organic-N, Total Phosphorus, Nitrate-N, Nitrate-N, Orthophosphate-P.

SITES NOT SAMPLED

None

DEVIATIONS FROM QAPP

Station 01_SG_74 Central Lagoon S. of Drain #7 was accessed by land in compliance with the NBVC biologist's request that the field team conduct walk-in sampling at that station on a permanent basis to avoid harassment of harbor seals. The collection at this site was consistent with previous samples in the area. GPS coordinates of the sample collection locations are provided on the field log sheet.

FOLLOW UP ACTIONS

None

Prepared by:	David Vilas, MBC	Submittal Date:	16 May 2014
Approved by:	Michael Marson, LWA	Submittal Date:	03 June 2014

Appendix B:
Calibration Event Summary for Salts TMDL

The following section provides a summary of the monitoring events not covered by our quarterly or wet weather monitoring completed during the sixth year of monitoring. The continuous sensor sites (03_UNIV, 04_WOOD, 9A_HOWAR, 9B_BARON, & 07_TIERRA) were visited monthly for calibration checks and flow measurements.

SUMMARY OF MONTHLY EVENTS

Monthly sampling events included only measuring electrical conductivity (EC), temperature, and chloride (no grab samples were required during these visits). EC and temperature were measured using a Hach sensION5 meter and chloride was measured with Hach Quantab titration strips. The following section details each monthly event.

Table 1. Monthly sensor site visits

Site ID	Date Visited	EC	Discharge
04_WOOD	08/09/2013	X	X
03_UNIV	08/09/2013	X	X
07_TIERRA	08/09/2013	X	X
9A_HOWAR	08/09/2013	X	X
9B_BARON	08/09/2013	X	X
07_TIERRA	08/21/2013		X
04_WOOD	09/23/2013	X	X
03_UNIV	09/24/2013	X	X
07_TIERRA	09/23/2013	X	X
9A_HOWAR	09/23/2013	X	X
9B_BARON	09/24/2013	X	X
9A_HOWAR	09/26/2013	X	X
04_WOOD	09/26/2013	X	X
04_WOOD	10/15/2013	X	X
03_UNIV	10/15/2013	X	X
07_TIERRA	10/15/2013	X	X
9A_HOWAR	10/15/2013	X	X
9B_BARON	10/15/2013	X	X
04_WOOD	11/06/2013	X	X
03_UNIV	11/06/2013	X	X
07_TIERRA	11/06/2013	X	X
9A_HOWAR	11/06/2013	X	X
9B_BARON	11/06/2013	X	X
04_WOOD	12/05/2013	X	X
03_UNIV	12/05/2013	X	X
07_TIERRA	12/05/2013	X	X
9A_HOWAR	12/05/2013	X	X
9B_BARON	12/05/2013	X	X
04_WOOD	01/07/2014	X	X
03_UNIV	01/07/2014	X	X
07_TIERRA	01/07/2014	X	X
9A_HOWAR	01/07/2014	X	X
9B_BARON	01/07/2014	X	X
04_WOOD	02/04/2014	X	X
03_UNIV	02/04/2014	X	X
07_TIERRA	02/04/2014	X	X
9A_HOWAR	02/04/2014	X	X
9B_BARON	02/04/2014	X	X
04_WOOD	02/19/2014		X

Site ID	Date Visited	EC	Discharge
04_WOOD	03/06/2014	X	X
03_UNIV	03/06/2014	X	X
07_TIERRA	03/14/2014	X	X
9A_HOWAR	03/06/2014	X	X
9B_BARON	03/14/2014	X	X
9A_HOWAR	03/14/2014	X	X
04_WOOD	04/03/2014	X	X
03_UNIV	04/03/2014	X	X
07_TIERRA	04/03/2014	X	X
9A_HOWAR	04/03/2014	X	X
9B_BARON	04/03/2014	X	X
04_WOOD	05/06/2014	X	X
03_UNIV	05/06/2014	X	X
07_TIERRA	05/06/2014	X	X
9A_HOWAR	05/06/2014	X	X
9B_BARON	05/06/2014	X	X
04_WOOD	06/05/2014	X	X
03_UNIV	06/05/2014	X	X
07_TIERRA	06/05/2014	X	X
9A_HOWAR	06/05/2014	X	X
9B_BARON	06/05/2014	X	X
04_WOOD	07/10/2014	X	X
03_UNIV	07/10/2014	X	X
07_TIERRA	07/10/2014	X	X
9A_HOWAR	07/10/2014	X	X
9B_BARON	07/10/2014	X	X
04_WOOD	07/16/2014	X	X
04_WOOD	07/25/2014	X	X
9A_HOWAR	07/25/2014	X	X

Appendix C:
Rating Curves and EC/Salt Relationships for Salts TMDL Compliance Sites for Monitoring Year July 2013-June 2014

RATING CURVES

Continuous water level time series data (5-min intervals) was converted to flow time series in cubic feet per second (cfs) using the United States Geological Society (USGS) shift-adjusted rating curve method. The method establishes a base rating for a given date range. Over the date range that shares a base rating, this rating is then shifted as necessary for subsets of the data to account for small changes in the geometry of natural channels often caused by deposition, scouring, and vegetation.

Rating curve equations for all sites took the form: $Q = c^* (Lvl + a + S)^b$ where,

Q = discharge (cfs)

Lvl = water level or "stage", referenced to depth sensor elevation (cm)

c = scaling coefficient

a = coefficient accounting for the vertical difference between depth sensor elevation (stage = 0) and stage at zero discharge (cm)

b = coefficient accounting for channel shape, natural channels fall between endpoints b=1.5 (square channel), and b=2.5 (triangular channel).

S = stage shift, typically varies over time for natural channels (cm).

Monthly manual measurements of discharge were performed at all sites, and used to establish base ratings and to determine the required "shifts" ("S" in the equation above) over time for the monitoring year. Base rating curve equations are provided in **Table 1**.

Table 1. Rating Curves for Salts TMDL Compliance Sites for Monitoring Year July 2013-June 2014

Site	Rating Curve
03_UNIV	Level < 50 cm: $Q = 0.142*(Lvl - 29.5 + C)^{2.0}$
	Level > 50 cm: $Q = 0.188*(Lvl - 30.0 + C)^{2.1}$
04_WOOD	$Q = 0.0169*(Lvl + 4 + C)^{1.65}$
07_TIERRA	$Q = 0.0228*(Lvl - 21.5 + C)^{1.9}$
9A_HOWAR	$Q = 0.065*(Lvl - 14.0 + C)^{1.9}$
9B_BARON	$Q = 0.1*(Lvl - 10 + C)^{1.65}$

EC/SALT RELATIONSHIPS

Site-specific, linear relationships between specific conductivity (EC) and salt constituents were used to convert continuous EC sensor data to estimated salt concentrations. Surrogate relationships were derived from field data for EC and salts (grab samples for total dissolved solids (TDS), sulfate, chloride, or boron from quarterly dry plus wet events) using linear regression, in the following form:

[Ion] = A*EC + B, where,

[Ion] = concentration of TDS, sulfate, chloride, or boron (mg/L)

A = slope

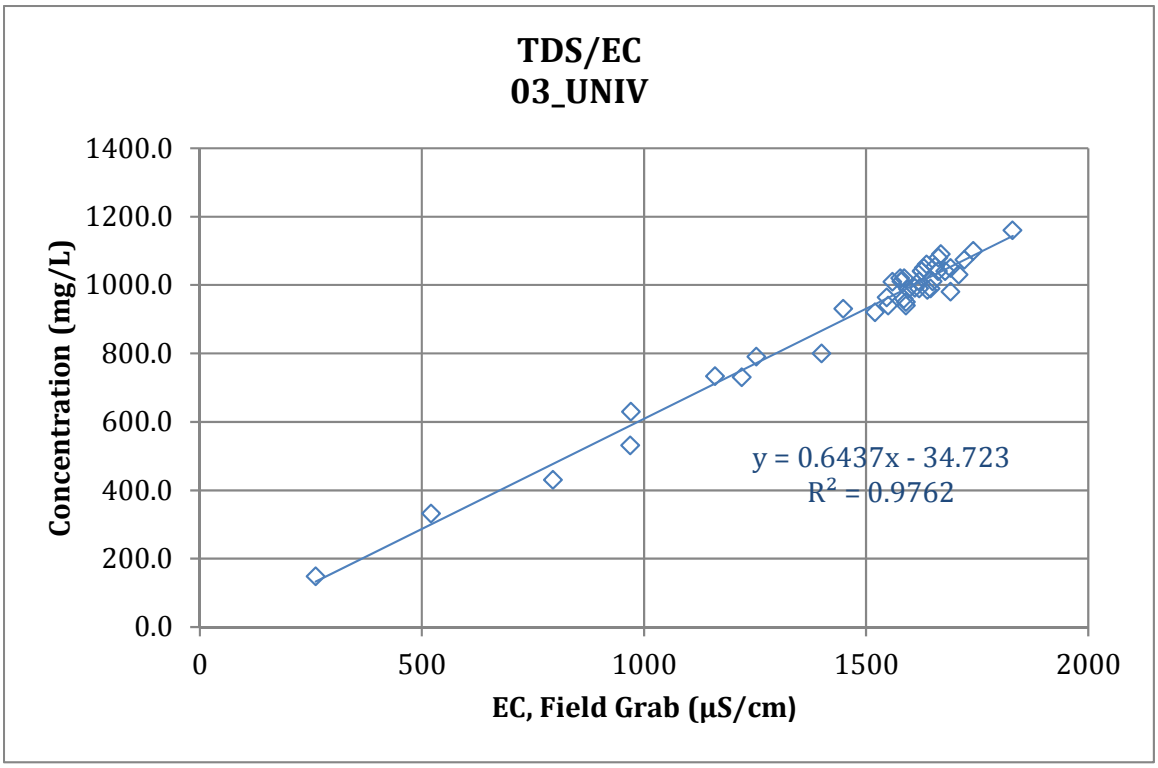
EC = specific conductivity (µS/cm)

