January 2015

REPORT OF WASTE DISCHARGE

Ventura Countywide Stormwater Quality Management Program

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

Prepared Under the Direction of:

Gerhardt Hubner, Deputy Director,

Ventura County Watershed Protection District

Stormwater Resources Section

Arne Anselm, Manager

Bill Carey, Water Resources Specialist

Kelly Hahs, Water Resources Specialist

Bram Sercu, Water Resources Specialist

EXECUTIVE SUMMARY

Program History

The first MS4 Permit for Ventura County was adopted by the Regional Board in 1994 and covered all ten cities, the County, and the Watershed Protection District. Prior to the adoption of that permit these agencies joined together to authorize the use of the Watershed Protection District's Benefit Assessment to finance stormwater quality programs. Since then the Permit has been renewed two times, each time substantially increasing requirements. The current Permit included the addition of 11 Major Outfall sites, prescribed Low Impact Development design standards and runoff retention requirements, and included eight Total Maximum Daily Loads (TMDLs) throughout the Region. This is in contrast to the previous Los Angeles Permit which had none of those. Ventura is also distinct from Los Angeles as land use within Ventura County is dominated by open space and agriculture, with interspersed pockets of urban areas.

Goals and Guiding Principles

Beyond meeting the Permit requirement, this ROWD serves to inform the Regional Board and the public on the accomplishments achieved by the Ventura Countywide Stormwater Quality Management Program (Program), the individual Permittees, and the broader watershed management groups, towards improving water quality in Ventura County. It includes the lessons learned over the last twenty years, the challenges identified for the future, and recommendations to help meet those challenges. Understanding the challenges ahead the Permittees saw the need to develop a more proactive and comprehensive view of water quality management. Through Strategic Planning Workshops themes emerged that are threaded throughout the document. Building upon these themes the Permittees also developed a set of guiding principles for the ROWD. We hope that each is reflected in the new MS4 Permit for the Ventura Program, with no language that may conflict with, or hinder these concepts:

- Program Priority Setting - Programs should be focused and driven by receiving water priorities and pollutants of concern, and programs should be prioritized by their effectiveness in reducing those pollutants;
- Flexibility in Watershed Planning and Implementation - Flexibility should be provided where possible, recognizing that the watersheds in Ventura County each have unique water quality challenges, and all are at different stages in watershed planning;
- Question Driven Monitoring - Monitoring should be question driven with a well-defined purpose and goals for the use of the data; and
- Options for Permit Compliance - Achievable permit compliance pathways are necessary.
- Watershed Focus – Include watershed focus and more holistic management where appropriate; however, it is necessary to keep all program planning and implementation options available;
- Regional Coordination - Program efforts should be coordinated with existing watershed plans and other entities that affect water quality in the region as appropriate;
- Build on Past Efforts - Where watershed programs are in place, existing efforts should be allowed to replace permit requirements if equivalent;
- Strategic Planning - Emphasize strategic planning, including the ability to prioritize and implement actions to focus on identified pollutants of concern; and
- Adaptive Management - Allow the evolution of MS4 program elements through the adaptive management process.

Program Accomplishments

Since the adoption of the third term Permit the Program has achieved many accomplishments in each of the program elements, and beyond Permit requirements. These include adopting a five-year implementation agreement and new stormwater quality ordinances, new bilingual BMP training posters for business and construction, drafting a Revised Technical Guidance Manual and Hydromodification Control Plan for land development, catch basin mapping and prioritization, increased trash management programs, new pesticide protocols, installation of eleven new outfall monitoring stations, water quality data trends analysis, development of a water quality index, and special studies to address pyrethoids, pentaclorophenol, aluminum and bacteria. All of these efforts have resulted in water quality at Ventura County beaches to be among the best in the state. There are many more accomplishments listed in this report including watershed scale efforts such as the multiple agreements formed countywide to address TMDLs. Based on these experiences, and understanding the distinctions between Ventura County and Los Angeles County, the Program has developed several recommendations.

Recommendations

Assuming the next Ventura Countywide Permit will be based on the current MS4 Permit for Los Angeles County, Order R4-2012-0175 (LA Permit), many of the recommendations are framed as changes or modifications to specific provisions of the LA Permit. Prioritizing based on how MS4s are potentially impacting beneficial uses of receiving waters, then focusing the needed resources on those issues creates a more efficient effort with a higher chance of success. The justifications for recommendations briefly summarized below are provided in the ROWD, and also summarized in the Conclusions section.

Receiving Water Driven Priorities

1. Receiving Water Limitations (RWL) - The Program supports the use of a watershed management planning and implementation process as a path for compliance with RWL. However a clear linkage between the compliance provisions and the prohibitions, receiving water limitations, and effluent limitations must be established. Compliance with RWL should also be achievable through traditional permit programs and minimum control measures.

2. Bacteria - Priority of bacteria source identification and risk assessment studies should be increased, so that resources can be focused on addressing sources that pose the highest risk to human health. However, to partly off-set these proposed additional efforts, the Program recommends discontinuing fecal coliform monitoring in stormwater, and implementing an 18-hr holding time for Enterococcus, E. coli and total coliform grab sampling for stormwater.

3. Aluminum - High natural background concentrations of aluminum appear to be a primary source contributing to the frequent water quality objective exceedances observed in Ventura County surface waters. A sound scientific and regulatory approach to managing the elevated concentrations of aluminum observed in Ventura County surface waters will be needed to sufficiently protect beneficial uses potentially impacted by this naturally occurring metal.

4. Municipal Action levels - Action levels should be removed from the Permit, or only be used as one of several pollutant prioritization tools. Action levels for pollutants that are not detected at environmentally relevant levels in receiving waters or discharges from outfalls will divert resources away from previously identified priorities.

Minimum Control Measures

Experience gained over the last twenty years of implementing stormwater programs has been used to direct our efforts and improve effectiveness within the confines of Permit compliance. The Permittees hold Permit compliance as their highest priority, and resources are directed toward compliance first. However, other potentially effective measures may not always get implemented due to the inflexibility and resource intensiveness of current Permit requirements. Despite this limitation, the Permittees have accomplished many achievements beyond Permit the requirements. Key areas of improvement in the Permit structure or language would allow the Permittees to create more effective and efficient programs for reducing pollutants discharged from their MS4s are detailed below:

5. Program Management: A well-defined pathway for compliance is necessary to provide assurance that implementation efforts will result in compliance with Receiving Water Limitations. Flexibility of program elements is necessary to perform true adaptive management;

6. Public Information and Participation: Pollutant prioritization should guide efforts, and Permit should allow flexibility to use source identification studies to identify target audiences responsible for those sources.

7. Industrial / Commercial Discharges: The Permit should provide flexibility to identify additional critical sources beyond those listed in the Permit.

8. New Development and Re-development: The recently developed Technical Guidance Manual (TGM) should guide land development programs, and new Permit requirements should not create a need to revise the TGM. Any change, no matter how minor, will require a revised TGM with a new effective date. This will create two very similar sets of rules to communicate to the development community resulting in confusion and additional effort with very little water quality improvement. New Permit requirements should not add to, nor conflict with, the current TGM.

9. Construction: The Permit should provide for reasonable site inspection frequencies based on risk to receiving waters due to project location or size.

10. Illicit Discharges: The Permit should allow for focused source identification efforts to replace less effective approaches of storm drain screening.

Monitoring and Assessment

The Program has a solid understanding of the water quality in receiving waters and discharges from the MS4s. The monitoring of receiving waters and outfalls encompasses more than ten years and five years respectively. Existing data should be evaluated to answer new questions, and additions or changes to this effort should be only be done to when priorities direct a need to reallocate resources. To best build on this experience and knowledge the following should guide monitoring provisions of the new Permit:

11. Question Driven – Ensure all monitoring is designed to provide useful and necessary data;

12. Flexible – Keeping the existing monitoring program as the basis, flexibility is needed to shift resources to focus on prioritized pollutants; and

13. Coordinated - Allow multiple party regional monitoring and reporting if approved by the Executive Officer (e.g. through TMDL monitoring programs).

Watershed Management

Inclusion of a watershed management approach as a component of the Permit facilitates efficient planning and implementation of effective programs to address the highest priority water quality challenges. We support the inclusion of the watershed management program as an option (rather than as a strict requirement) to provide flexibility for individual permittees to select the methods of planning and implementation appropriate for their agency. In an effort to continue to improve on existing efforts, the Program has identified several key modifications to the watershed management program element of the LA Permit below.

14. Existing Watershed Management Planning Efforts – Allow to replacement of some or all of the Permit requirements if equivalent (e.g. trash TMDL implementation plans).

15. Water Quality Priority Prioritization - The process in the Permit should be modified to both allow for existing watershed prioritization processes to be used, and to clarify the prioritization process for receiving water limitation violations.

16. Reasonable Assurance Analysis - Requirements should be modified to ensure MS4s are not required to demonstrate that reductions solely from MS4s will bring the waterbody into compliance with water quality standards, and to be better aligned with the prioritization allowed within the permit.

17. Source Assessment - Requirements should focus on developing information to guide program implementation rather than just identifying sources. .

18. TMDL compliance schedules - The Permit should ensure that the adopted TMDL schedules are included, and modify the requirements for development of schedules for new receiving water limitation violations.

19. BMP Compliance Pathway - Depending on watershed constraints, retention of the 85th percentile storm may be achieved by BMPs that are regional, distributed, multiparty, or multi-benefit, or a combination of the above. The Permit should allow for 85th percentile as a compliance mechanism regardless of how the 85th percentile storm is captured.

20. Adaptive Management - The timing of the requirements should be changed to be consistent with the Permit cycles.

21. WMPs for TMDL Compliance - The Permit should provide a pathway to allow the WMPs to be a compliance mechanism for final TMDL effluent limitations.

22. Incentivize Infiltration Projects - The Permit and watershed management planning efforts, not just the enhanced watershed management plans, should incentivize infiltration projects, especially green streets and regional projects with multiple benefits.

The Program understands their fourth term permit will be the foundation for the future of stormwater programs in Ventura County, and are willing to work with Regional Board staff to create a path to that future. A collaborative process will allow all stakeholders to communicate their needs and expectations, fostering improved communication, trust, and relationships leading to a better outcome for all involved. At the end of the process, we hope to have a Permit that provides a clear and achievable path for Permittees to demonstrate, and continued improvement in water quality throughout our watersheds.

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1 INTRODUCTION

1.1 VENTURA COUNTYWIDE STORMWATER QUALITY MANAGEMENT PROGRAM OVERVIEW

The Watershed Protection District (Principal Permittee), the County of Ventura, and the incorporated cities of Camarillo, Fillmore, Moorpark, Ojai, Oxnard, Port Hueneme, Ventura, Santa Paula, Simi Valley, and Thousand Oaks, (each a Permittee, and collectively known as Permittees) operate municipal storm drain systems and discharge stormwater and urban runoff pursuant to the countywide NPDES Permit (Board Order No. 10-0108 or Permit). This Permit, administrated by the Los Angeles Regional Water Quality Control Board (RWQCB), requires a Report of Waste Discharge be submitted 180 days before the Permit expires on July 9, 2015.

1.2 GOALS OF REPORT OF WASTE DISCHARGE (ROWD)

Beyond meeting the Permit requirement, this ROWD serves to inform the Regional Board and the public on the accomplishments achieved by the Ventura Countywide Stormwater Quality Management Program (Program), the individual Permittees, and the broader watershed management groups towards improving water quality in Ventura County, and includes the lessons learned over the last twenty years of addressing runoff pollution, the challenges identified for the future along with recommended actions to help meet those challenges.

1.2.1 Description of ROWD Sections

This document has been designed to meet the required contents of an ROWD. The background of the Program and Permit, along with descriptions of the watersheds of Ventura County, the urbanized areas within those watersheds, and the MS4 facilities in the urbanized areas presented in this introduction serve as the facility description for the ROWD. A description of BMPs has been included in Section 2 by summarizing the Program structure, and funding, along with the many Program achievements. In Section 3, monitoring data from the major outfalls, receiving waters, and special studies (including those beyond permit requirements), and TMDL monitoring, have been statistically analyzed to create a characterization of the discharge and an understanding of its influence on the receiving waters. This analysis includes trends detected in receiving waters since the Program first started monitoring, and an evaluation of water quality issues identified by the Regional Board. The section concludes with identification of pollutants of concern associated with MS4 facilities. Finally, Section 4 is where the lessons learned over the last twenty years are incorporated into proposed improvements which the Program requests be considered during the drafting of the Ventura Countywide fourth-term MS4 NPDES Permit.

1.3 REGION OVERVIEW

Ventura County has a population of more than 823,000 people (2010 Census) and is located north and west of Los Angeles County, east of Santa Barbara County and south of Kern County. The Pacific Ocean forms the southwestern boundary of Ventura County providing 42 miles of coastline. The County has a total area of 1,199,748 acres (1,843 square miles), of which over

550,000 acres are in the National Forest. Virtually the entire north half of the County is within the Los Padres National Forest, although there are privately owned holdings scattered throughout the Forest area. Residential, agricultural and business uses are primarily located in the southern portion of the County. Ventura County has a Mediterranean climate, with an average July high temperature of 79 degrees, and an average January low temperature of 42 degrees. The average annual rainfall is approximately 18 inches.

1.3.1 Watersheds

The urbanized areas of Ventura County are divided among four main watersheds and the coastal region. They are, from north to south Ventura River Watershed, Santa Clara River Watershed, Calleguas Creek Watershed, and Malibu Creek Watershed (Figure 1-1).

Watershed-based management plans have been prepared for the major watersheds in the Region: the Calleguas Creek Watershed Management Plan (2005), the Santa Clara River Enhancement and Management Plan (2005), and the Ventura River Watershed Management Plan (2014).

Figure 1-1 Ventura County Watersheds

1.3.1.1 *The Ventura River Watershed*

The Ventura River Watershed is a coastal watershed located in the northwestern portion of Ventura County draining an area of 228 square miles roughly half of which is on Forest Service land (USFS, 1997). The Ventura River has several major tributaries including Matilija, North Fork Matilija, San Antonio, and Cañada Larga. Lake Casitas serves as the primary water supply for the area within the watershed. The Rincon and Hall/Arundell Watersheds are generally, and for the purposes of this Plan, grouped together with the Ventura River Watershed. The Ventura River Watershed is minimally developed and compared to other watersheds of the Region has large areas with good water quality and excellent aquatic habitat. About 30 miles of the upper Fork of Matilija Creek and its tributaries are designated as Wild and Scenic Rivers.

The Permittees with MS4s that drain to the Ventura River Watershed are the County of Ventura, and the cities of Ojai and Ventura.

1.3.1.2 *The Calleguas Creek Watershed*

The Calleguas Creek Watershed encompasses an area of approximately 343 square miles, predominantly in southeastern Ventura County. The major hydrologic features of the watershed include Conejo Creek, Arroyo Santa Rosa, Arroyo Simi, Arroyo Las Posas, and Calleguas Creek, as well as Revolon Slough and Mugu Lagoon. The northern boundary of the watershed is formed by the Santa Susana Mountains, South Mountain, and Oak Ridge Mountains. The southern boundary is formed by the Simi Hills and Santa Monica Mountains. Presently 50 percent of the watershed is undeveloped open space, 25 percent is agricultural, and the remaining 25 percent is in urban land use. The watershed ultimately drains to the Pacific Ocean through Mugu Lagoon.

Prior to the 1940s, Calleguas Creek and its main tributaries provided drainage for stormwater and irrigation discharge with rare occurrences of year-round flow. However, over the past 50 years, steadily increasing wastewater discharges and urban runoff now provide portions of Calleguas Creek and its tributaries with perennial flow.

The Permittees with MS4s that drain to the Calleguas Creek Watershed are the County of Ventura, and the cities of Camarillo, Moopark, Simi Valley, Thousand Oaks, and Oxnard.

1.3.1.3 *The Santa Clara River*

The Santa Clara River is the largest river system in Southern California remaining in a relatively natural state. The Santa Clara River headwater is at Pacifico Mountain in the San Gabriel Mountains and it flows in a generally western direction for approximately 84 miles through Tie Canyon, Aliso Canyon, Soledad Canyon, the Santa Clarita Valley, the Santa Clara River Valley, and the Oxnard Plain before discharging to the Pacific Ocean near the Ventura Harbor. The Santa Clara River and tributary system has a watershed area of about 1,634 square miles. Major tributaries include Castaic Creek and San Francisquito Creek in Los Angeles County, and the Sespe, Piru, and Santa Paula Creeks in Ventura County. Approximately 40 percent of the watershed is located in Los Angeles County and 60 percent is in Ventura County. Figure 3-3 provides a map depicting the Santa Clara River Watershed in Ventura County.

The Santa Clara River Watershed is the largest Watershed in the County and also has the lowest percentage of development. About 90 percent of the Watershed is to the east and north of the floodplain in the mountainous terrain of the San Gabriel Mountains, the Sierra Pelona, and the Topatopa Mountains of the Sespe back-country to headwaters near Pine Mountain and Mt. Piños, and to the south of the river including the Santa Susana Mountains, Oak Ridge, and South Mountain. Much of this area is in the Angeles National Forest and Los Padres National Forest. The remaining 10 percent of the watershed is mostly located in the relatively flat terrain of the Oxnard Plain, the Santa Clarita Valley, Castaic Valley, the Santa Clara River Valley, and the floors of the larger canyons, including the upper Soledad, and lower Sand, Mint, Bouquet, Placerita, San Francisquito, Piru, Santa Paula, and Sespe Canyons.

The Permittees with MS4s that drain to the Santa Clara River Watershed are the County of Ventura, and the cities of Fillmore, Santa Paula, Oxnard, and Ventura.

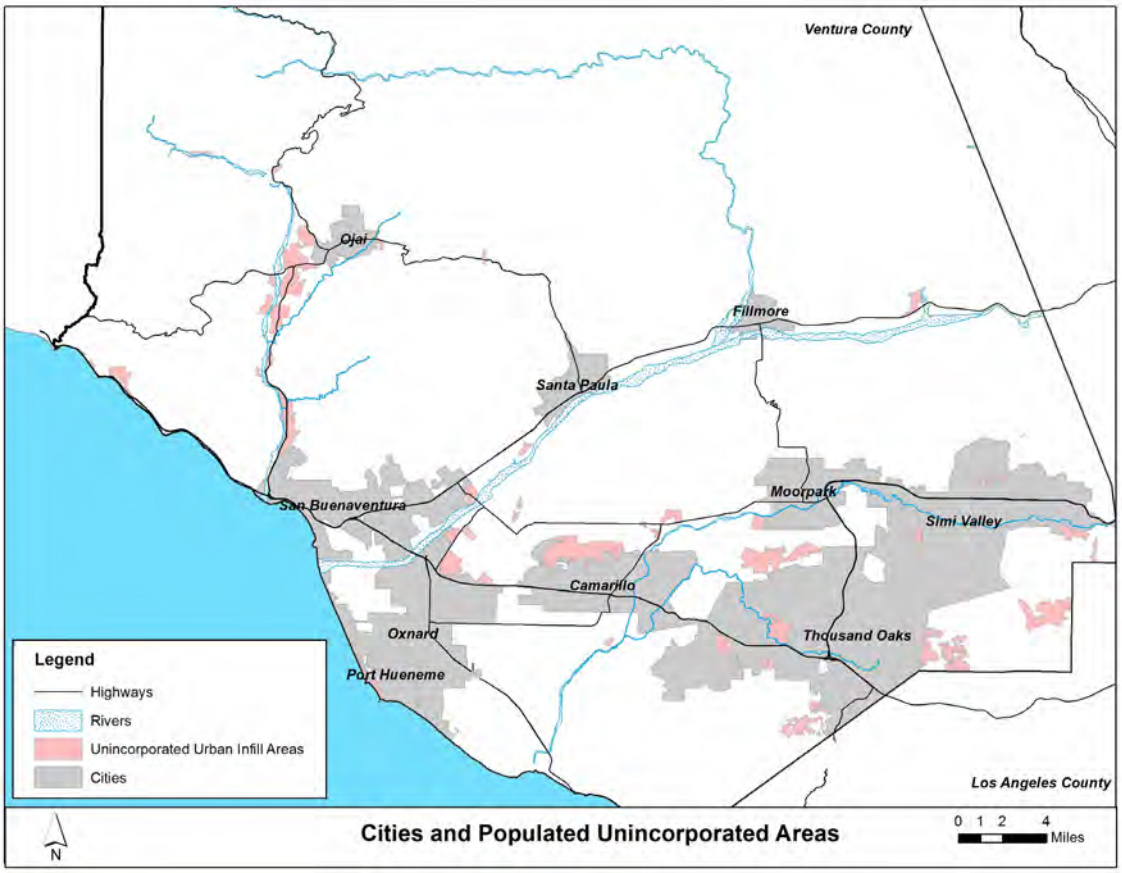
1.3.2 Urbanized areas

Existing urban areas and city boundaries are included in the maps of Attachment A are based on the cities' City Urban Restriction Boundaries (CURB) lines, and in the case of the unincorporated County, the Existing Community designation. These boundaries are a growth management tool intended to channel growth and protect agricultural and open-space land. There are no MS4 facilities outside of these urbanized areas, so the Stormwater Permit, and therefore this ROWD, do not apply to those areas, only to the urbanized areas identified in Attachment A.

1.3.2.1 *Land use*

Each incorporated city in the Region serves as the land use agency for areas within its jurisdiction. The ten incorporated cities include San Buenaventura (Ventura) and Ojai in the Ventura River Watershed; Camarillo, Thousand Oaks, Simi Valley, and Moorpark in the Calleguas Creek Watershed; and Oxnard, Port Hueneme, Santa Paula and Fillmore in the Santa Clara River Watershed. The County of Ventura serves as the land use agency for unincorporated areas of the County. The more populated unincorporated communities of Piru, Saticoy, El Rio, Oak Park, Newbury Park, Meiners Oaks, Oak View, and Casitas Springs. The location of each incorporated city, in the region and populated unincorporated areas are shown on Figure 1-2.

Figure 1-2 Incorporated Cities and Populated Unincorporated County Areas



Ventura County and the ten cities within the County have collaborated in land use decision-making since 1969 when in cooperation with the Local Agency Formation Commission (LAFCO) a landmark set of county-wide policies entitled the "Guidelines For Orderly Development" were adopted. These policies clarified the relationship between the County and the cities regarding land use planning. These guidelines have resulted in confining urban development within cities' boundaries, which are much better equipped to deliver urban services.

The County, local cities and other agencies successfully collaborated again in 1974 to adopt the Regional Land Use Program. This program led to coordination among the cities and the County regarding such issues as population forecasting, transportation planning, spheres of influence planning, air quality planning, and water quality planning. Many of these early planning efforts have directly resulted in continued cooperative water management efforts.

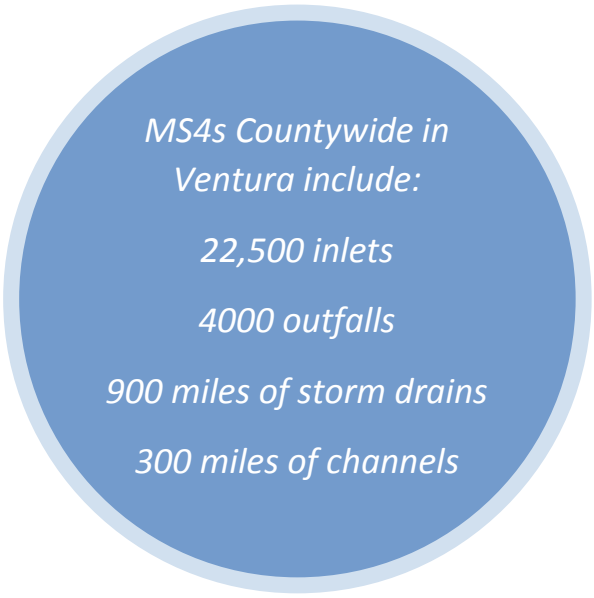
1.3.2.2 *Controlling Sprawl*

The County's residents are united in their efforts to moderate the pace of urban growth and preserve the County's agricultural and open space resources. Of the County's ten cities, eight (Camarillo, Fillmore, Moorpark, Oxnard, Santa Paula, Simi Valley, Thousand Oaks, and Ventura) have approved Save Our Open Space and Agricultural Resources (SOAR) measures and City Urban Restriction Boundaries (CURB) which define and limit where growth can occur and require voter approval of any development outside those areas. There are two cities which do

not have these measures: Port Hueneme, which is completely surrounded by the City of Oxnard and the Pacific Ocean, and therefore has no potential to expand; and the City of Ojai, which is known for its determined no-growth sentiment, and uses its General Plan and zoning approval process to limit growth. Finally, County residents adopted a Countywide SOAR measure which effectively limits urban development on Open Space and Agricultural areas.

1.4 Description of MS4 Facilities

The Ventura Countywide Stormwater Quality Management Program consists of eleven distinct MS4s. Other than where the cities' and the county's storm drains discharge into Watershed Protection District facilities, and a few areas where cities and the unincorporated areas may intersect these facilities are not highly interconnected. Originally designed to protect life and property many storm drains followed the natural landscape and drainage routes. Because of this there are many areas where natural springs feed into the MS4 during dry weather and runoff from upland natural areas enter during wet weather. The range of flows entering and exiting these MS4s will vary dramatically depending on storm intensity and the size of the catchment and antecedent moisture conditions.



The Watershed Protection District possesses jurisdictional authority over any channel containing runoff with a peak flow rate of more than 500 cubic feet per second (cfs) during a 100-year storm (referred to as "redline" channels). Jurisdictional authority does not define the channel as an MS4, but grants the District the authority to require sufficient information and engineering studies to show that any connections do not negatively impact the conveyance capacity of the jurisdictional channel. These redline channels may, or may not have engineered improvements, and may or may not require ongoing maintenance. Operations and Maintenance field crews regularly inspect and clear obstructions from the over 200 miles of improved and unimproved channels within the District's jurisdiction. However, the NPDES Permit only applies to the point sources (pipes or man-made conveyances) of the system.

The Permittees currently are responsible for close to 900 miles of storm drains 18 inches in diameter or greater, and close to 300 miles of channels. Storm water enters these facilities through roughly 22,500 inlets and exits from over 4000 outfalls countywide. Included in these systems are close to 150 debris basins and BMPs.

1.4.1 Unified Integrated Storm Drain Map

The Program has begun creating a unified integrated storm drain GIS mapping application. The goal of this effort is to create a new Countywide Storm Drain System Atlas Maps including the

stormwater drainage related information for the five small cities of Fillmore, Moorpark, Ojai, Port Hueneme, and Santa Paula who currently do not have this mapped in a geo-referenced database format. The result will be consistent with existing GIS Storm Drain System Atlas Maps for the Permittees Thousand Oaks, Camarillo, Simi Valley, Oxnard, Ventura, and the County. The ultimate goal is to produce a Countywide GIS analysis to 1) Create Countywide Unified Stormwater GIS tool, and 2) Identify infiltration constrains per 2011 Technical Guidance Manual.

The storm drain mapping for the small cities will ensure future opportunities for the Program to work collaboratively on stormwater and TMDL required treatment BMPs, future stormwater treatment projects, and provide regional understanding and visualization of challenges to be faced when planning on stormwater and TMDL required treatments on the watershed scale or countywide. This effort is also expected to be helpful in communicating the local conditions and complexity of planning, designing, and implementation of stormwater and urban runoff treatment and associated costs to regulators, NGOs, and the general public.

1.5 Challenges and Guiding Principles

1.5.1 Challenges

Municipalities face a myriad of environmental regulations ranging from their existing National Pollutant Discharge Elimination System (NPDES) stormwater permit and Total Maximum Daily Loads (TMDL) requirements to new regulations that will include statewide bio-criteria, trash, and nutrient policies. At the same time, regulatory strategies are evolving statewide to reflect more of a watershed-based, results-oriented, adaptive management approach to achieving water quality goals. Considering these realities, the Program has identified several challenges facing the Program in the upcoming permit term and have developed a number of proposed improvements for the next permit to help support addressing these challenges.

1.5.1.1 *Fiscal Challenges and Long Term Funding*

With a multitude of competing local interests and a lack of adequate secure funding, the Program continues to face challenges in funding local stormwater programs. For the past several years, managers have been forced to do more with less, developing and implementing programs to comply with increasing regulations, while budgets have remained relatively flat. Recognizing this reality, the concepts of prioritization and adaptive management become key to program planning and implementation. Eliminating ineffective activities will result in the reallocation of resources to strategies that have more potential benefits. Although overall program costs are unlikely to go down, the cost-benefit of resources expended should improve. Ultimately, the Program must be able to evolve and adapt to not only ensure compliance, but to move in the direction of water quality programs that are more holistic, rational, and sustainable in the future.

1.5.1.2 *Public Awareness and Support*

General awareness regarding water resources continues to present challenges to practitioners tasked with regulatory compliance. Inadequate public understanding of stormwater systems, the effects of urban runoff and stormwater on the environment, and the regulatory pressures affecting local jurisdictions, require navigation to allow effective implementation and funding of stormwater programs. Additionally, to garner public support, agencies must be able to demonstrate the public benefits of the programs being implemented. Public officials and key decision makers are confronted with many priorities when allocating resources and if the benefits of the program cannot be clearly demonstrated, support wanes and funding for important programs becomes a lower priority. The Program intends to continue a strong education and outreach effort in hopes of creating public ownership of stormwater resources by continuing to educate the public to implement individual efforts, make a commitment to clean water, and support sustained financing. However, to support this goal, the Program must be able to modify program requirements to support implementing actions that are most clearly linked to protection of beneficial uses and water quality priorities.

1.5.1.3 *Pollutant Sources and Regulation*

Sources of pollutants in stormwater and urban runoff are diverse and their effects on the environment are complex. As stormwater regulations were initially envisioned, pollutants were primarily from sources including commercial and industrial facilities, municipal areas and activities, construction, and development and so have been regulated. With this perspective, regulators approached stormwater as a point source, attempting to regulate specific facilities and implement site specific BMPs to solve the pollution problem, similar to the approach of regulating wastewater treatment plants as point sources. As programs have evolved and knowledge of sources has increased, we know that there are many other sources and factors in the environment affecting stormwater and urban runoff. Additional factors include land uses beyond the control of MS4s such as agriculture and Phase II sources, environmental factors such as bacterial regrowth and nutrient cycling, the influence of groundwater and geology on receiving waters, and natural loading. While stormwater programs are effective in controlling some of these sources, others are more effectively addressed through true source control initiatives, such as the phasing out of copper in brake pads through the Brake Pad Partnership. Other pollutants, such as trash, present significant challenges in source identification, often coming from many diffuse sources potentially outside of the control of stormwater programs. Considering the diffuse sources and other environmental factors, we have learned stormwater functions more as a non-point source of pollution, but continues to be regulated in a point source paradigm. As a result it is important to ensure the permit requirements are reflective of the nature of the sources and discharges, and does not include conditions that are unachievable given the diverse makeup of MS4 discharges.

1.5.1.4 *Program Evolution*

The MS4 programs implemented over the past two decades have been driven by the Maximum Extent Practicable standard, resulting in the implementation of a broad array of activities with the expectation that water quality would improve. In cases where sufficient improvements were not realized, TMDLs became the new drivers, pushing programs towards water quality based outcomes and often resulting in watershed oriented collaboration to address the varied

sources of pollutants. While this approach is typically more holistic in nature, there are inherent challenges related to jurisdictional boundaries, political pressures, competing priorities, and funding. Due to the differences in the maturity of watershed programs within the County, it is important to provide options for program planning and implementation at different scales, allowing programs to leverage actions to date to plan and implement efficiently. Furthermore, it is important that comprehensive watershed planning efforts be able to establish implementation plans that define compliance within the watershed, providing needed assurance moving forward that actions will result in compliant programs.

1.5.2 Guiding Principles

In response to these challenges, the Program has developed a set of principles to guide its participation in the Permit re-issuance process and in implementation of the new MS4 Permit for Ventura County.

- The Program supports an improved watershed focus and more holistic management where appropriate; however, considering the unique nature of each watershed within the Region, it is necessary to keep all program planning and implementation options available.

- Program efforts should be coordinated with watershed plans and other entities that affect water quality in the region as appropriate. Permit language should not hinder holistic watershed management.

- Where watershed programs are in place, existing efforts should be allowed to either replace permit requirements if equivalent or add to such existing efforts to build an equivalent program.

- There should be an increased emphasis on strategic planning, including the ability to prioritize and implement actions to focus on identified pollutants of concern. Permit language should be supportive of these concepts and conflicting requirements should be eliminated.

- The Program supports the evolution of MS4 program elements through the adaptive management process. The Permit should facilitate meaningful, timely assessments that will lead to improved program efficiency and effectiveness through integration and streamlining where possible.

- The Program supports the use of the best available science that leads to informed stormwater management and public policy decisions. Monitoring and reporting requirements need to be limited to those elements that provide information that will help answer key questions, inform management decisions, and should be coordinated where appropriate (e.g., integrate TMDL and MS4 monitoring).

2 VENTURA COUNTYWIDE STORMWATER MANAGEMENT PROGRAM

2.1 PROGRAM BACKGROUND

2.1.1 Permit History

The first stormwater permit for Ventura County was adopted in 1994 and included all ten cities, the County, and the Watershed Protection District. This NPDES MS4 Stormwater Permit (Permit) served to increase awareness of stormwater pollution to both the public agencies and the public. On July 27, 2000 a second permit was adopted that included logical and incremental increases in the requirements. Notable new requirements were increased monitoring and land development criteria for the treatment of stormwater runoff. That five-year permit was on administrative extension until May 7, 2009, when Board Order 09-0057 was adopted. Shortly after adoption of that permit the Regional Board rescinded it to hold a new adoption hearing. On July 8, 2010 Order No. R4 2010-0108 was adopted with minor changes. The 2010 Permit had a new set of implementation deadlines associated with it and replaced the order adopted in 2009 in its entirety. This last permit greatly increased the monitoring requirements by adding eleven Major Outfall sites on top of the three wet weather receiving waters sites that had been monitored under the previous permit. Additionally, this is the first time Low Impact Development and runoff retention requirements were required by the LA-RWQCB.

2.1.2 Organization and Coordination

The Watershed Protection District (Principal Permittee), the County of Ventura, and the incorporated cities of Camarillo, Fillmore, Moorpark, Ojai, Oxnard, Port Hueneme, Ventura, Santa Paula, Simi Valley, and Thousand Oaks, (each a Permittee, and collectively known as Permittees) operate municipal storm drain systems and discharge stormwater and urban runoff pursuant to the countywide NPDES Permit. Their waste Discharger Identification Numbers (WDID) and contacts are listed in Table 2-1.

The Permittees joined together in 1992 to create a countywide stormwater quality program.

In 1992 the concept of a single countywide Permit was initiated in Ventura County. This began with the initial Report of Waste Discharge and the authorization to use the Watershed Protection District's Benefit Assessment Program to finance the activities and program efforts. Subsequently, on June 30, 1992, the District (as the Permit's Principal Permittee) entered into four separate District-zone-based implementation agreements with the ten Ventura County cities and the unincorporated areas of the county (the Permittees). Collectively, these four agreements were known as the Implementation Agreement for the Ventura Countywide Stormwater Quality Management Program. The Implementation Agreement identified the responsibilities of the Permittees and set forth the methodology for

using the District's Benefit Assessment financing to fund the NPDES Stormwater Programs countywide.