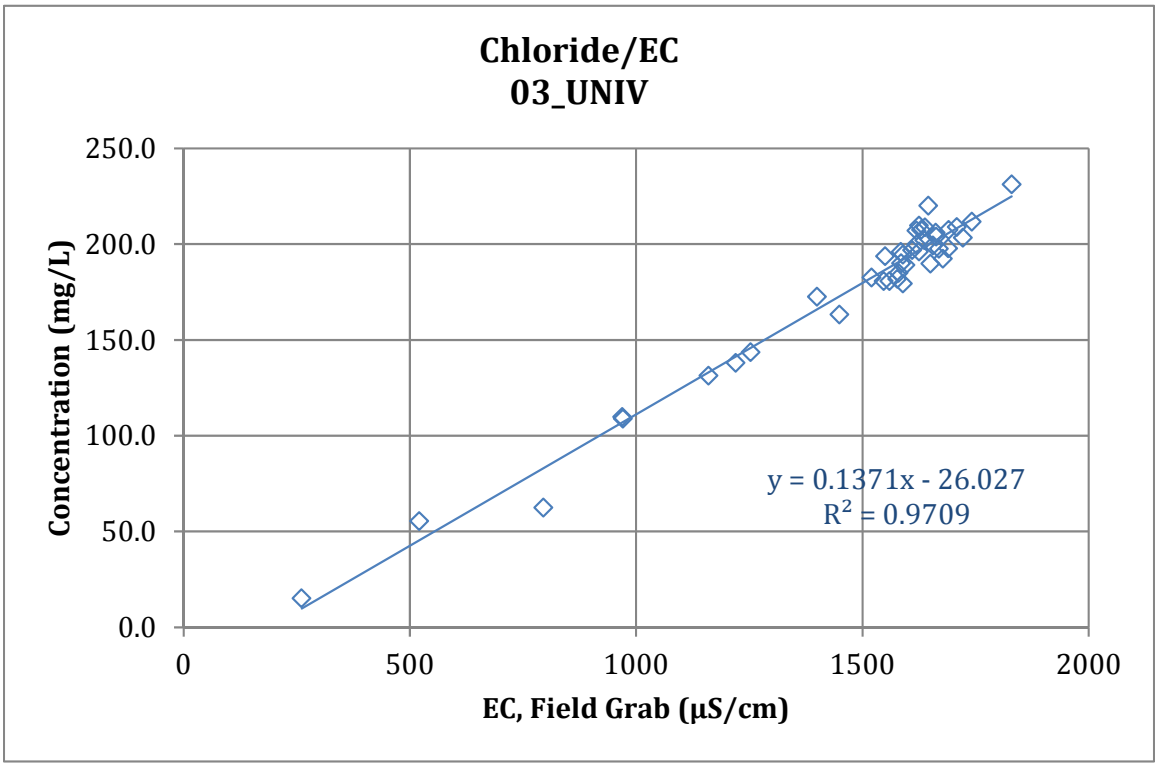
B = y intercept

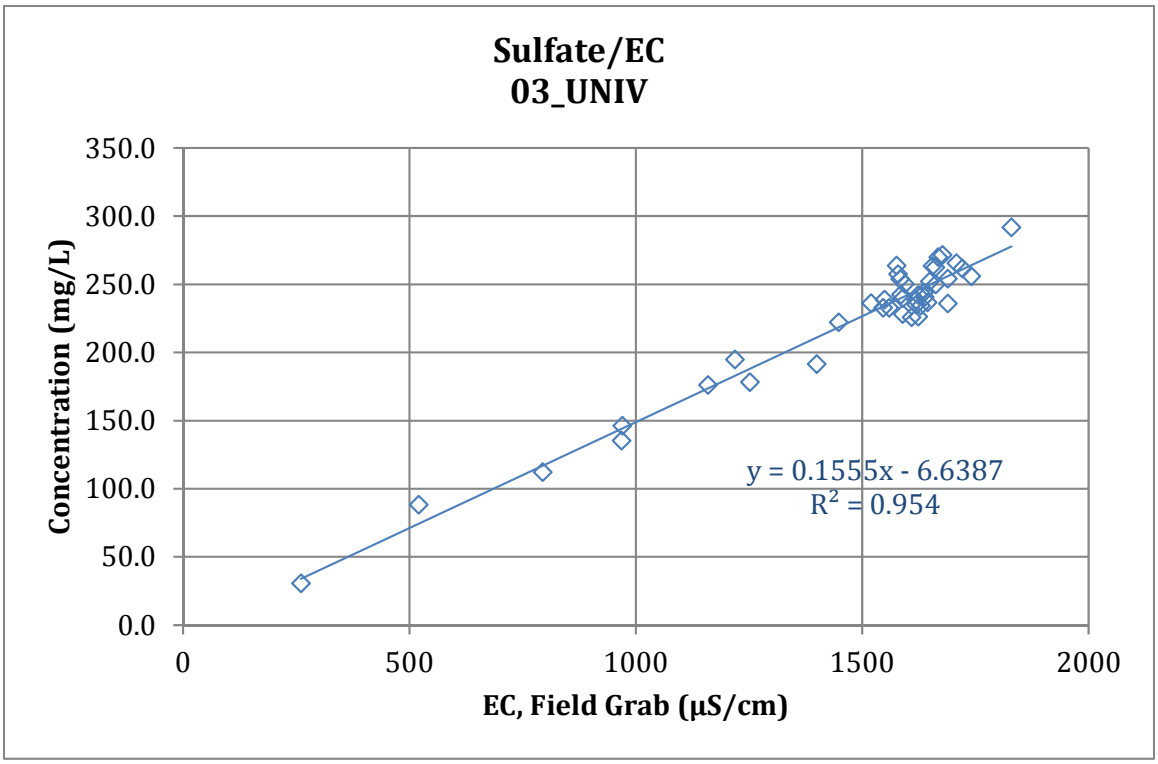
Evaluation of data from July 2012-June 2014 indicated that EC vs. salt relationships at most of the Salts TMDL compliance sites had not significantly changed from those obtained during a one-year pilot study in 2011. Consequently, most surrogate relationships used to convert EC sensor data for monitoring year July 2013-June 2014 to salt concentrations were derived from all available field data between January 2011 and June 2014. However, an analysis of covariance (ANCOVA) indicated that the surrogate relationships for EC-vs.-Chloride and EC-vs.-Sulfate at 9B_BARON had shifted. New surrogate relationships for these two cases were derived using data collected after July 2012, and used to convert EC sensor data for July 2013-June 2014. Parameters for the surrogate relationships are reported in **Table 2**. The surrogate relationships are illustrated in figures following **Table 2**.

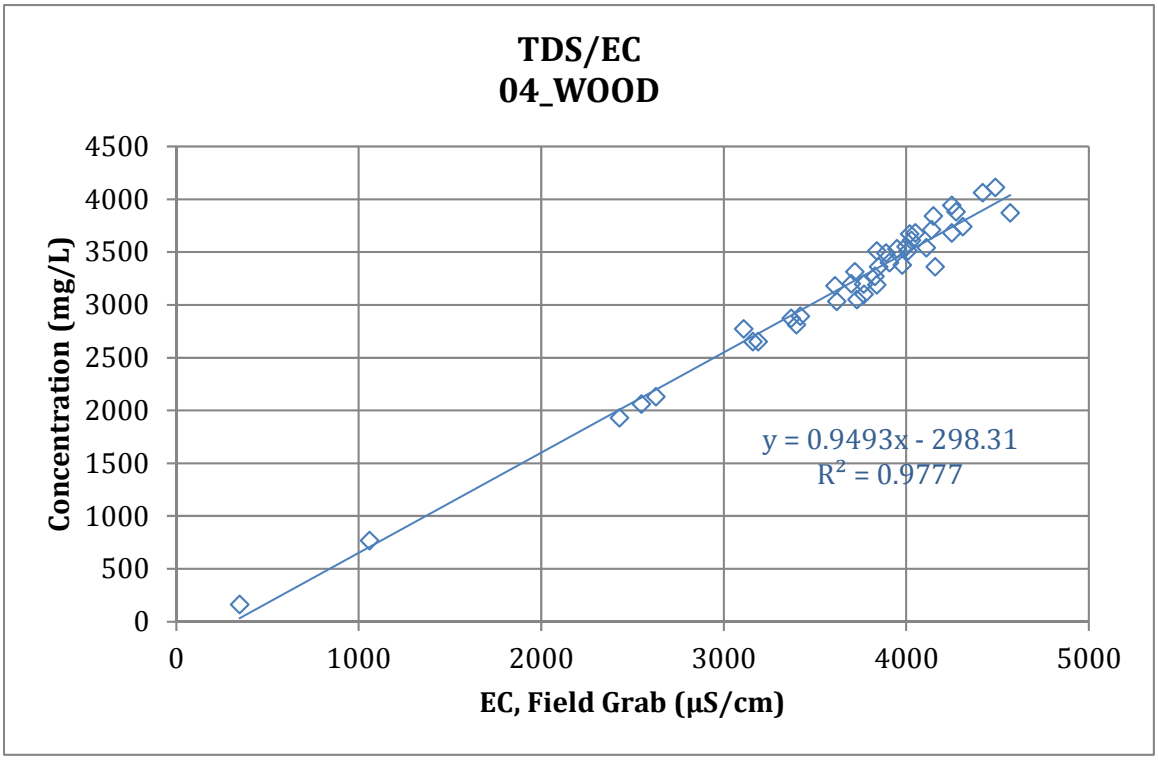
Table 2. Parameters for surrogate relationships used to derive salt concentrations from EC sensor data for monitoring year July 2013-June 2014. Date ranges are for the field data that were used to construct the relationship.

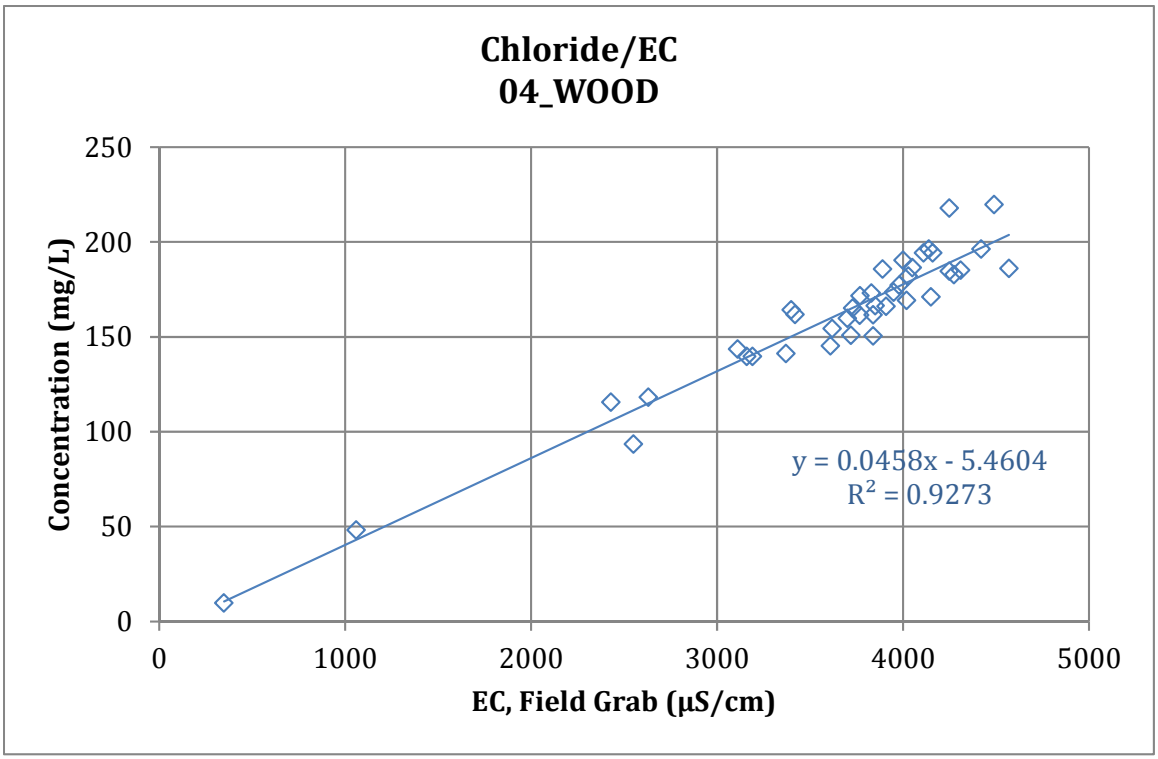
		TDS	Cl	SO4	B
03_UNIV	A	0.64372492	0.13714246	0.15545597	
	B	-34.7232	-26.0269	-6.6387	
	R2	0.9762	0.9709	0.9540	
	Count	42	42	42	
	Date Range	1/31/2011 – 5/29/2014			
04_WOOD	A	0.94933064	0.04578293	0.47514864	0.00046804
	B	-298.3071	-5.4604	-145.4058	-0.0718
	R2	0.9777	0.9273	0.9717	0.8005
	Count	42	41	41	42
	Date Range	1/31/2011 – 5/29/2014			
07_TIERRA	A	0.73313906	0.10622834	0.28464300	0.00044982
	B	-98.7443	-16.6708	-54.5589	-0.0604
	R2	0.9787	0.9663	0.9683	0.9115
	Count	31	31	31	31
	Date Range	1/31/2011 – 5/28/2014			
9A_HOWAR	A	0.62411152	0.13259620	0.15951796	
	B	-20.3903	-15.4805	-11.6112	
	R2	0.9849	0.9604	0.9396	
	Count	32	31	31	
	Date Range	1/31/2011 – 5/28/2014			
9B_BARON	A	0.62368123	0.15471268	0.12645454	
	B	-32.0803	-23.9806	-0.6176	
	R2	0.9694	0.9811	0.9207	
	Count	32	10	10	
	Date Range	1/31/2011-5/28/2014	8/29/2012 – 5/28/2014		

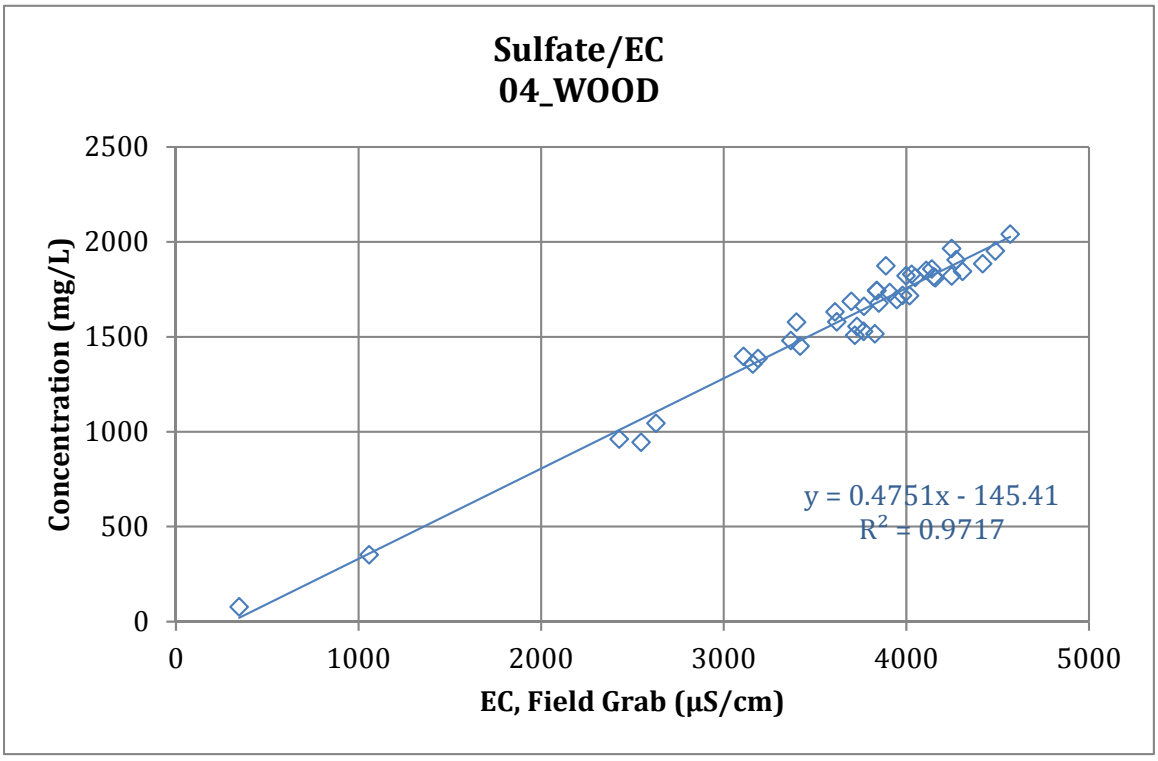

TDS/EC
03_UNIV
Concentration (mg/L)
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.6437x - 34.723
R² = 0.9762