The Agreement has been amended over the years and with the new Permit a renewed effort to secure a long term agreement was initiated. The result was a five year Implementation Agreement with all Permittees to replace the original agreement. The Agreement defines the fiscal responsibilities (expenditures and contributions) of all collective parties with respect to the current Permit. It formalizes the Permittees' commitment to cooperate and to mutually fund an integrated Program for protecting and improving water quality in Ventura County.

Table 2-1 WDID Numbers and Contacts for the Permittees

Permittee	Contact	Address	WDID Number
Ventura County Watershed Protection District	Gerhardt Hubner (805) 645-5150	800 S. Victoria Ave. Ventura CA, 93001	4A560120001
Ventura County Unincorporated	Ewelina Mutkowska (805) 645-1382	800 S. Victoria Ave. Ventura CA, 93001	4A560121005
Camarillo	Anita Kuhlman (805) 383-5659	601 Carmen Drive P.O. Box 248 Camarillo, CA 93001	4A560124001
Fillmore	Michael Koroknay (805) 524-1500	250 Central Ave. Fillmore, CA 93015	4A560100003
Moorpark	John Brand (805) 517-6248	799 Moorpark Ave, Moorpark, CA 93021	4A560125001
Ojai	Greg Grant (805) 646-5581 x251	PO Box 1570 Ojai, CA 93024	4A560126001
Oxnard	Jeremy Grant (805) 385-3965	305 West Third Street Oxnard, CA 93030	4A560127001
Port Hueneme	Fred Camarillo (805) 986-6556	250 North Ventura Road Port Hueneme, CA 93041	4A560122002
Santa Paula	Brian Yanaz (805) 933-4212	970 Ventura Street P.O. Box 569 Santa Paula, CA 93061	4A560128001
Simi Valley	Kevin Gieschen (805) 583-6462	2929 Tapo Canyon Rd. Simi Valley, CA 93063	4A560110004
Thousand Oaks	Jim Taylor (805) 449-2442	2100 Thousand Oaks Blvd. Thousand Oaks, CA 91362	4A560129001
Ventura	Karen Sedlacek (805) 652-4582	501 Poli Street P.O. Box 99 Ventura CA 93002	4A560107008

2.1.2.1 *Program Management*

The NPDES Management Committee is the principal forum for directing the Program's development and implementation. This Committee is attended by senior staff from all Permittee agencies, and meets monthly to assure Program continuity. Committee members have been authorized by their Director of Public Works as Management Committee Voting Representatives with the authority to approve the Principal Permittee's budget and modifications. If no Representative is authorized, it is the Directors of Public Works responsibility to voice their opinion at meetings when these items are on the agenda. In addition to budgeting and program direction, this committee also periodically evaluates the

need to create ad hoc committees or workgroups to develop tools and accomplish the objectives of the NPDES Stormwater Program.

Subcommittees provide a forum for discussion of particular program elements and are attended by the staff with the appropriate expertise from each Permittee. These meetings allow for a more uniform approach and regional consistency to program implementation countywide. This helps provide a level playing field for businesses and residents countywide. More importantly it allows the Permittees to learn from each other, and have access to tools that have already been developed. This is very beneficial for the smaller agencies which have limited resources.

The subcommittees were created at the beginning of the Program, and have continued to meet and evolve over the years as requirements and pollutant priorities have changed. Each subcommittee focuses on specific Permit requirements and implementation programs to improve water quality. These generally follow the six minimum program elements required by the U.S. EPA: Public Information and Participation, Land Development, Construction, Public Agency Activities, and since the inspection staff usually performs both functions Commercial and Industrial Business and Illicit Discharge/Illicit Inspection have been combined into one subcommittee.

2.1.2.2 *Program Elements*

The subcommittee structure and reporting of Ventura Countywide Stormwater Quality Management Program (VCSQMP) follows the structure presented in the Clean Water Act Section 402(p) requirements which requires Phase I MS4s to implement a stormwater management program that contains the following elements:

- **Program Management:** including program structure, institutional arrangements, legal authority, and fiscal resources
- **Public Information and Participation:** including general and focused outreach, school education programs, citizen participation, and effectiveness evaluation of the public information program.
- **Industrial / Commercial Discharges:** including identification of sources, BMPs, outreach, inspections, staff training, and coordination with state General Permit.
- **New Development and Re-development:** including planning processes, local permits, staff training, post-construction structural BMPs, and outreach.
- **Construction:** including erosion and grading permits, construction BMPs, site inspections, enforcement, and coordination with state General Permit.
- **Public Agency (Municipal) Operations:** including inventory and BMPs for corporation yards, parks and recreation, storm drain system operation and maintenance, streets and roads, flood control, public facilities, and ponds, fountains, and other public water bodies.

- **Illicit Discharges:** including prohibition of illicit connections and dumping, hotline response, and enforcement procedures.

- **Water Quality Monitoring Program:** including characterization of discharges from the MS4, and impacts to the receiving waters.

2.1.3 Funding

The funding sources used by the Permittees include: Watershed Protection District Benefit Assessment Program, General Fund, Utility Tax, Separate Tax, Gas Tax, Special District Fund, and others (Developer Fees, Business Inspection Fees, Sanitation Fees, Fleet Maintenance, Community Services District, Water Fund, Grants, and Used Oil Recycling Grants).

All Permittees except the City of Moorpark gave authorization to use the Watershed Protection District's Benefit Assessment to finance the activities and requirements. This was done through watershed based Implementation Agreements for the Ventura Countywide Stormwater Quality Management Program. The Implementation Agreements identified the responsibilities of the parties to the Permit and set forth the methodology for using the District's Benefit Assessment financing to fund the NPDES Stormwater Program in their respective jurisdictions. Table 2-2 lists the rates and Benefit Assessments Units for each Permittee.

To facilitate management of its revenues and projects, the District is divided into four zones, roughly corresponding to the major watersheds within the county (Figure 2-1). Zone 1 essentially follows the boundaries of the Ventura River Watershed and coastal drainages in the western part of the county. Zone 2 essentially follows the boundaries of the Santa Clara River Watershed and local coastal drainages in the cities of Ventura and Oxnard. Zone 3 essentially follows the boundaries of the Calleguas Creek Watershed and its tributaries. Zone 4 is a mixture of Malibu coastal drainages in the southern part of the county and the relatively undeveloped Cuyama River Watershed in the northern part of the county.

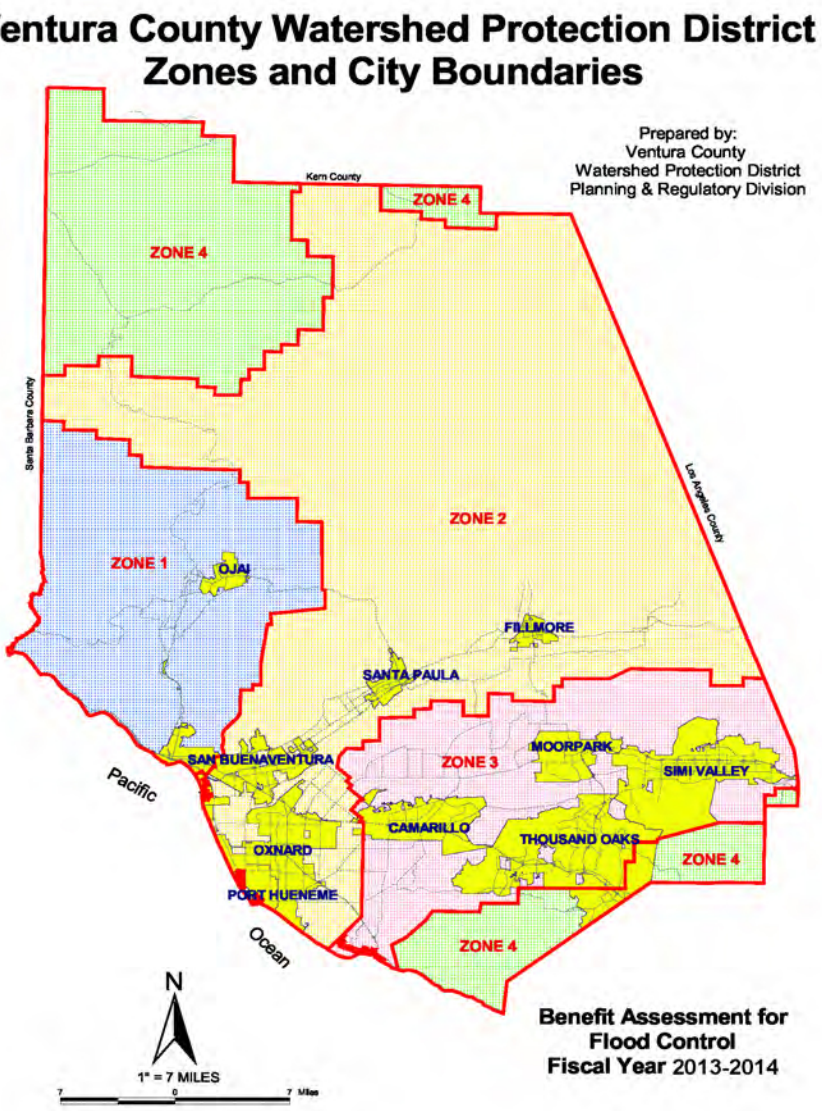
The County of Ventura receives an assessment for these purposes only in the unincorporated areas of Ventura River/Ojai Valley (District Zone 1) and the Santa Clara River Valley/Oxnard (District Zone 2) areas for FY 2013/14. The County unincorporated areas of the Calleguas Creek watershed (District Zone 3) and Hidden Valley/Lake Sherwood/Oak Park (District Zone 4), and as mentioned, the City of Moorpark has no NPDES assessment. Therefore, these agencies do not receive assessments to fund its NPDES programs in these areas.

With the adoption of the second term NPDES Permit in 2000, the Principal Permittee Program responsibilities and associated costs increased significantly. The District could no longer solely shoulder these fiscal obligations without assistance from the Permittees. In response, the Permittees' Public Works Directors created a committee to draft a new implementation agreement.

In FY 2007/08, the first amendment to the agreement was approved to address this needed cost-sharing. In FY 2008/09 and 2009/10, the second and third amendments to the original agreement were approved to continue this needed cost-sharing. The additional program costs for the Principal Permittee and Permittees associated with the third term NPDES Permit in 2010 prompted further effort among the Public Works Directors to equitably share the increased

costs. The result of that effort was a new NPDES Implementation Agreement to supersede the original agreement and amendments.

Figure 2-1 Benefit Assessment Zone Map



The Agreement defines the fiscal responsibilities (expenditures and contributions) of all collective parties with respect to the current Permit. It formalizes the Permittees' commitment to cooperate and to mutually fund an integrated Program of protecting and improving water quality in Ventura County. The five year time frame was designed to mirror the term of the Permit. As new permits are written and adopted for Ventura County these agreements will be reviewed, revised, and renewed as appropriate.

Unfortunately, funding through the Benefit Assessment program has not kept pace with the increased costs of Permit compliance. Due to the passage of Proposition 218 in 1996 the rates have been frozen and cannot be raised without passing approval from the public.

Table 2-2 Stormwater Benefit Assessment Units and Rates

Zone	City	Parcels	Assessment Units	Rate	Total Assessment
Zone 1 (Ventura River)	Ojai	2,879	4,383	$7.82	$34,261
	Ventura	7,687	9,860	$5.90	$58,138
	Unincorporated County	8,165	14,806	$1.45	$21,435
Zone 2 (Santa Clara River)	Fillmore	3,730	4,286	$4.00	$17,141
	Oxnard	38,829	56,455	$10.28	$580,201
	Santa Paula	6,744	9,089	$6.65	$60,414
	Ventura	23,974	32,611	$5.90	$192,301
	Unincorporated County	8,991	27,705	$1.36	$37,630
	Camarillo	13	222	$5.00	$1,112
	Port Hueneme	6,315	4.926	$3.00	$14,768
Zone 3 (Calleguas Creek)	Camarillo	22,302	30,529	$5.00	$152,561
	Moorpark	10,356	13,280	$0.00	$0.00
	Simi Valley	37,337	47,921	$3.87	$185,287
	Thousand Oaks	35,473	49,912	$5.12	$255,383
	Unincorporated County	10,034	22,751	$0.00	$0.00
Zone 4 (Malibu Creek)	Thousand Oaks	5512	8444	$5.47	$46,144
	Unincorporated County	8336	7600	$0.00	$0.00

2.2 PROGRAM ACCOMPLISHMENTS

Since the adoption of the third term Permit the Program has achieved many accomplishments in each of the program elements. Every year these are summarized in the Annual Report. Below is a compilation of the program accomplishments since Permit adoption presented by program element. Also included are the special studies performed by the Program, several beyond Permit requirements, and a summary of the Strategic Planning performed by the Management Committee to establish a vision for water quality in Ventura County.

Many Program accomplishments were achieved beyond Permit requirements.

2.2.1 Program Management

- Water quality at beaches throughout Ventura County among the best in the state.

- Adoption of a five-year Implementation Agreement by all Permittees ensuring continued cooperation countywide, and authorization by Public Works Directors for Management Committee members to vote on budget issues empowering the Committee to allocate resources to address stormwater issues.

- Adoption of Stormwater Quality Ordinance update and submittal of legal assurance by each Permittee to document Permittees' legal authority to comply with 2010 Permit.

- Adoption of a Program Mission Statement: *Enhance, protect, and preserve water quality in Ventura County water bodies using proactive and innovative ideas for preservation of biodiversity, ecological viability, and human health. Work as a countywide team with public agencies, private enterprise, the environmental community, and the general public to locally implement Clean Water Act requirements, balancing the action taken with social and economic constraints.*

- Initiated development of a long term strategic plan for addressing water quality issues in the County including identifying the goals and objectives that will ensure success when accomplished.

- New Annual Report format developed in conjunction with Regional Board staff with over 50 specific Performance Measures identified, and included in an electronic reporting format.

- Improved Principal Permittee Program efficiency through implementation of recommendations provided through a detailed program efficiency audit to evaluate any capability to improve efficiency of the Principal Permittee's mandated and required efforts.

- On May 2, 2013 the Program gave an informative presentation to the Regional Board covering the Permit implementation including pollutant prioritization, success stories, and the challenges in Ventura County.

- Provided support funding to Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) for an Environmental Impact Report (EIR) for a single use bag ordinance. This EIR will be available to the Permittees who want to pursue a single use bag ordinance to reduce litter.

- Active participation in Stormwater Monitoring Coalition of Southern California, Southern California Coastal Water Research Project (SCCWRP), and California Stormwater Quality Association (CASQA).

2.2.2 Public Information and Public Participation Program

- Development and implementation of a targeted public education campaign on horse manure management using multiple direct mailers and retail store cooperation;

- Implementation of new Youth Outreach Plan based on a Youth Awareness Survey conducted to establish a baseline of understanding before targeted outreach began. In-school outreach rallies done at 26 schools to over 23,000 students with the cooperation of local radio station Q104.7, and multiple presentations to Boys and Girls Clubs across Ventura County. Also, a kids and teachers activity page was included in the redesigned Community for Clean Watershed website.

- Initiated and promoted a social media presence to the Public Outreach program that includes Facebook and twitter.

- Development and distribution of Retail Partnership BMP brochures targeted to customers of auto parts stores, pet stores, and home improvement/garden centers.

- Installed Watershed Identification Signs across the four watersheds of the County to remind residents they live in a watershed, and to keep it clean.

- Over 89 million impressions made since Permit adoption with over 10 percent of those made in Spanish.

- Countywide organization and participation each year in the statewide Coastal Cleanup Day Event at over 20 different beaches and inland waterways.

2.2.3 Industrial Commercial Business Program

- Development and distribution of new bilingual BMP training posters for display in restaurants, auto-related businesses, and nurseries.

- Development and distribution of new information packet on the General Industrial Stormwater Permit requirements and multiple BMP fact sheets for different industrial processes and functions.

- Revision of inspection program and inspection forms to include implementation of Permit required BMPs.

- Updated BMP fact sheets for Building and Grounds Maintenance, Pool and Spa Maintenance, Commercial Pesticide Application, Mobile Cleaning Services, Mobile Auto Detailing and Charity Car Wash Events, and Building Repair and Remodeling for use in educating the public when an illicit discharge is suspected.

2.2.4 Planning and Land Development Program

- Submittal of a revised Technical Guidance Manual for New and Significant Re-development. Development of the Manual included a significant stakeholder process and ended with a one day training seminar. The revised Technical Guidance Manual has been implemented, and an electronic application tool for project proponents to determine applicability and calculate retention volumes has been provided to the development community.

- Framework options for managing offsite compliance program for developments that prove technical infeasibilities to onsite LID outlined and potential opportunities for large scale regional mitigation was researched and presented to the Permittees for local or regional implementation.

- Completion of a countywide Hydromodification Control Plan (HCP), which included mapping of the areas the Permit identified as susceptible to hydromodification. The HCP was developed through an open stakeholder process, and in close cooperation with SCCWRP to aid in a hydromodification effects study.

- Implementation of tracking, inspection, and enforcement programs for post-construction BMPs including annual maintenance verification monitoring for private projects and on-site inspection of Permittee's BMPs at least once per two years.

2.2.5 Development Construction Program

- Implementation of construction site inspection program for small and large sites and tracking of enhanced BMPs, and more frequent inspections required for the high risk sites.

- Development of a model construction sites stormwater inspection checklist for use by all Permittees.

- Development and distribution of new BMP training posters for construction sites identifying several potential causes of stormwater pollution and the appropriate BMPs to prevent it at small, large, and high risk sites.

- Outreach and support in implementation of the new General Construction Permit.

2.2.6 Public Agencies Activities Program

- Elimination of wash water discharges from vehicle and equipment washing at each Permittee's facilities including all of the County of Ventura's Fire Stations.

- Prioritization of Permittee's catch basins and implementation of inspection and clean-up programs based on prioritization results.

- Increased trash management programs within high trash areas and at public events which included the installation of excluders on catch basins in high trash generating areas.

- Approved a Ventura Countywide Pesticide Protocol, modified it to include Monthly Pesticide Use Forms, and clarified requirement of direct on-site supervision.

- Annual training program for Permittee's employees and contractors and annual training sessions held in cooperation with the Ventura County Office of Education to facility maintenance at public schools.

2.2.7 Illicit Discharge and Illegal Connections Elimination Program

- Mapping of storm drain system and all known storm drain system connections in consistent format specified by Principal Permittee. Additional funding was allocated to initiate GIS mapping of storm drain systems to create a Unified Countywide Storm Drain Geodatabase to facilitate multijurisdictional and regional treatment planning efforts.

- Mapping of the reported illicit connection and discharges to identify priority areas.

- Developed a protocol for illicit discharge and illicit connection field screening.

- Screened outfall and storm drains for evidence of illicit discharges and illicit connections.

2.2.8 Monitoring

- Installed new flow weighted composite sampling equipment and telemetry systems at eleven new Major Outfall locations.

- Improved data evaluation and comparison to water quality objectives through a comprehensive review of Basin Plan, California Toxics Rule, and Program's water quality database stored values and programmed calculations. The new approach provides more consistency with other stormwater agencies in southern California, and provides more consistent protection of beneficial uses.

- Developed a Water Quality Index to distill the over 200 constituents monitored into an easy to communicate form.

- Comprehensive assessment and statistical analysis of more than 10 years of monitoring data resulted in:

    1. Identification of pollutants in Ventura County MS4s that cause or contribute to exceedances of water quality standards in receiving waters.

    2. Identification of trends in receiving water quality. Water quality improvements, including reduced number of exceedances, were found for a wide variety of constituents.

    3. Determination of baseline water quality for Ventura County MS4s.

2.2.9 Total Maximum Daily Loads (TMDLs)

Since Permit adoption in July 2010, a number of new TMDLs were adopted and approved within Ventura County. The following is a summary of effective memoranda of Agreement (MOAs) formed among TMDL Responsible Parties to meet TMDL implementation schedule milestones which is also presented in Table 2-3. TMDLs established by U.S. EPA do not have an implementation schedule and so there are no specific TMDL requirements that TMDL Responsible Parties are required to implement.

Table 2-3 TMDL Memorandums of Agreements

Watershed	TMDL	TMDL Requirement	MOA Effective Date	Participating Parties
VRW	Algae, Eutrophic Conditions, & Nutrients TMDL	Development of Receiving Water Monitoring Plan	05/01/2014	City of Ventura, City of Ojai, County of Ventura, District, Ojai Valley Sanitary District, VCAILG (Farm Bureau of Ventura County), & Caltrans
		Receiving Water Monitoring	01/19/2015	
		Development of Implementation Plan	01/05/2015	City of Ventura, City of Ojai, County of Ventura, District, & Caltrans
VRW	VRE Trash TMDL	Implementation of TMRP/MFAC	03/28/2009	City of Ventura, County of Ventura, District, Fairgrounds, State Parks, VCAILG (Farm Bureau of Ventura County), & Caltrans
SCR	SCR Bacteria TMDL	Development of Receiving Water Monitoring Plan	09/04/2012	City of Fillmore, City of Santa Paula, City of Oxnard, City of Ventura, & County of Ventura
		Development of Implementation Plan	11/01/2014	
CCW	OC Pesticides TMDL	Implementation of TMDL Requirements	06/30/2009	CCW MS4s, CCW WWTPs, and VCAILG (Farm Bureau of Ventura County)
CCW	Metals TMDL			
CCW	Salts TMDL			
CCW	Toxicity, Chlorpyrifos, and Diazinon TMDL			
CCW	RSBW Trash TMDL			
CCW	Oxnard Drain TMDLs			
OCW	Harbor Beaches TMDL	Implementation of MS4 Permit Requirements	07/08/2012	County of Ventura, VC Harbor Dpt, and VC Environmental Health Dpt.*
MCW	Malibu Creek Bacteria TMDL	TMDL Monitoring	07/20/2010	District, County of Ventura, & City of Thousand Oaks
MCW	Malibu Creek Trash TMDL	Implementation of TMRP/MFAC	07/30/2012	

* City of Oxnard is implementing this TMDL on its own.

2.2.10 Special studies

- Pyrethroid Insecticides Study - In April 2012 the Program implemented the first phase of a pyrethroid study that showed no significant sediment toxicity to *Hyalella Azteca*, or concentrations approaching levels of pyrethroids known to be toxic at any of the monitored sites.

- Hydromodification Control Study – The Permittees participated in the "Development of Tools for Hydromodification Assessment and Management" project undertaken by the Southern California Stormwater Monitoring Coalition and coordinated by SCCWRP.

- Low Impact Development – The Permittees have joined with the Southern California Stormwater Monitoring Coalition to help fund the project "Quantifying the Effectiveness of Site Design/ Low Impact Development Practices in Southern California".

- Southern California Bight Project – The Principal Permittee has participated in this multiple year regional monitoring survey with the primary objective to assess the spatial extent and magnitude of ecological disturbances on the mainland continental shelf through both collecting samples and serving on the Steering Committee.

- Bioassessment – The Principal Permittee has participated with the Southern California Regional Monitoring Program though extensive field data collection, and guiding the development of the program through Regional Monitoring Program Steering Committee and Southern California Stormwater Monitoring Coalition.

- Pentachlorophenol - Responded to elevated levels of pentachlorophenol at an urban outfall with a special investigation that conclusively found the source, and initiated a multi-agency effort to eliminate the discharge.

- Aluminum Background Study - Additional sampling and historical data analysis to help identify sources of aluminum and potential solutions. Aluminum has been found at notably high levels in both natural sediments and flows from natural areas.

- Bacteria Source Markers – Several source identification studies were initiated, quantifying human, dog, and bird genetic markers in MS4 outfalls, receiving waters, and background sites. The results will help the Program identify the controllable sources of indicator bacteria in the receiving waters, and assess the risk to human health associated with elevated bacteria levels.

2.2.11 Water Quality Strategic Planning

The Permittees wanted to develop a more proactive and comprehensive view of water quality management that was capable of addressing the number and complexity of additional water quality regulations, particularly in light of the lengthy and contentious previous NPDES stormwater permit renewal process.

The Water Quality Strategic Planning effort (Strategic Plan) enabled the Permittees to establish a vision for water quality in Ventura County and a framework for achieving that vision. Through this process, Permittees are working to develop a strategy for prioritizing and optimizing resources and holistically addressing water quality concerns. In particular, Permittees hope to utilize the Strategic Plan to prioritize efforts.

The primary purpose of the Strategic Plan is to identify the most important water quality priorities and develop coordinated and effective strategies for achieving them. Currently, Permittees believe that various requirements create program costs without any attendant water quality improvements. Eliminating ineffective activities should result in the ability to redeploy those resources to implementing strategies that have more impact on real water quality

improvements. Thus, overall program costs are unlikely to go down, but the cost-benefit of resources expended should improve. In addition, the Strategic Plan already recognizes and anticipates the need to partner with other entities, both NGOs and other agencies, and with other planning processes, such as Integrated Regional Water Management, to achieve success in reaching water quality goals. Through partnering, there is a very real opportunity to leverage other resources to achieve our shared objectives.

Permittees have not yet begun the second phase of the planning effort which will create a comprehensive water quality strategic plan. The comprehensive plan will break down objectives into discrete tasks with milestones and assigned responsibilities. This stage will establish a clear picture of implementation commitment(s) in a collaborative setting with other NPDES stormwater Permittees.

The Vision Statement and goals approved by the Management Committee are listed below.

Vision Statement:

> *"Our vision of the future is a thriving community supportive of the integrative management, protection and sustainable use of stormwater resources***."**

Strategic Plan Goals:

- Relationships - We will create and nurture cooperative working relationships within and among agencies, stakeholders, and all levels of government to share a common goal of improving water quality and natural resources.

- Education and Ownership - We will create public ownership of stormwater resources by educating the public to achieve individual compliance, commitment to clean water, and financing of the program.

- Reliable Funding - We will secure reliable sources of funding sufficient to meet the stormwater program goals and objectives.

- Sustainable Regulatory Framework - We will promote a regulatory framework that is sustainable for all stakeholders.

- Informed Decisions - We will support and use the best available science that leads to informed stormwater management and public policy decisions.

- Measurable Achievements - We will achieve optimal water quality, enhance beneficial uses, and establish healthy watersheds.

2.3 WATERSHED MANAGEMENT ACCOMPLISHMENTS

2.3.1 Ventura River Watershed

- Over seventy (70) percent full trash capture device compliance by the point sources have been implemented as required by the Ventura River Estuary Trash TMDL and on-going

Estuary-wide clean-up under a cooperation with the Ventura Hillside Conservancy. A cooperative effort by the TMDL Responsible Parties including County of Ventura, Watershed Protection District, City of Ventura, California Department of Recreation (Fairgrounds), California State Parks Department, California Department of Transportation, and Farm Bureau of Ventura County representing Ag Dischargers has been on-going since 2009.

- Ventura River Algae TMDL Implementation Plan is currently under development as funded through an Agreement among County of Ventura, Watershed Protection District, City of Ojai, City of Ventura, and California Department of Transportation. This Plan will include BMPs, implementation schedule, and Risk Assurance Analysis to achieve compliance with Algae TMDL by June 2019.

- Comprehensive algae, nutrient, and general water quality monitoring of receiving waters as required by the Ventura River Algae TMDL will be initiated in January 2015 through an Agreement among County of Ventura, Watershed Protection District, City of Ojai, City of Ventura, Ojai Valley Sanitary District, California Department of Transportation, and Farm Bureau of Ventura County representing Ag Dischargers.

- Ventura River Watershed Council has developed its Watershed Management Plan through a comprehensive stakeholder process; draft will be available in early 2015.

2.3.2 Santa Clara River Watershed

- Santa Clara River Bacteria TMDL Implementation Plan is currently in development through an Agreement among County of Ventura and the cities of Fillmore, Oxnard, Santa Paula, and Ventura.

- Receiving water monitoring plan has been developed as required by the Bacteria TMDL through an Agreement among County of Ventura and the cities of Fillmore, Oxnard, Santa Paula, and Ventura.

- Nitrogen receiving water limits are being met, delisting of impairment sought.

- Salt and Nutrient Management Plan has been completed and a draft is currently out for public review.

- POTWs in the watershed have upgraded treatment processes.

- Water conservation and water recycling efforts and activities have increased.

- Efforts to regulate water softeners have commenced.

- Ordinances have been updated to address septic systems within the watershed.

2.3.3 Calleguas Creek Watershed

- TMDL Responsible Parties are developing an Implementation Plan to meet wasteload allocations of all effective TMDLs.

- POTWs upgraded treatment processes to reduce discharges of nitrogen compounds.

- The stakeholders are proceeding with all special studies required under the TMDLs. The special studies for the Nitrogen, Toxicity, and Metals TMDLs have all been completed and submitted to the RWQCB.

- The AWQMP continues to be implemented by agricultural dischargers to reduce discharges of all pollutants covered by the TMDLs. Surveys show that growers are actively implementing BMPs in high priority watersheds.

- Stormwater agencies have implemented actions to reduce discharges of OC Pesticides and PCBs, metals, and trash in the watershed.

- Salinity Management Pipeline operational.

- Stakeholders are actively implementing actions outlined in the Salts TMDL to reduce the salt imbalance in the watershed.

- Revolon Slough and Beardsley Wash Trash TMDL Responsible Parties including County of Ventura, Watershed Protection District, City of Camarillo, City of Oxnard, California Department of Transportation, and Farm Bureau of Ventura County representing Ag Dischargers have been implementing TMDL requirements since 2009.

2.3.4 Malibu Creek Watershed

- County of Ventura, Watershed Protection District, and City of Thousand Oaks have been working cooperatively to implement requirements of the Bacteria and Trash TMDLs. In fall of 2013, a dry weather bacteria source identification study was completed including marker testing to better inform future implementation actions.

- County of Ventura and Watershed Protection District developed an Implementation Plan Addendum to define a Bacteria TMDL compliance strategy focused on reducing bacteria loads within the urban areas.

- County of Ventura, Watershed Protection District, and City of Thousand Oaks participate in monthly watershed-wide coordination meetings of the Malibu Creek Watershed Management Council including County of Los Angeles, cities located within Los Angeles County, Las Virgenes Municipal Water District, and other agencies.

3 CHARACTERIZATION OF DISCHARGE

3.1 MONITORING PROGRAM

The Ventura Program has been performing monitoring at key receiving water locations within the watershed for more than ten years, and multiple outfalls since 2009. Prior to that selected land use sites were monitored as far back as 1995. Through this combination of monitoring, the Program has a solid understanding of the water quality in receiving waters and in the MS4s.

3.1.1 Overview

The following sections detail the purpose of the Program's runoff monitoring and the locations of the sampling sites.

3.1.1.1 *Mass Emission Monitoring*

Mass Emission stations are located in the lower reaches of the three major watersheds in Ventura County (Ventura River, Santa Clara River, and Calleguas Creek). As such, the Mass Emission drainage areas are much larger than the drainage areas associated with Major Outfall stations (described in Section 3.1.1.2), and include large contributions from other sources of discharge, such as wastewater treatment plants, agricultural runoff, non-point sources, and groundwater discharges.

The purpose of mass emission monitoring is to identify pollutant loads to the ocean and identify long-term trends in receiving water pollutant concentrations. This type of monitoring, in conjunction with the Major Outfall monitoring, is also useful in helping to determine if the MS4 is contributing to exceedances of water quality objectives by comparing results to applicable water quality objectives in the Los Angeles Region Water Quality Control Plan (Basin Plan) and the California Toxics Rule (CTR).

Each monitoring season water quality samples from three wet-weather events and one dry-weather event are targeted for water chemistry analysis at each Mass Emission station, as required by the NPDES Permit. Aquatic toxicity samples are collected at each Mass Emission station during the first sample event of the monitoring year and tested with the species that was determined to be the most sensitive to contaminants for each station, based on the results from the 2009/10 monitoring year.

3.1.1.2 *Major Outfall Monitoring*

The Permit requires sampling at one representative station (major outfall) for each Permittee's MS4. Many of the monitoring requirements for Major Outfall stations are similar to those for the Mass Emission stations, as are the reasons for undertaking this monitoring. Four of the stations were monitored beginning with the 2009/10 monitoring season and seven of the stations were new to the 2010/11 monitoring season. Station selection for these new sampling locations is described in Section 3.1.2.2.

Each monitoring season water quality samples from three wet-weather events and one dry-weather event are targeted for water chemistry analysis at each of the eleven Major Outfall stations, as required by the NPDES Permit. Aquatic toxicity samples are also collected at each of the Major Outfall stations during Event 1 of each monitoring year and tested with the species that was determined to be the most sensitive to contaminants for that station, based on the results from the 2009/10 or 2010/11 monitoring year, as applicable.

Using the data from the Major Outfall monitoring in conjunction with the Mass Emission monitoring, the Stormwater Monitoring Program will help the Program determine if an MS4 is potentially contributing to exceedances of water quality objectives by comparing results to applicable water quality objectives in the Basin Plan and the CTR. Over the course of many years, the data will be able to describe trends in waters from the Major Outfall stations. This information will be useful in evaluating the effectiveness of the Program implementation and provide Permittees with real data on which to base future management decisions.

3.1.1.3 *Dry-Season, Dry-Weather Analytical Monitoring*

The Permit requires the analysis of pollutant discharges from representative MS4 outfalls in each municipality and in the unincorporated County area during dry-weather between May 1 and Sept 30. The Stormwater Monitoring Program meets this requirement by sampling once during the summer at or near Major Outfall stations, or at another pre-selected representative site if flow was insufficient at the Major Outfall station.

3.1.1.4 *Bioassessment Monitoring*

Prior to the adoption of the new Orders (No. 09-0057 in 2009 and its replacement, R4-2010-0108 in 2010), the Stormwater Monitoring Program performed bioassessment monitoring in the Ventura River watershed at fixed locations. That sampling effort was terminated in favor of a new program working to standardize bioassessment monitoring throughout Southern California undertaken by the Stormwater Monitoring Coalition of Southern California (SMC) and led by the Southern California Coastal Water Research Project (SCCWRP). The Stormwater Monitoring Program was instructed to participate in this new Regional Monitoring Program (RMP) by performing sampling at 15 random sites and three targeted sites throughout the County annually, for the duration of the five year study. The initial study focused on perennial streams and ended in 2013, however the regional bioassessment effort is ongoing and is being modified and revised as new information becomes available.

3.1.2 Monitoring Station Locations and Descriptions

3.1.2.1 *Mass Emission Stations*

Mass Emission stations are located in the three major Ventura County watersheds: Ventura River (ME-VR2), Santa Clara River (ME-SCR), and Calleguas Creek (ME-CC). In locating these stations, every effort was made to position the station as low as possible in the watershed to capture as much of the runoff as possible, while still remaining above tidal influence. See Figure 3-1 for the location of Mass Emission stations.

The ME-VR2 station is located at the Ojai Valley Sanitary District's wastewater treatment plant (WWTP) near Cañada Larga Road and captures runoff from the City of Ojai, several unincorporated communities (e.g., Meiners Oaks, Casitas Springs), a very small portion of the City of Ventura, and a large portion of undeveloped landscape, the latter of which comprises the bulk of the watershed. Monitoring at the ME-VR2 station was initiated during the 2004/05 monitoring season after landslide activity at the original Ventura River Mass Emission station, ME-VR, precluded further sampling at that location.

The ME-CC station is located along Camarillo Street (formerly University Drive) near California State University at Channel Islands and captures runoff from the cities of Camarillo, Thousand Oaks, Moorpark, and Simi Valley. This watershed has the largest urban influence (roughly 30% urbanized), but

also includes significant flows from agricultural runoff found predominantly in the lower two-thirds of the watershed. Monitoring at the ME-CC station was initiated during the 2000/01 monitoring season.