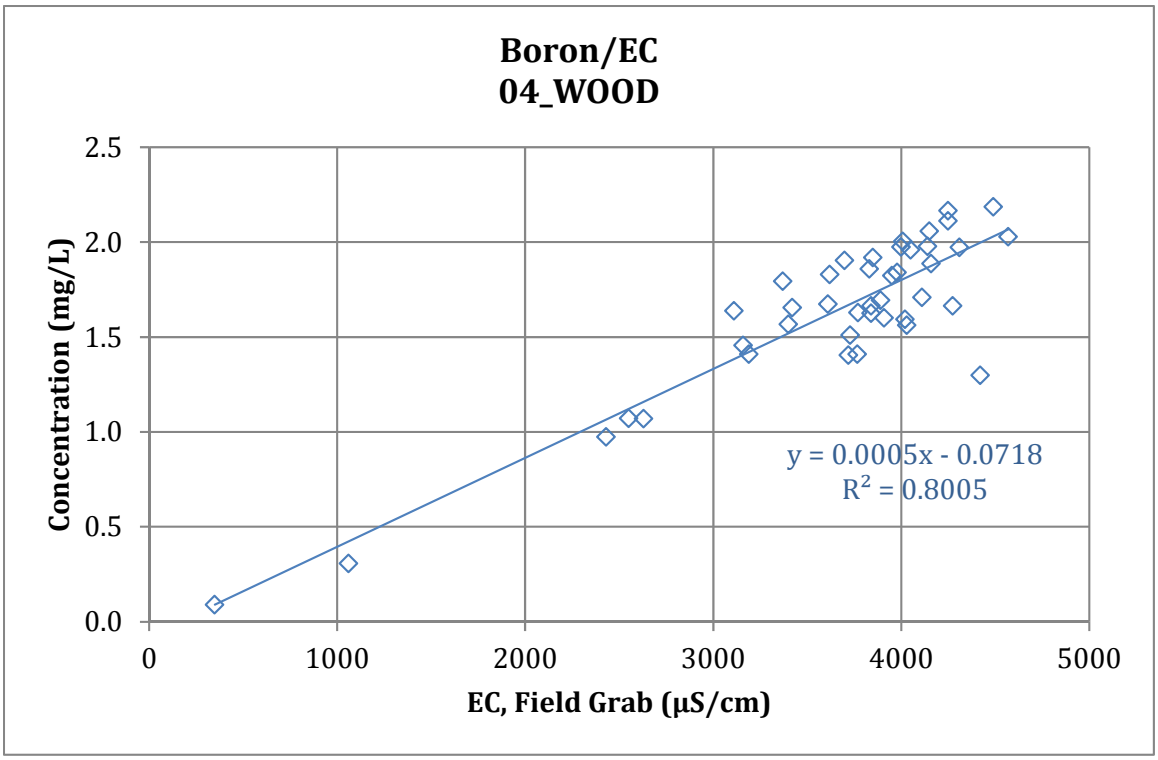

Chloride/EC
03_UNIV
Concentration (mg/L)
250.0
200.0
150.0
100.0
50.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.1371x - 26.027
R² = 0.9709

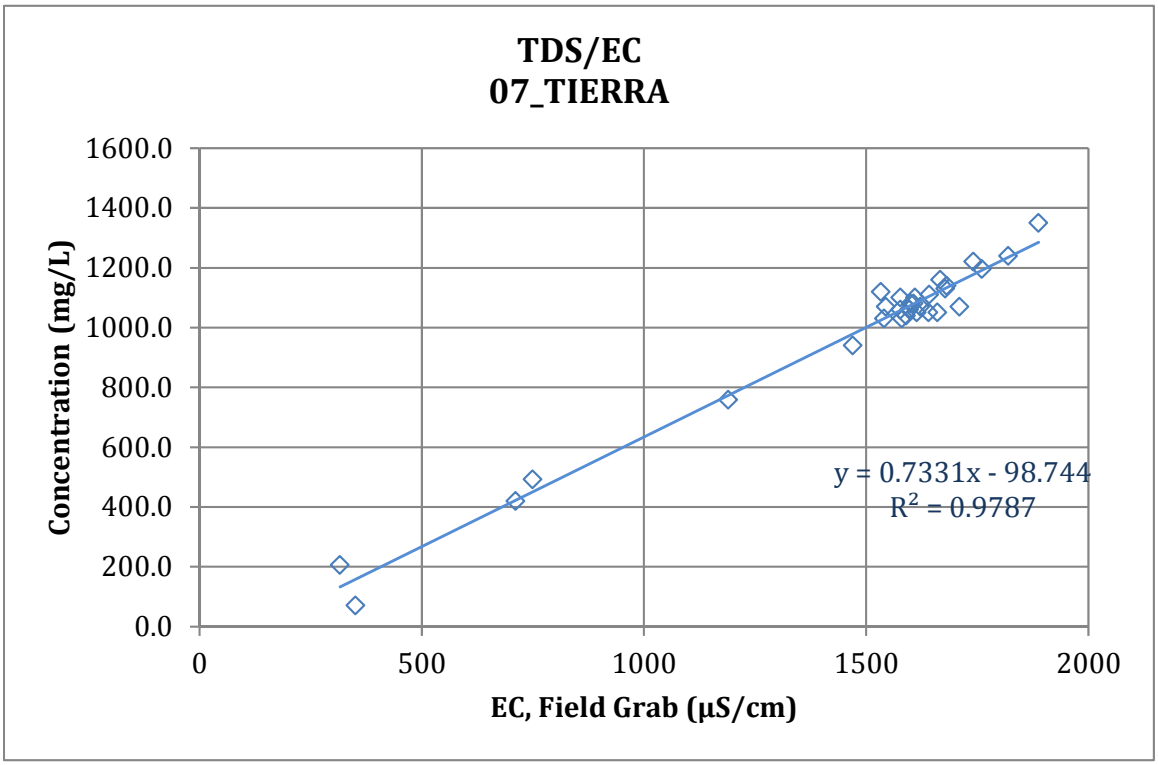

Sulfate/EC
03_UNIV
Concentration (mg/L)
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.1555x - 6.6387
R² = 0.954

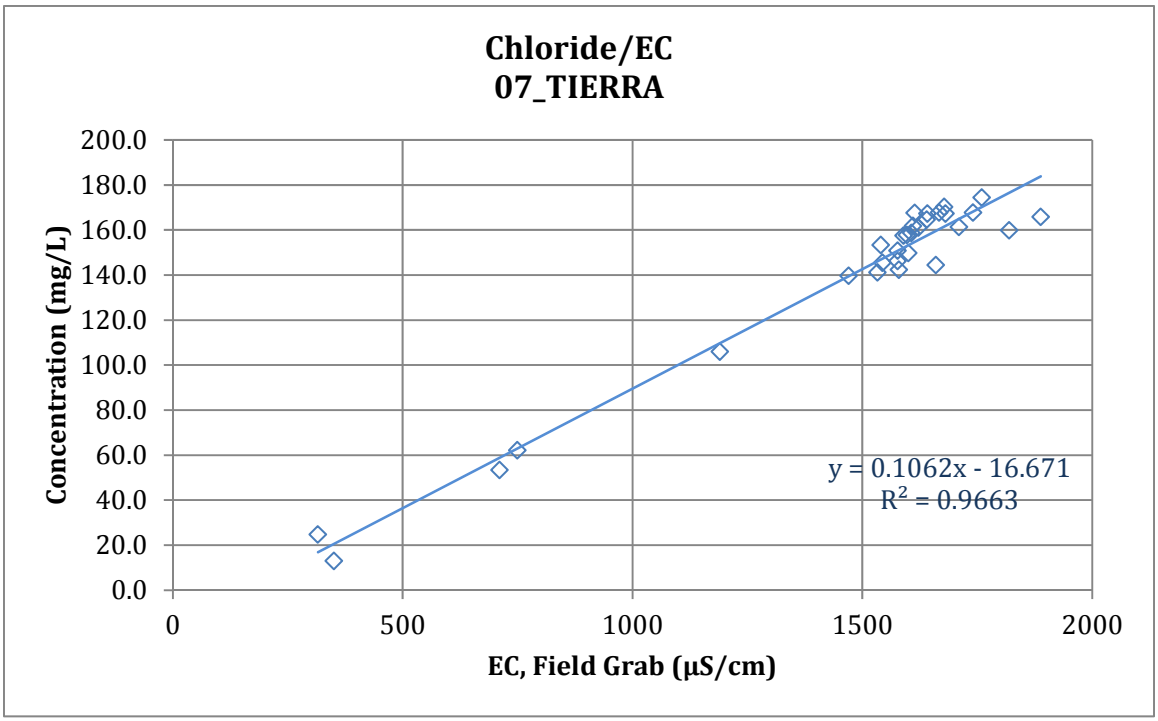

TDS/EC
04_WOOD
Concentration (mg/L)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0
1000
2000
3000
4000
5000
EC, Field Grab (µS/cm)
y = 0.9493x - 298.31
R² = 0.9777

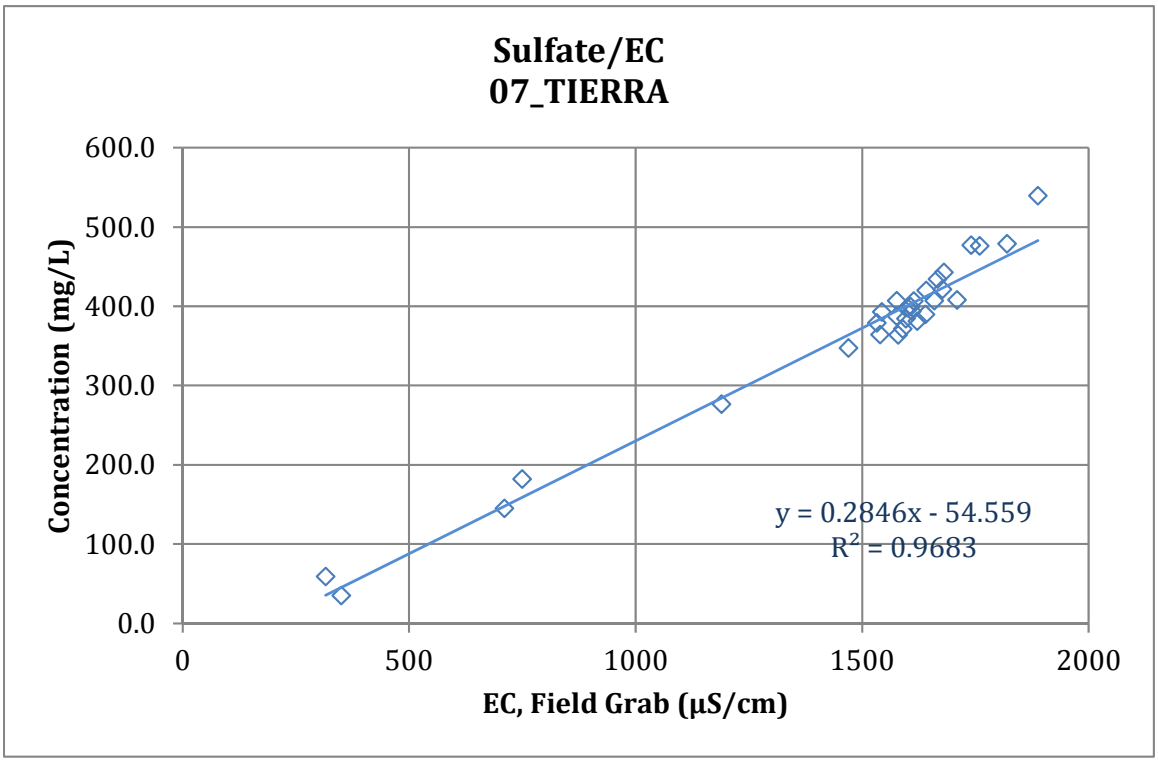

Chloride/EC
04_WOOD
Concentration (mg/L)
250
200
150
100
50
0
0
1000
2000
3000
4000
5000
EC, Field Grab (µS/cm)
y = 0.0458x - 5.4604
R² = 0.9273

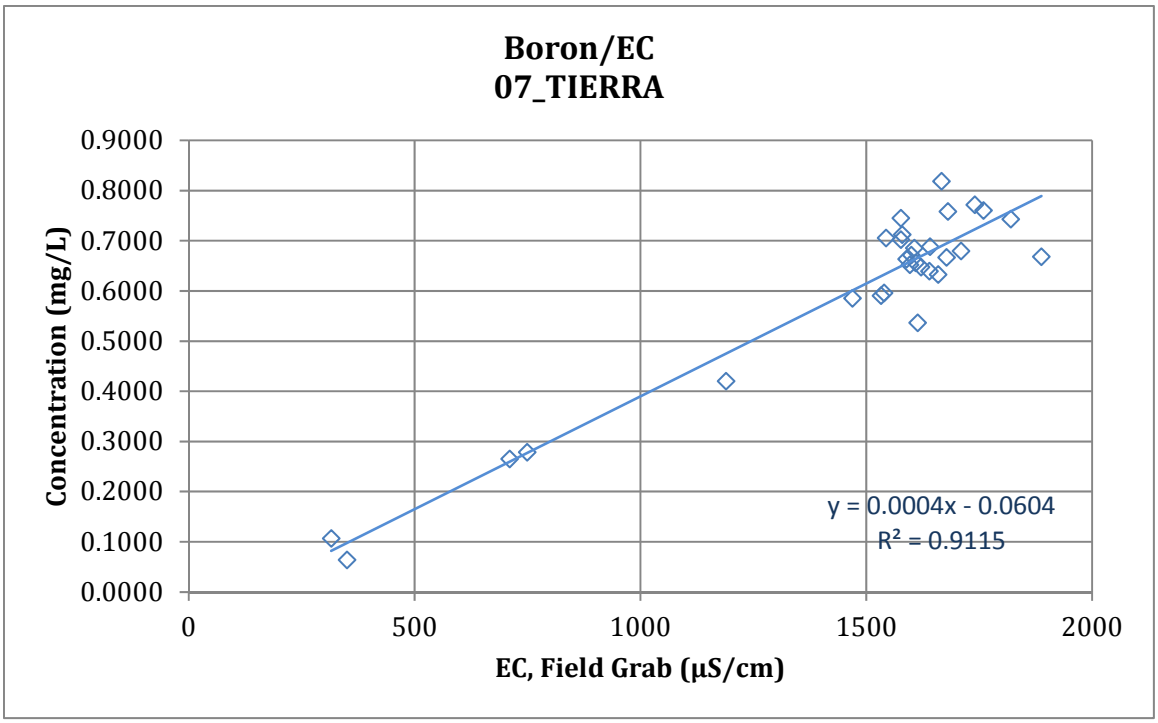

Sulfate/EC
04_WOOD
Concentration (mg/L)
2500
2000
1500
1000
500
0
0
1000
2000
3000
4000
5000
EC, Field Grab (µS/cm)
y = 0.4751x - 145.41
R² = 0.9717