The ME-SCR station is located at the United Water Conservation District's (UWCD) Freeman Diversion Dam east of Saticoy and captures runoff from the cities of Santa Paula and Fillmore, communities upstream in Los Angeles County, agricultural fields, and a large amount of undeveloped landscape. Monitoring at the ME-SCR station was initiated during the 2001/02 monitoring season. Unlike at the other two Mass Emission stations, accurate measurement of flow at this location is not possible due to the configuration and operation of the diversion structure. In dry conditions, the river is usually diverted to groundwater infiltration ponds. In wet-weather conditions, the Santa Clara River can also flow past the diversion dam through two other routes. One route is through the river diversion gate structure where the majority of wet-weather flow passes. The other route is over the diversion dam, a situation which occurs only during high flows generated by large storm events. Flood flows are monitored at the diversion dam by the Hydrology Section, but there is no flow meter installed at the river diversion gate due to complex hydraulics. A sonic water level sensor was installed over the pond behind the diversion so that a gate opening would be noticed. A text message is automatically sent to sampling team members when the gate is opened, which lets them know the intake strainer could lose contact with the river. A special swing arm intake strainer has been installed to alleviate this potential problem, but the installation is still being refined.

3.1.2.2 *Major Outfall Stations*

Of the eleven Major Outfall stations, four were added to the Stormwater Monitoring Program in 2009 and seven were added in 2010. As directed by the NPDES Permit, these stations represent the runoff from each city/unincorporated county (Permittee) in which they are located. The four municipalities selected for inclusion in the 2009/10 Stormwater Monitoring Program were Camarillo (MO-CAM), Ojai (MO-OJA), unincorporated Meiners Oaks (MO-MEI), and Ventura (MO-VEN).[1] The stations in the seven remaining municipalities brought online for the 2010/11 monitoring year were Fillmore (MO-FIL), Moorpark (MO-MPK), Oxnard (MO-OXN), Port Hueneme (MO-HUE), Santa Paula (MO-SPA), Simi Valley (MO-SIM), and Thousand Oaks (MO-THO). Figure 3-1 shows the locations of the Major Outfall stations.

The MO-CAM station is located on Camarillo Hills Drain (a tributary of Revolon Slough) just north of Daily Drive in Camarillo. The predominant land use in the watershed is residential. Less than 8% of the watershed is commercial and less than 1% is agricultural.

The MO-OJA station is located on Fox Canyon Barranca (a tributary of San Antonio Creek) near the Ojai Valley Athletic Club in Ojai. Almost half of the watershed is classified as vacant, with residential land use comprising about 40%. About 3% of the watershed is commercial and about 5% is agricultural.

The MO-MEI station is located on Happy Valley Drain (a tributary of the Ventura River) near Rice Road in Meiners Oaks. Almost half of the watershed is classified as residential. Another quarter of the watershed is classified as vacant. About 3% of the watershed is commercial and about 15% is agricultural.

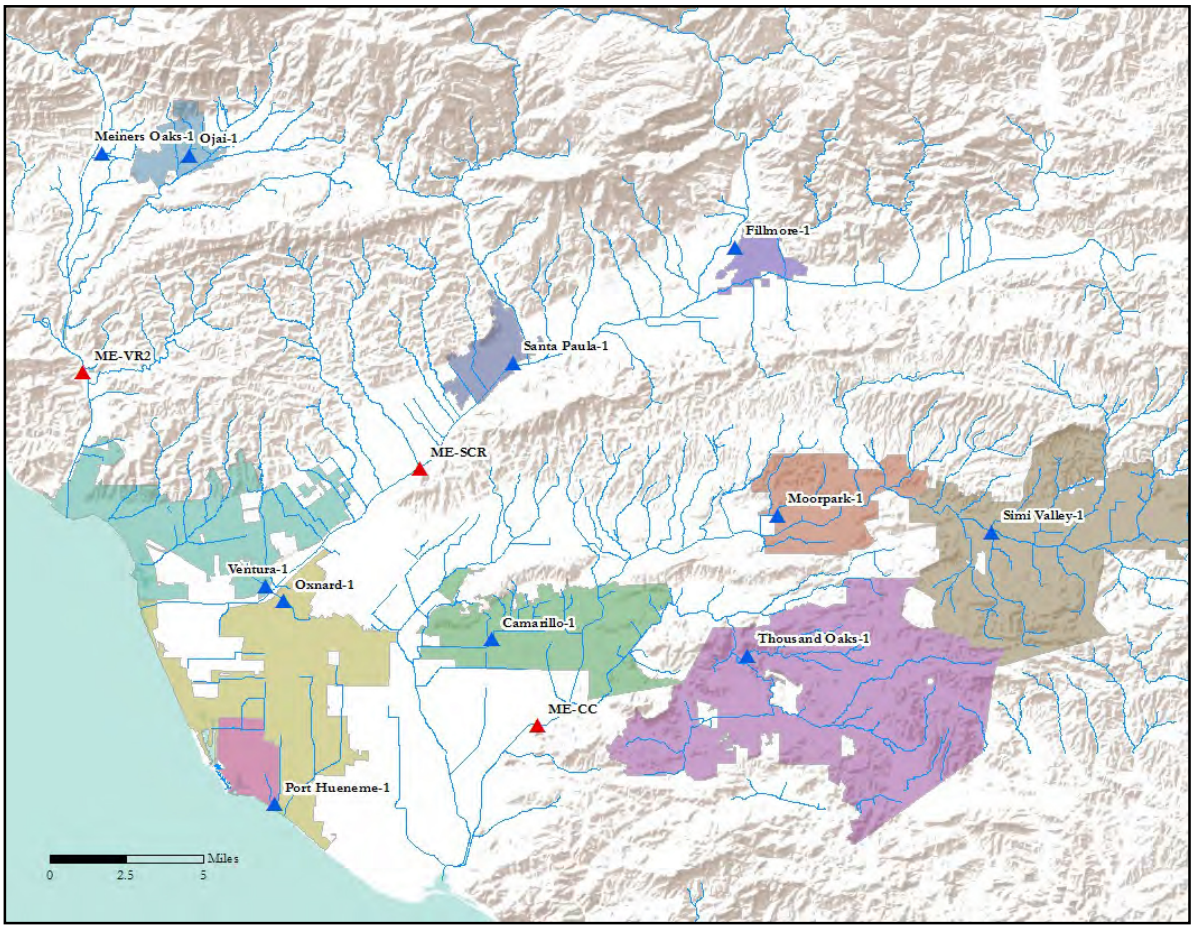
[1] Site names shown on the map reflect the names given to each site in the NPDES permit; site names throughout this report are shortened to those shown on chains-of-custody (COCs) for brevity. Under this naming convention, MO-CAM is synonymous with Camarillo-1, MO-FIL with Fillmore-1, MO-HUE with Port Hueneme-1, MO-OJA with Ojai-1, MO-OXN with Oxnard-1, MO-MEI with Meiners Oaks-1 (VCUnincorporated-1), MO-MPK with Moorpark-1, MO-SPA with Santa Paula-1, MO-SIM with Simi Valley-1, MO-THO with Thousand Oaks-1, and MO-VEN with Ventura-1.

The MO-VEN station is located on Moon Ditch (a tributary to the Santa Clara River) near the US101-Johnson Drive interchange in Ventura. Over half of the watershed is residential and a quarter is commercial. Industrial land uses account for almost 7% of the watershed, while agriculture comprises less than 1% of the watershed.

The MO-FIL station is located on the North Fillmore Drain (a tributary of Sespe Creek) near Shiells Park in Fillmore. Almost half the watershed is residential and just over a third is classified as vacant. Agriculture land uses account for almost 7% of the watershed, while commercial comprises less than 1% of the watershed.

The MO-MPK station is located on the Walnut Canyon Drain (a tributary to Arroyo Las Posas) near the intersection of Los Angeles Avenue and Mira Sol Drive in Moorpark. Over half the watershed is classified as vacant, less than 10% of the land is residential, and almost 13% of the watershed is used for agriculture.

Figure 3-1 Mass Emission and Major Outfall Sampling Locations



The MO-OXN station is located on El Rio Drain (a tributary to the Santa Clara River) near the corner of Buckaroo Avenue and Winchester Drive in Oxnard. Most of the watershed is classified as residential, however almost 20% is commercial and less than 2% is agricultural.

The MO-HUE station is located on Hueneme Drain (a tributary of the J Street Drain at the Pacific Ocean) southeast of Bubbling Springs Park in Port Hueneme. The land use is predominantly residential, with commercial and vacant land uses accounting for only 3% each.

The MO-SPA station is located on the 11th Street Drain where it enters the Santa Clara River, east of the Santa Paula airport. About half of the watershed is classified as residential, less than 15% as commercial, and schools and transportation account for about 10% each.

The MO-SIM station is located on Bus Canyon Drain (a tributary of the Arroyo Simi) near the intersection of 5th Street and Los Angeles Avenue in Simi Valley. Over half (57%) of the watershed is classified as vacant and about one third is residential. All other land uses account for less than 1% of the watershed each.

The MO-THO station is located on the North Fork Arroyo Conejo (a tributary to Conejo Creek) in the Hill Canyon WWTP. The main land uses in the watershed are residential (56%) and vacant land (31%).

3.1.2.3 *Analytes*

Dry weather and wet weather samples from the Mass Emission stations and the Major Outfall stations are analyzed for well over 200 constituents including conventional pollutants, bacteria, general chemistry, total and dissolved metals, nutrients, semi-volatile organics, chlorinated pesticides, polychlorinated biphenyls, organophosphate pesticides, herbicides, and chronic aquatic toxicity. Attachment G of the Permit lists the constituents to be analyzed. In addition to this broad suite of analytes, Attachment B of the Permit specifies pollutants of concern for each of the three watersheds. These, and any unrequested analytes for which results are obtained during method analysis, were incorporated into the sampling program and appear in the table in Attachment B of this ROWD, along with their reporting limits and analytical methods.

3.2 Outfall Water Quality

The availability of five years' worth of MS4 outfall monitoring data is unique in southern California, and presents an opportunity to gain new insights on MS4 impacts on receiving water quality. The Program considers that Major Outfall monitoring data is most useful for making general assessments of MS4 impacts in Ventura County, and potentially for assessing individual Permittees' storm water management programs. However, the latter should be performed with consideration of the specific land-use distribution and Permittee efforts in the subwatershed draining to the Major Outfall station.

The assessments of non-storm water quality in Major Outfalls includes instances of no flow as a valid sampling event, with all constituent concentrations equal to zero. Eliminating dry-weather urban runoff is a preferred strategy for improving non-storm water quality, so when this is achieved it is recorded as zero discharge of pollutants.

3.2.1 MS4 cause or contribute assessment

Assessments whether MS4s cause or contribute to exceedances of water quality standards have been reported in the VCSQMP Annual Reports. The annual report defines

"cause or contribute" as the instances where samples from a Major Outfall station as well as from the Mass Emission station in the same watershed, and collected during the same event, both exceed a water quality standard.

The Major Outfalls that caused or contributed to exceedances of water quality standards during the first five years of the current permit (2009/10 – 2013/14) are shown in Table 3-1. Ventura County MS4s contribute exceedances of water quality standards for only six constituents. For storm water, MS4s consistently cause or contribute to exceedances for *E. coli*, fecal coliforms and total aluminum. Only the Thousand Oaks Major Outfall (THO) caused or contributed to exceedances for chloride (18% of samples). For non-storm water, only some MS4s caused or contributed to exceedances, for chloride, total dissolved solids, and total selenium. Note that the "cause or contribute" assessment is not possible for the Port Hueneme (HUE) Major Outfall, since there is no monitoring at a corresponding receiving water station.

Table 3-1 Frequency (%) of Major Outfall samples causing or contributing to exceedances of water quality standards in receiving water (2009/10 – 2013/14). Major Outfall stations are grouped by watershed.

	Ventura		Santa Clara				Calleguas				Coastal
	OJA	MEI	OXN	VEN	SPA	FIL	CAM	THO	SIM	MPK	HUE
Storm water											
E. coli	79	79	73	79	73	73	86	91	82	82	NA
Fecal coliforms	93	93	55	64	64	55	79	82	73	73	NA
Aluminum, total	7	7	45	71	73	27	79	100	73	91	NA
Chloride								18			
Non-storm water											
Chloride						25		100	100	25	
TDS						25		75	75	25	
Selenium, total				20		25					

3.2.2 MS4 elevated levels

Water quality in Major Outfall stations has been assessed in the VCSQMP Annual Reports by identifying "elevated levels", i.e. when a constituent concentration exceeds the water quality standard in a Major Outfall station, even when there is no measurable impact to beneficial uses of receiving waters.

A summary of elevated levels during the first five years of the current permit (2009/10 – 2013/14) is shown in Tables 3-2 and 3-3, showing frequencies of occurrences for each constituent. Comparison with Table 1 shows that most of the elevated levels do not cause or contribute to exceedances of water quality standards. In storm water, such elevated levels were found most frequently across stations for MBAS, pentachlorophenol and bis(2-ethylhexyl)phthalate. In non-storm water, such elevated levels were found most frequently for *E. coli* and fecal coliforms, pH, and total selenium.

Assessment of elevated levels in Major Outfalls can be useful for identifying outfalls where additional improvements in water quality may be required, but at a priority level below those associated with TMDLs and exceedances of receiving water limitations. Municipal storm water action levels (MALs) could be used for prioritization at this level. If MALs are used VCSQMP proposes they should be established based on the Major Outfalls monitoring data, i.e. only for constituents with elevated levels. This approach would differ from the one used in the LA MS4 Permit Order R4-2012-0175, where MALs were established for a pre-determined list of constituents based on the National Stormwater Quality Database (for more details, refer to section 4.2.3 of this report).

Table 3-2 Frequency (%) of elevated levels in Major Outfall storm water samples (2009/10 – 2013/14). Major Outfall stations are grouped per watershed.

	Ventura		Santa Clara				Calleguas				Coast
	OJA	**MEI**	**OXN**	**VEN**	**SPA**	**FIL**	**CAM**	**THO**	**SIM**	**MPK**	**HUE**
E. coli	100	100	100	100	91	82	100	100	100	100	100
Fecal coliforms	100	100	100	100	100	91	100	100	100	100	100
Aluminum, total	100	93	73	93	100	27	79	100	82	100	17
DO						9			9		58
pH			9				14				
NH3			17								
Chloride	27							27			
TDS								27			
MBAS	7	7	55	36	73	20	15				
Perchlorate						27					
Arsenic, total										9	
Chromium, total								9			
Benzo(a)pyrene							8				8
Bis(2-ethylhexyl) phthalate	7			21	27		15		9		
Pentachlorophenol	7	7	9		18					45	

Table 3-3 Frequency (%) of elevated levels in Major Outfall non-storm water samples (2009/10 – 2013/2014). Major Outfall stations are grouped per watershed.

	Ventura		Santa Clara				Calleguas				Coast
	OJA	**MEI**	**OXN**	**VEN**	**SPA**	**FIL**	**CAM**	**THO**	**SIM**	**MPK**	**HUE**
Chloride	100	60				50		100	100	25	
TDS	100	40				25		100	100	25	
E. coli	80	20	56	30	11	100	60	33	33	44	100
Fecal coliforms	80	40		20	25	75	60	25	75	25	100
pH	11	20	75	89			89			13	
DO						38					25
Nitrate									25		
Ammonia	20			60			60				
MBAS					25					25	
Arsenic, total				20							
Selenium, total	20			100		100			100		
Mercury, total				20							
Copper, dissolved			22	60							
Benzo(a)pyrene			25								
Benzo(k)fluoranthene									25		
Dibenzo (a,h)fluoranthene							20				
Indeno(1,2,3-cd) pyrene							20		25		
Perchlorate									25		25
Pentachlorophenol	20				25						
Bis(2-ethylhexyl) phthalate	20		25							25	

3.2.3 Trends

Major Outfalls have been monitored for 4 or 5 years, depending on station, at a frequency of 3 wet events per year, and one dry event per year. An additional set of dry weather grab samples were taken

each year for a limited number of constituents. Trends have not been analyzed because the time period of 5 years was deemed too short to detect any meaningful trends.

Concentration trends at Mass Emission stations have been analyzed using the non-parametric Kendall Tau correlation coefficient (cfr. section 3.3.2). A power analysis (Figure 3-2) shows that at the current rate of dry weather sampling (1 sample/yr), it would take 10 years before a trend with Tau > 0.7 can be detected. A Tau correlation of 0.7 is very high, and unlikely to be observed given the high variability in most water quality constituent concentrations. Therefore, at the current rate of dry weather sampling it will take at least 10 years before any trends can be detected. For the constituents that are sampled twice per year, trends may be detectable after 5-10 year of monitoring.

At the current rate of wet weather sampling (3 samples/yr), a Tau correlation coefficient > 0.45 can be detected at this point (after 5 years), which is still relatively high, given the variability in constituent concentrations and storm sizes. To put this analysis in perspective, simulated examples of trends at different Kendall Tau correlation coefficients are shown in Figure 3-3. Note that number of samples required to detect linear trends, using the Pearson correlation coefficient, are much higher than for detecting a similar Kendall Tau correlation coefficient (Figure 3-4).

Figure 3-2 Power analysis showing how many years of sampling are required to detect significant Kendall Tau correlation coefficients, for different sampling intervals.

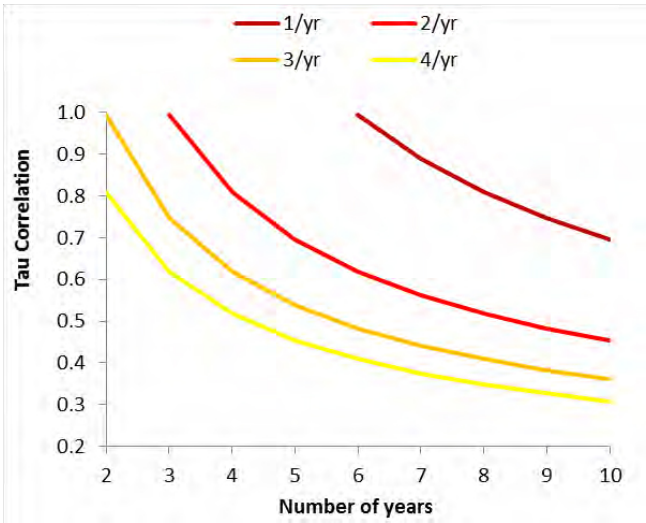


Figure 3-3 Simulation of trends at different Kendall Tau correlation coefficients.

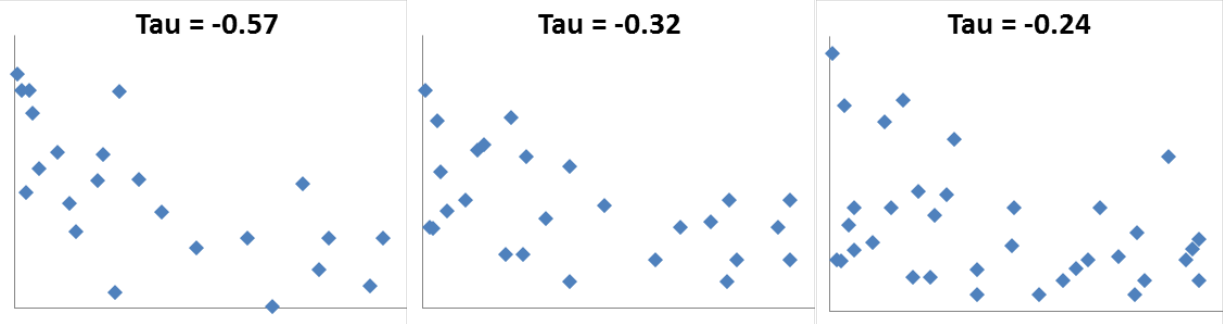
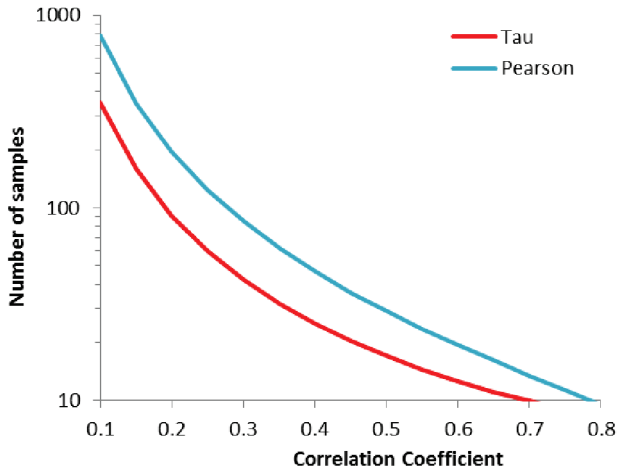


Figure 3-4 Comparison of number of samples needed to detect significant trends using Kendall Tau or Pearson correlation coefficients.



3.3 RECEIVING WATER QUALITY

3.3.1 Water Quality Index

3.3.1.1 *Description*

The Program's River Water Quality Index mathematically combines a number of variables, based on a large set of monitoring data, in one easily understood value. It was developed specifically for the Program to summarize chemical, microbiological, and toxicity monitoring data, and is based on the Alberta River Water Quality Index (http://environment.alberta.ca/01275.html). The Index provides a simple snapshot of annual water quality conditions in the main rivers of the County, with a strong focus on its ability to meet applicable water quality objectives. Detailed calculation methods are available at the VCSQMP website (http://vcstormwater.org/monitoring/water-quality-index).

3.3.1.2 ***Methodology***

The Program's River Water Quality Index is calculated annually for each watershed, for dry and wet weather separately, based on the average of six sub-indices calculated for six variable groups: salts, bacteria, nutrients, organics (includes pesticides), metals, and toxicity.

The constituents included in the index were selected based on their relevance to river water quality. They include almost all constituents that have exceeded water quality objectives since 2004 in the County of Ventura receiving waters (excluding a few that correlate with other constituents) and all pesticides that were detected by the MS4 outfall monitoring program (often these do not have water quality objectives). Toxicity test results are included in the toxicity variable group.

The Index formula is based on three aspects of water quality that relate to water quality objectives:

- Scope (F1): how many constituents do not meet objectives?
- Frequency (F2): how frequently do measurements not meet objectives?
- Magnitude (F3): by how much do measurements not meet objectives?

Index values are calculated annually for the six variable groups for each watershed, and separately for dry and wet weather events. The latter is important because water quality and pollutants of concern are often different during dry and wet weather, as our Mediterranean climate hardly produces rain between May and September. The sub-indices are then averaged to produce an overall River Water Quality Index for dry and wet weather events. Multiple indices can also be averaged to obtain an index for all watersheds combined, or for dry and wet weather combined, as in the following example for 2013/14:

Site	Event	Salts	Bacteria	Nutrients	Organics	Metals	Toxicity	Overall Index
ME-CC	Dry	17	100	100	97	100	n/a	83
	Wet	68	17	100	95	83	100	77
	Year	43	58	100	96	92	100	80
ME-SCR	Dry	18	100	100	97	95	n/a	82
	Wet	17	31	100	100	48	100	66
	Year	17	65	100	99	72	100	74
ME-VR	Dry	100	100	100	100	100	n/a	100
	Wet	100	38	100	100	100	100	90
	Year	100	69	100	100	100	100	95
All	Dry	45	100	100	98	98	n/a	88
	Wet	62	28	100	98	77	100	78
	Year	53	64	100	98	88	100	83

3.3.1.3 *Rating System*

Index results are reported as a number between 0 and 100, where 100 represents the best water quality, relative to objectives. The numbers are further ranked into five grades, each with a color code for graphing and mapping purposes:

Index score	Grade	Interpretation
96 – 100	A	Excellent – Guidelines almost always met
81 – 95	B	Very Good
66 – 80	C	Fair
46 – 65	D	Marginal
0 – 45	F	Poor – All constituents exceed guidelines with high frequency

Using the same example as above, the grades for 2013/14 are:

Site	Event	Salts	Bacteria	Nutrients	Organics	Metals	Toxicity	Overall Index
ME-CC	Dry	F	A	A	A	A	n/a	B
	Wet	C	F	A	B	B	A	C
	Year	F	D	A	A	B	A	B
ME-SCR	Dry	F	A	A	A	B	n/a	B
	Wet	F	F	A	A	D	A	C
	Year	F	D	A	A	C	A	C
ME-VR	Dry	A	A	A	A	A	n/a	A
	Wet	A	F	A	A	A	A	B
	Year	A	C	A	A	A	A	B
All	Dry	F	A	A	A	A	n/a	B
	Wet	D	F	A	A	C	A	C
	Year	D	D	A	A	B	A	B

3.3.1.4 *What does the Index show?*

Water quality has improved in Ventura County since 2003/04 (Figure 3-5). The current water quality in the County of Ventura is generally good, with B to C grades at most locations. Still, slightly reduced scores have been observed for the last two years.

Index scores are general best for ME-VR/VR2, followed by ME-SCR, and finally by ME-CC, likely related to the degree of urbanization and agriculture in each watershed (Figure 3-3). Water quality is usually better during dry weather events compared to storm events (Figure 3-6).

Trends of sub-indices are shown in Figure 3-7. The sub-indices quickly indicate what constituent classes are associated with drops of the overall Index. For instance, a low Index score in 2004/05 during wet weather (Figure 3-5) was caused by low sub-index scores for metals and toxicity.

For the 2013/14 monitoring year, salts are mostly responsible for water quality impairments during dry weather, and bacteria and metals for impairments during wet weather. Lower scores for salts were observed during the past two years for dry and wet weather, at stations ME-CC and ME-SCR, which have been driving down overall index scores (Figure 3-7).

Figure 3-5 Water Quality Index trends for all locations combined.

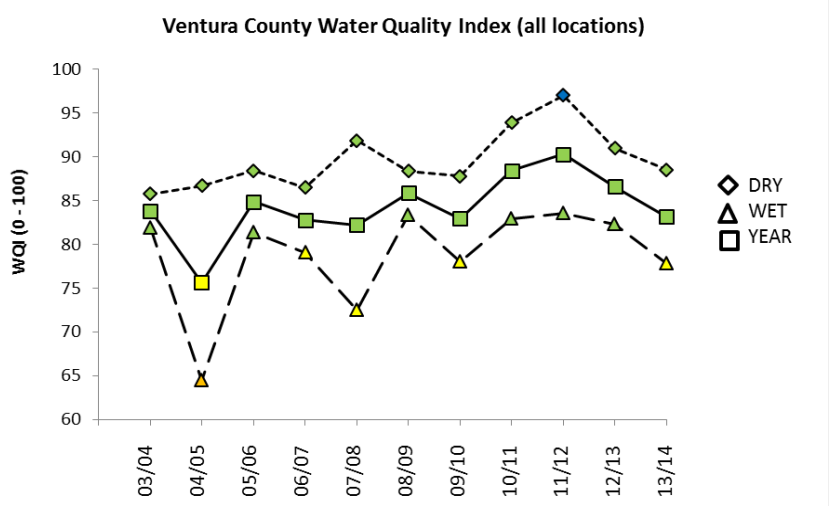


Figure 3-6 Combined wet and dry Water Quality Index trends for each receiving water station.

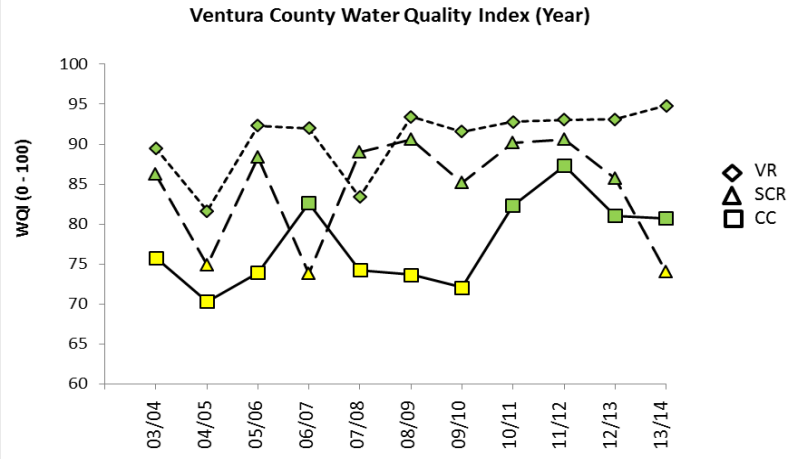
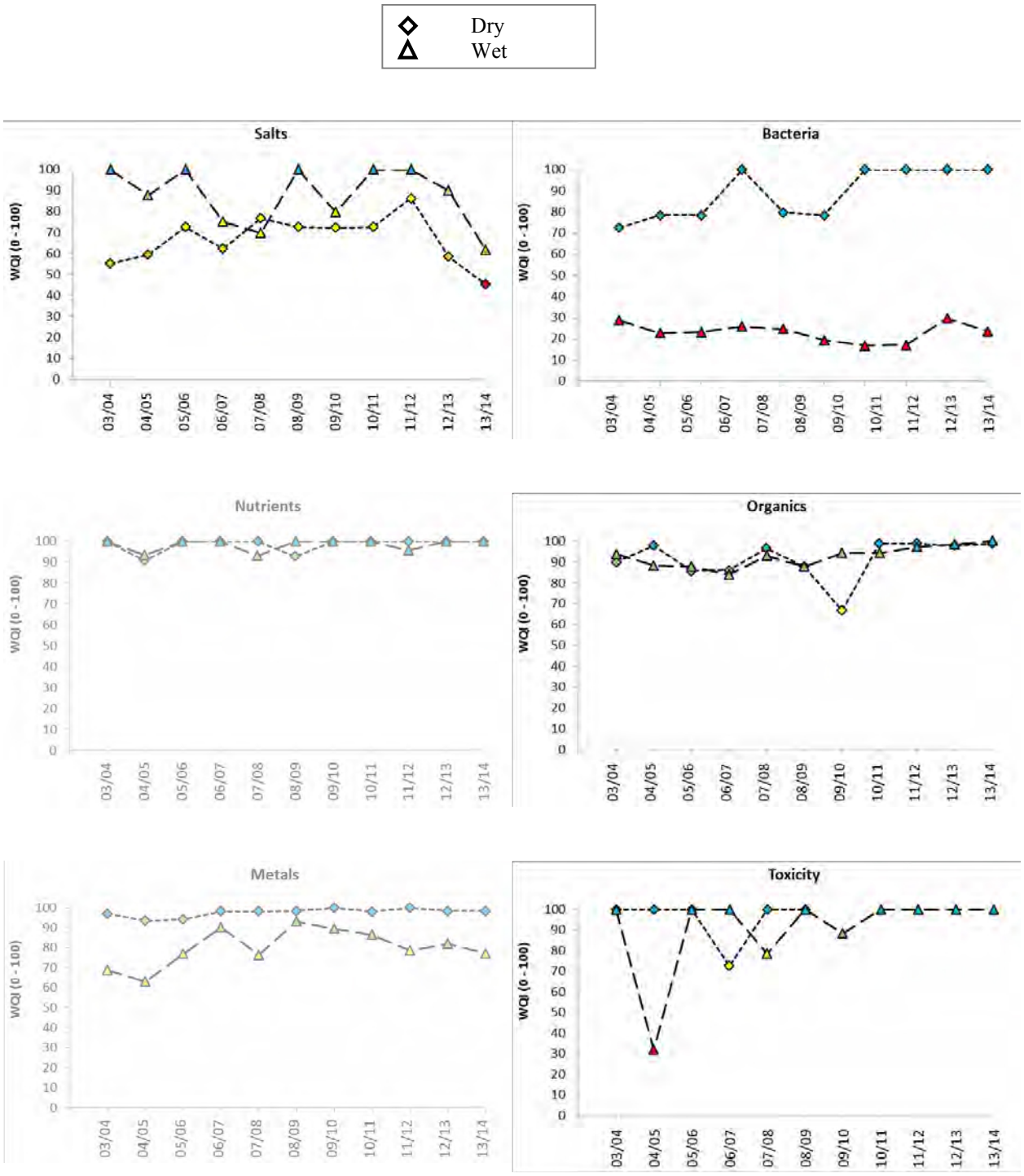


Figure 3-7 Sub-index trends with grades indicated by color codes



3.3.2 Mass Emission Stations Concentration Trends 2001 - 2014

3.3.2.1 *Methods*

Trend analysis was performed for Ventura County's three Mass Emission stations, using data collected between February 2001 (ME-CC and ME-VR/VR2) or November 2001 (ME-SCR) and April 2014. The trend analysis was performed separately for wet and dry weather events, and data for ME-VR and ME-VR2 were pooled to be consistent with the other stations, and to obtain sufficient data for trend analysis.

Concentration trends in time were determined by correlating the variables concentration and sampling date. Non-parametric statistical methods were used, based on the recommendations of Helsel and Hirsh (2002)[2], and therefore tests for normality or data transformations were not required. Trend analyses were performed for all constituents with more than 10% of the data above the limit of detection. Statistical procedures were based on Helsel and Hirsh (2002)[19] and Helsel (2012)[3], and varied based on the occurrence of observations qualified as non-detectable (NDs) and detectable but not quantifiable (DNQ), as summarized in Table 3-4. The statistical procedures used were able to incorporate variable detection and reporting limits. Trends were considered to be statistically significant at $p < 0.05$. Note that the non-parametric statistics do not assume or require linear trends.

Table 3-4. Statistical procedures and software for trend analysis

Statistic/Procedure	Constituent concentrations	Software
Kendall Tau	Always above reporting limit	Analyze-it for Microsoft Excel
Kendall Tau	< 90% of observations below detection limit, one detection limit, no DNQs	Analyze-it for Microsoft Excel
Kendall Tau	< 90% of observations below detection limit, multiple detection limits, no DNQs	R (package "NADA")
Wilcoxon score	< 90% of observations below reporting limit, DNQs and NDs occur	R (package "interval")
LOESS regression	n/a	R (function "loess")

Whenever significant trends were found, we also determined if the trends were caused by one of the following co-variables: logarithm of flow (instantaneous for grabs, mean event flow for composites), logarithm of total suspended solids (for wet weather only) or antecedent dry period (time since last wet event with at least 0.1" of precipitation). Statistical procedures were based on Helsel and Hirsch (2002)[19] and consisted of (i) determining correlation (using Kendall Tau) between concentration and co-variables, (ii) if a significant correlation was observed, a non-parametric LOESS regression of concentration vs. co-variable was performed, (iii) the adjusted concentration was calculated by subtracting the LOESS trendline value from the concentration value, and (iv) the trend analysis was repeated for the adjusted concentrations versus time. The adjusted trends are a better representation of actual trends, and indicate if constituent concentrations *for a given flow*, or *for a given concentration of TSS*, have changed in time. Conversely, trends that are caused by patterns of flow, TSS, or antecedent dry period would not be identified as significant trends in time.

[2] Helsel, D.R. and R. M. Hirsch, 2002. Statistical Methods in Water Resources. Techniques of Water Resources Investigations, Book 4, chapter A3. U.S. Geological Survey, 522 p.

[3] Helsel, D.R., 2012, Statistics for censored environmental data using Minitab® and R, 2nd ed., John Wiley & Sons, Inc., Hoboken, NJ, 324 p.

Figure 3-8. Summary of significantly increasing and decreasing trends at Mass Emission Stations. Decreasing trends are indicated by downward green arrows, increasing trends by upward red arrows. For metals, total fractions are indicated by full arrows, dissolved fractions by open arrows. Grey arrows indicate where a significant trend was initially found, but where adjusting for TSS (1), flow (2) or antecedent dry period (3) yielded non-significant trends.

Group	Analyte	DRY			WET		
		ME-CC	ME-SCR	ME-VR	ME-CC	ME-SCR	ME-VR
Bacteria	Coliforms, total						
	Coliforms, fecal						
	E. coli				2		
	Enterococcus				2	3	
Nutrients	TKN				2		
	Phosphorus, dissolved	2					
Conventional	Hardness						
	TDS						
	Chloride	2			2		2
	Conductivity				2		
	BOD						
	TOC						1
	TSS						2
	pH						
	Phenolics						
Organics	Phenol						
	DEHP						
Pesticides	Dacthal						
	Diazinon						
Metals	Aluminum						
	Arsenic				1		
	Barium						
	Antimony				2		
	Cadmium				1		1
	Chromium				1		1
	Chromium (VI)						
	Copper				1		1
	Iron						
	Mercury				1		
	Nickel				1		1
	Lead				1		1
	Selenium					1	
	Silver						
	Thallium				1		
	Zinc				1		1

Temporal trends of water quality exceedances were also determined. The total number of exceedances were summed and divided by the number of events for each monitoring year, for wet and dry events separately, in order to obtain an average number of exceedances per wet and dry event. For dry events, trends were determined between 2001 and 2014. For wet events, data prior to 2004 were not included, because some of the constituents that sometimes cause exceedances were not analyzed at the time. Statistical significance of trends was determined by correlating average annual number of exceedances

with time (year) using Kendall Tau. All exceedances were determined by comparing to Basin Plan and CTR numerical water quality criteria.

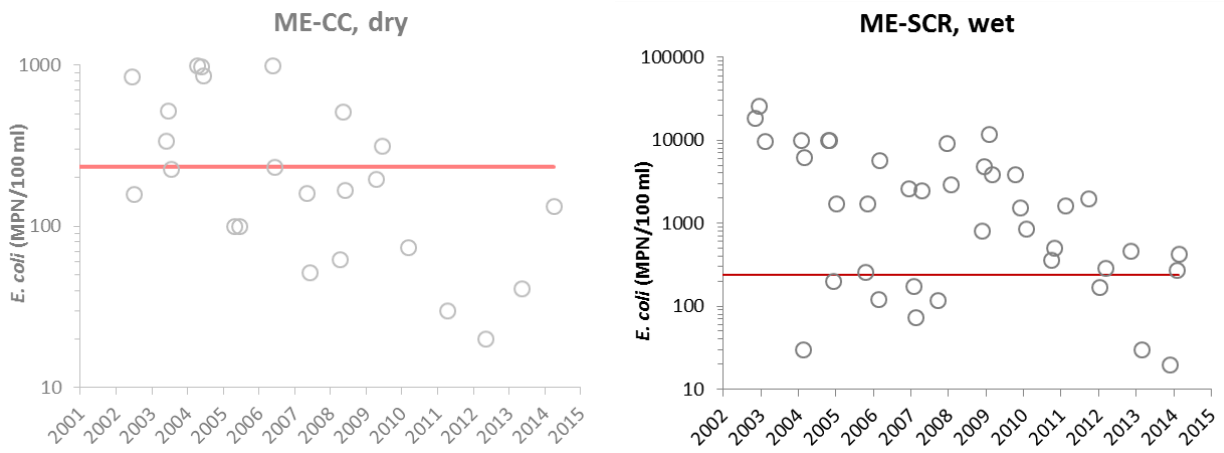
3.3.2.2 *Concentration Trends*

A summary of significant trends indicates that many constituent concentrations have decreased since 2001, including bacteria, nutrients, conventional parameters, organics, pesticides, and metals (Figure 3-8). Four out of the 217 monitored constituents exhibit increasing concentration trends, but it should be noted that none of these are exceeding water quality standards, or even getting close. A few of the most noteworthy achievements and some of the increasing trends are discussed below, with example graphs to illustrate trends.

3.3.2.2.1 Indicator bacteria

Fecal indicator bacteria are high priority pollutants in stormwater and non-storm water, and sources of bacteria are notably hard to identify and control. Therefore, the decreasing indicator bacteria concentrations observed in some watersheds are very encouraging. Dry-weather ***E. coli*** and ***Enterococcus*** concentrations have significantly decreased at ME-CC since 2001, to the point that water quality objectives are no longer exceeded at ME-CC (Figure 3-9). Decreasing **total coliform** and ***E. coli*** wet-weather concentrations were also observed at ME-SCR.

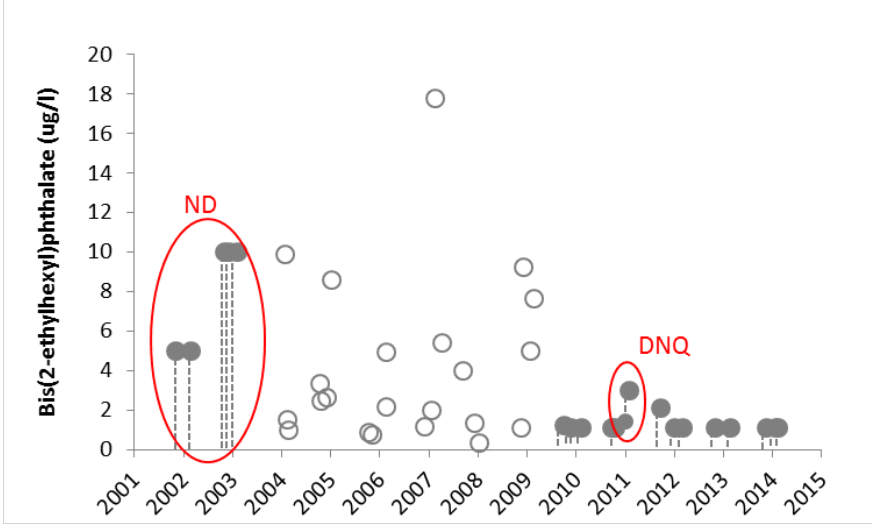
Figure 3-9. Decreasing E. coli concentrations at ME-CC (dry-weather) and ME-SCR (wet-weather). Red lines indicate Water Quality Objective.



3.3.2.2.2 Organic compounds and pesticides

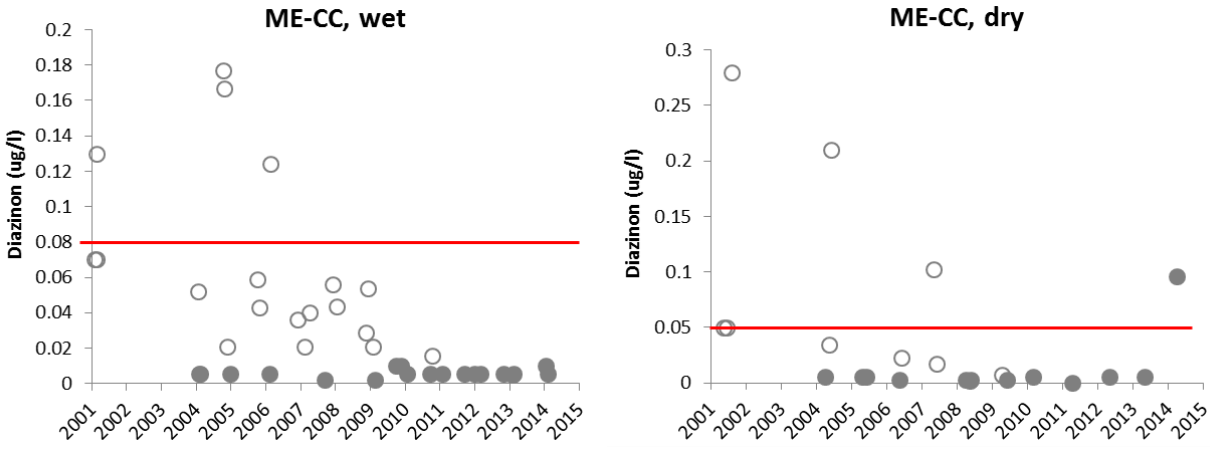
Wet-weather concentrations of bis(2-ethylhexyl)phthalate (DEHP) have decreased at ME-SCR, to the point that they no longer exceed the Basin Plan Objective of 4 µg/l (Figure 3-10).

Figure 3-10. Decreasing concentrations of bis(2-ehtylhexyl)phthalate at ME-SCR during wet-weather. Concentrations below the reporting or detection limit are indicated by full grey symbols at detection limit value, connected by dotted line to zero. Examples of occurrences of non-detects (ND) and detectable but non-quantifiable (DNQ) are shown in red.



Dry and wet weather concentrations of the pesticide diazinon have decreased at ME-CC, to the point that concentrations higher than the Department of Fish and Game aquatic life criteria have not been observed since 2006 for wet weather and since 2007 for dry weather (Figure 3-11). Also, exceedances of TMDL Waste Load Allocations for diazinon (0.10 µg/l) have not been exceeded since then. Reductions can likely be attributed to the phasing out of residential uses of diazinon, with a sales ban in the U.S. as of December 31, 2004, and implementation of the TMDL for toxicity, chlorpyrifos, and diazinon in the Calleguas Creek watershed.

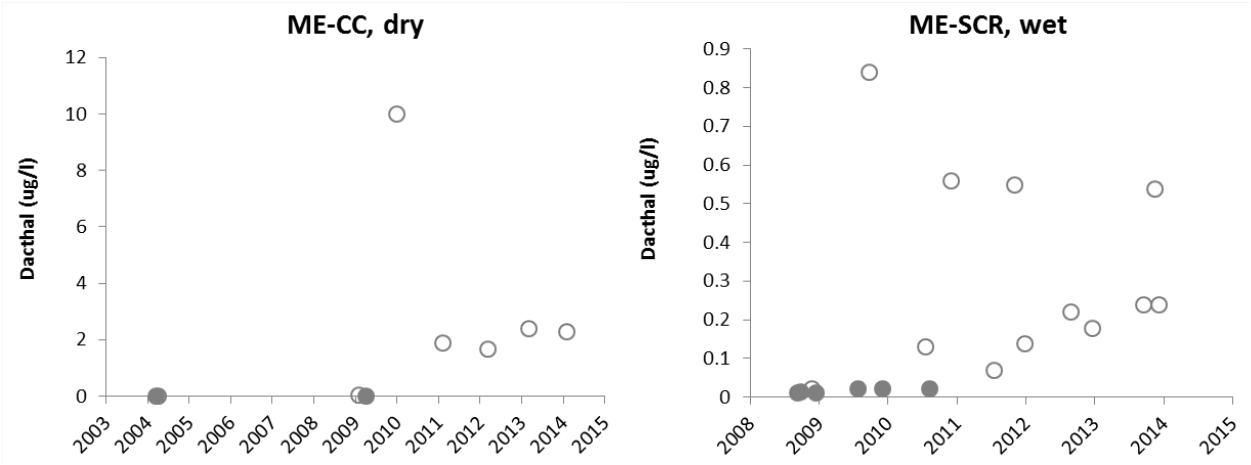
Figure 3-11. Diazinon trends at ME-CC. California Department of Fish and Game recommended criteria are shown by a red line (continuous concentrations for dry weather and maximum concentrations for wet weather). Concentrations below the detection limit are indicated by full grey symbols at detection limit value.



Concentrations of dacthal, used as a pre-emergence herbicide, have increased at ME-CC (dry-weather) and ME-SCR (wet-weather), since measurements started in 2004 and 2008, respectively (Figure 3-12). Concentrations do not exceed the USEPA IRIS Reference Dose (70 µg/l) and US EPA National

Recommended Water Quality Criterion for protection of freshwater aquatic life of 14,300 µg/l (instantaneous maximum). However, the US EPA National Recommended Water Quality Criterion for protection of human health & welfare of 0.008 µg/l is usually exceeded. Note that none of the referenced criteria for dacthal are applied as water quality objective.

Figure 3-12. Concentrations of dacthal at ME-CC (dry-weather) and ME-SCR (wet-weather). Concentrations below the detection limit are indicated by full grey symbols at detection limit value.



3.3.2.2.3 Metals

Concentrations of many metals have decreased since 2001 at all Mass Emission stations. Decreasing dry-weather trends were observed for chromium, copper, nickel and zinc for both total and dissolved fractions, at most stations (examples for dissolved copper are shown in Figure 3-13). Dissolved concentrations of these metals decreased in some cases for wet-weather as well.

Selenium concentrations have also decreased in many cases since 2001. Only dissolved selenium concentrations decreased during dry-weather, but both dissolved and total fractions during wet-weather. Concentrations decreases for lead were mostly observed during dry-weather, while those for iron and cadmium during wet-weather.

Arsenic concentrations have increased at ME-CC during dry-weather, but increases are small, and the maximum observed concentration of 4.5 µg/l is still well below the water quality objective of 50 µg/l (Figure 3-14).

Figure 3-13. Dry-weather dissolved and total copper concentrations at ME-SCR and ME-CC. Concentrations below the detection limit are indicated by full grey symbols at detection limit value.

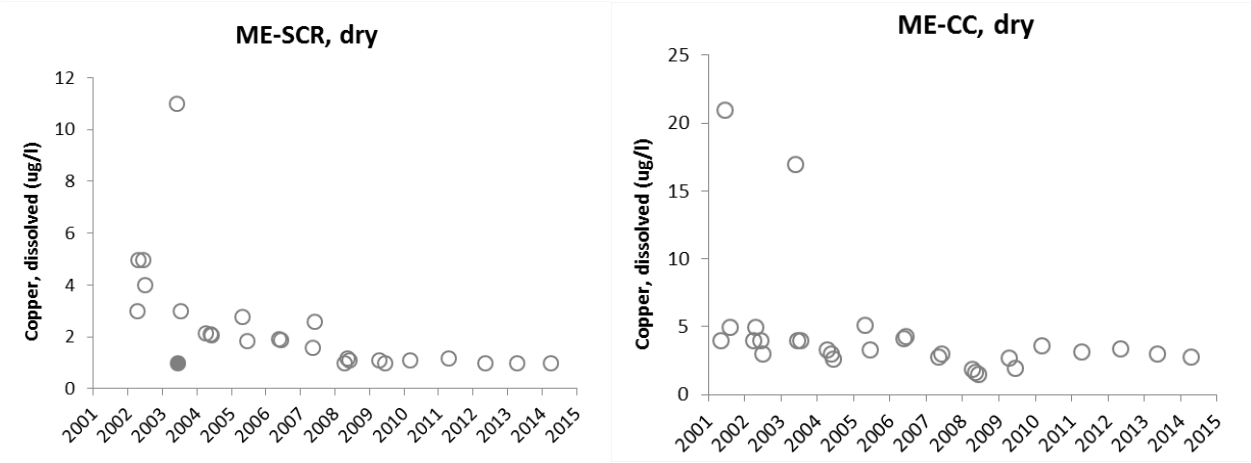
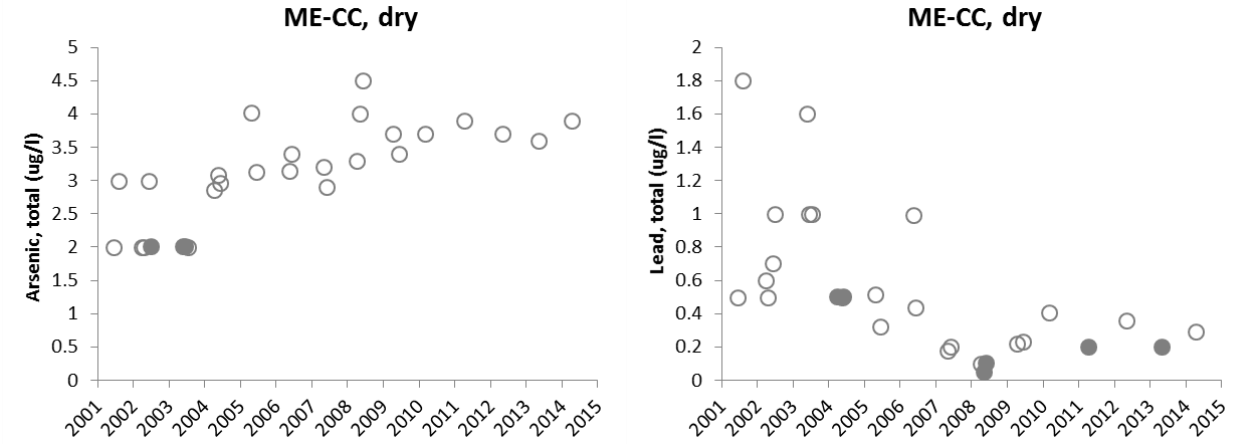


Figure 3-14. Dry-weather concentrations of arsenic and lead at ME-CC. Concentrations below the detection limit are indicated by full grey symbols at detection limit value.

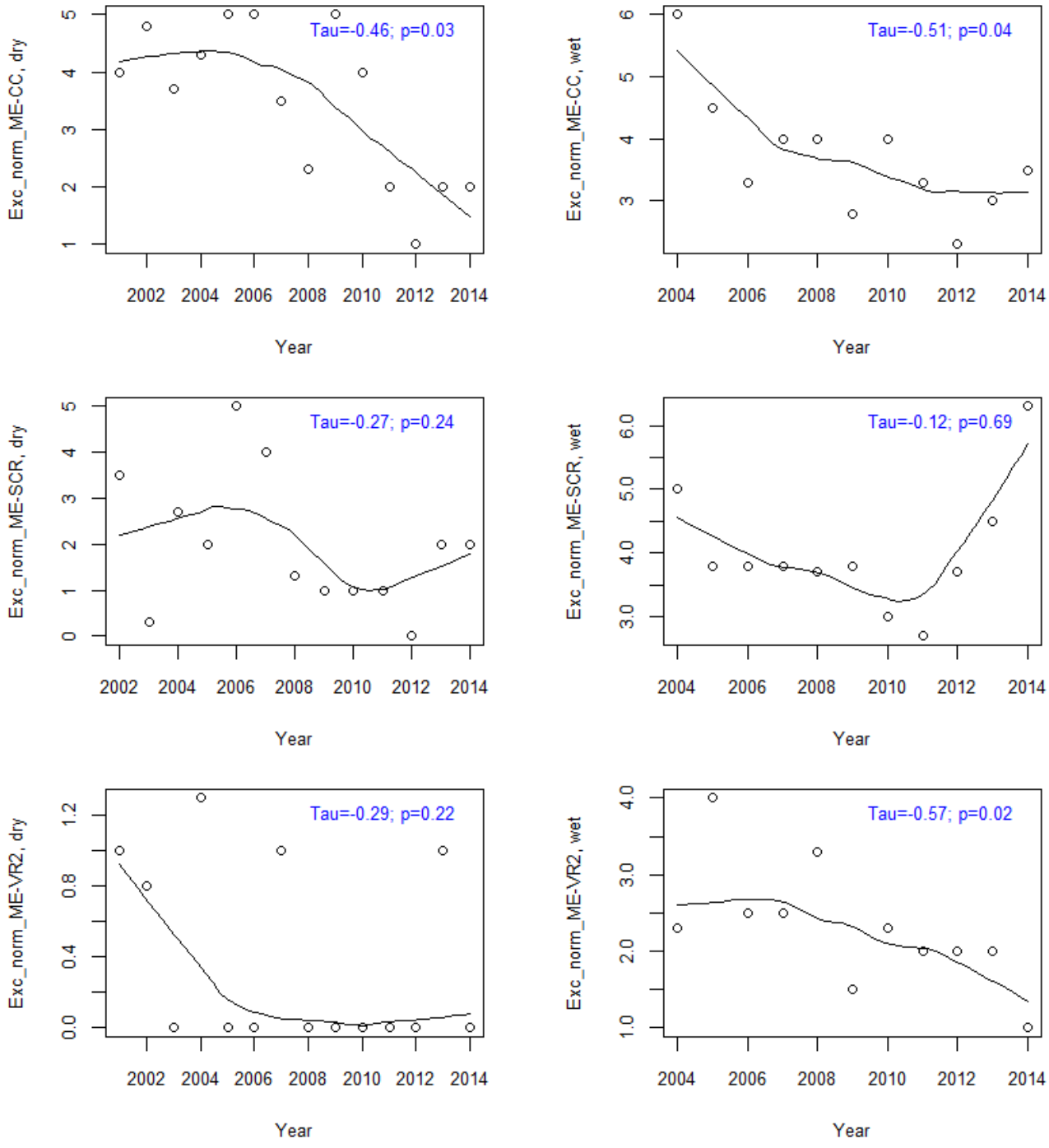


3.3.2.3 *Trends in Water Quality Exceedances*

The number of exceedances per event was calculated by dividing the total number of exceedances each year by the number of events sampled. Calculations were performed for each station, separately for dry-weather and wet-weather. Wet-weather trends were calculated starting from the 2003/04 season, as the number of analytes measured and analytical methods were too different in previous seasons. Trends are plotted in Figure 3-15, with LOESS trend lines and Kendall Tau statistic and significance.

The number of exceedances has decreased significantly at ME-CC, for dry-weather and wet-weather, and at ME-VR2 for wet-weather only. Higher numbers of wet-weather exceedances are often related to metal exceedances (in particular for cadmium, chromium and nickel), which are in turn correlated with TSS concentrations caused by high flow events. Therefore, the decreasing trends are caused, at least in part, by the high metal concentrations during the large storms observed in 2004 and 2005, implying that the decreasing trend may be reversed if larger storm events occur in the future.

Figure 3-15. Average annual number of exceedances per event for dry-weather (left column) and wet-weather (right column) sampling. Lines represent LOESS curves, obtained by local regression modeling. Kendall Tau statistic and statistical significances are included for each set of data.



No significant trend in exceedances was observed at ME-VR/VR2 during dry-weather. However, the number of exceedances per event at this location has always been very low, between zero and one, implying that decreasing trends will only be observed if no exceedances occur for several years in a row.

No significant trends in exceedances were observed at ME-SCR. The above average number of exceedances observed for the 2013/14 wet season was due to exceedances for chloride and total dissolved solids, likely related to drought conditions.

3.3.2.4 *Conclusions*

Most of the 217 constituents currently monitored at the Mass Emission stations by the Program have been monitored since 2001. Concentrations of thirty-five of these 217 constituents, including metals, bacteria, nutrients, salts and one pesticide, have decreased at one or more stations. Only five constituents exhibited increasing concentration trends, in all but one case at only one of the stations. None of these constituents were causing water quality exceedances, based on Basin Plan and CTR numeric water quality criteria, at the stations where increasing trends were observed.

The average number of exceedances per event has decreased since 2001 at ME-CC and ME-VR/VR2. Decreasing trends during wet-weather could be attributed in part to smaller storm sizes and therefore fewer exceedances for some metals in recent years.

3.4 SPECIAL STUDIES

The Program has engaged in several monitoring special studies, some were required by the Permit and others were initiated as a response to water quality issues discovered through water quality monitoring. The goal is always to obtain information that will help answer management questions regardless of whether the study is aimed at pollutants of concern (aluminum and bacteria), measuring overall stream health (bioassessment), or emerging concerns (pyrethroids).

3.4.1 Aluminum

The total aluminum concentrations observed by the Program in Ventura County surface waters and urban runoff during wet weather events routinely exceed the Title 22 Drinking Water Primary Maximum Concentration Level (MCL) cited in the Los Angeles Region Water Quality Control Plan (Basin Plan). This limit of 1000 µg/L is generally applied to treated drinking water prior to the distribution system. Such exceedances have been observed since early 2004, when the Program began analyzing for aluminum in its routine water quality monitoring.

To investigate the high concentrations of total aluminum identified in urban runoff and surface waters in Ventura County, primarily during storm events, the Program conducted a historical data evaluation, and initiated new monitoring during the 2013/14 monitoring season. Monitoring was performed on river sediments, as well as wet weather flows from pristine upstream areas and below urbanized areas.

Natural background sites were monitored for water (December 2013 and February 2014) and sediment (December 2013) and data showed that upstream locations in each of the three watersheds also possess elevated water column and sediment aluminum concentrations. Wet weather aluminum at these background sites was seen from 19,000 µg/L to 250,000 µg/L.

Correlation analyses of total aluminum and TSS showed a high correlation between total aluminum and TSS concentrations measured in Ventura County water quality samples suggests that the total aluminum measured in water quality samples is derived from the erosion of soil. Historical data along with dry weather monitoring of sediment performed in December 2013 by the Program revealed that total aluminum sediment concentrations are extremely high. Aluminum, on average, constitutes 2-3% of the soil in Ventura County.

3.4.2 Bacteria

Storm water and non-storm water runoff in the County of Ventura often contains elevated levels of fecal indicator bacteria, as has been observed elsewhere. However, the sources of these fecal indicator bacteria remain elusive. As human waste poses greater risk to human health than other animal sources (except cattle), high priority for additional sampling and/or BMP implementation should be given to drainages with frequent detection of human markers. Identification of other sources of fecal pollution can also help source control or remediation efforts. Note that a quantitative assessment of the percentage of fecal indicator bacteria originating from human or other waste is not achievable at this time.

The Ventura Countywide Stormwater Quality Management Program has taken several steps to better understand the sources of fecal indicator bacteria in storm water and non-storm water, in order to improve effectiveness and prioritization of management actions. The efforts include initiatives by the Program, Program participation in the microbiology component of the Bight '13 regional monitoring, and studies by individual co-Permittees (Table 3-5).

3.4.2.1 *Bight '13 Microbiology Study*

The Bight '13 Microbiology Program is a collaborative effort between multiple storm water agencies in southern California and Southern California Coastal Water Research Project (SCCWRP), with the goal to assess the extent of human fecal contamination from coastal drainages to the ocean. VCSQMP and other agencies participating in the program are sampling dry and wet weather runoff within their jurisdictions, and analyzing samples for a human-associated fecal marker (HF183). The percentage of samples positive for human fecal material will then be used to assess the extent of human fecal contamination at each site and across the region. The summer dry weather component in Ventura County consists of weekly sampling, and a minimum of 50 samples will be collected at each site over two years. Ventura County dry weather sites include Ventura River, Santa Clara River, Calleguas Creek and Oxnard Industrial drain. Storm water sampling targets up to 6 storm events per season, for at least 2 years. Ventura County storm water sites include Mass Emission sites ME-CC, ME-SCR and ME-VR2. Another goal of the Bight '13 study was to train the Ventura County Public Health Lab to process and analyze water samples for host-specific DNA markers. The close collaboration between VCSQMP and the Public Health Lab has been crucial in improving VCSQMP's capabilities to undertake various source identification studies.

3.4.2.2 *County-wide MS4 Bacteria Special Study*

The goal of this study is a regional assessment of the sources of *E. coli* in receiving waters, MS4s and control sites, in order to provide a regional assessment framework and inform future local studies and BMP implementation efforts. The study focusses on the sources humans, birds, and dogs, as these are relevant for MS4's and can be reliably determined using current analytical methods. Stormwater runoff samples are taken during up to 6 storm events per season, at all Major Outfall stations. Up to three events include sampling of three control sites. The dry weather portion of this special study follows a hybrid monitoring design, including 54 random MS4 and control sites (sampled once) and 11 major outfall sites (sampled twice) per year. Dry weather sampling was completed in the fall of 2014, and sample analyses and data interpretation are underway.

3.4.2.3 *Upper Malibu Creek Watershed Dry Weather Source Identification Study*

A source identification study was performed jointly by County of Ventura and City of Thousand Oaks to determine sources of *E. coli* in Upper Medea Creek and Upper Lindero Creek drainage areas, subject to a bacteria TMDL. The study found dogs and unknown sources to be the predominant contributor to *E. coli* in MS4s, and sporadic detection of human waste. In receiving waters, however, no traces of human and dog waste were observed, and birds were identified as a predominant source of *E. coli*. The relative contributions of birds and MS4 outfalls to receiving water *E. coli* are still unclear. The study has been completed in fall of 2013 to inform implementation of BMPs and compliance strategies.

3.4.2.4 *Channel Islands Harbor Beaches QMRA*

The County of Ventura participated in a Quantitative Microbial Risk Assessment (QMRA) study led by SCCWRP. A source tracking study was performed in 2012, identifying three potential sources of fecal

pollution: a storm drain on Hobie Beach, seabirds, and sewage infrastructure adjacent to the beach. The presence of human fecal pollution halted the QMRA because where human fecal pollution is present, existing water quality objectives are considered appropriate for the protection of human health. Since the study, the Channel Islands Beach Community Services District has completed a sewer replacement project of the trunk line adjacent to the beach and the County of Ventura and City of Oxnard have started conversations on how to remediate the *Enterococcus* pollution from the storm drain at Hobie Beach. Monitoring for fecal indicator bacteria and host-specific markers will be used to determine improvements following these remediation actions, and determine the appropriate strategy for the beaches.

Table 3-5 Summary of bacteria source identification studies in Ventura County

Study	Participants	Sample period	Sample type	Samples collected to date	Targeted hosts	Status	Comments
County-wide MS4	VCSQMP	Summer dry (2014)	Random MS4 Random non-MS4 control Program major outfall stations	77	Human, dog, bird	Field work complete Analyses in progress	
County-wide MS4	VCSQMP	Stormwater (2014-)	Program major outfall stations	46	Human, dog, bird	Field work and analyses in progress	Ongoing study until further notice
Bight '13 Microbiology	VCSQMP	Summer dry (2013-2015)	Discharge to ocean (rivers and channel)	132	Human	Field work and analyses in progress	
Bight '13 Microbiology	VCSQMP	Stormwater (2014-)	Program Mass Emission stations	11	Human	Field work and analyses in progress	Program may continue study after Bight '13
Upper Malibu Creek Watershed Source Identification	County of Ventura, City of Thousand Oaks	Summer dry (2013)	Creeks, outfalls, storm drains	87	Human, dog, bird	Final Report available	
Channel Islands Harbor Beaches QMRA	County of Ventura	Summer dry (2012)	Surfzone	396	Human	Final Report available	Follow-up study in planning phase

3.4.3 Pyrethroids

Pyrethroid insecticide monitoring of sediments was performed as required by the Permit to accomplish the following objectives:

i. Establish baseline data for major watersheds;
ii. Evaluate whether pyrethroid insecticide concentrations are at or approaching levels known to be toxic to sediment-dwelling aquatic organisms;
iii. Determine if pyrethroids discovered are from urban sources; and
iv. Assess any trends over the permit term.

No significant levels of pyrethroids or sediment toxicity were detected at any of the monitored sites.

In April 2012 the Ventura County Watershed Protection District (District), as the Principal Permittee, conducted sediment monitoring for the Pyrethroid Insecticides Study (Study) at two locations in both the Ventura River and Santa Clara River watersheds. In addition, pyrethroid analysis of sediments in the Calleguas Creek Watershed (CCW) is conducted annually in August as part of the CCW TMDL monitoring program. Data from theTMDL was used to meet the requirements for that watershed, as allowed by the Permit.

No significant levels of pyrethroids or sediment toxicity were detected at any of the monitored sites.

Four pyrethroids were detected in the Study samples and varied depending on site. The four detected pyrethroids were bifenthrin (three sites), pendimethalin (two sites), permethrin (one site) and dichloran (one site). Toxicity units were calculated based on the concentration of the pyrethroid (normalized for total organic carbon) and the known *Hyalella azteca* LC50, if available. All calculated toxicity units were less than one indicating the samples were non-toxic. This is also supported by the lack of toxicity seen in the analysis of the sediment samples.

Three years of data (2008-2010) were available for the TMDL site (03_UNIV) that was selected as the most representative of urban land use in the Calleguas Creek Watershed for reporting in 2013. Pyrethroids were not detected in the three years of sampling, which prevents the calculation of toxicity units; however using the MDL in the calculation provided an estimated upper limit of toxicity units for the sample. Eight of the eighteen calculated data points were above one, which indicates that if pyrethroids were present, but just below detectable levels, there could be a contribution to sediment toxicity. Toxicity was not observed in the corresponding sediment samples, which suggests that concentrations of pyrethroids in the samples, if present, are well below the MDL.

Due to the absence of significant toxicity in the samples, there are no recommendations to mitigate urban contributions of pyrethroids in the three sampled watersheds at this time other than to continue the Ventura Countywide Stormwater Management Program's current pesticide use education and outreach efforts. The Program plans to add Calleguas Creek Watershed sample sites to the Study for 2015 to avoid issues with different detection levels and sampling strategies for the next reporting cycle.

3.4.4 Regional Bioassessment

Streams are an important natural resource in Southern California, where competing pressures on aquatic resources are intense and growing. Assessing the biological condition of these streams has been the focus of considerable monitoring activity, but until 2009, these efforts were minimally coordinated and provided only limited information about the health of streams in the region. This ecological assessment of the health by Southern California's perennial wadeable streams is the result of a five-year probability survey by the Stormwater Monitoring Coalition and represents one of the most comprehensive assessments of stream conditions in the US.

The five-year survey was designed to answer key questions essential to watershed management:

1) What is the ecological condition of streams in the region?

2) What stressors are associated with poor condition?

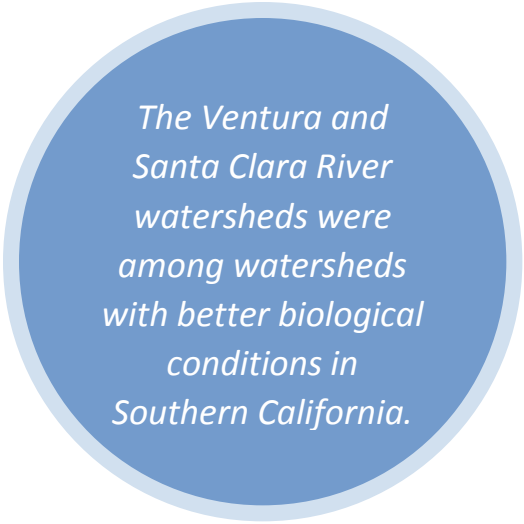
3) Are conditions changing over time?

Answering these questions at the regional scale provides resource managers throughout the region with the ability to contextualize their programs and address questions like, How effective are our management actions? Where is stream protection most needed? Which stressors pose the greatest risk to stream health?

Since the initiation of the SMC's stream survey in 2009, stormwater agencies have been able to coordinate their monitoring efforts with regulatory agencies, reallocate resources, and generate the needed data in a cost-neutral way, while simultaneously allowing regulated agencies to fulfill their permit obligations. This survey serves as the regional component of the statewide Perennial Stream Assessment, allowing both the SMC and the State Water Resources Control Board to leverage resources and support each other's surveys.

To answer key management questions, over 500 sites were sampled for benthic macroinvertebrates, diatoms, soft algae, and riparian wetland condition to measure the biological health of over 7000 km of streams. In addition, water chemistry, water column toxicity, and physical habitat were assessed in order to identify stressors affecting biological conditions in the region. Furthermore, because the survey spanned five years, initial estimates of regional trends are now possible.

From the first five year study, it was observed that about 13% of assessed southern Californian perennial streams are biologically healthy. The Ventura and Santa Clara River watersheds were among watersheds with better biological conditions, and Calleguas Creek watershed was among the watersheds with streams in the poorest condition. High-risk and extensive stressors associated with poor biological condition included physical habitat degradation, nutrients, and certain major ions. Water toxicity, metals, and pyrethroids had weaker associations. The findings do not prove causation and are limited to stressors that were measured. Co-occurrence of multiple stressors make it difficult to assess the risk of individual stressors. The



restriction to perennial streams may have biased the estimates of regional health by excluding many streams in undeveloped areas.