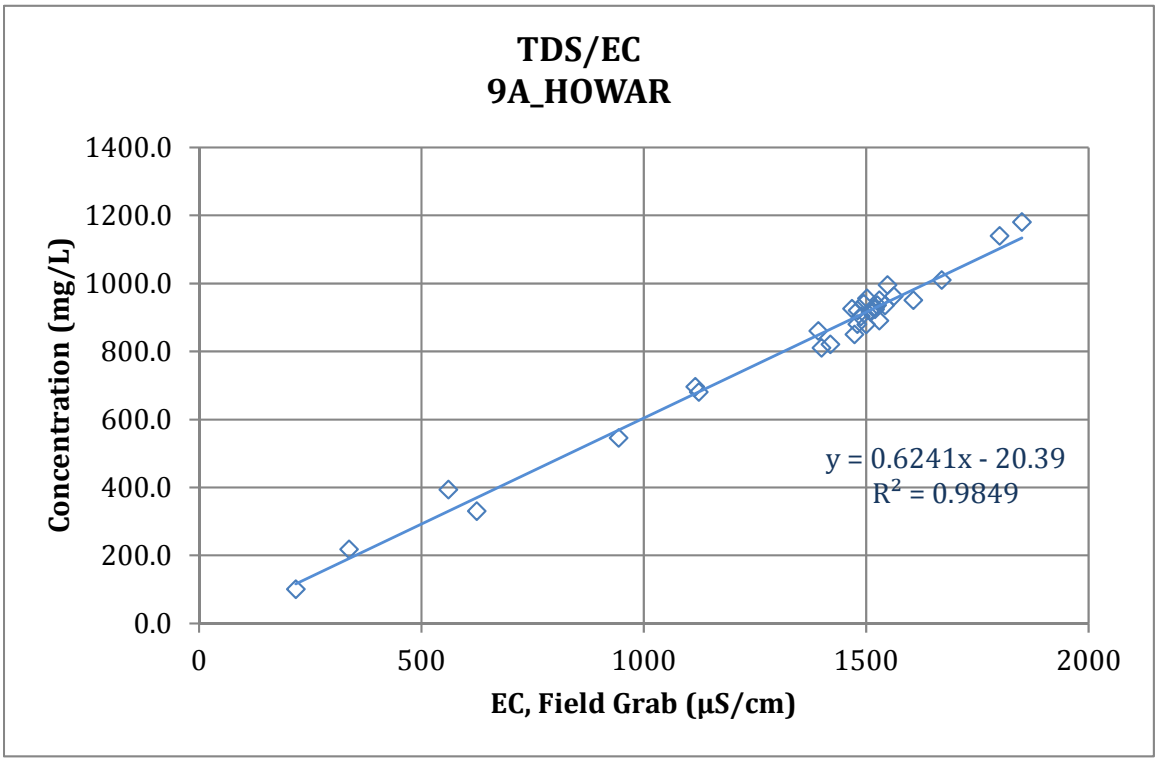

Boron/EC
04_WOOD
Concentration (mg/L)
2.5
2.0
1.5
1.0
0.5
0.0
0
1000
2000
3000
4000
5000
EC, Field Grab (µS/cm)
y = 0.0005x - 0.0718
R² = 0.8005

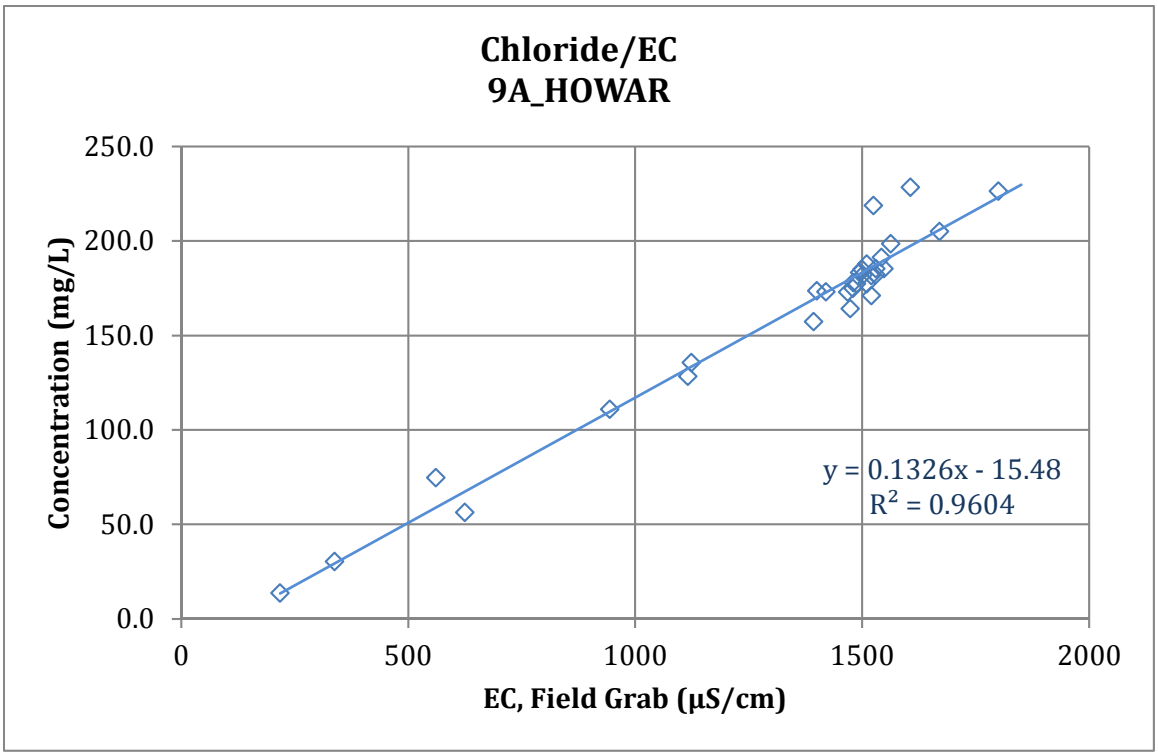

TDS/EC
07_TIERRA
Concentration (mg/L)
1600.0
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.7331x - 98.744
R² = 0.9787

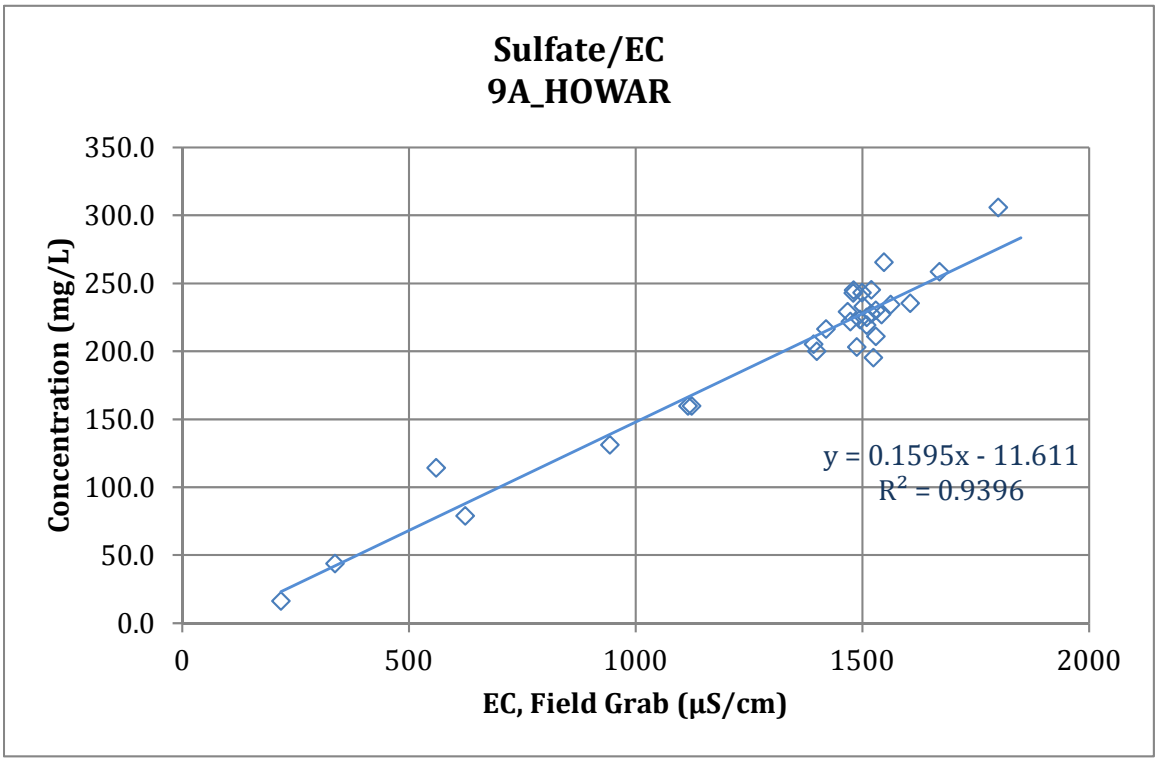

Chloride/EC
07_TIERRA
Concentration (mg/L)
200.0
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.1062x - 16.671
R² = 0.9663

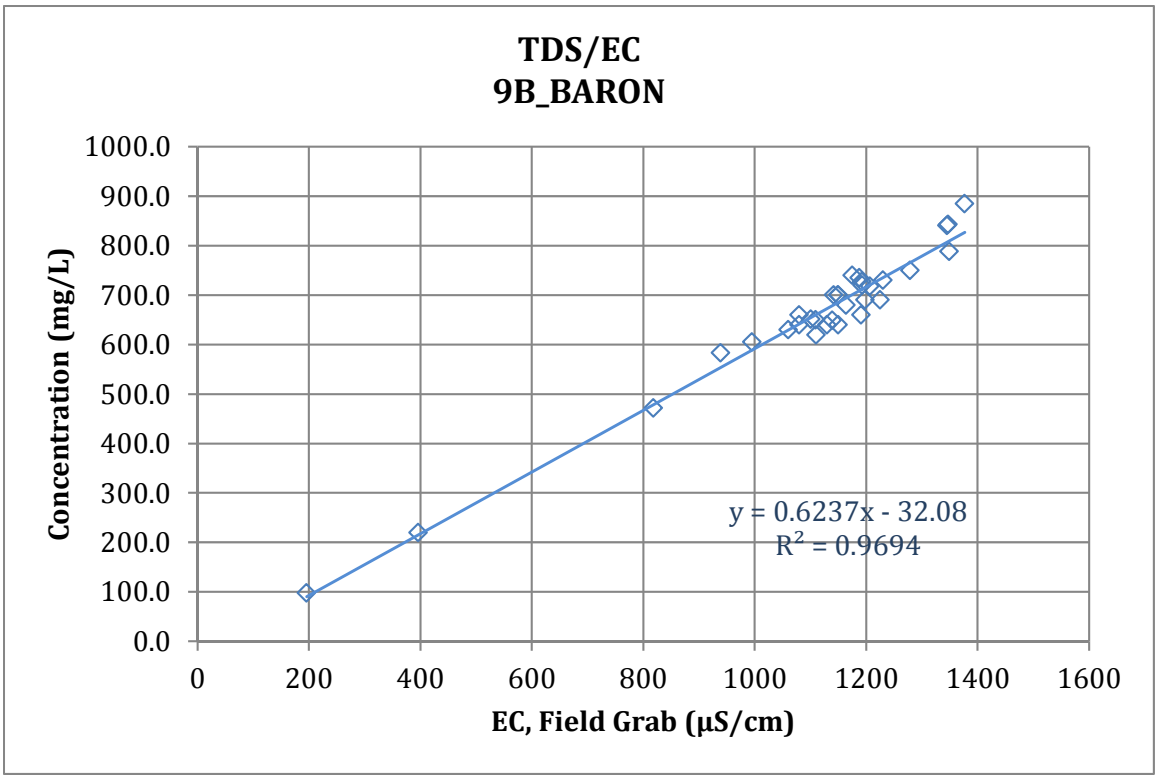

Sulfate/EC
07_TIERRA
Concentration (mg/L)
600.0
500.0
400.0
300.0
200.0
100.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.2846x - 54.559
R² = 0.9683

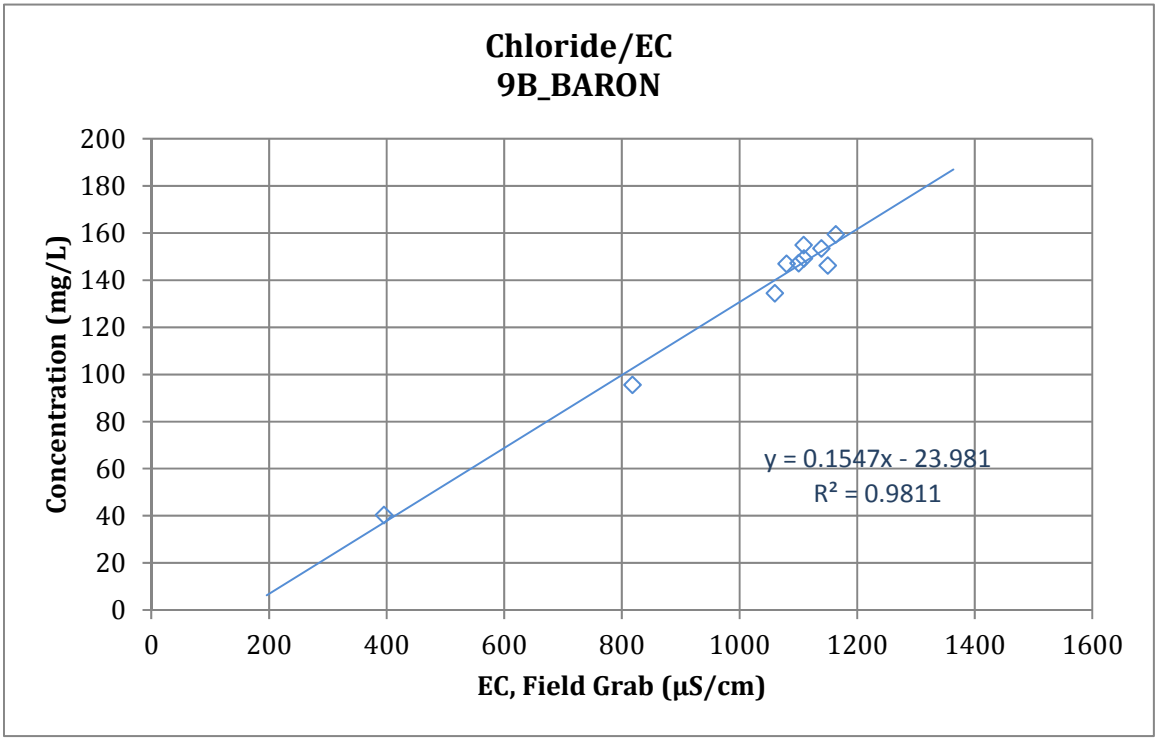

Boron/EC
07_TIERRA
Concentration (mg/L)
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.0004x - 0.0604
R² = 0.9115