Beginning in 2014, sampling includes revisits to previously sampled sites for trend detection, and since 75% of southern Californian streams are nonperennial, the study has expanded to include nonperennial streams for assessments of condition. High-priority stressors (habitat, nutrients, and ions) will continue to be measured, but low-priority stressors (water column metals and toxicity) will be discontinued unless they are a known concern at a site. For the next five year study, the RMP is considering expanding habitat assessment to include hydromodification and channel modification indicators, and adding new stressors of interest including sediment pyrethroids, sediment toxicity, and bioanalytical screens for contaminants of emerging concern. Sampling is generally conducted in late spring and early summer but has been expanded to include early spring in order to capture data from early drying intermittent streams.

3.5 TMDL MONITORING SUMMARY

The following subsections summarize current TMDL monitoring activities by watershed: Ventura River Watershed (VRW), Santa Clara River Watershed (SCRW), Calleguas Creek Watershed (CCW), Oxnard Coastal Watershed (OCW), and Malibu Creek Watershed (MCW). Table 3-6 summarizes the 17 effective Ventura County TMDLs by watershed that contain MS4 WLAs . Table 3-7 presents information about the status of the monitoring programs for each effective TMDL, including whether a monitoring plan has been developed, if the monitoring plan has been approved by the Executive Officer of the Regional Board, and if the monitoring plan is currently being implemented.

Table 3-6 Summary of Effective TMDLs

Watershed	TMDL	TMDL Type	Effective Date
VRW	Total Maximum Daily Load for Algae, Eutrophic Conditions, and Nutrients in the Ventura River and its Tributaries (Algae TMDL)	RWQCB Adopted TMDL	June 28, 2013 [1]
VRW	Ventura River Estuary Trash TMDL (VRE Trash TMDL)	RWQCB Adopted TMDL	March 6, 2008
SCR	Santa Clara River Nitrogen Compounds TMDL (Nitrogen TMDL)[2]	RWQCB Adopted TMDL	March 23, 2004
SCR	Santa Clara River Bacteria TMDL (SCR Bacteria TMDL)	RWQCB Adopted TMDL	March 21, 2012
SCR	TMDL for Chloride in the Santa Clara River, Reach 3 (Reach 3 Chloride TMDL) [2]	USEPA-promulgated TMDL	June 18, 2003
CCW	Organochlorine (OC) Pesticides, Polychlorinated Biphenyls (PCBs) and Siltation in Calleguas Creek, its Tributaries, and Mugu Lagoon (OC Pesticides TMDL)	RWQCB Adopted TMDL	March 24, 2006
CCW	Toxicity, Chlorpyrifos, and Diazinon in the Calleguas Creek, its Tributaries and Mugu Lagoon (Toxicity TMDL)	RWQCB Adopted TMDL	March 24, 2006
CCW	Metals and Selenium in Calleguas Creek, its Tributaries, and Mugu Lagoon (Metals TMDL)	RWQCB Adopted TMDL	March 26, 2007
CCW	Boron, Chloride, Sulfate and TDS (Salts) in the Calleguas Creek, its Tributaries and Mugu Lagoon (Salts TMDL)	RWQCB Adopted TMDL	December 2, 2008
CCW	Revolon Slough and Beardsley Wash Trash TMDL (RSBW Trash TMDL)	RWQCB Adopted TMDL	March 6, 2008
CCW	TMDLs for Pesticides, PCBs, and Sediment Toxicity in Oxnard Drain 3 (Oxnard Drain TMDLs)	USEPA-promulgated TMDL	October 6, 2011
OCW	TMDL for Bacteria in Harbor Beaches of Ventura County (Channel Island Harbor Beaches TMDL)	RWQCB Adopted TMDL	December 18, 2008.
MCW	Malibu Creek and Lagoon Bacteria TMDL (Malibu Creek Bacteria TMDL)	RWQCB Adopted TMDL	January 24, 2006 [1]
MCW	Malibu Creek Watershed Trash TMDL (Malibu Creek Trash TMDL)	RWQCB Adopted TMDL	July 7, 2009
MCW	TMDL for Nutrients Malibu Creek Watershed (Malibu Creek Nutrients TMDL)	USEPA-promulgated TMDL	March 21, 2003
MCW	Los Angeles Area Lakes TMDL for Nitrogen, Phosphorus, Mercury, Trash, Organochlorine Pesticides and PCBs (LA Lakes TMDL); specifically only Lake Sherwood Mercury TMDL applies.	USEPA-promulgated TMDL	March 26, 2012
MCW	Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments (Benthic TMDL)	USEPA-promulgated TMDL	July 2, 2013
Santa Monica Bay	SMB Marine Debris TMDL	RWQCB Adopted TMDL	May 20, 2012

1. In the USEPA approval letter for the Ventura River Algae, Eutrophic Conditions, and Nutrients TMDL, USEPA made a finding that this TMDL also addressed the pumping and diversion listings for the Ventura River.
2. Although WLAs are included in the MS4 Permit for these TMDLs, MS4s are considered a minor source contributing to the overall loading of the respective pollutants.

Table 3-7 TMDL Monitoring Plan Information Presented by Watershed

Watershed	TMDL	Mon. Plan Developed	Mon. Plan Approved	Mon. Plan Implemented
VRW	Algae TMDL	X	X	January 2015
VRW	VRE Trash TMDL	X	X	X
SCR	Nitrogen TMDL[1]	X		X
SCR	SCR Reach 3 Chloride TMDL[2]	NR	NR	NR
SCR	SCR Bacteria TMDL	X		
CCW	CCW OC Pesticides TMDL	X	X	X
CCW	CCW Toxicity TMDL	X	X	X
CCW	CCW Metals TMDL	X	X	X
CCW	CCW Salts TMDL	X	X	X
CCW	RSBW Trash TMDL	X	X	X
CCW	Oxnard Drain 3 TMDL[2]	NR	NR	NR
OCW	CIH Beaches TMDL	X	X	X
MCW	Malibu Creek Bacteria TMDL	X	X	X
MCW	Malibu Creek Trash TMDL	X		X
MCW	Malibu Creek Nutrients TMDL[2]	NR	NR	NR
MCW	LA Lakes TMDL (Lake Sherwood)[2]	NR	NR	NR
MCW	Malibu Creek Benthic TMDL[2]	NR	NR	NR

"X" indicates the monitoring plan has been developed, approved, and/or implemented.

"NR" indicates a monitoring plan was not required for receiving water monitoring.

1. Existing monitoring at Mass Emission Site under the MS4 Permit is utilized to meet TMDL monitoring requirements in accordance with the TMDL.
2. These TMDLs are USEPA-promulgated TMDLs that do not require monitoring. Monitoring may be required by individual permits to implement the various TMDLs, but monitoring was not specified in the 2010 Ventura County MS4 permit.

3.5.1 Ventura River Watershed TMDLs

The following subsections present information on TMDL monitoring conducted in the VRW including relevant reaches, monitoring analytes, reporting, and a data summary.

3.5.1.1 *Ventura River Watershed Reaches*

The Ventura River is divided into five distinct reaches as detailed in Table 3-8. In addition, the Ventura River Estuary is a water body distinct from the rest of the Ventura River. Major tributaries to the Ventura River include: Cañada Larga, Coyote Creek, San Antonio Creek, and Matilija Creek. Algae TMDL compliance monitoring is required to be conducted in Ventura River Reaches 1-5, the Ventura River Estuary, and the major tributaries Cañada Larga, and San Antonio Creek. VRE Trash TMDL compliance monitoring occurs on the parcels within the Ventura River Estuary. Figure 3-17 depicts the Ventura River reaches and the major tributaries.

Table 3-8. Ventura River Watershed Reaches

Reach	Geographic Description
1	Between Main St. and the Ventura River Estuary
2	Between confluence with Weldon Canyon and Main St.
3	Between Casitas Vista Rd. and confluence with Weldon Canyon
4	Between Camino Cielo Rd. and Casitas Vista Rd.
5	Above Camino Cielo Rd.

3.5.1.2 *Ventura River Watershed Analytes*

Receiving water compliance monitoring analytes for the VRW TMDLs are listed in Table 3-9.

Table 3-9. Ventura River Watershed TMDLs Compliance Monitoring Analytes

TMDL	Analyte
Algae [1]	Algal Biomass, Algal Percent Cover Dissolved Oxygen, pH, Temperature, Electrical Conductivity Nitrogen, Phosphorus
Trash	Visual inspection of trash quantity

1. TMDL compliance monitoring will be commenced in January 2015.

3.5.1.3 *Ventura River Watershed Reporting*

The results of compliance monitoring for the Algae TMDL will be reported in an Annual Monitoring Report. The results of compliance monitoring for the VRE Trash TMDL have been reported in Annual Monitoring Reports since 2009.

3.5.1.4 *Summary of Results to Date*

Monitoring has not yet been initiated for the Algae TMDL. Responsible Parties to the TMDL, including the Cities of Ventura and Ojai, County of Ventura, Ojai Valley Sanitary District, California Department of Transportation, Farm Bureau of Ventura County representing Ag Dischargers, and Ventura County Watershed Protection District, submitted a TMDL monitoring plan on June 28, 2014 and will initiate monitoring on January 19, 2015 as approved by the Executive Officer of the Regional Board.

Under the VRE Trash TMDL, trash data (pieces of trash) were collected from 2009-2013 as required under the 2009 Executive Officer-approved Trash Monitoring and Reporting Plan (TMRP) and Minimum Frequency of Assessment and Collection/Best Management Practice (MFAC/BMP) Program. The TMRP and MFAC/BMP Program were originally developed to address point and nonpoint sources of trash. However, during implementation of the MFAC/BMP Program, the Responsible Parties determined that the MFAC/BMP Program was not successful at addressing trash from both source types. As such, the Responsible Parties gained approval from the Regional Board to address point sources through the installation of trash full capture devices on conveyances discharging to the Estuary and address nonpoint sources through a revised MFAC/BMP Program. The revised MFAC/BMP Program was aimed at eliminating homeless encampments in the Estuary as they were determined to be the main source of nonpoint trash in the Estuary. The revised MFAC/BMP Program shifted monitoring from a numeric based assessment program to a visual based assessment program. As such, numeric trash data were no

longer collected after 2013. Table 3-10 lists the total pieces of trash collected from 2009-2013 as part of the VRE Trash TMDL. Trash data are highly variable due primarily to environmental conditions such as how much wind and/or storm events occurred during a particular year and during certain parts of years (winter versus summer). In addition, it is very difficult to directly identify the sources of trash (e.g., MS4, agriculture) within the watershed.

Table 3-10. Trash Data Collected under the VRE Trash TMDL

Trash Monitoring Year	Total Pieces of Trash Collected [1]
2009-2010	8,143
2010-2011	5,021
2011-2012	8,919
2012-2013	6,944

1. Trash data are not used to determine compliance with the VRE TMDL

Figure 3-16: Type of Trash Found (left) and Trash Collection (right) During a MFAC Event

Figure 3-17: Ventura River Reaches and Major Tributaries

3.5.2 Santa Clara River Watershed TMDLs

The following subsections present information on TMDL monitoring conducted in the SCRW including relevant reaches, monitoring analytes, reporting, and a data summary.

3.5.2.1 *Santa Clara River Watershed Reaches*

The SCRW has twelve distinct reaches as detailed in

Table 3-11. The estuary and Reaches 1 through 4B are entirely located within Ventura County. Reach 5 begins within an open space area of Ventura County just 4,500 feet west from the Los Angeles County's border. Although the Ventura County MS4 Permit requires receiving water compliance monitoring for the Chloride TMDL, there is no MS4 in the Ventura County portion of Reach 5. As such, receiving water monitoring is not conducted. Considering that there is no MS4 within the Ventura County land areas designated in the TMDL, the TMDL should be removed from the next MS4 Permit.

Table 3-11. Santa Clara River Watershed Reaches

Reach	Geographic Description	County
1	SCR Between Hwy 101 Bridge and Santa Clara River Estuary	Ventura
2	SCR Between Freeman Diversion Dam near Saticoy and Highway 101 Bridge	Ventura
3	SCR Between A Street in Fillmore and Freeman Diversion Dam near Saticoy	Ventura
4A	SCR Between confluence of Piru Creek and A Street in Fillmore	Ventura
4B	SCR Between Blue Cut gauging station and confluence of Piru Creek	Ventura
5	SCR Between West Pier Hwy 99 and Blue Cut gauging station	Los Angeles, Ventura (4,500 ft west from LA open space only)
6	SCR Between Bouquet Canyon Road Bridge and West Pier Hwy 99	Los Angeles
7	SCR Between Lang gauging station and Bouquet Canyon Road Bridge	Los Angeles
8	SCR Above Lang gauging station	Los Angeles
9	Santa Paula Creek above Santa Paula Water Works Diversion Dam	Los Angeles
10	Sespe Creek above gauging station, 500' downstream from Little Sespe Creek	Los Angeles
11	Piru Creek above gauging station below Santa Felicia Dam	Los Angeles

SCR Bacteria TMDL Responsible Parties developed TMDL monitoring plan and submitted to RWQCB on March 21, 2013. The monitoring is required 90 days after RWQCB Executive Officer approves the monitoring plan. Approval has not been yet received.

Receiving water compliance monitoring is conducted in conjunction with monitoring at the MES under the MS4 Permit for the Nitrogen TMDL and not required for the Reach 3 Chloride TMDL. Both TMDLs characterize MS4 discharges as minor point sources, citing water reclamation plants and publicly owned

treatment works as major point sources of the TMDL pollutants[4]. The relative contribution from the MS4s should be taken into account in future watershed planning processes, including prioritization and BMP implementation. While these TMDLs are important to the MS4s in the watershed, they may not, and should not be, prioritized as high as TMDLs where the MS4 is likely a more significant contributor (e.g., bacteria). Figure 3-18 depicts the Santa Clara River reaches and major tributaries.

3.5.2.2 *Santa Clara River Watershed Analytes*

Compliance monitoring analytes for the SCRW TMDLs are listed in Table 3-12.

Table 3-12. Santa Clara River Watershed TMDLs Compliance Monitoring Analytes

TMDL	Constituent
SCR Bacteria [1]	*E. coli*, *Enterococcus*, Fecal Coliform, Total Coliform
SCR Nitrogen	Ammonia-nitrogen, Nitrate + Nitrite nitrogen

1. TMDL compliance monitoring has not yet commenced pending RWQCB approval of submitted monitoring plan.

3.5.2.3 *Santa Clara River Watershed Reporting*

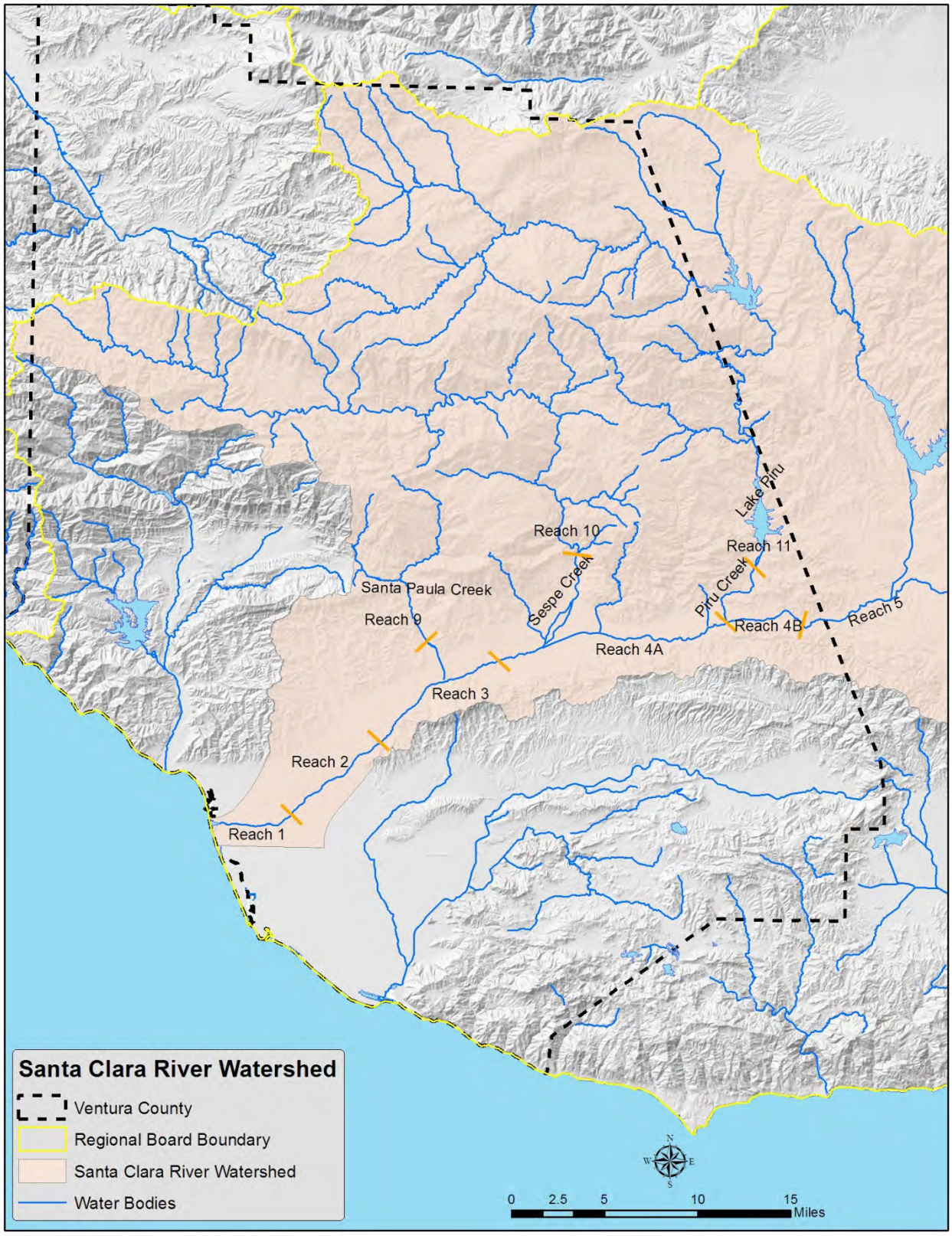
The results of compliance monitoring for the Chloride TMDL is reported in an Annual Monitoring Report and the results of compliance monitoring for the Bacteria TMDL will be reported in a separate Annual Monitoring Report.

3.5.2.4 *Summary of Results to Date*

Receiving water monitoring required by the Nitrogen TMDL is performed at the MES, concurrent with monitoring required under the MS4 Permit. A brief discussion of the MES data is provided in Section 3.3. As noted in the water quality index and in the trends tables, water quality data indicates that water quality standards are being met. Required receiving water monitoring for the SCR Bacteria TMDL includes collecting *E. coli*, *enterococcus*, fecal coliform, and total coliform data. Responsible Parties to the TMDL, including the Cities of Fillmore, Santa Paula, and Ventura, and County of Ventura, in cooperation with City of Oxnard, recently submitted an in-stream monitoring plan to the Regional Board, which was due one year after the effective date of the TMDL. Monitoring is required to begin within six months of approval of the in-stream monitoring plan. Monitoring will commence within the required six months following Executive Officer approval. Chloride data are not collected for the Reach 3 Chloride TMDL as it is an USEPA-promulgated TMDL and TMDL-specific monitoring beyond Permit MRP is not required. Chloride data are not collected in Reach 5 as part of the Chloride TMDL as there is no MS4 in the Ventura County portion of Reach 5.

[4] TMDL for Chloride in Santa Clara River, Reach 3. U.S. Environmental Protection Agency Region IX, June 18, 2003, page 12; Resolution No. 03-011, Amendment to the Water Quality Control Plan – Los Angeles Region to Incorporate the Santa Clara River Nitrogen Compounds TMDL, Proposed for adoption by the California Regional Water Quality Control Board, Los Angeles Region on August 7, 2003. Attachment A.

Figure 3-18 Santa Clara River Reaches and Major Tributaries



3.5.3 Calleguas Creek Watershed TMDLs

The following subsections present information on TMDL monitoring conducted in the CCW including relevant reaches, monitoring analytes, reporting, and a data summary.

3.5.3.1 *Calleguas Creek Watershed Reaches*

Receiving water TMDL compliance monitoring currently occurs at the base of subwatersheds as defined in the TMDL. Table 3-14 provides the reach numbers and names, the subwatersheds, and a geographic description of the designated reaches within the CCW.

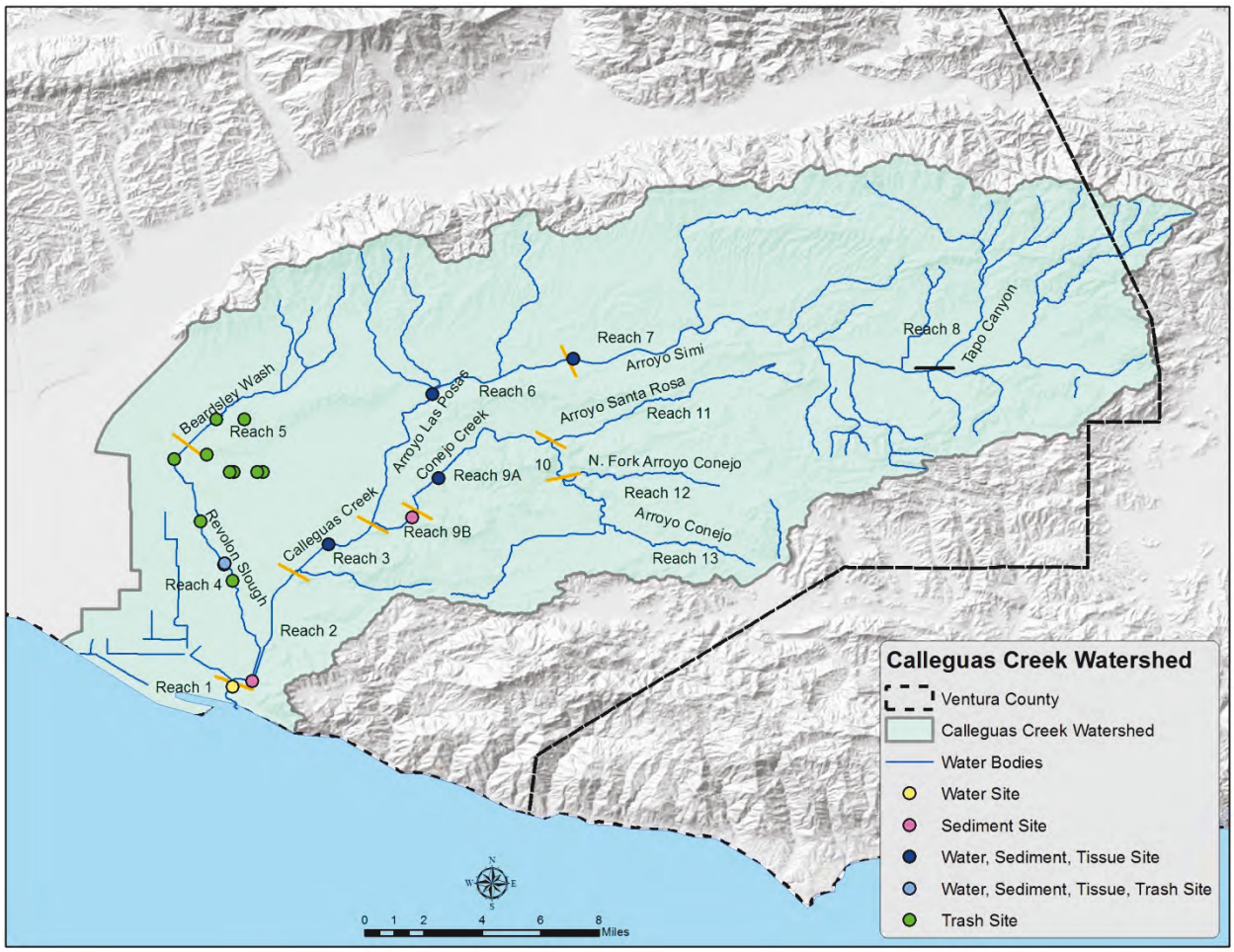


Figure 3-20

Table 3-13. Calleguas Creek Watershed Reaches

Reach	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. For consistency with the TMDLs and historic site naming conventions, the reach designations used in previous CCW annual reports have been maintained.

3.5.3.2 *Calleguas Creek Watershed Analytes*

Compliance monitoring for the five TMDLs requires samples to be collected from water, sediment, and tissue. Table 3-15 presents a list of the sample analytes.

3.5.3.1 *Calleguas Creek Watershed Reporting*

The results of compliance monitoring for the OC Pesticides TMDL, the Metals TMDL, the Toxicity TMDL, and the Salts TMDL are reported together in a coordinated Annual Monitoring Report. The results of compliance monitoring for the RSBW Trash TMDL are reported in a separate Annual Monitoring Report.

Table 3-14. Calleguas Creek Watershed TMDLs Compliance Monitoring Analytes

TMDL	Constituent
OC Pesticides TMDL	Water, Sediment, Tissue: Organochlorine (OC) Pesticides and PCBs
Toxicity TMDL	Water: Chronic Aquatic Toxicity, Diazinon and Chlorpyrifos; Sediment: Chronic Sediment Toxicity
Metals TMDL	Copper, Mercury, Nickel, Zinc, and Selenium
Salts TMDL	Electrical Conductivity (EC) and Discharge, Total Dissolved Solids (TDS), Sulfate, Chloride, Boron
RSBW Trash TMDL	Trash Pieces and Weight

3.5.3.2 *Summary of Results to Date*

This section provides a summary of the data collected for the five Regional Board-promulgated TMDLs in the CCW with MS4 WLAs.

Trends analyses were performed for all collected water, sediment, and tissue samples at receiving water compliance sites. Data were collected between August 2008 and May 2013. For water column samples, trends were analyzed by site for dry weather data only and for wet and dry weather data combined. Fewer wet weather water column samples are available for analysis and were therefore not analyzed separately.

The results of the trends analysis are presented in Table 3-15 through Table 3-18. Arrows are used to show statistically significant increasing or decreasing trends. Table entries "NT" (i.e., "no trend"), indicate there were sufficient data for analysis, but there were no statistically significant trends. Grey cells in the tables indicate that there were insufficient detected data for an analysis to be conducted. If a constituent is not included in the table, it was not detected in more than 10% of the samples at any watershed site to be included in the analyses. Constituents with TMDL targets that are not being detected at sufficient frequencies to allow for analysis are listed below. The majority of the constituents have not been detected at all during the TMDL monitoring period in any media.

1. Aldrin
2. Endosulfan I
3. Endosulfan II
4. Dieldrin
5. Endrin
6. Lindane
7. BHC-alpha and beta
8. Heptachlor
9. Heptachlor Epoxide

In several cases, data indicates that water quality standards are being met in receiving waters where TMDLs have been implemented and sufficient data has been collected to delist for the TMDL constituent. These include sediment, multiple metals, several organochlorine and organophosphorous pesticides. Relevant data for delisting will be submitted during the next 303(d) listing/delisting cycle. In these cases, Responsible Parties listed in the TMDL should not have to implement additional BMPs.

Table 3-15. Water Concentration Trends for Dry Weather Samples

Constituents	01_RR_BR	03_UNIV	04_WOOD	06_SOMIS	07_HITCH	9B_ADOLF
Chlorpyrifos	NT	NT	NT	NT	NT	NT
Copper, D & T	NT	↑	NT	NS	NS	NS
4,4'-DDD	↓		NT	NT		
4,4'-DDE	NT	NT	NT	NT	NT	NT
2,4'-DDT			NT			
4,4'-DDT			NT	NT		
Diazinon	NT	NT	NT	NT		
Mercury, D & T [1]	↓	↓	↓	NS	NS	NS
Nickel, D & T	NT	NT	NT	NS	NS	NS
Selenium, D & T	NT	NT	NT	NS	NS	NS
Total Suspended Solids	NT	NT	NT	↑	NT	NT
Toxaphene	↓	NT	↓	NT		
Zinc, D & T [2]	NT	↑	↑	NS	NS	NS

NS – Constituent not sampled
NT – No statistically significant trends
Down arrows indicate statistically significant decreasing trends. **Up** arrows indicate statistically significant increasing trends.
Gray cells represent insufficient detected data for analysis.

1. Only dissolved mercury showed a decreasing trend at 04_WOOD. Total mercury did not show any trends.

2. Only total zinc showed an increasing trend at 04_WOOD. Dissolved zinc did not show any trends.

Non-detect samples analyzed using the Method Detection Limit (MDL) value.

Table 3-16. Water Concentration Trends for Combined Wet and Dry Weather Samples

Constituents	01_RR_BR	03_UNIV	04_WOOD	06_SOMIS	07_HITCH	9B_ADOLF
Chlordane, alpha-	NT		NT			
Chlordane, gamma-	NT		NT			
Chlorpyrifos	NT	NT	NT	NT	NT	NT
Copper, D&T	NT	↑	NT	NS	NS	NS
2,4'-DDD	NT	NT	NT			
4,4'-DDD	↓	NT	NT	NT	NT	
2,4'-DDE	NT	NT	NT			
4,4'-DDE	NT	NT	NT	NT	NT	NT
2,4'-DDT	NT	NT	NT	NT	NT	
4,4'-DDT	NT	NT	NT	NT	NT	
Diazinon	NT	NT	NT	NT	NT	
Mercury, D & T[1]	↓	↓	↓	NS	NS	NS
Nickel, D & T	NT	NT	NT	NS	NS	NS
Selenium, D & T	NT	NT	NT			
Total Suspended Solids	NT	NT	NT	NT	NT	NT
Toxaphene	↓	NT	↓	NT	NT	NT
Zinc, D & T [2]	NT	↑	NT	NS	NS	NS

NS – Constituent not sampled
NT – No statistically significant trends
Down arrows indicate statistically significant decreasing trends. **Up** arrows indicate statistically significant increasing trends.
Gray cells represent insufficient detected data for analysis.

1. Only dissolved mercury showed decreasing trends. Total mercury did not show any trends.

2. Only dissolved zinc showed an increasing trend at 04_WOOD. Total zinc did not show any trends.

Non-detect samples analyzed using the Method Detection Limit (MDL) value.

Table 3-17. Sediment Concentration Trends

Constituents	Mugu Lagoon Sediment Sites	02_PCH	03_UNIV	04_WOOD	06_SOMIS	07_HITCH	9A_HOWAR	9B_ADOLF
2,4'-DDD				↓				
4,4'-DDD				↓				
2,4'-DDE				NT				
4,4'-DDE	NT [1]	↓	NT	↓	NT		↓	↓
Toxaphene				↓				

NT – No trends
Down arrows indicate statistically significant decreasing trends.
Gray cells represent insufficient detected data for analysis

1. Sufficient data for analysis were only available at 01_SG_74
Non-detect samples analyzed using the Method Detection Limit (MDL) value.

Table 3-18. Concentration Trends in Fish Tissue Samples

Constituents	01_Central_ Lagoon	01_Western_ Arm	03_UNIV	04_WOOD	06_SOMIS	07_HITCH	9B_ADOLF
Chlordane, alpha-			NT		NT	NT	NT
Chlordane, gamma-			NT	NT	NT		NT
2,4'-DDD			↓	NT	NT	NT	NT
4,4'-DDD			↓	NT	NT	NT	NT
2,4'-DDE			NT	NT		NT	NT
4,4'-DDE	NT		↓	NT	NT	NT	NT
2,4'-DDT			NT	NT	NT	NT	NT
4,4'-DDT			NT	NT		NT	NT
PCB Aroclor 1254			NT	NT	NT		NT
Toxaphene	NT		NT	NT	NT		
Chlorpyrifos	NS	NS	NS		NS	NS	NS
Mercury			NS	NT	NS	NS	NS
Selenium	NT	NT	NS	NT	NS	NS	NS

NS – Constituents not sampled
Down arrows indicate statistically significant decreasing trends.
NT – No trends
Gray cells represent insufficient detected data for analysis.

Under the RSBW Trash TMDL, trash data (pieces of trash) were collected from 2009 as required under the 2009 Executive Officer-approved Trash Monitoring and Reporting Plan (TMRP) and Minimum Frequency of Assessment and Collection/Best Management Practice (MFAC/BMP) Program. In 2013, weight of trash was added to the monitoring matrix. Table 3-20 lists the total pieces of trash collected between 2009 and 2014 as a part of the MFAC/BMP Program and Figure 20 depicts the typical amounts of trash collected during a MFAC event.

Compliance with point source wasteload allocation will be achieved through the installation of trash full capture devices on conveyances discharging to Revolon Slough/Beardsley Wash by 2016. The nonpoint sources will be addressed through an MFAC/BMP Program. Additionally, the City of Camarillo is proposing to further revise their compliance approach for point sources of trash by implementing a MFAC/BMP Program focused on catch basins the City of Camarillo is responsible for. The Program will include full capture device installation and catch basin trash levels assessments. The City of Camarillo is waiting for Regional Board approval of the point sources MFAC/BMP Program. The TMRP and MFAC/BMP Program were originally developed to track BMP effectiveness by counting pieces of trash at representative monitoring sites. However, during implementation of the MFAC/BMP Program, the Responsible Parties determined that this matrix was not successful and requested RWQCB to initiate more effective and cost efficient visual monitoring program instead. This revision was approved by the RWQCB on December 22, 2014. Figure 3-21 shows the Calleguas Creek reaches, major tributaries, and TMDL monitoring locations.

Figure 3-19: Before and After Pictures from a Typical MFAC Event.

Table 3-19. Trash Data Collected under the RSBW Trash TMDL

Trash Monitoring Year	Total Pieces of Trash Collected [1]
2009-2010	5,718
2010-2011	4,613
2011-2012	6,238
2012-2013	6,313
2013-2014	4,731

1. Trash data are not used to determine compliance with the RSBW TMDL

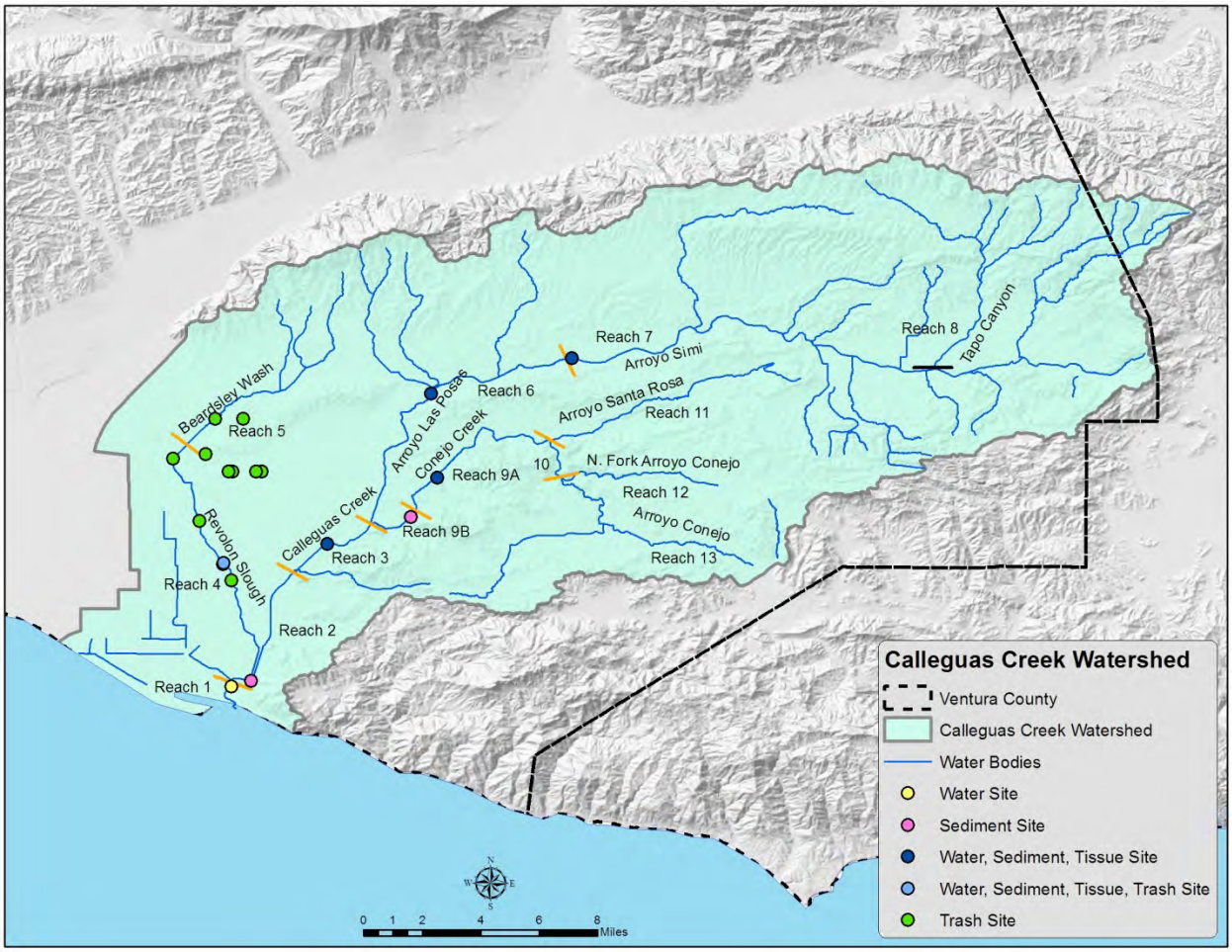


Figure 3-20. Calleguas Creek Reaches, Major Tributaries, and TMDL Monitoring Locations

3.5.4 Oxnard Coastal Watershed TMDLs

The following subsections present information on TMDL monitoring conducted in the OCW including relevant reaches, monitoring analytes, reporting, and a data summary.

3.5.4.1 *Oxnard Coastal Watershed Reaches*

Monitoring is conducted at Hobie Beach and Kiddie Beach through the Ventura County Environmental Health Division's Ocean Water Quality Monitoring Program funded by AB 411. The major water bodies within the OCW are listed in Table 3-21 and depicted in Figure 3-22.

Table 3-20. Oxnard Coastal Watershed Water Bodies

Water Body	Geographic Description
Hobie Beach	Eastern End of Main Harbor Entrance, North of Southern Entrance Jetty
Kiddie Beach	Eastern End of Main Harbor Entrance, South of Southern Entrance Jetty

3.5.4.2 *Oxnard Coastal Watershed Analytes*

Compliance monitoring analytes for the Harbor Beaches Bacteria TMDL include fecal coliform, total coliform, and enterococcus.

3.5.4.3 *Oxnard Coastal Watershed Reporting*

The Harbor Beaches Bacteria TMDL requires the Responsible Parties to submit a Compliance Report evaluating compliance with dry weather allocations, interim wet weather allocations, and rolling 30-day geometric mean targets six and eight years after the effective date. The effective date of the Harbor Beaches Bacteria TMDL is December 18, 2008. As such, Compliance Reports are due on December 18, 2014 and by December 18, 2016. In addition, a Final Compliance Report is required ten years after the effective date or December 18, 2018. The Responsible Parties submitted the first Compliance Report on December 18, 2014.

3.5.4.4 *Summary of Results to Date*

Trends analyses were performed for fecal coliform, total coliform, and enterococi samples collected at Hobie Beach (Site 36000) and at Kiddie Beach (Site 37000) between February 2009 and April 2014. Trends were analyzed for each constituent by site for summer dry, winter dry, and wet weather conditions. The results of the trends analysis are presented in Table 3-22. Arrows in the table show statistically significant increasing or decreasing trends. Table entries "NT", indicate there were sufficient data for analysis, but there were no statistically significant trends.

The data show an increasing trend in fecal coliform concentrations during summer dry weather at the Hobie Beach and Kiddie Beach sites. In addition, the data show a decreasing trend in total coliform concentrations at Hobie Beach during winter dry weather. (Table 3-22).

Table 3-21 Harbor Beaches Bacteria TMDL Data Trends: Summer Dry, Winter Dry, and Wet Weather

Weather Condition/Bacteria Type	Hobie Beach	Kiddie Beach
Summer Dry		
Fecal Coliform	↑	↑
Total Coliform	NT	NT
Enterococcus	NT	NT
Winter Dry		
Fecal Coliform	NT	NT
Total Coliform	↓	NT
Enterococcus	NT	NT
Wet Weather		
Fecal Coliform	NT	NT
Total Coliform	NT	NT
Enterococcus	NT	NT

NT – No trends

Down arrows indicate statistically significant decreasing trends. **Up** arrows indicate statistically significant increasing trends.

Non-detect samples analyzed using the Method Detection Limit (MDL) value.

Figure 3-21. Oxnard Coastal Watershed Water Bodies and TMDL Monitoring Locations

3.5.5 Malibu Creek Watershed TMDLs

The following subsections present information on TMDL monitoring conducted in the MCW including relevant reaches, monitoring analytes, reporting, and a data summary.

3.5.5.1 *Malibu Creek Watershed Reaches*

The major water bodies of the MCW are listed in Table 3-22 and depicted in Figure 3-23Figure 3-22. TMDL compliance monitoring for bacteria within Ventura County is conducted weekly in Hidden Valley Creek (no MS4), Potrero Valley Creek (no MS4), Medea Creek Reach 2, Lindero Creek Reach 2, Chesebro Canyon Creek (no MS4), and West Lake Creek (no MS4). Since July 2011, the monthly TMDL compliance monitoring for trash in Ventura County is conducted in Medea Creek Reach 2 and Lindero Creek Reach 2. No other TMDL compliance monitoring is conducted in the MCW as the other TMDLs are USEPA-promulgated and do not contain monitoring requirements.

Table 3-22. Ventura County Portion of Malibu Creek Watershed Water Bodies

Water Body	Geographic Description
Hidden Valley Creek	Upstream of Lake Sherwood
Potrero Valley Creek	Between Lake Sherwood and Westlake Lake
Lindero Creek Reach 2	Upstream of Lake Lindero
Medea Creek Reach 2	Upstream of Confluence of Lindero Creek Reach 1 and Medea Creek Reach 1
Palo Comado Creek	Western Main Tributary to Medea Creek Reach 2
Las Virgenes Creek	Northeastern Most Tributary to Malibu Creek
Chesebro Canyon Creek	Eastern Main Tributary to Medea Creek Reach 2

3.5.5.2 *Malibu Creek Watershed Analytes*

Compliance monitoring analytes for the MCW TMDLs include fecal coliform, total coliform, *enterococcus*, and trash (pieces, weight, and volume).

3.5.5.3 *Malibu Creek Watershed Reporting*

The Responsible Parties of the Malibu Creek Bacteria TMDL submit monthly data reports to the Regional Board and the results of Malibu Creek Trash TMDL monitoring are submitted in Annual Monitoring Reports.

3.5.5.4 *Summary of Results to Date*

Trends analyses were performed for all collected water samples at receiving water compliance sites for Ventura County. Data were collected between March 2008 and October 2014. Trends were analyzed by site for dry weather data and for wet weather data.

The results of the trends analysis are presented in Table 3-23. Arrows are used to show statistically significant increasing or decreasing trends. ”NT” (i.e., “no trend”) is used to show constituent-water body combinations that had sufficient data for analysis, but for which the trends were not determined to be significant. Grey cells in the tables indicate that there were insufficient detected data for an analysis to be conducted. The data indicate that the MCW-12

and MCW-15c sites exhibit statistically significant decreasing trends in *E. coli* and fecal coliform concentrations over time during dry and wet weather and the MCW-14b site exhibits a statistically significant decreasing trend in *E. coli* concentrations over time during dry weather (Table 3-23).

Three of the eight sites have primarily had no flow during the weekly sampling events over the past six years of monitoring: MCW-9 (98% of sampling events), MCW-17 (81% of sampling events), and MCW-18 (99% of sampling events). When the sites are dry, it indicates that the water bodies and the subwatersheds they drain are not contributing to bacteria loading to Malibu Creek. The monitoring sites are shown in Figure 3-23.

Based on the trends analysis and the lack of flow at three of the eight monitoring sites during the majority of monitoring events, inputs of bacteria from five of the eight subwatersheds draining Ventura County are decreasing (Upper Lindero Creek, Upper Medea Creek) or non-existent (Hidden Valley Creek, Potrero Canyon Creek, Cheesebro Creek).

Table 3-23. E. coli Concentration Trends for Dry and Wet Weather Samples

Constituents	MCW-8b	MCW-9 [1]	MCW-12	MCW-14b		MCW-15c [2]	MCW-17 [1]	MCW-18 [1]
E. coli (Dry)	NT	NT	↓	↓		↓NT	NT	
E. coli (Wet)	NT	NT	↓	NT		↓NT	NT	NT
Fecal Coliform (Dry)	NT	NT	↓	NT		↓	NT	
Fecal Coliform (Wet)	NT	NT	↓	NT		↓	NT	NT

NT – No trends

Down arrows indicate statistically significant decreasing trends.

Grayed out blank cells represent insufficient data for analysis

1. Sites MCW-9, MCW-17, and MCW-18 had no flow (i.e., were dry) 98%, 81%, and 99%of the sampling events, respectively,
2. MCW-15b was sampled from 3/11/08-8/10/10, the "Special-05" site was renamed MCW-15c and replaced the MCW-15b site on 8/17/10. Data were combined from both sites for the trends analyses as the two sites are in close proximity to each other.

Non-detect samples analyzed using the Method Detection Limit (MDL) value.

To meet the requirements of the MCW Trash TMDL, the Responsible Parties submitted a Trash Monitoring and Reporting Plan (TMRP) to the Regional Board on April 30, 2010. The Responsible Parties developed the TMRP to assess trash in Lindero Creek and Medea Creek utilizing one representative monitoring location per creek. The Responsible Parties collected and assessed trash data from July 1, 2011 through June 30, 2012 to identify a baseline amount of trash from which the Responsible Parties would assess point source compliance. In addition, the Responsible Parties collected and assessed trash monthly from July 1, 2012 through June 30, 2013 to serve as the first-year monitoring data. Trash data collected included pieces, volume, and weight as shown in Table 3-24. The Responsible Parties will continue to collect and assess trash monthly at the two monitoring locations to determine compliance with the MCW Trash TMDL.

Table 3-24. Trash Data Collected under the MCW Trash TMDL

Monitoring Date	Medea Creek (MC1)			Lindero Creek (LC1)		
	Pieces	Volume (cf)	Weight (lbs)	Pieces	Volume (cf)	Weight (lbs)
7/19/12	9	0.2	0.5	24	0.6	1.1
8/29/12	8	0.1	0.1	14	1.2	2.1
9/27/12	11	0.1	0.1	8	0.6	0.1
10/19/12	20	0.3	0.1	9	0.4	0.2
11/26/12	11	0.3	0.6	29	0.4	3
12/20/12	2	0.3	2.9	11	0.1	0.3
1/29/13	36	0.5	0.3	53	0.6	4.7
2/14/13	18	0.5	0.3	17	0.2	0.9
3/21/13	10	0.6	0.6	31	0.5	1.8
4/25/13	11	0.04	1.1	21	0.6	2.2
5/30/13	20	0.6	1.8	0	0	0
6/27/13	7	0.2	0.2	12	0.1	0.3
Annual Total	**163**	**3.7**	**8.6**	**229**	**5.4**	**16.8**

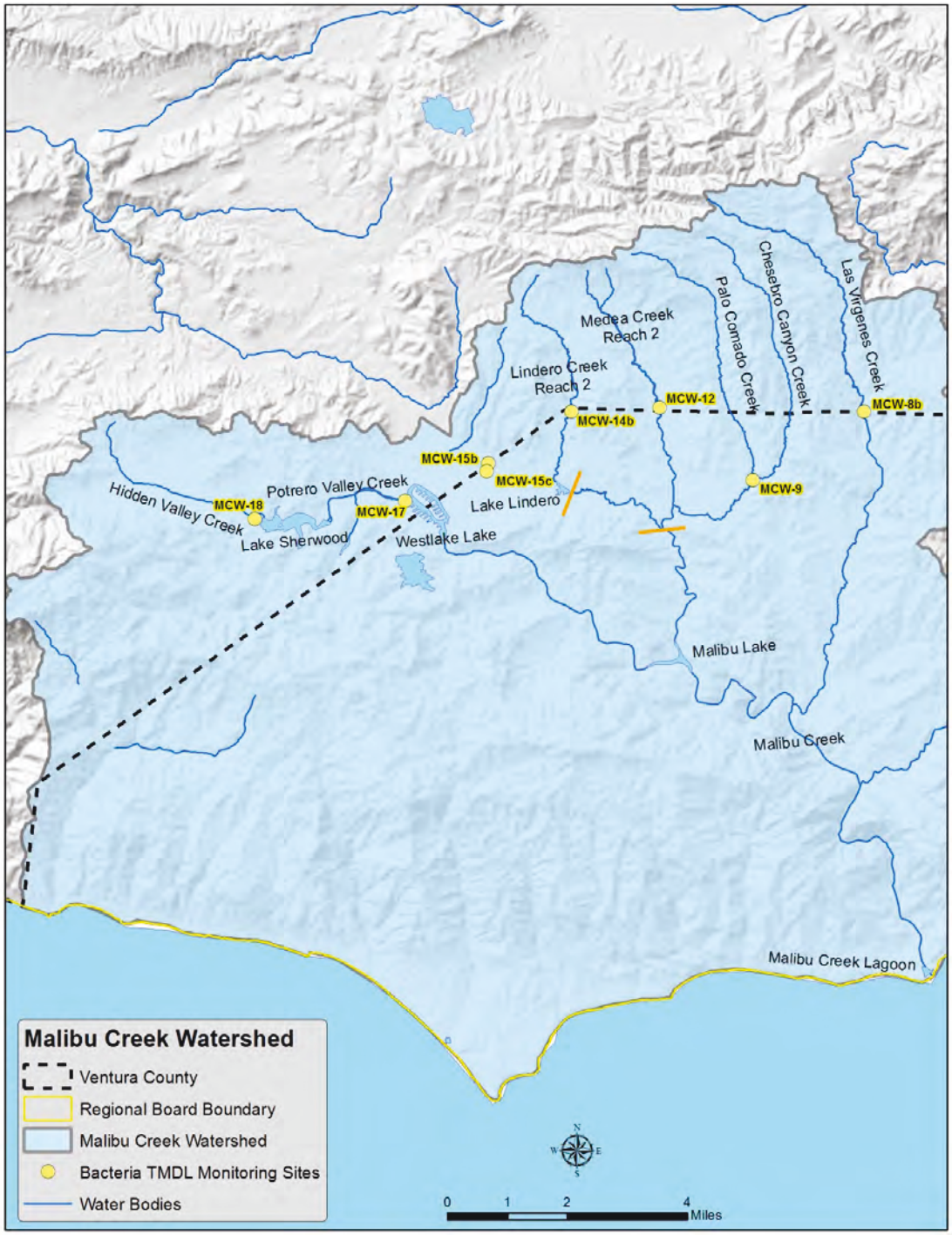


Figure 3-22. Ventura County Malibu Creek Watershed Bacteria TMDL Monitoring Sites

3.5.6 TMDL Related Recommendations

Having implemented multiple TMDLs over the current permit term, water quality data has demonstrated several successes in the Santa Clara and Calleguas Creek Watersheds leading to a few recommendations for the upcoming MS4 Permit. These watersheds have well organized and active watershed programs contributing to water quality

improvements. The following recommendations should be included in the next iteration of the MS4 Permit for the VCSQMP.

- The Upper Santa Clara River Chloride TMDL should be removed from the Ventura County MS4 Permit. Although a WLA is assigned to MS4 Permittees discharging to the Upper Santa Clara River, there is no MS4 within the Ventura County portion of the watershed.
- The Permit should acknowledge that delisted waterbodies have no reasonable potential to exceed established WLAs, therefore where delisting(s) for TMDL constituents have occurred, no further actions should be required of the named responsible parties. Data collected indicates that this may be applicable to the following TMDLs:
    - TMDL for Nitrogen Compounds in the Santa Clara River;
    - Sediment and several organochlorine pesticides under the TMDL for OC Pesticides, PBCs, and Siltation in Calleguas Creek;
    - Select OP Pesticides under the TMDL for Toxicity, Chlorpyrifos, and Diazinon in Calleguas Creek, its Tributaries, and Mugu Lagoon; and
    - Multiple metals under the TMDL for Metals and Selenium in Calleguas Creek, its Tributaries, and Mugu Lagoon.
- The prioritization process within the watershed management programs should account for, and lower the priority for, TMDL pollutants in two key circumstances:
    - Where MS4s are acknowledged to be a minor contributing source, as written in the TMDL or demonstrated through monitoring; and
    - Where sufficient data exists to delist the waterbody pollutant combination covered under the TMDL.

3.6 POLLUTANTS OF CONCERN IDENTIFICATION

The current LA MS4 Permit includes identification of water quality priorities based on three primary considerations including TMDLs, 303(d) listings, and exceedances of receiving water limitations. In general, these categories appear to be a good starting point for prioritization. However, local knowledge of water quality problems within Ventura County must be considered when developing priorities for the watersheds. Given the extensive prioritization efforts, planning, and monitoring that has occurred over the recent permit term, the Program has a solid understanding of the pollutants of concern within its watersheds and the prioritization process required within the new MS4 Permit should be structured to support these priorities, as implementation programs are underway in many cases.

Table 3-25 presents a summary of initial pollutants of concern/water quality priorities. The summary was developed at the watershed scale so if a TMDL or 303(d) listing exists for any reach in the watershed, it was included in the table. All TMDLs listed include wasteload allocations for MS4s, but an analysis has not been conducted for 303(d) listed constituents to determine if MS4s are causing or contributing to the impairment. Cells that state TMDL and 303(d) mean that at least one reach in the watershed is covered by a TMDL for the constituent, but at least one other reach is on the 303(d) list and has not yet been addressed by a TMDL.

Table 3-25. Pollutant of Concern Summary

Constituent	CCW	SCR	VR	MCW	Oxnard Coastal	Coastal
Indicator Bacteria/Coliform	303(d)	TMDL	303(d)	TMDL	TMDL	303(d)
Trash	TMDL and 303(d)		TMDL	TMDL		
Sedimentation/Siltation	TMDL and 303(d)			TMDL		
Diazinon	TMDL					
Chlorpyrifos	TMDL					
Toxicity	TMDL	303(d)				
Boron	TMDL	303(d)				
Chloride	TMDL	TMDL and 303(d)				
Sulfate	TMDL	303(d)				
TDS	TMDL	303(d)	303(d)			
Dieldrin	TMDL					
Chlordane	TMDL					
DDT Compounds	TMDL					303(d) [2]
Toxaphene	TMDL					
PCBs	TMDL					303(d) [2]
Bifenthrin	TMDL					
Copper	TMDL					
Nickel	TMDL					
Mercury	TMDL		303(d)	TMDL		
Selenium	TMDL					
Specific conductance	303(d)					
Total Nitrogen		TMDL [1]	TMDL	TMDL		
Total Phosphorus			TMDL	TMDL		
Aluminum [3]	RWL	RWL	RWL			
pH		303(d)	TMDL			
Temperature			TMDL			
Algal Biomass			TMDL			
Algal Percent Cover		TMDL				
Dissolved Oxygen			TMDL			
Fish Barriers			303(d)			

1. Pollutants of concern are limited to ammonia-N, nitrate-N, and nitrite-N rather than total nitrogen.
2. Listings are in Port Hueneme Back Basins and Ventura Marina Jetties. USEPA website indicates these constituents are being addressed by an alternative to a TMDL.
3. Aluminum has been identified as a pollutant of concern based on the receiving water and outfall data analysis.

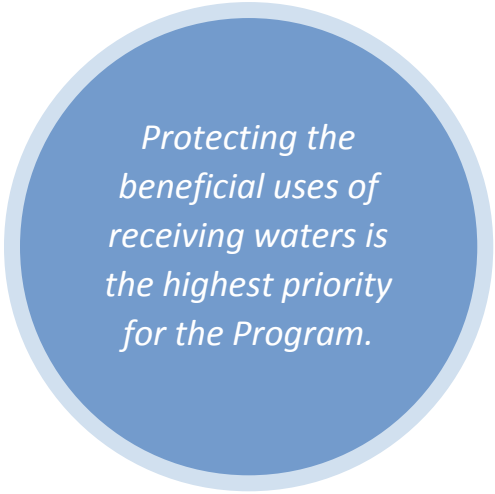
Using this information as a basis, the Program can then consider where the MS4s have a reasonable potential to cause or contribute to exceedances in the receiving waters. Factors such as frequency and magnitude should also have bearing on the prioritization process. Based on a preliminary evaluation of the existing regulatory landscape (i.e., TMDLs, 303(d) listings), existing receiving water and MS4 data, and source assessments, the major drivers for the Program appear to be bacteria and aluminum, both of which have complex sources and fate and transport within the environment. These are further discussed in Section 4.

4 PROGRAM PRIORITIES (LESSONS LEARNED AND PROPOSED IMPROVEMENTS)

4.1 RECEIVING WATER DRIVEN PRIORITIES

Protecting the beneficial uses of receiving waters is the highest priority for the Program. Prioritizing based on how MS4s are potentially impacting those uses, then focusing the needed resources on those issues creates a more efficient effort with a higher chance of success.

4.1.1 Receiving Water Limitations



The Program continues to have fundamental concerns over the current approach to compliance with Receiving Water Limitations (RWLs), as required by precedential receiving water limitations language set forth in Order WQ 99-05. As incorporated into the current Los Angeles Permit, this language requires strict compliance with receiving water limitations at all times and does not appear to provide an alternative compliance pathway. In spite of the substantial efforts put forward by stormwater Permittees in Ventura County, this language all but assures continued non-compliance, as it is not feasible to control all sources contributing to exceedances of water quality standards in receiving waters all of the time. To address this concern, the Program supports the inclusion of an achievable path to compliance for the receiving water limitations.

In the LA Permit, a potential path to compliance is provided through the watershed management programs. These programs go well beyond the traditional iterative process, providing reasonable assurance that receiving water limitations will be attained through comprehensive water quality and source assessments, modeling, monitoring, and adaptive management. Although MS4 Permits throughout the State are shifting to watershed based approaches, the process is particularly well defined in the LA Permit and establishes a level of rigor not seen in other places.

The Program strongly supports the use of a watershed management planning and implementation process as an optional path for compliance with receiving water limitations and hopes that this option is included in the next MS4 Permit for Ventura County. However, while we support watershed management programs as a means to compliance with receiving water limitations and recognize that this pathway is included in Part VI.C of the current LA Permit, the Program has concerns over the lack of connection between the language in Part V.A (Receiving Water Limitations), Part VI.C (Watershed Management Programs), and TMDLs in Attachments L - R. Additionally, we feel that compliance with Receiving Water Limitations should also be

achievable through traditional permit programs and implementation of minimum control measures (MCMs). Several of the concerns identified are further discussed below.

- The Receiving Water Limitations provisions may be construed as standalone provisions that would expose the Permittees to state and federal enforcement actions, as well as to third party actions under the federal Clean Water Act's citizen suit provisions. For example, Part V.A.1 of the LA Permit states that "Discharges from the MS4 that cause or contribute to the violation of receiving water limitations are prohibited" and is a stand-alone provision. The language found in Part VI.C (Watershed Management Programs) regarding compliance with receiving water limitations through a watershed management program could be considered irrelevant. We recommend that a clear linkage between the compliance provisions and the prohibitions, receiving water limitations, and effluent limitations must be established.
- The Receiving Water Limitations should establish a sufficient linkage with approved compliance schedules for TMDLs that have been incorporated into the Basin Plan. TMDLs adopted within the region include a schedule to provide MS4 Permittees the time necessary to develop and implement a plan to achieve water quality standards in impaired waters. Without modification, the Receiving Water Limitations may be in *conflict* with TMDL compliance schedules. We recommend that language be included to clarify that in instances where a TMDL is in place, or a TMDL is being developed, the permittees shall achieve compliance with receiving water limitations as outlined in the specific provisions for Total Maximum Daily Loads.
- Watershed management programs are intended to focus on water quality priorities. Pollutants addressed by existing TMDLs or are exceeding frequently such that a TMDL may be warranted are clearly high priority. However, pollutants that intermittently exceed a WQO or exceed once during a permit term appear to result in violations of the RWL provisions and will require Permittees to expend resources in line with pollutants that have been identified as a priority. This approach is counterproductive to the outcome driven and strategic watershed based approach. We recommend that language currently in Part V.A.3 of the LA Permit be revised such that exceedances of "non-priority" constituents trigger inclusion on a watch list to be considered in the subsequent adaptive management process. The language should indicate that where Permittees continue to implement programs in support of priorities, exceedances of "non-priority" constituents should not constituent immediate violations of receiving water limitations.
- Traditional RWL language includes an iterative process for MS4s to respond to exceedances of water quality standards that persist. Part V.A.3 in the LA Permit is a good example. However, the language appears too broad and suggests the Permittees would have to submit a completely separate report even in cases when (1) TMDL pollutant WLAs are exceeded but the TMDL compliance date has not yet occurred and (2) non-TMDL pollutant RWLs are exceeded and the pollutant is a watershed priority but the BMP implementation schedule described in the watershed management plan has not yet been exhausted. In these two cases, the water quality standards exceedances are "expected" and no further action is needed. We recommend that the language in Part V.A.3 be modified to specify that exceedances of priority pollutants addressed

within the current stormwater management programs would not trigger further action until compliance schedules have come due; instead the Permittees should complete the implementation of actions identified in the stormwater management plan(s).

- The alternative compliance pathway within the current LA Permit attempts to provide compliance with receiving water limitations via the watershed management programs. While we understand the inclination towards watershed planning, this level of effort is not always feasible or appropriate for some smaller communities operating on limited budgets. The lack of ability to participate in a watershed approach should not preclude jurisdictions from an alternative to achieve compliance with receiving water limitations. Where jurisdictions are able to demonstrate robust, yet appropriate, levels of planning and implementation within their own agencies, an alternative pathway to compliance should be provided. However, this option should be developed so as not to negate the current incentives to participate in watershed programs (e.g., the 85th percentile compliance option). We recommend that language is developed and included in Part VI.D, Stormwater Management Program Minimum Control Measures, to provide an alternative compliance pathway for jurisdictions which choose not to participate in a watershed planning process.

The Program understands the intent of the RWL language and is supportive of the inclusion of alternative compliance pathways as discussed above. However, we feel that there are several shortcomings within the current LA Permit language that could lead to non-compliance and legal implications for the Permittees. As demonstrated through the mature stormwater programs implemented to date, the Permittees are committed to understanding the water quality problems in the Region and have taken responsibility for their contributions. As our understanding grows and programs evolve, we have come to realize the complexity of the challenges we are trying to address, yet remain committed to sensible, prioritized implementation of programs that make prudent use of public funds. With that in mind, it is critical that some assurance of compliance is included in the RWL language. Simple changes to the language in Part V.A can result in an achievable compliance pathway for Permittees while keeping our sites firmly set on attaining water quality standards in receiving waters, consistent with the intent of the precedential receiving water limitations language and with the Clean Water Act.

4.1.2 Bacteria

The Ventura Countywide Stormwater Quality Management Program has been monitoring fecal indicator bacteria (FIB) in receiving waters ("Mass Emission stations) and contributions from MS4 ("major outfall stations"), since 2001 and 2009, respectively. Analysis of monitoring data has led to the following general observations:

1) Major outfalls persistently cause or contribute to violations of REC-1 water quality objectives for *E. coli* in storm water, as has been reported in the Annual Reports.
2) There is a significant linear correlation between storm water concentrations of *E. coli* and fecal coliforms (Figure 1a).
3) Storm water FIB concentrations in receiving waters are highly variable, and generally well above water quality standards (Figure 1b), despite decreasing concentrations that

have been observed for total coliforms, *E. coli,* and Enterococcus (see section 3.2.3). Note that no significant trends were observed for fecal coliforms.

4) Storm water FIB concentrations in major outfall stations are highly variable, have not shown any trends since 2009, and are generally well above the water quality standards (Figure 1c).

These observations imply that improvements have been made in receiving waters since the second Ventura County stormwater permit was adopted in 2000, but that implementation of requirements of the second and third permit have not been able to reduce FIB concentrations to the point where water quality standards are met.

Storm water FIB monitoring in receiving waters and outfall stations has been very useful in determining current baseline concentrations for FIB and contributions of MS4's to receiving waters. Further reductions in storm water FIB concentrations will require large scale implementation of storm water treatment or infiltration across all watersheds. While it is the expectation that storm water programs will continue to make progress to that effect, a sufficient number of such BMPs need to be installed before reductions in receiving waters and major outfalls can be reasonably expected, which could take many years.

Therefore, the Program recommends to prioritize FIB monitoring to the following projects:

1) **BMP and green infrastructure effectiveness monitoring.** This will focus efforts on determining reductions relative to the current baseline where they can be reasonably expected. Monitoring for FIB to determine trends or reductions on a drainage area/watershed scale will be useful only when effectiveness monitoring projects prove to be successful, and sufficient BMPs and green infrastructure projects have been implemented in the drainage area/watershed. The County Government Center Parking Lot LID monitoring by County of Ventura co-Permittee is an example of BMP effectiveness monitoring, initiated under the expiring permit (R4-2010-0108). It includes monitoring of flow and a number of storm water pollutants (including FIB) to determine load reductions achieved by permeable pavement.
2) **Bacteria source identification and risk assessment studies.** Section 3.4.2 lists projects that have been initiated under the expiring permit, and are representative examples of potential projects for the next permit term.

As a tradeoff for allocating more resources to BMP effectiveness monitoring and source identification/risk assessment studies, the Program recommends changing receiving water and major outfall FIB monitoring as follows:

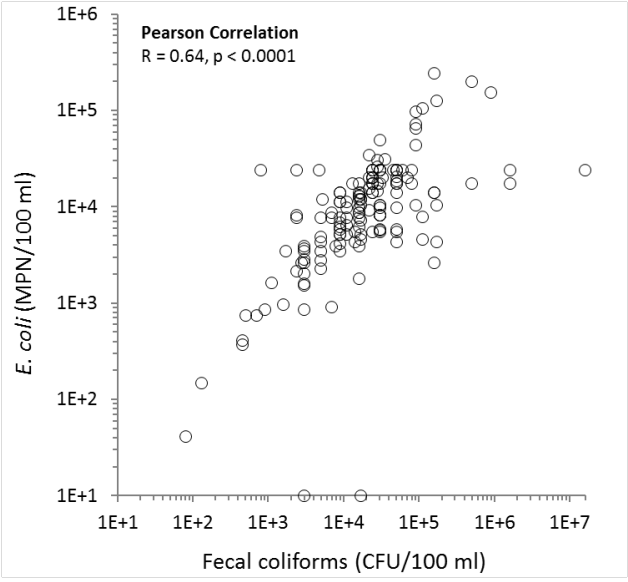
1) **Discontinue fecal coliform monitoring in stormwater (but continue *E. coli*).** A 2010 Basin Plan amendment removed fecal coliform objectives for REC-1 uses, but unfortunately REC-2 objectives for fecal coliforms remain. However, as all of the water bodies in Ventura County are designated REC-1 and REC-2, the more stringent REC-1 criteria apply, which can be assessed using *E. coli* only. Given the strong linear correlations between log-transformed *E. coli* and fecal coliform concentrations in outfalls, any changes in freshwater bacterial water quality can be assessed using *E. coli* only. While the useful information gained by including fecal coliforms in addition to *E.*

coli for storm water monitoring is limited, the costs are disproportionally high given the fecal coliform assay takes 72 hours to complete and multiple manipulations by laboratory staff are required.

2) **Implement an 18-hr holding time for Enterococcus, *E. coli* and total coliform grab sampling for storm water.** The Ventura Countywide Stormwater Program makes it a high priority to try to collect storm water grab samples during the rising limb of the hydrograph. In Ventura County, rain events often occur at night, and the currently permitted 6-hr holding time for bacteria creates a logistical and safety burden, with sampling crews often having to deliver samples to the lab after a long night of sampling, and comes with a significant extra cost due to field staff and laboratory overtime charges. At the same time, a number of studies suggest that extending the holding time to 18 hours or more would not affect measured total coliform and *E. coli* concentrations.[5,6,7] Because bacteria grab sample concentrations in storm water are highly variable, analytical method precision is relatively low, and FIB concentrations exceed freshwater basin plan objectives by a large margin almost 100% of the time, there is no managerial or regulatory benefit associated with obtaining potentially slightly more accurate bacteria concentration data using a 6-hour holding time compared to the proposed 18-hour holding time.

These improvements to the monitoring program will result in significant savings in both staff time and laboratory costs without impacting the Program's ability to assess water quality discharged from outfalls and compliance with Water Quality Objectives in the receiving waters.

Fig. 1a. Significant linear correlation between storm water E. coli and fecal coliform concentrations in major outfalls (all stations combined).



[5] Aulenbach, 2010. Bacteria holding times for fecal coliform by mFC agar method and total coliform and *Escherichia coli* by Colilert-18 Quanti-Tray method. Environ. Monitoring Assessment, 161: 147-159.
[6] Pope ML, Bussen M, Feige MA, Shadix L, Gonder S et al., 2003. Assessment of the effects of holding time and temperature on *Escherichia coli* densities in surface water samples. Appl. Environ. Microbiol., 69: 6201-6207.
[7] Housten-Galveston Area Council, 2005. Bacteria die-off study.

Fig. 1b. Storm water E. coli concentrations at receiving water stations compared to REC-1 water quality objective.

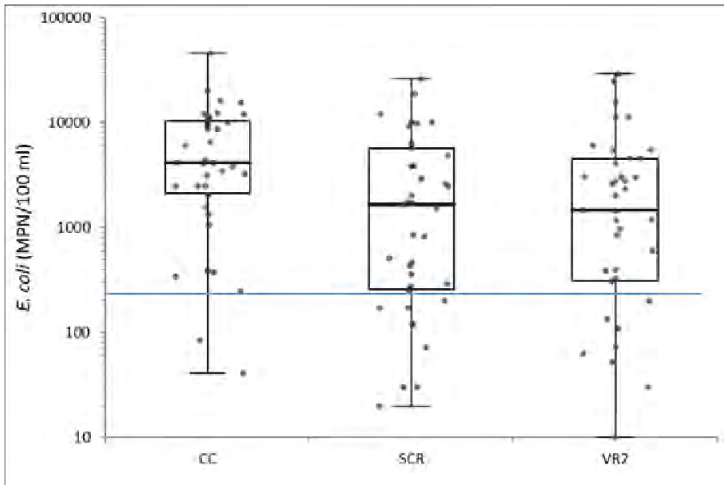
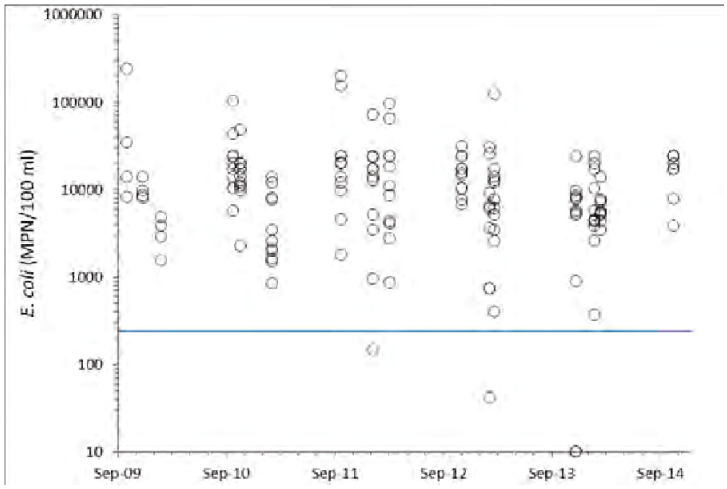


Fig. 1c. Storm water E. coli concentrations at major outfalls (all stations combined) compared to REC-1 water quality objective.