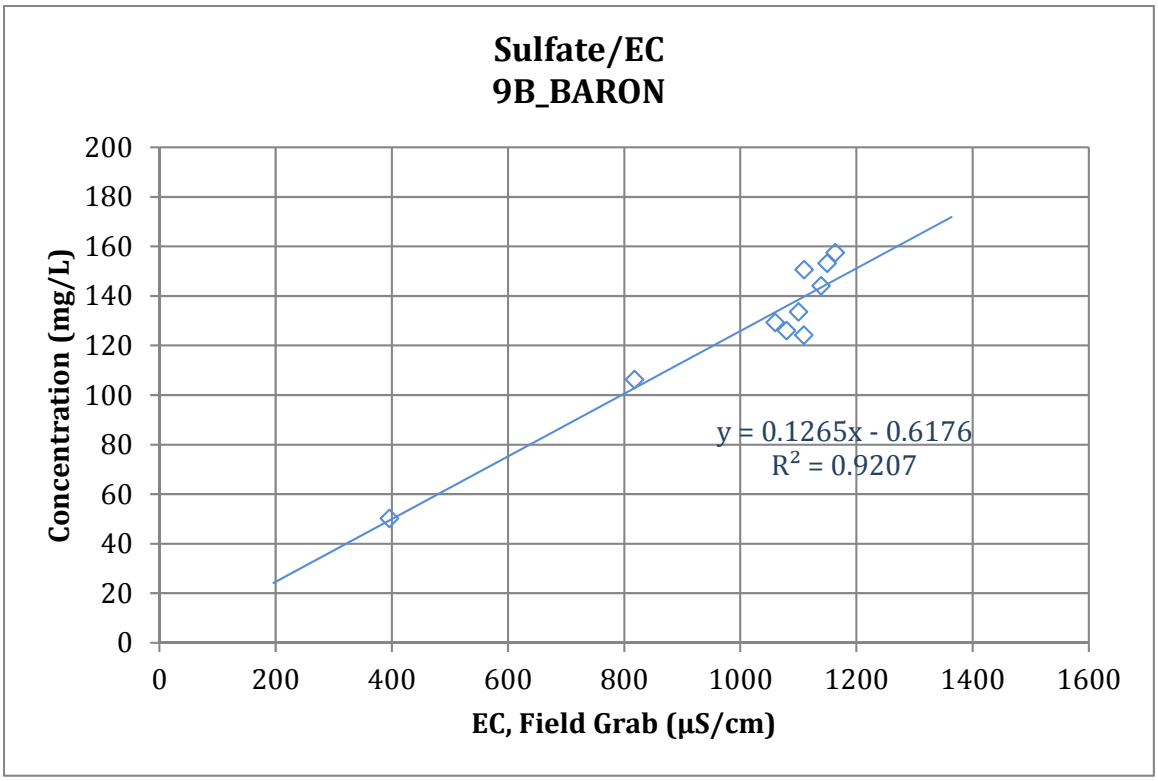

TDS/EC
9A_HOWAR
Concentration (mg/L)
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.6241x - 20.39
R² = 0.9849


Chloride/EC
9A_HOWAR
Concentration (mg/L)
250.0
200.0
150.0
100.0
50.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.1326x - 15.48
R² = 0.9604


Sulfate/EC
9A_HOWAR
Concentration (mg/L)
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
0
500
1000
1500
2000
EC, Field Grab (µS/cm)
y = 0.1595x - 11.611
R² = 0.9396


TDS/EC
9B_BARON
Concentration (mg/L)
1000.0
900.0
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
0
200
400
600
800
1000
1200
1400
1600
EC, Field Grab (µS/cm)
y = 0.6237x - 32.08
R² = 0.9694


Chloride/EC
9B_BARON
Concentration (mg/L)
200
180
160
140
120
100
80
60
40
20
0
0
200
400
600
800
1000
1200
1400
1600
EC, Field Grab (µS/cm)
y = 0.1547x - 23.981
R² = 0.9811


Sulfate/EC
9B_BARON
Concentration (mg/L)
EC, Field Grab (µS/cm)
y = 0.1265x - 0.6176
R² = 0.9207
0
20
40
60
80
100
120
140
160
180
200
0
200
400
600
800
1000
1200
1400
1600

Appendix D:
Toxicity Testing and Toxicity Identification Evaluations (TIE) Summary

TOXICITY TESTING PROCEDURES

For the Creek Watershed TMDL Compliance Monitoring Program (CCWTMP), toxicity testing at various locations is conducted to meet total maximum daily load (TMDL) requirements. The following is a brief summary of the procedures for the analytical methods used by the CCWTMP. Specific details concerning the standard operating procedures (SOPs) followed by field crews collecting applicable samples and laboratory analyses are found in the Quality Assurance Project Plan (QAPP).

For the CCWTMP toxicity measures, standard test species were utilized for toxicity testing. *Ceriodaphnia dubia* was used for fresh water aquatic toxicity testing and *Hyalella azteca* for the saline water aquatic toxicity testing and bulk sediment and porewater toxicity testing. *Hyalella azteca* was used to conduct aquatic toxicity testing if sample salinity exceeded 1.5 part per thousand (PPT) but was less than 15 PPT. All test species are standard United States Environmental Protection Agency (USEPA) test species and considered the most applicable for the various types of pollutants impacting the watershed, and all analytical testing procedures were conducted using standard USEPA methods.

The results of each toxicity test are used to trigger further investigations to determine the cause of observed laboratory toxicity if necessary per the QAPP. If testing indicates the presence of significant toxicity in the sample, toxicity identification evaluations (TIEs) procedures are initiated to investigate the cause of toxicity. For the purpose of triggering TIE procedures, significant toxicity is defined as at least 50% mortality. The 50% mortality threshold is consistent with the approach recommended in guidance published by USEPA for conducting TIEs (USEPA, 1996), which recommends a minimum threshold of 50% mortality because the probability of completing a successful TIE decreases rapidly for samples with less than this level of toxicity.[1] A component of the compliance requirement when significant toxicity is found is to initiate a targeted Phase 1 TIE and test to determine the general class of constituent (*i.e.*, non-polar organics) causing toxicity. The targeted TIE focuses on classes of constituents anticipated to be observed in drainages dominated by urban and agricultural discharges and those previously observed to cause toxicity. Phase 2 TIEs may also be utilized to identify specific constituents causing toxicity if warranted. TIE methods will generally adhere to USEPA procedures documented in conducting TIEs.[2,3,4,5] For samples exhibiting toxic effects consistent with

[1] United States Environmental Protection Agency (USEPA). 1996. Marine Toxicity Identification Evaluation. Phase I Guidance Document EPA/600/R-96/054. USEPA, Office of Research and Development, Washington, D.C.

[2] United States Environmental Protection Agency (USEPA). 1991. Methods for Aquatic Toxicity Identification Evaluations: Phase 1 Toxicity Characterization Procedures (Second Edition). EPA-600/6-91/003. USEPA, Environmental Research Laboratory, Duluth, MN.

[3] United States Environmental Protection Agency (USEPA). 1992. Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents Phase 1. EPA/600/6-91/005. USEPA, Office of Research and Development, Washington, D.C.

carbofuran, diazinon, or chlorpyrifos, TIE procedures follow those documented in Bailey *et al*.[6] To address toxicity of unknown causes in sediment (> 50% mortality), sediment porewater was extracted and a Phase 1 TIE was performed. In addition, a Phase 1 TIE was performed on bulk sediment.

The decision to initiate TIE procedures on any sample, including samples exceeding the mortality threshold, as well as the focus and scope of TIE procedures, was determined by the Project Manager and toxicity laboratory staff. When deciding whether to initiate TIE procedures for a specific site and monitoring event, a number of factors were considered, including the level of toxicity, the magnitude of sample mortality and/or reburial levels as compared to lab control results, history of toxicity at the site, the species and endpoints exhibiting toxic effects, as well as the primary technical basis for triggering TIEs described above. A summary of the toxicity results and subsequent TIE actions, including the rationale for initiating TIE procedures for a specific sample are described below.

TOXICITY RESULTS SUMMARY

Freshwater sediment toxicity samples are collected annually during the first event of each monitoring year. Water column toxicity samples are collected at freshwater sites during each of the quarterly and wet weather events. Monitored sites include the following:

- **Sediment Toxicity (Freshwater Sites)**
  - 04_WOOD
  - 03_UNIV
- **Freshwater Water Column Toxicity**
  - 04_WOOD
  - 03_UNIV
  - 9B_ADOLF
  - 06_SOMIS
  - 07_HITCH
  - 10_GATE
  - 13_BELT

[4] United States Environmental Protection Agency (USEPA). 1993a. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fourth Edition. EPA/600/4-90/027F. USEPA, Office of Research and Development, Washington, D.C.

[5] United States Environmental Protection Agency (USEPA). 1993b. Methods for Aquatic Toxicity Identification Evaluations: Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity. EPA/600/R-02/080. USEPA, Office of Research and Development, Washington, D.C.

[6] Bailey, H.C., DiGiorgio, C., Kroll, K., Miller, J.L., Hinton, D.E., Starrett, G. 1996. Development of Procedures for Identifying Pesticide Toxicity in Ambient Waters: Carbofuran, Diazinon, Chlorpyrifos. Environ. Tox. and Chem. V15, No. 6, 837-845.

Toxicity samples for sediment were collected at the freshwater sites during dry weather Event 39. Water column toxicity testing was conducted during all four dry weather events (Events 39, 40, 41, and 43), and the one wet weather event (Event 42). The following section describes the toxicity samples collected at each site for each event, the results of the tests, and a summary of applicable TIEs initiated per the requirements in the QAPP.

Event 39 Sediment Toxicity

Table 1. Freshwater Sediment Toxicity Event 39 - *Hyalella azteca*

Site ID	Toxicity Results		
	Observed Significant Mortality	TIE Initiated	Observed Significant Reduced Growth
04_WOOD	**YES**	NO [1]	**YES**
03_UNIV	**YES**	**YES** [2]	**YES**

1. Although the reduction in the survival response at this treatment was statistically significant, there was <50% reduction relative to the Control and no follow-up testing was performed.
2. There was >50% reduction in *H. azteca* survival; as a result, a TIE targeted for organics was performed.

Event 39 Water Column Toxicity

Table 2. Freshwater Water Column Toxicity Event 39 - *Ceriodaphnia dubia and Hyalella azteca*

Site ID	Toxicity Results			
	Ceriodaphnia dubia			*Hyalella azteca*
	Observed Significant Mortality	TIE Initiated	Observed Significant Reduced Reproduction	Observed Significant Mortality
03_UNIV	NO	NO	**YES**	
9B_ADOLF	NO	NO	NO	
10_GATE	NO	NO	NO	
13_BELT	NO	NO	NO	
06_SOMIS	NO	NO	**YES**	
07_HITCH	NO	NO	**YES**	
04_WOOD				**YES**

Event 39 Toxicity and TIE Summary

Freshwater sites exhibited significant mortality in all sediment samples, but toxicity at the 04_WOOD site was not sufficient (mean % survival <50%) for a TIE to be performed. As such, TIEs for sediment porewater and bulk sediment were performed only at the 03_UNIV site. The results of the sediment porewater TIE suggest there are multiple compounds (organics and/or ammonia) contributing to sediment porewater toxicity. The results of the bulk sediment TIE suggest there are multiple compounds contributing to bulk sediment toxicity including non-polar organics and to a lesser extent, metals. However, the bulk sediment TIE results suggest that ammonia is not a cause of bulk sediment toxicity. This may also suggest that ammonia is not a cause of sediment porewater toxicity as the pH of porewater increases as it is removed from the sediment, which increases toxicity (i.e., the increase in pH accounts for the toxicity rather than the ammonia concentration).

Freshwater water column did not exhibit significant reductions to mortality or reproduction at any of the monitoring locations during this event.

Event 40 Water Quality Toxicity

Table 3. Water Quality Toxicity Event 40 - *Ceriodaphnia dubia* and *Hyalella azteca*

Site ID	Toxicity Results			
	Ceriodaphnia dubia			*Hyalella azteca*
	Observed Significant Mortality	TIE Initiated	Observed Significant Reduced Reproduction	Observed Significant Mortality
03_UNIV	NO	NO	NO	
9B_ADOLF	NO	NO	YES	
13_BELT	NO	NO	YES	
06_SOMIS	NO	NO	YES	
07_HITCH	NO	NO	YES	
04_WOOD				NO

Event 40 Toxicity and TIE Summary

- No significant reductions in survival were observed for either test organism at the six sample sites during the sampling event.
- Significant reductions in reproduction were observed for *Ceriodaphnia dubia* at four of the five sites tested for this organism.
- No TIEs were performed on samples collected for this sampling event.

Event 41 Water Quality Toxicity

Samples were collected at sites: 9B_ADOLF, 03_UNIV, 10_GATE, 06_SOMIS, and 07_HITCH, in addition to 04_WOOD. Successful toxicity testing on event 41 samples was only completed for 04_WOOD. Low conductivity sites testing could not be completed due to a decline in the *C. dubia* laboratory culture.

Table 4. Water Quality Toxicity Event 41 - *Ceriodaphnia dubia and Hyalella azteca*

Site ID	Toxicity Results			
	Ceriodaphnia dubia		*Hyalella azteca*	
	Observed Significant Mortality	Observed Significant Reduced Reproduction	Observed Significant Mortality	TIE
04_WOOD			NO	NO

Event 41 Toxicity and TIE Summary

- Significant mortality was not observed for *Hyalella azteca* at 04_WOOD.
- TIEs were not performed on any samples collected during this sampling event.

Event 42 Water Quality Toxicity

Table 5. Water Quality Toxicity Event 42 - *Ceriodaphnia dubia*

Site ID	Toxicity Results		
	Ceriodaphnia dubia		
	Observed Significant Mortality	Observed Significant Reduced Reproduction	TIE Initiated
03_UNIV	NO	NO	NO
9B_ADOLF	NO	NO	NO
13_BELT	NO	NO	NO
06_SOMIS	NO	**YES**	NO
07_HITCH	NO	NO	NO
04_WOOD	NO	**YES**	NO
10_GATE	NO	**YES**	NO

Event 42 Toxicity and TIE Summary

- No significant reductions in survival were observed for *Ceriodaphnia dubia* tests.
- Significant reduced reproduction was observed for the 06_SOMIS, 04_WOOD, and 10_GATE sites.
- A TIE was not performed on any samples collected during the sampling event.

Event 43 Water Quality Toxicity

Table 6. Water Quality Toxicity Event 43 - *Ceriodaphnia dubia* and *Hyalella azteca*

Site ID	Toxicity Results			
	Ceriodaphnia dubia			*Hyalella azteca*
	Observed Significant Mortality	Observed Significant Reduced Reproduction	TIE Initiated	Observed Significant Mortality
03_UNIV	NO	NO	NO	
9B_ADOLF	NO	NO	NO	
10_GATE	NO	NO	NO	
13_BELT	NO	NO	NO	
07_HITCH	NO	NO	NO	
04_WOOD				NO

Event 43 Toxicity and TIE Summary

- No significant reductions in survival or reproduction were observed for *Ceriodaphnia dubia* or *Hyalella azteca* for all sites.

Appendix E:
Laboratory QA/QC Results and Discussion

QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance and quality control (QA/QC) measures are built into the CCWTMP to assure that collected data are credible. Two types of quality controls were conducted. Field quality controls (to test for field contamination and precision) were conducted by the field crews and include: equipment blanks, field blanks, and field duplicates and laboratory quality controls (to test for laboratory contamination and precision) were conducted by the labs and include: method blanks, blank spikes, blank spike duplicates, lab duplicates, matrix spikes, matrix spike duplicates, laboratory control samples, and surrogates (organics only). Equipment blanks only apply to the shovels used in sediment sample collection. All field protocols for the collection of clean samples were followed according to the QAPP. The following section lists the quality control failures that occurred during the 2013-2014 monitoring year and any associated qualifiers and comments.

Blank Contamination

During the sixth year of monitoring, a majority of the blank failures were in the metals field blanks. There were very few blank detections for other constituents. There were no equipment blank hits and the lab blank hits were mostly for metals as well. Details of all the blank hits are reported in Table 1 below. The following lists a basic summary of the blank contamination results:

- Field Blanks – 1566 analyzed – 55 detections above the RL (3.51%) (does not include surrogates)
- Equipment Blanks – 121 analyzed – 0 detections above RL (0.0%) (does not include lab duplicates or surrogates)
- Laboratory Blanks – 4858 analyzed – 17 detections above RL (0.35%) (does not include surrogates)

Precision

The purpose of analyzing 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. QA failures for precision are noted when the RPD between a sample and its duplicate are greater than the acceptance value. Details of all the RPD failures are reported in Table 2 below. The following list summarizes the precision analysis results:

- Field Duplicates – 2470 analyzed – 83 failed RPD (3.36%) (does not include surrogates)
- Laboratory Duplicates – 1253 analyzed – 44 failed RPD (3.51%) (includes surrogates)
- Blank Spike/LCS Duplicates – 4177 analyzed – 27 failed RPD (0.65%) (includes surrogates)
- Matrix Spike Duplicates – 742 analyzed – 17 failed RPD (2.29%) (includes surrogates)

Accuracy

Percent recoveries of blank spike samples (BS), laboratory control spike samples (LCS), and matrix spike samples (MS) check the accuracy of lab reported sample concentrations. For the BS and LCS, a majority of the percent recoveries that fell outside the acceptable range were for pesticides constituents, with more than half occurring in the August event from both sediment and water samples. For the rest of the failed BS, they were scattered across the entire monitoring year. For the matrix spike samples that fell outside the acceptable range, half of them were from the first event of the year in sediment, tissue, and water samples. About a quarter of the samples that fell outside the acceptable range were metals samples, two thirds were from pesticides, and the rest were from the nutrients category. Table 3 summarizes the QA/QC sample results for accuracy that did not meet percent recovery objectives. The following lists the results of the accuracy analysis results:

- Blank Spike/LCS Samples – 8231 Analyzed – 43 fell outside the range (0.52%) (does not include surrogates)
- Matrix Spike Samples – 1470 Analyzed – 99 fell outside the range (6.73%) (does not include surrogates)

Table 1. Blank Contamination Observed

Constituent	Matrix	Event	Lab Batch	Equip Blank	Field Blank	Lab Blank	Program Qualifier	Comments
General Water Quality								
Dissolved Organic Carbon (mg/L)	Water	39	_3082616_W_DOC		0.42			
Total Hardness (calc) (mg/L)	Water	40	Physis E-7036 W		0.2			
Nutrients								
Ammonia as N (mg/L)	Water	40	Physis C-14132 W		0.02		FD RPD	FieldDup RPD failed
OC Pesticieds								
None								
PCBs								
None								
OP Pesticides								
None								
Pyrethroid Pesticides								
Sumithrin (ng/l)	Water	40	W3K0500			4.53		
Metals & Selenium								
Total Chromium (µg/L)	Water	39	Physis E-5134 W		0.01			
Total Chromium (µg/L)	Water	39	Physis E-5137 W		0.0331			
Total Chromium (µg/L)	Water	40	Physis E-7041 W		0.0472		U	Upper Limit due to analyte found in blank
Total Chromium (µg/L)	Water	41	Physis E-7054 W		0.0398			
Total Chromium (µg/L)	Water	43	Physis E-7101 W		0.03		FD RPD	FieldDup RPD failed
Dissolved Copper (µg/L)	Water	40	Physis E-7036 W		0.059			
Dissolved Copper (µg/L)	Water	40	Physis E-7041 W		0.018		FD RPD	FieldDup RPD failed
Dissolved Copper (µg/L)	Water	41	W4B0593			0.278		
Dissolved Copper (µg/L)	Water	42	Physis E-7067 W		0.653		U	Upper Limit due to analyte found in blank
Dissolved Copper (ug/l)	Water	40	W3K0917			0.115		

Constituent	Matrix	Event	Lab Batch	Equip Blank	Field Blank	Lab Blank	Program Qualifier	Comments
Total Copper (µg/L)	Water	39	Physis E-5134 W		0.051			
Total Copper (µg/L)	Water	40	Physis E-7036 W		0.094			
Total Copper (µg/L)	Water	40	Physis E-7041 W		0.011		U	Upper Limit due to analyte found in blank
Total Copper (µg/L)	Water	41	Physis E-7054 W		0.022			
Total Copper (µg/L)	Water	42	Physis E-7067 W		0.075			
Total Iron (µg/L)	Water	41	Physis E-7054 W		0.7			
Total Iron (µg/L)	Water	43	Physis E-7101 W		1.32		FD RPD	FieldDup RPD failed
Total Iron (µg/L)	Water	43	Physis E-7102 W		0.5			
Dissolved Lead (µg/L)	Water	42	Physis E-7067 W		0.006		LD RPD	LabDup RPD failed
Total Lead (µg/L)	Water	39	Physis E-5137 W		0.0078			
Total Lead (µg/L)	Water	42	Physis E-7067 W		0.071			
Dissolved Manganese (µg/L)	Water	39	Physis E-5134 W		0.096			
Dissolved Manganese (µg/L)	Water	41	Physis E-7061 W		0.012			
Total Manganese (µg/L)	Water	39	Physis E-5134 W		0.01			
Total Manganese (µg/L)	Water	39	Physis E-5137 W		0.04			
Total Manganese (µg/L)	Water	41	Physis E-7054 W		0.02			
Total Manganese (µg/L)	Water	41	Physis E-7061 W		0.033			
Total Manganese (µg/L)	Water	42	Physis E-7067 W		0.03			
Total Manganese (µg/L)	Water	43	Physis E-7102 W		0.02			
Dissolved Mercury (µg/L)	Water	41	W4B0290			0.005		
Dissolved Mercury (µg/L)	Water	42	Physis E-6064 W		0.0008	0.001	U, U	Upper Limit due to analyte found in lab and field blank
Dissolved Mercury (µg/L)	Water	43	W4E0632			0.013		
Total Mercury (µg/L)	Water	42	Physis E-6064 W		0.0008	0.0009	U, U	Upper Limit due to analyte found in lab and field blank
Dissolved Molybdenum (µg/L)	Water	39	Physis E-5134 W		0.19			
Dissolved Molybdenum (µg/L)	Water	39	Physis E-5137 W		0.015			
Dissolved Molybdenum (µg/L)	Water	40	Physis E-7036 W		0.09			

Constituent	Matrix	Event	Lab Batch	Equip Blank	Field Blank	Lab Blank	Program Qualifier	Comments
Dissolved Molybdenum (µg/L)	Water	41	Physis E-7061 W		0.04			
Dissolved Molybdenum (µg/L)	Water	43	Physis E-7101 W		0.1			
Dissolved Molybdenum (µg/L)	Water	43	Physis E-7102 W		0.019			
Total Molybdenum (µg/L)	Water	39	Physis E-5134 W		0.12			
Total Molybdenum (µg/L)	Water	39	Physis E-5137 W		0.012			
Total Molybdenum (µg/L)	Water	40	Physis E-7036 W		0.05			
Total Molybdenum (µg/L)	Water	41	Physis E-7061 W		0.04			
Total Molybdenum (µg/L)	Water	43	Physis E-7101 W		0.09			
Total Molybdenum (µg/L)	Water	43	Physis E-7102 W		0.012			
Dissolved Nickel (µg/L)	Water	39	Physis E-5137 W		0.006			
Dissolved Nickel (µg/L)	Water	40	Physis E-7041 W		0.0034			
Dissolved Nickel (µg/L)	Water	41	Physis E-7054 W		0.0081			
Dissolved Nickel (µg/L)	Water	41	W4B0593			0.166		
Dissolved Nickel (µg/L)	Water	43	Physis E-7101 W		0.01			
Total Nickel (µg/L)	Water	39	Physis E-5137 W		0.0057			
Total Nickel (µg/L)	Water	40	Physis E-7041 W		0.0038		U	Upper Limit due to analyte found in blank
Total Nickel (µg/L)	Water	41	Physis E-7054 W		0.0037			
Total Nickel (µg/L)	Water	42	Physis E-7067 W		0.03			
Total Nickel (µg/L)	Water	43	Physis E-7101 W		0.03			
Dissolved Silver (µg/L)	Water	43	Physis E-7101 W		0.02		MS <LL, EST MS/MSD, U	MS failed lower limit, Estimate due to MS/MSD RPD failure, Upper Limit due to analyte found in blank
Total Silver (µg/L)	Water	39	Physis E-5137 W		0.02			
Total Silver (µg/L)	Water	40	Physis E-7041 W		0.03		U	Upper Limit due to analyte found in blank
Total Silver (µg/L)	Water	43	Physis E-7101 W		0.04			
Total Silver (µg/L)	Water	43	Physis E-7102 W		0.03			
Dissolved Strontium (µg/L)	Water	39	Physis E-5134 W		0.15			

Constituent	Matrix	Event	Lab Batch	Equip Blank	Field Blank	Lab Blank	Program Qualifier	Comments
Total Strontium (µg/L)	Water	39	Physis E-5134 W		0.11			
Total Strontium (µg/L)	Water	43	Physis E-7101 W		0.24			
Total Tin (µg/L)	Water	41	Physis E-7054 W		0.01			
Dissolved Zinc (µg/L)	Water	39	Physis E-5134 W		1.1			
Dissolved Zinc (µg/L)	Water	40	Physis E-7036 W		0.44			
Dissolved Zinc (µg/L)	Water	41	Physis E-7054 W		0.0808			
Dissolved Zinc (µg/L)	Water	41	Physis E-7061 W		1.33			
Dissolved Zinc (µg/L)	Water	41	W4B0593			2.47		
Dissolved Zinc (µg/L)	Water	42	Physis E-7067 W		0.32			
Dissolved Zinc (µg/L)	Water	43	Physis E-7101 W		3.54		FD RPD, U	FieldDup RPD Failed, Upper Limit due to analyte found in blank
Dissolved Zinc (ug/l)	Water	40	W3K0917			2.09		
Total Zinc (µg/L)	Water	39	Physis E-5134 W		1.5			
Total Zinc (µg/L)	Water	40	Physis E-7036 W		0.64			
Total Zinc (µg/L)	Water	40	Physis E-7041 W		0.2178		U, FD RPD	FieldDup RPD Failed, Upper Limit due to analyte found in blank
Total Zinc (µg/L)	Water	41	Physis E-7054 W		0.2474			
Total Zinc (µg/L)	Water	41	Physis E-7061 W		2.03			
Total Zinc (µg/L)	Water	42	Physis E-7067 W		1.71			
Total Zinc (µg/L)	Water	43	Physis E-7101 W		3.14		U	Upper Limit due to analyte found in blank

Table 2. Precision QA/QC Issues

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
General Water Quality										
Clay - <0.0039 mm (%)	sediment	39	IIRMES_GC-02-027_S_GS	04_WOOD		***33***	0			
Sand 0.0625 to <2.0 mm (%)	Water	42	1011002-096	04D_WOOD			***92***			
Silt - 0.0039 to <0.0625 mm (%)	sediment	39	IIRMES_GC-02-027_S_GS	04_WOOD		***31***	13			
Total Suspended Solids (mg/L)	Water	39	Physis C-13125 W	04_WOOD		***35***			FD RPD	FieldDup RPD Failed
Total Suspended Solids (mg/L)	Water	39	Physis C-13126 W	07_MADER		***67***				
Total Suspended Solids (mg/L)	Water	41	Physis C-15066 W	01_BPT_3		***65***			FD RPD	FieldDup RPD Failed
Nutrients										
Ammonia as N (mg/L)	Water	39	Physis C-14024 W	LABQA	***40***					
Ammonia as N (mg/L)	Water	39	Physis C-14015 W	04_WOOD				***33***		
Ammonia as N (mg/L)	Water	40	Physis C-14132 W	01T_ODD2_DC H		***150***		25	FD RPD	FieldDup RPD Failed
Ammonia as N (mg/L)	Water	41	Physis C-15142 W	03_UNIV		***35***			MS <LL, FD RPD	MS failed lower limit, FieldDup RPD Failed
Ammonia as N (mg/L)	Water	41	Physis C-15142 W	10_GATE		***35***			MS <LL, FD RPD	MS failed lower limit, FieldDup RPD Failed
OrthoPhosphate as P (mg/L)	Water	40	Physis C-14104 W	01T_ODD2_DC H		***197***	0	3	FD RPD	FieldDup RPD Failed
Phosphorus, Total as P (mg/L)	Water	40	Physis C-14111 W	07_HITCH		3	1	***48***		
Total Kjeldahl Nitrogen (mg/L)	Water	41	Associated_QC1144224_W_CON	03_UNIV		***33***				
OC Pesticides										