4.1.3 Aluminum

The Program regularly observes exceedances of the Title 22 Drinking Water Primary MCL for total aluminum of 1000 µg/L in wet weather water quality samples. Exceedances of the Title 22 Primary MCL also are observed for dry weather water quality samples, but on a much less frequent basis. An aluminum investigation into the cause(s) of such exceedances to guide any implementation actions to limit such exceedances where possible was conducted by the Program and is described in section 3.4.1. , and the full report is included as Attachment C. This special study examined the sources of aluminum in the various watersheds, and included monitoring on river sediments, along with wet weather flows from pristine upstream areas, and below urbanized areas.

Correlation analyses of total aluminum and TSS, and total aluminum and flow using a Kendall correlation test showed that measured total aluminum and TSS concentrations are strongly

correlated for both wet weather and combined dry and wet weather data at significance levels less than 0.001 or better. The correlation analyses also suggest that total aluminum concentrations at the Mass Emission sites evaluated are more strongly correlated with TSS than with flow, indicating that measured water column aluminum concentrations are more dependent on the amount of solids suspended in the water column than the flow transporting the aluminum and TSS.

Based on a review of available Ventura County soils the average mass of total aluminum per mass of TSS in the water column that was calculated for the three watersheds appears to be consistent with the range of total aluminum soil concentrations measured in the three watersheds. These observations in combination with the earlier evaluation that showed a high correlation between total aluminum and TSS concentrations measured in Program water quality samples suggests that the total aluminum measured in water quality samples is derived from the erosion of soil.

Wet weather monitoring of upstream natural areas performed in February 2014 showed total aluminum and TSS water column concentrations in each of the three watersheds similar to historically observed concentrations in each watershed at the Mass Emission sites. A total aluminum concentration of 250,000 µg/L measured at the Las Llajas Dam natural background site in the Calleguas Creek Watershed that is not only the highest concentration ever measured in the watershed, but also among all sites monitored by the Program. With the exception of the Santa Clara River Watershed, total aluminum and TSS concentrations measured at the upstream locations were greater than concentrations measured at the downstream Mass Emission stations within a given watershed. All total aluminum concentrations measured in samples collected in February 2014 exceeded Title 22 Primary MCL of 1000 µg/L for the parameter.

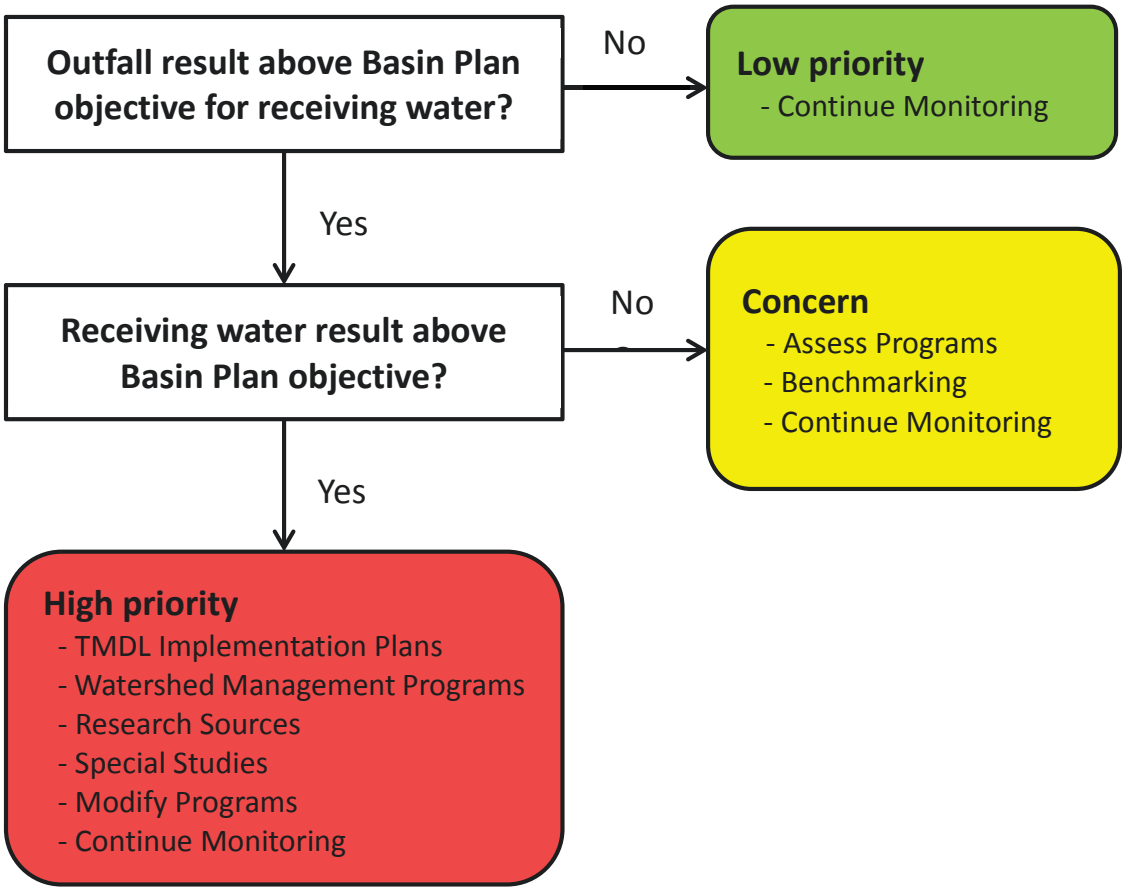
The exceedingly high level of total aluminum detected in runoff from undeveloped areas suggests that wet weather aluminum will routinely exceed water quality objectives regardless of Permittee efforts. Since high background concentrations of aluminum appear to be a primary source contributing to the routine water quality objective exceedances observed in Ventura County surface waters, the Program will need to discuss with the Los Angeles Regional Board the implementation of an appropriate regulatory mechanism (e.g., reference stream/antidegradation approach; natural source exclusion approach; water-effects ratio approach; or high-flow suspension of beneficial use) that would limit the Permittees' liability for controlling such background concentrations. Resolution to this issue will begin by initiating discussions with Regional Board staff. A sound scientific and regulatory approach to managing the elevated concentrations of aluminum observed in Ventura County surface waters will be needed to sufficiently protect beneficial uses potentially impacted by this naturally occurring metal.

4.2 Outfall Action Levels

As previously stated, the Program supports the inclusion of an optional watershed management approach within the next Ventura County MS4 Permit. Within the LA Permit, the Watershed Management Program Provisions (Part VI.C) mostly focus on the integration and sequencing of the minimum control measures and TMDLs as the basis for the Watershed Management

Programs. However, in order not to negate the very intent and purpose of the Watershed Management Programs – other provisions of the permit must support the Watershed Management Programs and not divert resources from implementation of the approved programs. The Program has developed a pollutant prioritization method based on protecting receiving water beneficial uses presented in Figure 4-1. The action levels included in the LA Permit are based on receiving water beneficial uses and are likely to divert resources away from receiving water priorities.

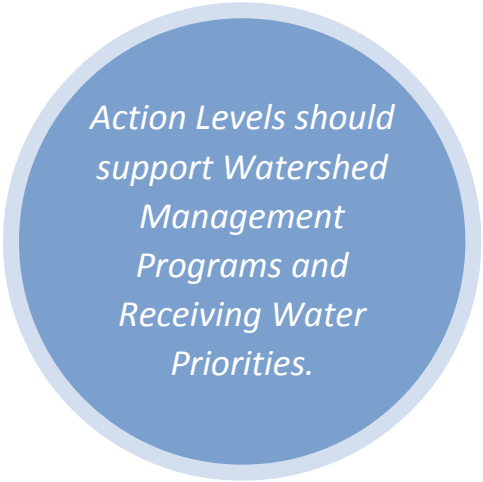
Figure 4-1 Pollutant Prioritization



4.2.1 Non-Stormwater Action Levels

Part III.A.4.c. of the LA Permit requires LA Permittees to take action when data, for even one sample, exceed the non-stormwater action levels (NALs) identified in Attachment G. As a result, the Program would be obligated to address even single sample exceedances from an outfall for any of the pollutants with assigned NALs, in direct conflict with the prioritization processes in Part VI.C.3.a of the LA Permit. Given that the prioritization of actions is one of the fundamental concepts in the Watershed Management Programs, having other permit requirements that may divert resources away from the actions outlined in the program defeats the purpose of the planning efforts. As a result, the Program does not support the inclusion of NALs within the next Ventura County MS4 Permit. Furthermore, unlike LA Permittees, non-stormwater monitoring at

"Major Outfall" stations has been a component of the Stormwater Monitoring Program since 2009 and has been conducted in subwatersheds representative of land uses within each particular jurisdiction. Given that the Program has collected an extensive amount of local data to characterize the actual quality of non-stormwater discharges within the County and the maturity of the Program, incorporating NALs into the next Ventura County MS4 Permit is unnecessary.



If NALs are incorporated into the next Ventura County MS4 Permit, the NALs must be incorporated in a manner which is consistent with the Regional Board's stated intent. In the *Response to Comments on the June 6, 2012, draft of the Tentative Waste Discharge Requirements for the Los Angeles County MS4 Permit*[8] (Response to Comments), the Regional Board indicated that NALs "were established to identify where impacts to receiving waters are the most likely to occur, considering the existing receiving water quality as well as the beneficial uses within the receiving water. The action levels are intended to be a screening tool to prioritize the control of non-stormwater discharges." In some instances, the LA Permit is clear regarding the intended use of NALs as one of many tools which can be used to implement the non-stormwater outfall based screening and monitoring program. For example, Part IX.C.1 of Attachment E of the LA Permit lists discharges for which existing monitoring data exceeds NALs as one of five characteristics which Permittees may use to determine significant non-stormwater discharges. Additionally, Part IX.E.1 of Attachment E of the LA Permit lists outfalls for which monitoring data exist and indicate recurring exceedances of one or more NALs as the third priority of four which can be used to prioritize source identifications for significant non-stormwater discharges. However, as previously stated, Part III.A.4.c. of the LA Permit requires action to be taken when data, for even one sample, exceed the NALs. To make this provision more consistent with the Regional Board's stated intent, the following revision is recommended,

> "*Evaluate monitoring data collected pursuant to the Monitoring and Reporting Program (MRP) of this Order (Attachment E), and any other associated data or information, and determine whether any of the authorized or conditionally exempt non-stormwater discharges identified in Parts III.A.1, III.A.2, and III.A.3 above are a source of pollutants that may be causing or contributing to an exceedance of applicable receiving water limitations in Part V and/or water quality-based effluent limitations in Part VI.E. To evaluate monitoring data collected for any of the authorized or conditionally exempt non-stormwater discharges identified in Parts III.A.1, III.A.2, and III.A.3 above, the Permittee shall either use applicable interim or final water quality-based effluent limitations for the pollutant or, if there are no applicable interim or final water quality-based effluent limitations for the pollutant, use applicable action levels provided in*

[8] http://www.swrcb.ca.gov/losangeles/water_issues/programs/stormwater/municipal/index.shtml#los_angeles

Attachment G. Based on non-stormwater outfall-based monitoring as implemented through the MRP, if monitoring data collected for any of the authorized or conditionally exempt non-stormwater discharges identified in Parts III.A.1, III.A.2, and III.A.3 above show exceedances of applicable water quality-based effluent limitations or action levels, the Permittee shall take further action to determine whether the discharge is causing or contributing to exceedances of receiving water limitations in Part V."

Also in the Response to Comments, the Regional Board indicated that "Nonstormwater action levels were established in the draft Order after evaluating dry weather data collected by the Permittees from 2005-2011. These data indicate frequent exceedances of receiving water limitations during dry weather." As a result, to provide a nexus to receiving waters and remain consistent with the Regional Board's stated intent, if NALs are incorporated into the next Ventura County MS4 Permit, NALs should only be established for constituents where data indicate water quality impairment in the receiving water according to the State's Listing Policy.

4.2.2 Municipal Action Levels

In the Response to Comments, the Regional Board indicated that municipal action levels (MALs) for stormwater were included in the LA Permit "as a tool for prioritizing implementation of stormwater controls and as one metric for evaluating stormwater discharges relative to the [Maximum Extent Practicable] standard." The Program does not view the MALs as the most effective tool for prioritizing implementation of stormwater controls and could result in the diversion of resources to lower priorities, similar to the NALs. However, if MALs are incorporated into the next Ventura County MS4 Permit as a tool to assist in the prioritizing of various aspects of the Watershed Management Programs, the Program recommends incorporating the language which had been included in Part 2 of the May 7, 2009 Revised Tentative Draft Ventura County MS4 Permit and which is included in Part VIII of Attachment G of the LA Permit. In particular, given that the requirement to submit a MAL Action Plan that requires an assessment of sources and identification of BMPs would be redundant for Permittees that are developing and implementing a watershed management program, the Program strongly supports inclusion of the following language from Part VIII of Attachment G of the LA Permit:

"Implementation of an approved Watershed Management Program…fulfills all requirements related to the development and implementation of the MAL Action Plan."

For clarification regarding the intent of the action levels, the Program would like the following language taken from the Response to Comments to be added to the next Ventura County MS4 Permit as the first provision of the "Non-stormwater Action Levels and Municipal Action Levels" attachment (Attachment G of the LA Permit):

"Action levels [are] established to identify where impacts to receiving waters are the most likely to occur, considering the existing receiving water quality as well as the beneficial uses within the receiving water. The action levels are intended to be a screening tool to prioritize the control of non-stormwater [and stormwater] discharges. The Regional Board recognizes that in some cases, action levels may be a secondary means of prioritization."

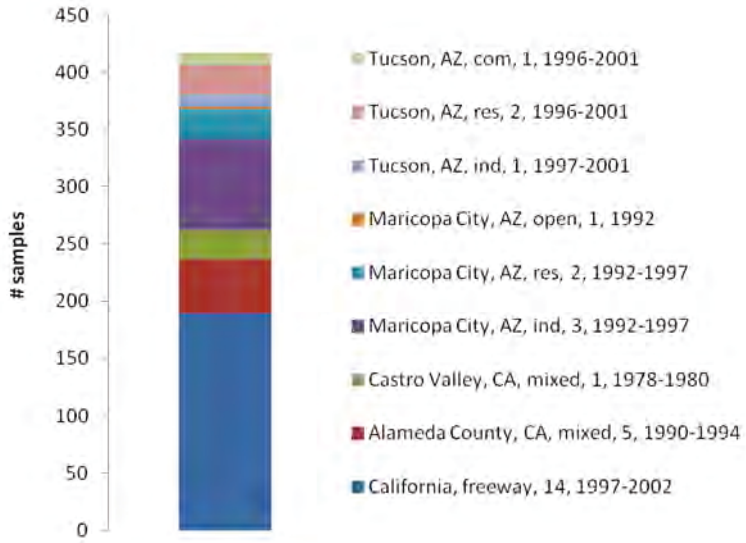
4.2.3 Application of MALs in Ventura County

The Ventura Countywide Stormwater Quality Management Program has been monitoring storm water quality at 11 Major Outfall stations, representative for each Permittee's MS4, during three storm events each year since 2009 or 2010 (depending on station). Major Outfall monitoring data has been used in conjunction with Mass Emission monitoring data to determine if and where the MS4 is contributing to exceedances of water quality objectives, as has been reported in the VCSQMP Annual Reports.

Additional thresholds besides water quality objectives are required for identifying "outlier" outfalls or MS4 sections, where water quality is significantly worse compared to what can be expected based on the current state of storm water management practices. These thresholds can then be used as a tool for identifying subwatersheds requiring additional BMPs to reduce pollutant loads and prioritize implementation of additional BMPs.

To that end, the current LA County MS4 Permit (Order R4-2012-0175) established Municipal Action Levels for 13 pollutants, based on nationwide Phase I MS4 monitoring data for pollutants in stormwater (National Stormwater Quality Database, version 3), and computed as 75th percentiles for selected pollutants for Rain Zone 6. However, a major disadvantage with this approach is that the selected samples are not representative of MS4 water quality in LA or even the southern California region. The majority of the samples used for the calculations are from inappropriate land uses (freeway runoff), different climates (Arizona), or are outdated (as far back as 1978) (Fig. 4-2). While this may have been the best available data for LA County at the time of the permit renewal process, this is not the case for Ventura County.

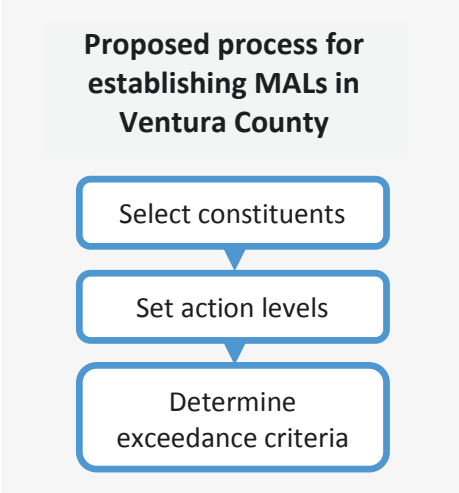
Figure 4-2 Geographical distribution of stormwater quality data in NSQD for EPA Rain Region 6. Figure legend indicates city, state, land use, number of locations, date.



4.2.4 Municipal Action Levels Recommendations

The Program recommends the Regional Board allows the Program the flexibility to establish alternative MALs for Ventura County, based on the Program's Major Outfalls storm water monitoring data, and submit the proposed MALs to the Regional Water Board Executive Officer for approval. The proposed process for establishing MALs consists of the following steps:

1. Select constituents that require MALs. Selection should be based on comparison to water quality objectives applicable to the selected watersheds. Any constituent that exceeds water quality objectives at least once across all Major Outfalls should be considered for inclusion.
2. Define process to compute MALs. Potential options include:
    a. Computing percentiles. Percentiles should be calculated based on a representative storm water quality database. Preferred options include databases with recent outfall monitoring data from storm water programs across southern California or Los Angeles Region, but the VCSQMP Major Outfalls database is a reasonable alternative if the former are not available.
    b. Comparing to water quality objectives
    c. A combination of options a and b. For example, use the larger value of 90th percentile or water quality objective.
3. Define criteria to determine when an exceedance of a MAL requires further action in a subwatershed. Options include criteria based on exceedance frequency, magnitude, or both.



The Program also recommends that existing outfall monitoring data should be used to determine discharges in excess of MALs. Additional outfall monitoring should not be required in the Monitoring and Reporting Program for this purpose.

The proposed process for Ventura County aims to offer the following advantages over the approach used in the LA MS4 permit:

1. MAL pollutants are linked to receiving water quality, because selection is based on comparison to water quality objectives.
2. MALs are relevant to Ventura County, because MAL constituents' selection is based on Ventura County Major Outfall monitoring data, and MALs are computed based on relevant monitoring data.
3. MALs are in no case more stringent than applicable water quality objectives.
4. Use existing monitoring data to identify MS4 discharges in excess of MALs, and reduce outfall monitoring for that purpose.

4.3 Program Elements – Lessons Learned and Proposed Improvement

The Permittees have been implementing stormwater programs for over twenty years. Experience gained over that time has been used to direct efforts and improve effectiveness within the confines of Permit compliance. That is to say, the Permittees hold Permit compliance as the priority, and resources are directed toward compliance first. As noted above the Permittees have accomplished many achievements beyond Permit the requirements. However, other potentially effective measures may not always get implemented due to the inflexibility

and resource intensiveness of Permit requirements. In this section the Permittees have identified key areas where improvements in the Permit structure or language could allow the Permittees to create more effective and efficient programs for reducing pollutants discharged from their MS4s. The lessons learned and proposed improvements are presented by program element.

4.3.1 Program Management

Working together the Permittees have been able to develop better programs individually and also achieve an economy of scale on certain program elements. By joining together early on, when only one of the twelve Permittees would have been permitted as a Phase I city, the Permittees set the course for the Ventura Countywide Stormwater Quality Management Program. Continuing this level of cooperation, even inclusive of the context of watershed management areas would be beneficial.

4.3.2 Monitoring

4.3.2.1 *Question driven approach*

The Program supports the use of the best available science that leads to informed stormwater management and public policy decisions. Monitoring and reporting requirements need to be limited to those elements that provide information that will help answer key questions, inform management decisions, and should be coordinated where appropriate (e.g., integrate TMDL and MS4 monitoring).

A well designed monitoring program will provide useful data to answer management questions. Questions whose answers will support the development of an effective stormwater management program that prioritizes pollutants of concern, and focuses resources on their reduction should be identified prior to the development of a monitoring plan. Clearly stated assessment questions are essential to effective monitoring design. SWAMP and the California Water Quality Monitoring Council have adopted the following four questions associated with core beneficial uses:

1. Is our water safe to drink?
2. Is it safe to swim in our waters?
3. Is it safe to eat fish and shellfish from our waters?
4. Are our aquatic ecosystems healthy?

A second level of more specific assessment sub-questions about the status of beneficial uses that provide additional focus for monitoring design. These questions closely align with the management questions in the Southern California Stormwater Monitoring Coalition's Model MS4 Monitoring Guidance:

1. Are the conditions of the receiving water protective of beneficial uses?
2. What are the extent and scale of current receiving water problems?
3. What are the MS4 contributions to the stressors and problems?

4. What are the sources to MS4 runoff that contribute to receiving water problems?

5. Are conditions improving or getting worse?

Built on these questions an effective monitoring plan can be used to trigger stressor and pollutant source identification, prioritize and refine control measures for the reduction of pollutant loading and the protection and enhancement of the beneficial uses of the receiving waters.

4.3.2.2 *Need for flexibility*

Revisions of the monitoring and reporting program are appropriate to ensure that the monitoring plan is collecting the appropriate information to answer the management questions. Flexibility in the monitoring requirements is built in to the NPDES Permit process. Revisions may be made under the direction of the Executive Officer at any time during the term of a permit. These revisions may include redistribution of monitoring resources to address, management questions, TMDL needs, and may alter the number of parameters to be monitored, the frequency of monitoring, or the number and type of samples collected.

The Ventura Countywide Program has a mature stormwater monitoring program. Having collected well over ten years of receiving water data and five years of outfall data from each Permittee the data is available to begin to address the key management questions as was done in our pollutant prioritization exercise and the Mass Emission trend analysis. As the answers to these questions become better understood, flexibility in monitoring design is needed to allow more refined studies to address new questions.

4.3.2.1 *Alternative Regional Monitoring*

Many management questions may be answered through monitoring designs that are better implemented through large scale or regionally coordinated efforts. These can be used to further characterize the stressors impacting receiving water health, assess trends in pollutant concentrations over time, and determine whether the designated beneficial uses are fully supported when there are multiple potentially responsible parties. The Southern California Regional Watershed Bioassessment Monitoring Program is a good example of a regional effort.

Additionally, Regional Studies may be employed to address common problems and sources of pollutants to MS4s (e.g. pyrethroids, copper and emerging pollutants of concern). Consistency in monitoring design and implementation improves the comparability of data and allows local information to be put in a broader context. Coordination and implementation of coordinated efforts at a watershed, regional, statewide level should be encouraged by allowing the Permittees to participate in such monitoring programs in lieu of a Permit prescribed monitoring program.

4.3.3 Outreach

Effective public outreach changes the public's behavior to reduce stormwater runoff pollution, and also builds support for stormwater programs. Outreach priorities should match receiving water priorities, with target audiences matching the sources of pollutants. Identifying these priorities and targets needs to be data driven. Flexibility to follow the data driven priorities is imperative in maintaining a cost effective program.

Public outreach seems simple, but is not without its challenges. Over the years we have learned that pollutant specific outreach works, but is quickly forgotten. That means that a continued and sustained efforts on specific messages are needed. However, we have also learned the public may reach saturation and static messaging will actually yield poorer awareness as the repeat messages are ignored.

The greatest challenge is changing behavior. Many people will do the right thing, once they learn what to do. But there are many in society who will willfully continue to pollute, even though they know we are asking them not to. Unfortunately, it will take a long term effort to correct this behavior. Society has made great improvements in getting the public to recycle, but that effort took generations and still there are those who refuse to recycle. Stormwater faces a similar long term behavior change challenge. This will only be further complicated with increasing stormwater treatment. If the public thinks all stormwater is treated we will have a harder time changing their behavior to prevent stormwater pollution.

4.3.4 Commercial / Industrial

Inspections of commercial and industrial businesses are an effective way to reduce the potential of pollutants reaching a MS4. They are also resource intensive with significant time required to identify, travel to, and inspect the appropriate businesses. To recover costs many Permittees have initiated inspection fees. This was possible through using the very specific requirements in the Permit as the nexus for charging the fee. Unfortunately, that specificity serves against the Permittees from expanding their inspection programs. For example, the Permit is very specific on the requirement to inspect automotive service facilities, and lists eleven SIC codes to define what that means. Permittees have always viewed motorcycle service facilities as having the same potential to discharge pollutants, and thus included them in their inspection programs. However, since the SIC code for motorcycle service facilities is not included in the definition of automotive service facilities the Permittees cannot show the nexus for the inspection and therefore cannot charge the inspection fee. Another example is the Permittees have inspected large hardware stores (e.g. Home Depot) because their nursery departments have potential to pollute. However, these stores do not use the same SIC code as a nursery.

The solution is not to identify more SIC codes. An overly detailed and prescriptive Permit creates difficulties in interpretation, and directs Permittee efforts with unintended consequences. A preferred solution is to provide the Permittees with the flexibility to identify additional critical sources beyond those listed in the Permit.

Conversely, this flexibility is needed to manage the inventory of critical sources so resources are not expended tracking and inspecting businesses that pose no threat to stormwater. Currently commercial laundries are considered a critical source, but through the required inspections Permittees have learned there is no stormwater exposure from them. Any critical source with

no potential to discharge pollutants should be rewarded with reduced inspections, and reduced fees. Business that have installed BMPs, or otherwise made improvements to eliminate exposure to stormwater should see a benefit for their efforts. Allowing Permittees the flexibility to make the determination for any critical source as non-exposure, would subject these businesses to verification once every five years instead of the regular inspection schedule.

Finally, a regular predictable inspection frequency will benefit the businesses who need to plan their expenses. Modifying the requirement from the current "twice per permit term" to once every two years would provide the level of predictability needed.

4.3.5 Land Development

The categories subject to new and re-development criteria in the Los Angeles and Long Beach Permits are very similar to the current Ventura Countywide Permit, and there is no requirement for 95% effective impervious surfaces on the subject categories. Because of this it could be argued that the Los Angeles Permit is actually less prescriptive. However, the Permittees would prefer not to have any changes at this time. The primary reason is any change, no matter how minor, will require a revised Technical Guidance Manual with a new effective date. This will create two very similar sets of rules to communicate to the development community that will result in confusion and extra effort, but very little water quality improvement.

The Program requests that no changes are made to the land development requirements that would require further amendments or revisions to the Technical Guidance Manual at this time.

4.3.6 Construction

The Ventura Countywide Permittees have been implementing an enhanced construction BMP program that precludes impacts to water quality posed by all construction sites on hillsides and that directly discharge to a 303d sediment listed waterbody. This program requires that a Qualified SWPPP Developer or Practitioner or Certified Professional in Erosion and Sediment Control conduct inspections of the construction sites weekly during the wet season and at least once every 24 hour period during a storm event. In addition the permittees require specific BMPs for all construction sites depending on the size (< 1 acre, 1 to < 5 acres, and 5 acres and greater) to prevent erosion and sediment loss and discharge of construction wastes. Co-permittees require Local SWPPPs for public and private construction sites greater than 1 acre and required SWPCPs on all public projects that were on a Capital Improvement Plan that disturb less than one acre of soil. Our current MS4 permit requires that Permittees inspect all construction sites for the implementation of storm water quality controls a minimum of once during the wet season. All Permittees are meeting or exceeding this requirement by conducting construction site inspections utilizing a model checklist to ensure that an effective combination of BMPs is implemented to control erosion and sediment loss and prevent any illicit discharges.

These measures have been successful in preventing sediment and other construction wastes from entering our storm drain system and downstream receiving waters. In light of the current successes of our construction program, we request that no increase in inspection frequency be required as it may take needed resources away from other storm water programs.

4.3.7 Public Agency

The Ventura Countywide Permittees have gone further in protecting stormwater runoff from public facilities than is required under the Los Angeles and Long Beach Permits. Over the past five years Permittees have made improvements to fire stations to ensure runoff from their cleaning practices do not impact stormwater. Improvements include both physical retrofits and staff training. BMPs installed at the fire stations are subject to public agency's inspection at least once every two years to ensure effectiveness in eliminating washwater runoff and proper maintenance. This cross-agency and costly effort demonstrates not only the Permittees' commitment to stormwater quality, but also serves as an example to the public.

4.3.8 Illicit Discharge

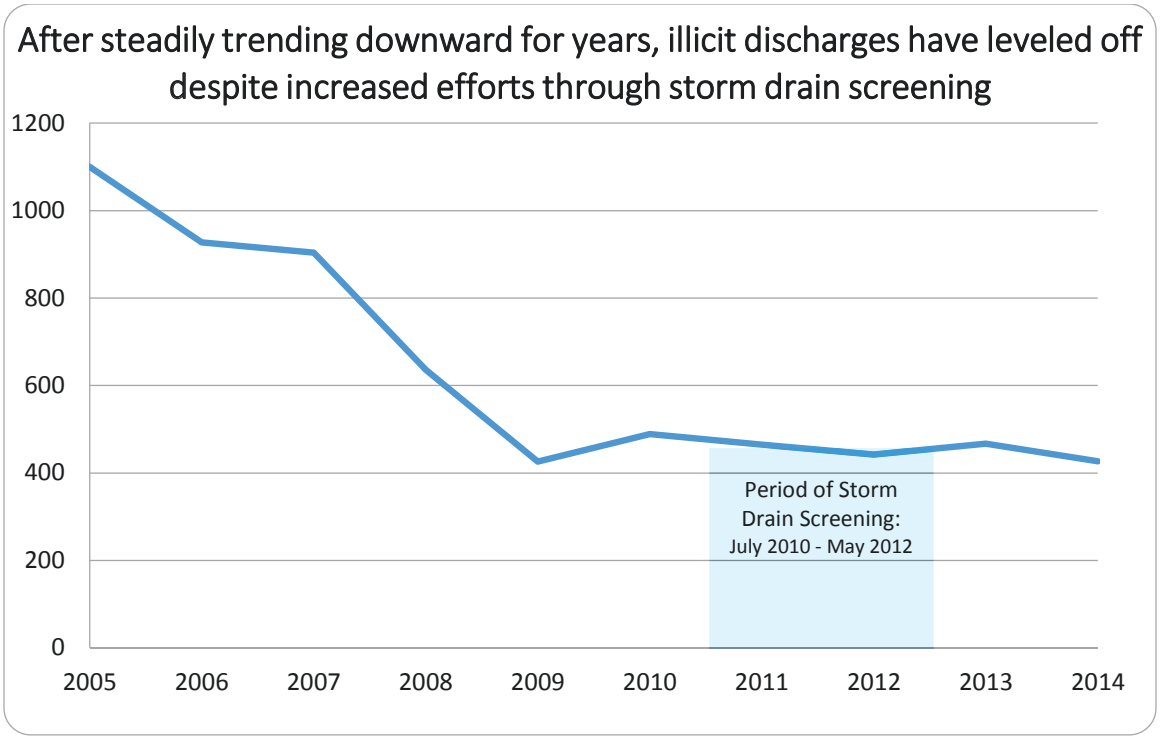
The public's awareness of illicit discharges has greatly increased over the life of the Program. In the early years the number of illicit discharges roughly doubled every year. This is because the concept that those discharges are polluting and that they should be stopped was becoming more commonplace. Eventually, the number of reported discharges began to decrease. It is assumed this is because people have actually changed their behavior and stopped using the storm drain as a convenient way to dispose of wastes.

Storm drain screening did not result in an increase in the discovery of illicit connections or discharges.

The Permittees all have mature illicit discharge inspection programs. For consistency we strongly support the language adopted in the most recent MS4 Permits for Los Angeles and Long Beach which allows increasing IC/ID response time from 24 to 72 hours. This is primarily for reports that are received afterhours on weekends; in the event of a potential emergency situation callers are always referred to call 911.

Illicit Discharge Screening - The Permittees have implemented a storm drain screening effort as required under the current Permit. Storm drain screening is very resource intensive, but experience has shown it does not increase the number of illicit discharges discovered. During the years the screening effort was underway the number of illicit discharges countywide did not appreciably change. This can be seen in the trend of actual illicit discharges countywide shown in Figure 4-1. The early reduction seen in illicit discharges can be seen as a change of behavior as the public gains knowledge of stormwater pollution. Field screening may have identified a few discharges, but public reporting remains the most efficient way to identify and respond to them. Additionally, field screening pulls resources away from prioritized pollutants and directs them on may be a wild goose chase. It would be much more effective for the Permittees to be allowed to develop efforts to identify and address sources of prioritized pollutants in a focused and researched method.

Figure 4-3 Illicit Discharges and Connections for past ten years



4.4 REPORTING

Stormwater managers have neither the ability nor the resources to track or to evaluate every measurable effort, and must therefore focus their limited resources where they matter most. The Program requests that the Permittees be allowed to continue the programmatic data collection and reporting they have been doing for the last Permit term. The Program has put significant effort into internally streamlining data collection, collating the data from all the Permittees, and presenting it in an easily understandable Annual Report to effectively convey program status and Permit compliance. This structure should be maintained under the new permit, and modified as necessary for improved the adaptive management process.

Programmatic data collection for stormwater programs can require significant effort by several departments within a single Permittee. The value of the data collected should be well understood before requirements are made. To effectively incorporate program data into an adaptive management process the metrics, monitoring methods, and analytical approaches needed to inform decision-making need to be clearly identified.

As programs are implemented and data obtained, program managers may re-evaluate how to measure program progress as they evaluate new data and develop appropriate metrics and assessment tools to measure progress. Before any permit requirements to collect the data are written, first a consideration of how the data will be evaluated should be done. Failing to identify specific analytical approaches up front can severely limit value of data, and therefore waste resources. The upfront identification of applicable data requirements will ensure that

outcomes are measurable and that managers are able to evaluate them once implementation phase data become available.

Regional Board staff are requested to work closely with the Permittees to evaluate the data reported, how new data will be used, and what metrics are needed before any changes to the current programmatic data collection are required.

If necessary, the reporting requirements could be modified to incorporate requirements for the WMPs and to provide clarity about the reporting requirements during the development of the WMPs, but the Program would like to work closely with the Regional Board to develop these requirements to ensure consistency with the current reporting process.