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
DDD(o,p') (µg/L)	Water	42	Physis O-6002 W	03_UNIV		***33***			H	Holdtime exceeded
DDD(o,p') (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD		19	***38***	1		
DDD(p,p') (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***35***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
DDD(p,p') (µg/L)	Water	42	Physis O-6002 W	03_UNIV		***39***			H	Holdtime exceeded
DDD(p,p') (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD				***32***		
DDD(p,p') (ng/dry g)	sediment	39	Physis O-5001 W	04_WOOD		***49***				
DDE(p,p') (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***31***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
DDE(p,p') (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD				***38***		
DDE(p,p') (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD		2	***31***		LD RPD, MS >UL, EST MS/MSD	LabDuplicate RPD Failed, MS failed upper limit, Estimate due to RPD failure between MS/MSD
DDE(p,p') (ng/dry g)	sediment	39	Physis O-5001 W	04_WOOD		***36***			FD RPD	FieldDup RPD Failed
DDE(p,p') (ng/wet g)	Tissue	39	Physis O-5019 W	04_WOOD				***69***		
Total DDE(p,p') (µg/L)	Water	40	Physis O-5037 W	07_HITCH		***57***				
DDT(o,p') (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***137***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
DDT(o,p') (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD		9	***38***		MS >UL, BS >UL	MS failed upper limit, BS failed upper limit
DDT(o,p') (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD		***32***			MS >UL, BS >UL	MS failed upper limit, BS failed upper limit
Total DDT(o,p') (µg/L)	Water	40	Physis O-5038 W	01T_ODD2_DCH		***48***				

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
DDT(p,p') (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD				***50***		
DDT(p,p') (ng/dry g)	sediment	39	Physis O-5001 W	04_WOOD		***73***			BS >UL	BS failed upper limit
DDT(p,p') (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD		***53***			EST MS/MSD	Estimate due to MS/MSD RPD failed
Chlordane, alpha- (ng/dry g)	sediment	39	Physis O-5001 W	04_WOOD		***31***				
Chlordane, gamma- (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***34***			H	Holdtime exceeded
Chlordane, gamma- (ng/dry g)	sediment	39	Physis O-5001 W	04_WOOD		***43***				
Endosulfan I (ng/wet g)	Water	39	Physis O-5019 W	LABQA	***36***					
Endosulfan II (ng/dry g)	Water	39	Physis O-5017 W	LABQA	***33***					
Methoxychlor (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD				***42***		
Methoxychlor (ng/wet g)	Tissue	39	Physis O-5019 W	04_WOOD				***40***		
Toxaphene (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***140***			H	Holdtime exceeded
PCBs										
PCB 003 (ng/dry g)	Water	39	Physis O-5017 W	LABQA	***87***					
PCB 008 (ng/dry g)	Water	39	Physis O-5017 W	LABQA	***42***					
PCB 138 (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***47***			H	Holdtime exceeded
PCB 141 (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***46***			H	Holdtime exceeded
PCB 151 (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***52***			H	Holdtime exceeded
PCB 153 (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***62***			H	Holdtime exceeded

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
PCB 194 (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***134***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
PCB 201 (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***195***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
PCB 206 (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD				***31***		
OP Pesticides										
Azinphos methyl (Guthion) (µg/L)	Water	41	W4B0333	LABQA				***26***		
Bolstar (µg/L)	Water	39	W3H0542	LabQA	***28***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Chlorpyrifos (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***156***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
Chlorpyrifos (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD		***32***	8		MS >UL	MS failed upper limit
Chlorpyrifos (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD		***61***			MS >UL	MS failed upper limit
Total Chlorpyrifos (µg/L)	Water	42	Physis O-6002 W	LABQA	***32***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Total Chlorpyrifos (µg/L)	Water	41	Physis O-5101 W	03_UNIV		***77***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
Demeton-s (ng/dry g)	Water	39	Physis O-5001 W	LABQA	***37***					
Dichlorvos (µg/L)	Water	41	W4B0333	LABQA	***35***					
Dichlorvos (µg/L)	Water	41	W4B0333	LABQA				***36***		
Total Dimethoate (µg/L)	Water	42	Physis O-6002 W	LABQA	***44***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Fensulfothion (µg/L)	Water	39	W3H0542	LabQA	***32***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Total Fensulfothion (µg/L)	Water	41	Physis O-5107 W	LABQA	***41***				EST BS/BSD	Estimate due to BS/BSD RPD failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Total Malathion (µg/L)	Water	42	Physis O-5134 W	03_UNIV		***66***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
Total Malathion (µg/L)	Water	42	Physis O-5134 W	13_SB_HILL		***103***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
Naled (µg/L)	Water	43	W4E0626	LABQA	***39***					
Total Tetrachlorvinphos (µg/L)	Water	41	Physis O-5092 W	LABQA	***34***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Pyrethroid Pesticides										
Bifenthrin (µg/L)	Water	42	Physis O-6002 W	13_SB_HILL		***38***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
Bifenthrin (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD		11	***54***		LD RPD, MS >UL	LabDuplicate RPD Failed, MS failed upper limit
Total Bifenthrin (µg/L)	Water	43	Physis O-6030 W	07_HITCH		***197***			FD RPD	FieldDup RPD Failed
Cyfluthrin, total (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***60***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
Cyfluthrin, total (µg/L)	Water	42	Physis O-6002 W	03_UNIV		***106***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
Cyfluthrin, total (µg/L)	Water	42	Physis O-6002 W	13_SB_HILL		***33***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
Cyfluthrin, total (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD				***74***		
Cypermethrin, total (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***56***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
Cypermethrin, total (µg/L)	Water	42	Physis O-6002 W	13_SB_HILL		***46***			H	Holdtime exceeded
Cypermethrin, total (ng/dry g)	sediment	39	Physis O-5001 W	04_WOOD		***33***				
Danitol (ng/dry g)	sediment	39	Physis O-5017 W	04_WOOD		2	***36***		LD RPD, MS >UL	LabDuplicate RPD Failed, MS failed upper limit
Danitol (ng/dry g)	sediment	39	Physis O-5001 W	04_WOOD		***60***			FD RPD	FieldDup RPD Failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Esfenvalerate (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***49***			H, FD RPD	Holdtime exceeded, FieldDup RPD Failed
Total Esfenvalerate (µg/L)	Water	40	Physis O-5038 W	01T_ODD2_DCH		***95***				
Fenvalerate (µg/L)	Water	42	Physis O-5154 W	03_UNIV		***50***			H	Holdtime exceeded
Total Fenvalerate (µg/L)	Water	40	Physis O-5038 W	01T_ODD2_DCH		***46***				
Total Fluvalinate (µg/L)	Water	40	Physis O-5038 W	01T_ODD2_DCH		***123***				
Total L-Cyhalothrin (µg/L)	Water	39	Physis O-4151 W	04_WOOD		***45***				
Total Prallethrin (µg/L)	Water	41	Physis O-5107 W	LABQA	***45***				EST BS/BSD	Estimate due to BS/BSD RPD failed
Total Prallethrin (µg/L)	Water	42	Physis O-6002 W	LABQA	***107***				BS <LL, EST BS/BSD	BS failed lower limit, Estimate due to BS/BSD RPD failed
Metals and Selenium										
Dissolved Aluminum (µg/L)	Water	43	Physis E-7101 W	01T_ODD2_DCH		***107***	0	0	FD RPD	FieldDup RPD Failed
Aluminum (µg/dry g)	sediment	39	Physis E-5149 W	LABQA			***59***			
Total Aluminum (µg/L)	Water	41	Physis E-7054 W	01_BPT_3		***32***			FD RPD	FieldDup RPD Failed
Total Aluminum (µg/L)	Water	43	Physis E-7101 W	01T_ODD2_DCH		***120***	5		FD RPD	FieldDup RPD Failed
Dissolved Beryllium (µg/L)	Water	40	Physis E-7041 W	01_BPT_14			***50***			
Dissolved Beryllium (µg/L)	Water	42	Physis E-7067 W	03_UNIV		***67***				
Total Beryllium (µg/L)	Water	40	Physis E-7041 W	01_BPT_15		***35***			U	Upper Limit due to analyte found in blank
Total Beryllium (µg/L)	Water	41	Physis E-7054 W	01_BPT_14			***33***			

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Dissolved Cadmium (µg/L)	Water	40	Physis E-7036 W	05D_SANT_VC WPD			***113***		LD RPD	LabDuplicate RPD Failed
Dissolved Cadmium (µg/L)	Water	40	Physis E-7036 W	07D_SIMI			***53***		LD RPD	LabDuplicate RPD Failed
Dissolved Cadmium (µg/L)	Water	41	Physis E-7052 W	9AD_CAMA			***41***	0	LD RPD	LabDuplicate RPD Failed
Dissolved Cadmium (µg/L)	Water	43	Physis E-7101 W	9AD_CAMA			***34***	0		
Total Cadmium (µg/L)	Water	39	Physis M-5133 W	07D_SIMI			***50***		LD RPD	LabDuplicate RPD Failed
Total Cadmium (µg/L)	Water	40	Physis E-7036 W	9AD_CAMA			***82***			
Total Cadmium (µg/L)	Water	41	Physis E-7061 W	03_UNIV		***33***			FD RPD	FieldDup RPD Failed
Dissolved Chromium (µg/L)	Water	42	Physis E-7067 W	03_UNIV		***50***			FD RPD	FieldDup RPD Failed
Total Chromium (µg/L)	Water	43	Physis E-7101 W	01T_ODD2_DC H		***34***	13		FD RPD	FieldDup RPD Failed
Dissolved Copper (µg/L)	Water	40	Physis E-7041 W	01_BPT_14			***88***		LD RPD, U, FD RPD	LabDuplicate RPD Failed, Upper Limit due to analyte found in blank, FieldDuplicate RPD Failed
Dissolved Copper (µg/L)	Water	40	Physis E-7041 W	01_BPT_15		***43***			LD RPD, FD RPD	LabDuplicate RPD Failed, FieldDuplicate RPD Failed
Dissolved Copper (µg/L)	Water	41	Physis E-7054 W	01_BPT_3		***80***			FD RPD	FieldDup RPD Failed
Dissolved Copper (µg/L)	Water	43	Physis E-7102 W	01_BPT_14			***67***		LD RPD	LabDuplicate RPD Failed
Total Iron (µg/L)	Water	43	Physis E-7101 W	01T_ODD2_DC H		***47***	5		FD RPD	FieldDup RPD Failed
Dissolved Lead (µg/L)	Water	39	Physis E-5134 W	01T_ODD2_DC H			***44***	0		
Dissolved Lead (µg/L)	Water	39	Physis E-5137 W	01_BPT_14		12	***68***		LD RPD	LabDuplicate RPD Failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Dissolved Lead (µg/L)	Water	40	Physis E-7041 W	01_BPT_15		***45***				
Dissolved Lead (µg/L)	Water	42	Physis E-7067 W	01_RR_BR			***88***	2	LD RPD	LabDuplicate RPD Failed
Dissolved Lead (µg/L)	Water	43	Physis E-7101 W	03_UNIV			***37***	0	LD RPD	LabDuplicate RPD Failed
Total Lead (µg/L)	Water	40	Physis E-7036 W	9AD_CAMA			***43***		LD RPD	LabDuplicate RPD Failed
Total Lead (µg/L)	Water	41	Physis E-7054 W	01_BPT_3		***39***			FD RPD	FieldDup RPD Failed
Total Lead (µg/L)	Water	43	Physis E-7101 W	01T_ODD2_DC H		***158***	19		LD RPD, FD RPD	LabDuplicate RPD Failed, FieldDuplicate RPD Failed
Total Lead (µg/L)	Water	43	Physis E-7101 W	07D_SIMI			***73***		LD RPD, FD RPD	LabDuplicate RPD Failed, FieldDuplicate RPD Failed
Dissolved Manganese (µg/L)	Water	42	Physis E-7067 W	03_UNIV		***97***			FD RPD	FieldDup RPD Failed
Total Manganese (µg/L)	Water	43	Physis E-7101 W	01T_ODD2_DC H		***41***	1		FD RPD	FieldDup RPD Failed
Dissolved Mercury (µg/L)	Water	43	Physis E-6069 W	01_BPT_14			***60***			
Dissolved Mercury (µg/L)	Water	43	Physis E-6069 W	01_BPT_6		***35***				
Total Mercury (µg/L)	Water	40	Physis E-6046 W	01_BPT_14			***33***			
Total Mercury (µg/L)	Water	40	Physis E-6048 W	03_UNIV			***33***	3		
Dissolved Selenium (µg/L)	Water	40	Physis E-7036 W	9AD_CAMA			***44***	0		
Dissolved Selenium (µg/L)	Water	40	Physis E-7041 W	01_BPT_14			***50***			
Dissolved Selenium (µg/L)	Water	41	Physis E-7052 W	9AD_CAMA			***40***	1		
Dissolved Selenium (µg/L)	Water	43	Physis E-7102 W	01_BPT_14			***33***			

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Total Selenium (µg/L)	Water	41	Physis E-7054 W	01_BPT_14			***47***			
Total Selenium (µg/L)	Water	41	Physis E-7054 W	01_BPT_3		***55***				
Total Selenium (µg/L)	Water	42	Physis E-7067 W	01_RR_BR			***42***		LD RPD	LabDuplicate RPD Failed
Dissolved Silver (µg/L)	Water	39	Physis E-5137 W	01_BPT_14		29	***50***			
Dissolved Silver (µg/L)	Water	43	Physis E-7101 W	03_UNIV			***67***		MS <LL, EST MS/MSD, U	MS failed lower limit, Estimate due to RPD failure between MS/MSD, Upper Limit due to analyte found in blank
Dissolved Silver (µg/L)	Water	43	Physis E-7101 W	07D_SIMI				***31***	MS <LL, EST MS/MSD	MS failed lower limit, Estimate due to RPD failure between MS/MSD
Dissolved Silver (µg/L)	Water	43	Physis E-7101 W	9AD_CAMA			0	***45***	MS <LL, EST MS/MSD	MS failed lower limit, Estimate due to RPD failure between MS/MSD
Dissolved Silver (µg/L)	Water	43	Physis E-7102 W	01_BPT_6		***40***			FD RPD, EST MS/MSD	FieldDup RPD Failed, Estimate due to MS/MSD RPD failed
Silver (µg/dry g)	sediment	39	Physis E-5149 W	04_WOOD		0	***40***			
Total Silver (µg/L)	Water	40	Physis E-7041 W	01_BPT_15		***67***			U	Upper Limit due to analyte found in blank
Total Silver (µg/L)	Water	41	Physis E-7054 W	01_BPT_14			***67***			
Total Silver (µg/L)	Water	41	Physis E-7054 W	01_BPT_3		***40***				
Dissolved Strontium (µg/L)	Water	40	Physis E-7036 W	01T_ODD2_DCH		1	0	***74***	MS >UL, EST MS/MSD	MS failed upper limit, Estimate due to RPD failure between MS/MSD

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Dissolved Strontium (µg/L)	Water	40	Physis E-7036 W	05D_SANT_VC WPD			2	***32***	MS >UL, EST MS/MSD	MS failed upper limit, Estimate due to RPD failure between MS/MSD
Dissolved Thallium (µg/L)	Water	40	Physis E-7041 W	01_BPT_14			***46***			
Dissolved Thallium (µg/L)	Water	41	Physis E-7052 W	9AD_CAMA			***40***	0		
Total Thallium (µg/L)	Water	39	Physis E-5134 W	04_WOOD		***67***				
Total Thallium (µg/L)	Water	40	Physis E-7041 W	01_BPT_14			***48***			
Total Thallium (µg/L)	Water	41	Physis E-7052 W	07D_SIMI			***100***			
Total Thallium (µg/L)	Water	41	Physis E-7052 W	9AD_CAMA			***40***			
Dissolved Tin (µg/L)	Water	39	Physis E-5137 W	01_BPT_14		***105***	18		FD RPD	FieldDup RPD Failed
Total Tin (µg/L)	Water	39	Physis E-5137 W	01_BPT_14		***78***	5		FD RPD	FieldDup RPD Failed
Total Tin (µg/L)	Water	40	Physis E-7041 W	01_BPT_15		***120***			FD RPD	FieldDup RPD Failed
Total Tin (µg/L)	Water	41	Physis E-7052 W	9AD_CAMA			***40***			
Total Tin (µg/L)	Water	42	Physis E-7067 W	01_RR_BR			***71***			
Total Tin (µg/L)	Water	42	Physis E-7067 W	03_UNIV		***42***				
Total Tin (µg/L)	Water	43	Physis E-7102 W	01_BPT_14			***31***			
Dissolved Titanium (µg/L)	Water	40	Physis E-7036 W	01T_ODD2_DC H		1	0	***62***	MS <LL, EST MS/MSD	MS failed lower limit, Estimate due to RPD failure between MS/MSD
Dissolved Zinc (µg/L)	Water	40	Physis E-7041 W	01_BPT_15		***36***			FD RPD	FieldDup RPD Failed

Constituent	Matrix	Event	Lab Batch	Site	BS/ BSD RPD	Field Dup RPD	Lab Dup RPD	MS/ MSD RPD	Program Qualifier	Comments
Dissolved Zinc (µg/L)	Water	43	Physis E-7101 W	01T_ODD2_DC H		***44***	1		FD RPD, U	FieldDup RPD Failed, Upper Limit due to analyte found in blank
Dissolved Zinc (µg/L)	Water	43	Physis E-7102 W	01_BPT_6		***45***			FD RPD	FieldDup RPD Failed
Total Zinc (µg/L)	Water	40	Physis E-7041 W	01_BPT_15		***62***			FD RPD	FieldDup RPD Failed

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

Table 3. Accuracy QA/QC Issues

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
General Water Quality											
None											
Nutrients											
Ammonia as N (mg/L)	Water	41	Physis C-15142 W	70	130	88	92	72	***68***	MS <LL, FD RPD	MS failed lower limit, FieldDup RPD failed
Ammonia as N (mg/L)	Water	43	Physis C-18017 W	70	130	120	112	***192***		MS >UL	MS failed upper limit
Ammonia as N (mg/L)	Water	43	Physis C-18019 W	70	130	116	100	***416***	***380***	MS >UL	MS failed upper limit
Nitrite as N (mg/L)	Water	40	Physis C-14104 W	70	130	100	93	***67***	73	MS <LL	MS failed upper limit
Nitrite as N (mg/L)	Water	42	Physis C-15152 W	70	130	100	93	***0***	***0***	MS <LL	MS failed upper limit
Nitrite as N (mg/L)	Water	43	Physis C-21029 W	70	130	93	93	***40***	***40***	MS <LL	MS failed upper limit
OrthoPhosphate as P (mg/L)	Water	41	Physis C-15093 W	70	130	114	112	***65***	***68***	MS <LL	MS failed upper limit
OC Pesticides											
Aldrin (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	96	97	***20***	***26***		
DDE(p,p') (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	104	113	***151***	103		
DDE(p,p') (ng/wet g)	Tissue	39	Physis O-5019 W	50	150	86	85	***1149***	***558***		
DDT(o,p') (ng/dry g)	Sediment	39	Physis O-5017 W	25	125	***129***	124	112	***129***		
DDT(p,p') (ng/dry g)	Water	39	Physis O-5001 W	25	125	116	***134***	X	X		
Endosulfan I (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	107	121	***41***	55		
Endosulfan I (ng/wet g)	Tissue	39	Physis O-5019 W	50	150	***36***	52	87	67		

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
Endrin (ng/dry g)	Water	39	Physis O-5001 W	25	125	112	***131***	X	X		
Endrin (ng/dry g)	Water	39	Physis O-5001 W	25	125	112	***131***	X	X		
Heptachlor (ng/dry g)	Water	39	Physis O-5001 W	50	150	150	***153***	X	X		
Heptachlor (ng/dry g)	Water	39	Physis O-5001 W	50	150	150	***153***	X	X		
Hexachlorobenzene (ng/wet g)	Tissue	39	Physis O-5019 W	50	150	72	84	***175***	***217***		
Methoxychlor (ng/wet g)	Tissue	39	Physis O-5019 W	50	150	68	69	***33***	***22***		
Total Endrin (µg/L)	Water	41	Physis O-5107 W	25	125	***129***	121	X	X		
Total Perthane (µg/L)	Water	41	Physis O-5092 W	50	150	***45***	51	X	X	BS <LL	BS failed lower limit
PCBs											
PCB 003 (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	***32***	81	107	100		
PCB 018 (ng/wet g)	Tissue	39	Physis O-5019 W	50	150	84	90	***154***	***152***		
Total PCB 168/132 (µg/L)	Water	43	Physis O-6022 W	50	150	***226***	***220***	X	X	BS >UL	BS failed upper limit
Total PCB 209 (µg/L)	Water	40	Physis O-5037 W	50	150	145	***153***	X	X		
OP Pesticides											
Chlorpyrifos (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	141	143	***162***	140		
Demeton-s (ng/dry g)	Water	39	Physis O-5001 W	25	125	***22***	32	X	X		
Total Phorate (µg/L)	Water	39	Physis O-4151 W	50	150	***48***	53	X	X		
Total Phosmet (µg/L)	Water	43	Physis O-6022 W	50	150	***36***	X	X	X	BS <LL	BS failed lower limit
Total Fensulfothion (µg/L)	Water	42	Physis O-6002 W	50	150	137	***155***	X	X		

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
Total Tetrachlorvinphos (µg/L)	Water	42	Physis O-6002 W	50	150	***153***	133	X	X		
Pyrethroid Pesticides											
Allethrin (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	107	91	***623***	***767***		
Bifenthrin (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	77	79	***493***	***499***		
Cyfluthrin (µg/L)	Water	43	W4E0777	11	214	76	X	***249***	***281***		
Cyfluthrin, total (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	141	150	***818***	***374***		
Cypermethrin (µg/L)	Water	43	W4E0777	20	206	86	X	***251***	***274***		
Cypermethrin, total (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	145	141	***805***	***783***		
Danitol (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	74	75	***506***	***512***		
Deltamethrin (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	64	65	***197***	***236***		
Deltamethrin/Tralomethrin (µg/L)	Water	43	W4E0777	0.2	230	60	X	***245***	***283***		
Dichloran (ng/l)	Water	40	W3K0500	53	161	***52***	55	X	X		
Esfenvalerate (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	54	56	***203***	***237***		
Fenvalerate (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	58	61	***240***	***276***		
Fenvalerate/Esfenvalerate (µg/L)	Water	43	W4E0777	32	193	112	X	***251***	***285***		
Fluvalinate (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	***49***	50	111	139		
L-Cyhalothrin (µg/L)	Water	43	W4E0777	61	209	177	X	***346***	***381***		
L-Cyhalothrin (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	64	66	***250***	***274***		
Permethrin (µg/L)	Water	43	W4E0777	37	209	116	X	***223***	***232***		

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
Permethrin, cis- (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	64	78	***565***	***575***		
Permethrin, trans- (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	63	70	***530***	***566***		
Prallethrin (µg/L)	Water	39	W3H0879	54	148	83	X	147	***157***	MS >UL	MS failed upper limit
Prallethrin (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	84	81	***488***	***562***		
Resmethrin (ng/dry g)	Sediment	39	Physis O-5017 W	50	150	70	52	***325***	***406***		
Sumithrin (µg/L)	Water	39	W3H0879	56	146	133	X	***172***	***200***	MS >UL	MS failed upper limit
Total Danitol (µg/L)	Water	41	Physis O-5101 W	50	150	144	***164***	X	X		
Total Prallethrin (µg/L)	Water	42	Physis O-6002 W	50	150	***33***	109	X	X	BS <LL, EST BS/BSD	BS failed lower limit, Estimate due to BS/BSD RPD failed
Total Resmethrin (µg/L)	Water	41	Physis O-5092 W	50	150	143	***151***	X	X		
Metals and Selenium											
Dissolved Iron (µg/L)	Water	40	Physis E-7036 W	75	125	X	X	83	***65***	MS <LL	MS failed upper limit
Dissolved Iron (µg/L)	Water	41	Physis E-7061 W	75	125	X	X	***46***	***44***	MS <LL	MS failed upper limit
Dissolved Selenium (µg/L)	Water	43	Physis E-7101 W	75	125	X	X	124	***126***	MS >UL	MS failed upper limit
Dissolved Silver (µg/L)	Water	39	Physis E-5134 W	75	125	X	X	***69***	***72***		
Dissolved Silver (µg/L)	Water	39	Physis E-5134 W	75	125	X	X	***64***	***59***		
Dissolved Silver (µg/L)	Water	40	Physis E-7036 W	75	125	X	X	***73***	80	MS <LL	MS failed upper limit
Dissolved Silver (µg/L)	Water	40	Physis E-7036 W	75	125	X	X	77	***73***	MS <LL	MS failed upper limit
Dissolved Silver (µg/L)	Water	40	Physis E-7036 W	75	125	X	X	***65***	80	MS <LL	MS failed upper limit

Constituent	Matrix	Event	Lab Batch	LCL	UCL	LCS %Rec.	LCSD %Rec.	MS %Rec.	MSD %Rec.	Program Qualifier	Comments
Dissolved Silver (µg/L)	Water	41	Physis E-7052 W	75	125	X	X	76	***68***	MS <LL	MS failed upper limit
Dissolved Silver (µg/L)	Water	41	Physis E-7061 W	75	125	X	X	***74***	***70***	MS <LL	MS failed upper limit
Dissolved Silver (µg/L)	Water	43	Physis E-7101 W	75	125	X	X	99	***62***	MS <LL, EST MS/MSD	MS failed lower limit, Estimate due to MS/MSD RPD failed
Dissolved Silver (µg/L)	Water	43	Physis E-7101 W	75	125	X	X	81	***69***	MS <LL, EST MS/MSD	MS failed lower limit, Estimate due to MS/MSD RPD failed
Dissolved Strontium (µg/L)	Water	39	Physis E-5134 W	75	125	X	X	***175***	***172***		
Dissolved Strontium (µg/L)	Water	39	Physis E-5134 W	75	125	X	X	***432***	***448***		
Dissolved Strontium (µg/L)	Water	40	Physis E-7036 W	75	125	X	X	***246***	***178***	MS >UL, EST MS/MSD	MS failed upper limit, Estimate due to MS/MSD RPD failed
Dissolved Strontium (µg/L)	Water	40	Physis E-7036 W	75	125	X	X	***332***	***152***	MS >UL, EST MS/MSD	MS failed upper limit, Estimate due to MS/MSD RPD failed
Dissolved Strontium (µg/L)	Water	41	Physis E-7061 W	75	125	X	X	***254***	***260***	MS >UL	MS failed upper limit
Dissolved Strontium (µg/L)	Water	42	Physis E-7067 W	75	125	X	X	***140***	***133***	MS >UL	MS failed upper limit
Dissolved Strontium (µg/L)	Water	43	Physis E-7101 W	75	125	X	X	***266***	***229***	MS >UL	MS failed upper limit
Dissolved Titanium (µg/L)	Water	40	Physis E-7036 W	75	125	X	X	87	***46***	MS <LL, EST MS/MSD	MS failed lower limit, Estimate due to MS/MSD RPD failed
Total Mercury (µg/L)	Water	43	Physis E-6069 W	75	125	96	91	***133***	***147***	MS >UL	MS failed upper limit

MS = Matrix Spike
MS = Matrix Spike Duplicate
LCS = Laboratory Control Spike
LCSD = Laboratory Control Spike Duplicate
%Rec = Percent Recovery