4.5 Watershed Management Approach

The Program supports the inclusion of a watershed management approach within the next Ventura County MS4 Permit, similar to the Watershed Management Programs (WMP) outlined in Section VI.C. of the 2012 Los Angeles County NPDES Permit (LA Permit). Inclusion of WMPs as a component of the permit facilitates efficient planning and timely implementation of effective programs and practices to address the highest priority water quality challenges facing the County. The Program also supports the inclusion of the WMP as an option within the permit rather than as a strict requirement to provide flexibility for individual permittees to select the methods of planning and implementation appropriate for their agency.

The Santa Clara River, Calleguas Creek, and Ventura River watersheds currently have active watershed planning processes that include a diverse set of stakeholders that go beyond stormwater management agencies. These efforts are supporting the identification of watershed priorities and collaborative, multi-benefit solutions to those priorities. Each watershed is in a different stage of the watershed planning process, but each process has resulted in increased collaboration and stakeholder involvement and a better understanding of watershed conditions, needs, and priorities. Additionally, the watershed processes have been successful in improving water quality and protecting beneficial uses. Following is a summary of the existing watershed processes and status of watershed planning.

4.5.1 Calleguas Creek Watershed

Watershed planning has been ongoing since 1996 in the Calleguas Creek Watershed. The watershed group consists of a number of committees that manage various aspects of the watershed planning process. The former Water Quality/Water Supply committee now consists of all responsible parties to the TMDLs, including wastewater treatment agencies, urban dischargers, agricultural dischargers, Caltrans, and the Navy. This committee is responsible for

coordinating the implementation of all effective TMDLs in the Calleguas Creek watershed. This includes conducting all required special studies, discussing and coordinating on implementation of control measures, and management of the Calleguas Creek Watershed TMDL Compliance Monitoring Program (CCWTMP). The committee is currently funding a coordinated and integrated implementation plan development process that will identify control measures to address all TMDLs, 303(d) listings, and water quality objective exceedances for all Responsible Parties in the watershed.

Through the watershed planning process, the watershed has successfully obtained funding for a regional salinity management pipeline to assist with addressing the watershed salts impairments, supported the Brake Pad Partnership in developing legislation to remove copper from brake pads, implemented trash controls, supported watershed-wide pesticide collection efforts, and utilized special study results to inform control measure identification and implementation. Data collected under the CCWTMP demonstrates water quality is improving for many constituents (see Section 3.3.2). Additionally, several reaches of the watershed could be delisted for metals, diazinon, chlopyrifos, and some organochlorine pesticides. The MS4s have been cooperating with the other Responsible Parties to the Revolon Slough and Beardsley Wash Trash TMDL since 2009.

The CCW process has demonstrated that the development and implementation of a collaborative, watershed based plan supported by ongoing monitoring, special studies, and adaptive management can lead to positive water quality outcomes in line with the goals of the TMDLs in Ventura County. The process also has demonstrated the need for flexibility to allow for coordination amongst agencies to identify the most cost effective and beneficial solutions to watershed priorities.

4.5.2 Santa Clara River Watershed

The Santa Clara River watershed has a watershed planning process that began in July 2006. The Santa Clara River Watershed Committee (SCRWC) is a coalition of stakeholders addressing issues critical to the watershed. The SCRWC is engaged in a variety of local planning efforts including development and implementation of an Integrated Regional Water Management Plan (IRWMP), implementation of integrated projects identified in the IRWMP with Prop. 50 funds, and development of future project ideas to address the objectives developed by the Committee. Subgroups of interested parties are formed as needed to support TMDL implementation. The MS4 Responsible Parties to the Santa Clara River Bacteria TMDL are currently in the process of developing an implementation plan.

The urban areas in the SCR watershed are much smaller than in the CCW and correspondingly the water quality concerns associated with urban runoff are fewer in this watershed. Additionally, there are only three effective TMDLs in this watershed that include MS4 allocations and only a few remaining 303(d) listings. As a result, there has been less need for the development of coordinated monitoring and implementation programs at the watershed level. However, the structure exists to support watershed planning as part of the MS4 permit implementation if appropriate.

Monitoring is ongoing throughout the watershed under the MS4 and conditional waiver for agricultural irrigated lands monitoring programs.

4.5.3 Ventura River Watershed

The Ventura River Watershed Council was formed in May of 2006 as a stakeholder group for watershed planning. It is an open group with active participation by government agencies, water and sanitation districts, environmental and educational non-profits, agricultural organizations, community volunteer groups, as well as engineers, biologists, businesses, and private citizens. This Council serves as the stakeholder group for a variety of local watershed planning efforts, including the development of the Integrated Regional Water Management Plan, and more recently the Council is focused on the development of a watershed management plan. The Ventura River Watershed is similar to the SCR in that the urban areas are generally smaller and the impairments are fewer than the CCW. Responsible Parties to the TMDLs have coordinated activities in support of TMDL implementation when feasible, including development of joint monitoring plans. The MS4 Responsible Parties have been participating in Ventura River Estuary Trash TMDL implementation since 2009. The MS4 Responsible Parties to the Ventura River Algae TMDL are currently in the process of developing an implementation plan in addition to working cooperatively with other TMDL Responsible Parties to initiate receiving water monitoring in January 2015.

4.5.4 Malibu Creek Watershed

The bulk of the watershed is in Los Angeles County and only small portions of the upper watershed are under County of Ventura and City of Thousand Oaks' jurisdictions. The first watershed-wide implementation plan was developed in 2007 followed by a focused implementation efforts taken by the County of Ventura and Watershed Protection District in 2012. This implementation plan addendum was focused on achieving compliance with effective bacteria and nutrients TMDLs (IP Addendum 1 was submitted to RWQCB in May 2013). In summer of 2013, all three Agencies worked cooperatively to conduct a bacteria source ID study to inform future implementation actions. The monthly Malibu Creek Watershed Management Council meetings offer opportunities to discuss TMDLs and watershed issues among all TMDL Responsible Parties. The County of Los Angeles and cities located within Los Angeles County are in the process of developing an Enhanced Watershed Management Plan to meet requirements of the recently adopted Los Angeles Permit.

Watersheds within Ventura County are not completely urbanized and in many cases the urban areas are a small portion of the watershed.

4.5.5 Proposed Improvements to the Watershed Planning and Implementation Process

The work and effort undertaken in the existing watershed groups have demonstrated the value of a watershed approach to addressing water quality. They have also demonstrated that each watershed in Ventura County is unique and all are at different stages in the watershed planning process. Additionally, the successes achieved in the Calleguas Creek Watershed show that implementing TMDL requirements based on a watershed approach can be successful in

improving water quality. However, the existing watershed processes have also demonstrated that solving watershed water quality concerns cannot be addressed solely through control of MS4 discharges. Unlike Los Angeles County, watersheds within Ventura County are not completely urbanized and in many cases the urban areas are a small portion of the watershed. As a result, not all water quality concerns or beneficial use impacts are a result of MS4 discharges and watershed priorities may not be directly tied to the quality or quantity of urban runoff. While the Program supports the inclusion of the WMPs in the next Ventura County MS4 permit, a number of recommendations have been identified to support the continued success of ongoing watershed management efforts in Ventura County.

The key proposed modifications to the WMP portion of the Los Angeles County MS4 permit are as follows and are discussed in more detail in the following sections:

1. Allow for the use of existing watershed management planning efforts to replace some or all of the permit requirements if equivalent. Specific provisions to consider include:
    a. A provision that allows for an existing watershed management planning effort to meet the requirements of the WMP section of the permit if deemed to be equivalent by the RWQCB.
    b. A provision that allows modifications to the required water quality priority analysis to support existing watershed priority analyses and to account for other sources that may be the source of water quality impairments.
    c. Provide a mechanism to allow multi-benefit projects and BMPs being implemented by non-MS4 dischargers to be included in the plan if they will support MS4 permit compliance.
2. Modify the water quality priority prioritization process in the permit to both allow for existing watershed prioritization processes to be used and to clarify the prioritization process for receiving water limitation violations.
3. Modify the reasonable assurance analysis requirements to ensure MS4s are not required to demonstrate that reductions solely from MS4s will bring the waterbody into compliance with water quality standards and to be better aligned with the prioritization allowed within the permit.
4. Modify the source assessment requirement to focus on potential MS4 sources.
5. Ensure the appropriate TMDL compliance schedules are included and modify the requirements for development of schedules for new receiving water limitation violations.
6. Allow for 85th percentile as a compliance mechanism and have the compliance mechanism apply regardless of how the 85th percentile storm is captured.
7. Modify the timing of the adaptive management requirements to be consistent with the permit cycles.
8. Allow the WMPs to be a compliance mechanism for final TMDL wasteload allocations.

4.5.5.1 *Use of Existing Watershed Management Planning Efforts*

As discussed above, the Calleguas Creek Watershed, Ventura River Watershed, and Santa Clara River Watershed are in the process of developing watershed implementation/management

plans. It is important that the permit provide a structure that allows for utilization of this information to the extent possible. The Program has identified a number of recommended additions to the watershed management programs to support incorporation of the existing local planning efforts.

4.5.5.1.1 Equivalent Planning Efforts

In the Calleguas Creek Watershed, a watershed implementation plan is being developed for all dischargers to the waterbody. In Ventura River and Santa Clara River Watershed, the MS4s are developing implementation plans to meet requirements of the Ventura River Algae and Santa Clara River Bacteria TMDLs.

Recognizing that the Ventura County MS4 permit renewal is upcoming, all three TMDL groups have selected to develop plans in accordance with the Los Angeles County MS4 permit watershed management program requirements to the extent possible. Each of the efforts has different focus and some elements will vary from the requirements in the LA Permit. Additionally, as the Ventura County MS4 permit has yet to be developed, the exact permit requirements are not yet known. However, if the plan includes all the essential elements to meet the Ventura County MS4 permit requirements, a mechanism should exist to allow any existing plan developed by a watershed group to be deemed functionally equivalent by the RWQCB Executive Officer.

We recommend that the permit include a specific provision in the Watershed Management Program section that states that any existing watershed management plan can be deemed functionally equivalent to a Watershed Management Program for the purposes of complying with the permit and that the Executive Officer can approve the plan for that purpose.

4.5.5.1.2 Existing Prioritization Processes

The water quality priority analysis process outlined in the Los Angeles County MS4 permit requires an extensive data analysis process that includes consideration of all data collected within the last 10 years from all available monitoring programs. Both the Calleguas Creek and Ventura River watersheds have developed data compilations and are in varying stages of developing data analyses to support identification of watershed priorities. The water quality priority analysis in the Ventura County MS4 permit should include flexibility to utilize existing data compilations and analyses if sufficient to identify exceedances of water quality objectives consistent with the permit.

Additionally, the water quality priority analysis should include a specific categorization process for constituents for which MS4 discharges could be contributing, but control of MS4 discharges would not bring the waterbody into compliance. The LA Permit allows for eliminating water quality priorities if it can be demonstrated that the MS4 is not causing or contributing to the exceedance. However, in the case where a MS4 is listed in a TMDL with an allocation, or where some loading is discharged from the MS4, it is not possible to eliminate the constituent from the priority list. Examples of this situation include nutrients and salts. While MS4 dischargers do contribute some loading of these constituents, other watershed sources are much larger contributors and without control measures on those sources, receiving waters will not meet objectives regardless of the control measures implemented by the MS4s. The Program requests that the categorization process in Section VI.C.5.a of the LA Permit be modified to include a new

category or subcategory for constituents where control measures by other sources are necessary to achieve receiving water objectives. The prioritization process should also provide enough flexibility to include best professional judgment in prioritization decisions based on watershed knowledge and program experience.

4.5.5.1.3 Consideration of Watershed Control Measures Implemented by Non-MS4 Dischargers

Through the Ventura County watershed planning processes, multiple benefit projects are generally prioritized and implemented where possible. The existing watershed structures and processes for identifying and funding projects, particularly through grant funds, provides a clear mechanism for improving water quality in the watersheds. There are several examples of multiple benefit projects that have already been funded and are being implemented. However, MS4 Permittees are not always the project implementation leads. The LA Permit does not clearly identify a mechanism for including control measures being implemented by other discharger types, particularly if those implementation measures will bring the waterbody into compliance without any control measures being implemented by the MS4s. The Program requests that the Watershed Management Program be allowed to reduce the implementation of control measures by MS4 permittees if reasonable assurance can be provided that control measures implemented by other parties will bring the receiving water into compliance with the objectives and that the proposed control measures will be implemented. This is consistent with 40 C.F.R. § 130.2(i) that allows less stringent allocations for point sources in TMDLs where non-point sources are significant and can be more cost effectively controlled than point sources if reasonable assurance can be shown that the non-point source controls will be implemented.

4.5.5.2 *Modification of the Water Quality Priority Prioritization Process*

The LA Permit requires a water quality priority analysis that results in a categorization of waterbodies and pollutants into three categories that are labeled as Category 1 (Highest Priority), Category 2 (High Priority) and Category 3 (Medium Priority) in Section VI.C.5.a.ii. Then, in Section VI.C.5.a.iv., the permit requires prioritization based on a source assessment. The prioritization is required to include TMDLs with interim and final deadlines that have passed, or are within the permit term, and other receiving water limitation violations.

While the Program supports the inclusion of a prioritization process as part of the Watershed Management Program, the current process outlined in the LA Permit is confusing, duplicative, and does not provide a clear pathway to support program implementation. A well-defined prioritization process should ensure that programs can stay focused on established priorities and that planning and implementation not be derailed by occasional exceedances of water quality objectives. The current LA Permit Provision VI.C.5.c.iii(3) contains requirements that force occasional exceedances of receiving water limitations to be elevated equivalent to TMDL compliance schedules and does not consider the frequency or duration of those exceedances in the prioritization process. Additionally, the prioritization process as outlined does not clearly allow for prioritization of TMDLs with interim and final dates outside of the permit term over occasional receiving water limitation exceedances. Without modifications to the prioritization process, permittees could be required to develop new milestones, schedules, and compliance dates (as soon as possible) to address new exceedances of receiving water limitations in lieu of focusing on TMDLs and identified impairments.

Further, the prioritization process must account for understanding of local conditions and sources, especially where TMDLs are in place. In some instances, TMDLs with MS4 WLAs are in the Permit, however the MS4 has little to no contribution to exceedances within the receiving water. In these cases, the constituents should not necessarily be elevated to the level of other TMDLs where MS4s may be contributing significantly. Lastly, the prioritization process should include consideration of frequency, magnitude, and timing of receiving water exceedances or impairments.

The Program requests modifications to the sections of the permit that discuss prioritization and scheduling to clearly allow prioritization of TMDLs and existing impairments where MS4s are a significant source over infrequent receiving water limitation violations. Additionally, the relationship between the categories and the prioritization process should be clarified or the categorization process should be utilized as the prioritization process. In taking these suggestions into account, the Permittees will be able to assign the highest priorities to pollutants that are most relevant to receiving water quality.

4.5.5.3 *Reasonable Assurance Analysis*

To further support the concern that in Ventura County watersheds, control measures implemented by MS4s may not be sufficient to bring waterbodies into compliance with water quality standards, the requirements for the reasonable assurance analysis (RAA) in the LA Permit should be modified. For all constituents in the new category or subcategory created above, the RAA should not be required to demonstrate compliance with water quality standards. Demonstration that reductions necessary to meet wasteload allocations or the standards in the MS4 discharges should be sufficient for the RAA.

Additionally, the Program requests that the RAA requirements be modified to not require the specific modeling of Category 3 pollutants. Category 3 pollutants consist of constituents that have infrequently exceeded receiving water limitations and would not have a sufficient number of exceedances to warrant a 303(d) listing. The limited number of exceedances means that modeling to assess the impact of control measures may be challenging and the constituents are of much lower priority than the TMDLs and 303(d) listings in Category 1 and 2. As a result, the permit should allow for a qualitative or relative assessment of the ability of the proposed control measures to sufficiently reduce or eliminate the observed receiving water limitation exceedances.

4.5.5.4 *Modify Source Assessment Requirement*

Section VI.C.5.a.iii of the LA Permit requires the development of a source assessment to help prioritize the water quality priorities. However, developing the information outlined in the LA permit for the source assessment can be a significant effort and may not be linked to generating information that is useful for developing the watershed management programs. The source assessment requirements should be modified to only require a baseline determination of

whether or not MS4s are a source of the pollutant of concern. If the MS4 is determined to be a potential source, gathering additional source information should be optional if needed to support the watershed management program development. Compiling specific source information should not be required if it does not support that goal.

4.5.5.5 *Development of Implementation Schedules*

Watershed priorities will likely be driven by confirmed water quality impairments and TMDLs. In most cases, compliance schedules established by TMDLs will be the drivers for establishing priorities and determining when control measures will be implemented. These schedules should be included in the Permit consistent with those established in the TMDLs. Schedules will integrate compliance points for the TMDLs with implementation timelines for jurisdictional and watershed based control measures, demonstrating when and how TMDL compliance will be achieved. However, because the adaptive management process will periodically evaluate these schedules, it is only appropriate to include interim and final compliance deadlines that will occur within the permit term in watershed plans, understanding that extended schedules will be developed with future iterations. It is recommended that the Permit include flexibility in interim and final compliance dates, allowing for the compliance schedules to be modified based on results of the adaptive management process.

4.5.5.6 *Implementation of Regional Control Measures*

Comprehensive compliance for a drainage area due to BMP implementation should not be limited only to those areas where multi-benefit "regional" BMPs are constructed. The enhanced watershed management plan (EWMP) approach in the LA Permit allows permittees to comprehensively evaluate opportunities for collaboration on multi-benefit regional projects that retain all non-stormwater and stormwater runoff from the 85th percentile, 24-hour storm event for the drainage areas tributary to the projects. The Permit provides compliance with receiving water limitations and TMDLs for specific drainage areas where these "regional" BMPs are implemented.

The Co-Permittees support this concept; however, compliance with receiving water limitations and TMDLs should be granted anytime all non-stormwater and runoff from the 85th percentile storm event is captured and retained, regardless of the types and combinations of BMPs used to achieve the standard. Where regional BMPs are selected, multiple benefits, although preferred, should not be a requirement for compliance. Depending on watershed constraints, retention of the 85th percentile storm may be achieved by regional BMPs, distributed BMPs such as green infrastructure, site specific BMPs such as cisterns, or a combination of any or all of the above. At this time, watersheds have not determined which approaches are feasible for their situations and all tools should be available to demonstrate retention and resulting compliance.

4.5.5.7 *Adaptive Management*

As watershed programs are implemented, adaptive management will be key to ensuring their success in addressing water quality priorities. The adaptive management process should allow:

- re-evaluation of water quality priorities;

- options for developing and assessing milestones and progress towards achieving interim and final TMDL compliance targets and assessment and evaluation of goals for constituents where targets are not established by a TMDL;
- modifications to the program based on evaluation of the effectiveness of the control measures and progress towards meeting goals; and
- modifications to the monitoring and assessment program to support effectiveness assessments.

While these individual pieces of the adaptive management process are generally allowed under the LA Permit, the Program is concerned about the timing of the evaluations. Provision VI.C.8.a.i of the LA Permit requires a comprehensive adaptive management process every two years. This period is too short to perform meaningful re-assessments and evaluation of water quality priorities, compliance schedules, and monitoring programs. Further, there will be too little data collected in the two year timeframe to support modifications to implementation measures. It is appropriate to assess these elements of the watershed management plans on a longer term scale such as once per permit term, coinciding with the development of the Reports of Waste Discharge. At this time, the reasonable assurance analysis could be updated and re-run to provide the most accurate and up to date assessments. Requiring more frequent comprehensive evaluations would be premature, putting the permittees at risk of having to change course mid-stream after committing significant resources, without the necessary analytical data to support modifications. The Program will consider iterative improvements to non-structural approaches based on gathering new information; however, requiring a full evaluation of the effectiveness of the Program and corresponding adaptations should only be *required* once per permit term.

4.5.5.8 *TMDL and Receiving Water Limitations Based Compliance Options*

TMDLs are not self-implementing and the Program understands the need for the Regional Board to incorporate wasteload allocations (WLAs) assigned to MS4 sources into the MS4 Permit. When including the TMDLs in the MS4 Permit, the Regional Board has discretion as to whether WQBELs are established via numeric effluent limits or through a BMP-based approach, as long as the effluent limits are "consistent with the assumptions and requirements of any available wasteload allocation for the discharge"[9]. The Regional Board's discretion was recently affirmed by USEPA, stating that "[w]here the TMDL includes WLAs for stormwater sources that provide numeric pollutant loads, the WLA should, where feasible, be translated into effective, measureable WQBELs that will achieve this objective. This could take the form of a numeric limit, or of a measurable, objective BMP-based limit that is projected to achieve the WLA."[10] The 2014 USEPA Memorandum goes further to state that "[t]he permitting authority's decision as to how to express the WQBEL(s), either as numeric effluent limitations or as BMPs, with clear, specific, and measurable elements, should be based on an analysis of the specific facts and

[9] see 40 CFR 122.44(d)(1)(vii)(B)

[10] USEPA, Memorandum, "Revisions to the November 22, 2002 Memorandum 'Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs,' " (November 26, 2014) (2014 USEPA Memorandum)

circumstances surrounding the permit, and/or the underlying WLA, including the nature of the stormwater discharge, available data, modeling results, and other relevant information."[11]

Based on this guidance, the Program believes that the new MS4 Permit should include options for final compliance with TMDLs and receiving water limitations through an alternative compliance pathway such as a watershed management plan. A BMP-based compliance option is warranted due to the unique nature of the watersheds, pollutants, and contributing sources within Ventura County and is supported by established, successful watershed planning and implementation processes already in place. The Program supports the approach currently in the LA Permit with respect to interim TMDL compliance and final compliance for USEPA established TMDLs in that compliance can be achieved through planning and implementation of watershed management plans. The Program also supports the final compliance option for TMDLs and receiving water limitations via the stormwater retention/treatment/diversion approach.

The LA Permit incorporates an alternative BMP based approach in the Permit via the watershed management programs and further provides full compliance with receiving water limitations and WQBELs through implementation of multi-benefit projects that capture the 85th percentile, 24-hour storm event. In areas where the 85th percentile, 24-hour storm event is captured, other structural BMPs are not required, a reasonable assurance analysis is not required and compliance is granted. This compliance option greatly incentivizes these types of projects.

Based on our experience with infiltration projects in the Ventura County Watersheds, it may not be feasible to construct retention BMPs in many places, rendering the incentive and compliance pathway moot. For this reason, it is recommended that the Board broaden the BMP based approach and further incentivize other types of projects and foster creativity within the watersheds. In doing so, it is critical to recognize that many projects will be able to provide multiple benefits to the watershed, even where it is infeasible to capture the 85th percentile storm event. For example, stream restoration projects can enhance tree canopy and habitat, provide stream bed and bank stabilization, and improve water quality. While difficult to quantify the benefits in terms of water quality and quantity, considering the overall functional uplift provided for the watershed, this type of BMP should be deemed equivalent to other BMPs that are currently deemed compliant. Another example would be the implementation of multiple smaller retention structures throughout the watershed, instead of one large retention structure at the terminus of the drainage area. In terms of water quality benefit, when considering the average storm size across the rainy season, the overall volume captured by many smaller BMPs may actually be greater than that of one or a few larger BMPs. This is because the larger BMPs are not typically filled to capacity and would likely not cover as much land area as smaller, more frequent BMPs. Other examples include land purchase and preservation, implementation and enhancement of riparian buffers, and more typical LID measures such as green streets, capture systems, and green roofs. Although some of these BMPs may carry greater uncertainty with respect to their effectiveness, where Permittees are able to demonstrate that these and other innovative BMPs will provide significant benefits to the watershed in addition to water quality, compliance should be granted. This will foster creativity and innovation, both necessary to solve our complex watershed challenges.

[11] *Id*., p. 6

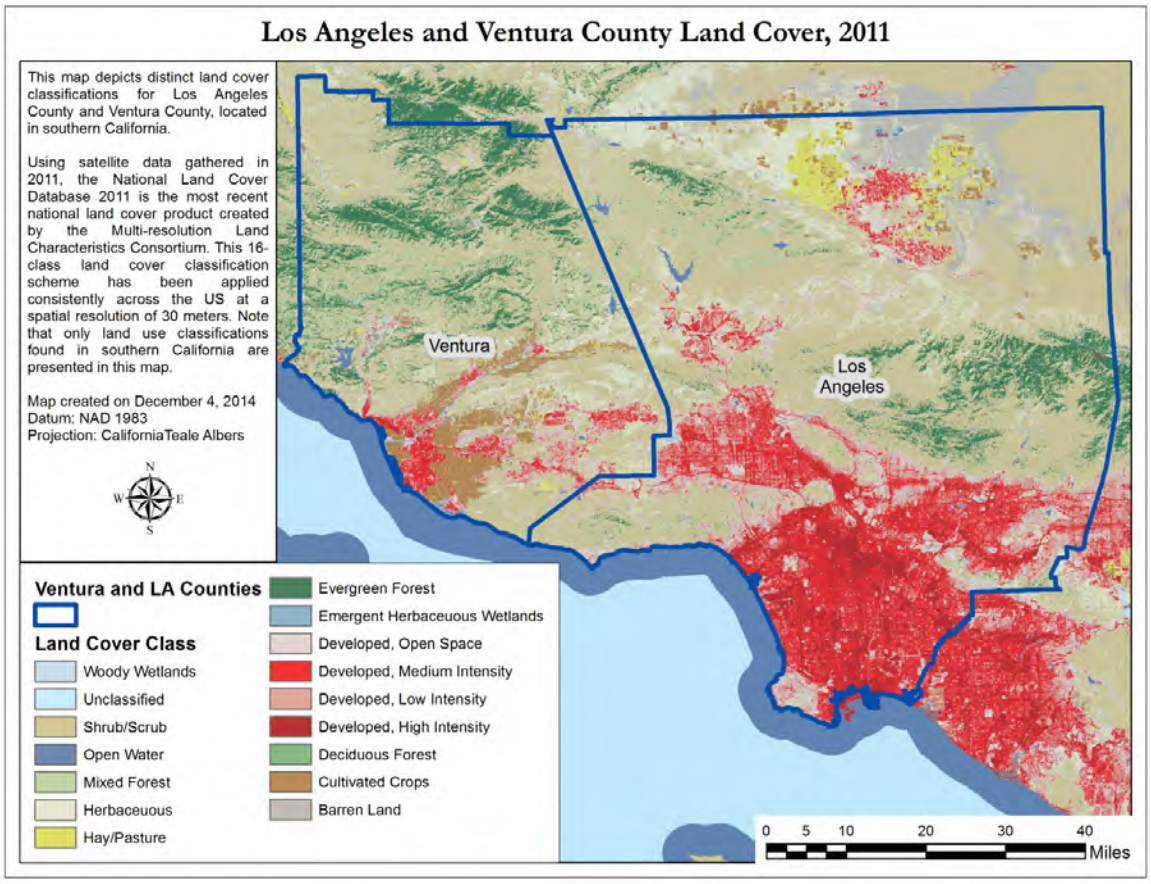
4.5.5.8.1 Why Regulate Ventura County Differently?

Historically, compliance was based upon a jurisdiction's implementation of the permit's requirements to the Maximum Extent Practicable. Monitoring was conducted to determine the effectiveness of implemented programs and BMPs in improving water quality. Those results informed changes to the permit program in an iterative process of adaptive management. However, more recently numeric standards for water quality included in permits have become the compliance measure. In the LA Permit, TMDL wasteload allocations were incorporated as numeric Water Quality Based Effluent Limitations (WQBELs). While numeric WQBELs may facilitate creating a quantifiable metric for measuring progress towards attaining water quality objectives, they do not fully accommodate the challenges with addressing stormwater discharges identified earlier. While the Program understands the reasoning for incorporation of numeric WQBELs in the LA Permit, differences in land use, water quality issues, sources, past permitting approaches, TMDL implementation, and watershed planning in Ventura County and Los Angeles County support the need to consider other mechanisms for incorporating TMDLs into the Ventura permit.

Land use within the Ventura County is dominated by open space and agriculture, with interspersed pockets of urban areas. In contrast, Los Angeles County consists of large areas of open space in the eastern parts of the watersheds, but is dominated by dense, largely impervious urban areas in the western portions. While both contain significant amounts of open space, the differences in density and the location of the urban areas are important factors affecting urban runoff. From a population standpoint, Ventura County has a population of approximately 840,000 and consists of 12 permittees, including 10 incorporated cities. With a land area of 1,843 square miles, this equates to a density of just over 450 persons per square mile. In contrast, Los Angeles County has a population of over 10 million[12], consisting of 86 permittees, including 84 incorporated cities. With a land area of 4,058 square miles, this equates to a density of over 2,450 persons per square mile. [13] Figure 4-4 visually depicts the differences in land cover between Ventura and Los Angeles Counties. To put this in perspective, the total developed land in Los Angeles County is over 1 million acres (35%) compared to less than 200,000 acres in Ventura County (13%). Agricultural land is much more predominant in Ventura County though, with over 90,000 acres (6.5%) of cultivated crops compared to less than 30,000 in Los Angeles (<1%).

[12] *Ibid.*
[13] www.quickfacts.census.gov (accessed on December 04, 2014)

Figure 4-4. Land Cover Comparison, Los Angeles and Ventura Counties



These stark differences in land use and population density are reflected in the pollutant issues and sources of pollutants within the counties. While both areas have issues in common, such as fecal indictor bacteria, the sources of the bacteria are vastly different, with more contribution from agriculture, open space, and natural sources within the Ventura County Watersheds. Other pollutants within the Los Angeles Watersheds such as heavy metals and toxicity are reflective of the dense urban environment. Pollutants in Ventura County such as chloride, aluminum, and nitrogen often stem from sources outside of the urban environment including agriculture, open space, and POTWs. These differences are key when considering how to improve water quality within the watersheds and how to regulate the various sources. Within Ventura County, the sources are diffuse and often the largest contributors are not regulated under the MS4 Permit. For this reason, a BMP based compliance option is necessary to ensure that MS4 Permittees are in compliance with TMDLs when they have controlled pollutants in their discharges. This is especially important when other significant sources are not regulated under the same constraints and timelines. For example, timelines for agriculture to come into compliance in some TMDLs are much longer than the timelines imposed on MS4s, potentially leading to uncontrolled discharges into receiving waters from agriculture resulting in exceedances for which the MS4 Permittees should not be held liable.

These differences in pollutants and pollutant sources have led to varied regulatory approaches across the Counties. In Los Angeles, where the pollutants are predominantly from urban sources, the Regional Board has determined that TMDLs with numeric WQBELs are appropriate, issuing 25 TMDLs in the region, with additional TMDLs from USEPA. In contrast, pollution issues within Ventura County that have been regulated with fewer TMDLs and a more recently updated (2010), more effective MS4 Permit. In Los Angeles County, the MS4 Permit issued in 2001 was in effect until recently. In turn, watershed based collaboration has been occurring within Ventura County for many years, an approach that is necessary to address all sources within the watersheds. Within Los Angeles County, the paradigm of watershed management is relatively new.

4.5.5.8.2 Demonstrated Success of BMP Based Approaches

Permittees and other entities (e.g., POTWs) within the Ventura County region have undertaken a commitment to improving local water quality through their participation and significant resource investment in ongoing regional water quality projects and efforts. The Program has a long history of participation in local watershed working groups and efforts which have achieved substantial success in BMP planning and implementation and monitoring, resulting in improvements in local water quality. With the inclusion of TMDL requirements in the 2010 permit, the permittees have gained significant experience in implementing TMDLs and understand the time and resource commitments necessary to comply. The permittees have experience with the potential challenges created by the incorporation of TMDLs into MS4 permits and are proposing ideas that will support the ongoing watershed coordination efforts.

Collaborative watershed solutions are already succeeding in Ventura County (as demonstrated in Sections 3.3 and 3.6 and discussed further in Section 5.3) and are examples of efficient and effective means of addressing prioritized water quality solutions with flexible action-based methods. The Program feels that the water quality improvements that have been observed in the County (see Sections 3.3 and 3.6) demonstrate that BMP-based implementation planning can result in water quality improvements. While the Program recognizes that not all TMDLs will have an implementation plan in place that meets the proposed requirements by the time of permit adoption, several plans are currently under development and may be available for consideration as non-numeric WQBELs during the adoption process. Combined with the historic evidence of water quality improvements, sufficient evidence is available that non-numeric, although fully measurable, WQBELs can be incorporated into the Ventura permit.

4.5.5.8.3 BMP Based Approach

The Program proposes that the permit allow for both interim and final TMDL compliance to be achieved through the use of an implementation plan that has undergone a

reasonable assurance analysis that will justify that the proposed BMPs will meet the TMDL's WLAs and RWLs. The plan would include implementation of a suite of BMPs, demonstrated by models to be sufficient in effectiveness and quantity to meet the required pollutant load reductions within the prescribed schedules. Compliance with the plan would be attained through full, timely implementation and would include a strong iterative process of BMP implementation, monitoring, analysis, and program adaptation. While this plan may be a watershed management program, it could be developed as a separate TMDL implementation plan if a watershed management program is not being developed.

Incorporation of non-numeric WQBELs as an option for compliance in the permit will support the Program in cost effectively meeting TMDL requirements. By allowing the adaptive management process of plan implementation and the BMPs contained therein, it will allow the Program to effectively prioritize the most serious water quality issues within their jurisdiction. The Program can then analyze trends reflected in monitoring data and pursue long-term financial planning as the upcoming resource needs can be predicted and planned for with greater accuracy. With the reduced liability assured if compliance is tied to implementation of the plan, agencies will have certainty that moving forward with implementation will not result in a violation of permit requirements at the end of the implementation period. The stability will allow the permittees to pursue and develop new, stable funding sources for future stormwater projects that will enhance water quality.

4.5.5.8.4 Suggested Modifications to Los Angeles Permit Language

As explained above, the LA Permit includes numeric WQBELs for TMDLs and then includes a number of mechanisms for demonstrating compliance with the numeric WQBELs. While Provision VI.E.2.d.i.(4) in the LA Permit does allow for interim TMDL compliance via implementation of an approved watershed management program, Provision VI.E.2.e.i does not include a provision allowing demonstration of compliance with final WQBELs through implementation of a watershed management program. The Program proposes to modify the compliance pathways and discussion of final WQBELs in the LA Permit as follows.

Provision VI.E.2.e.i of the LA Permit states:

> *A Permittee shall be deemed in compliance with an applicable final water quality-based effluent limitation and final receiving water limitation for the pollutant(s) associated with a specific TMDL if any of the following is demonstrated:*
>
> *(1) There are no violations of the final water quality-based effluent limitation for the specific pollutant at the Permittee's applicable MS4 outfall(s);*
>
> *(2) There are no exceedances of applicable receiving water limitation for the specific pollutant in the receiving water(s) at, or downstream of, the Permittee's outfall(s);*
>
> *(3) There is no direct or indirect discharge from the Permittee's MS4 to the receiving water during the time period subject to the water quality-based effluent limitation and/or receiving water limitation for the pollutant(s) associated with a specific TMDL; or*

(4) In drainage areas where Permittees are implementing an EWMP, (i) all non-stormwater and (ii) all stormwater runoff up to and including the volume equivalent to the 85th percentile, 24-hour event is retained for the drainage area tributary to the applicable receiving water. This provision (4) shall not apply to final trash WQBELs.

The Program proposes to add a fifth option stating the following:

(5) The Permittee has submitted and is fully implementing an approved Watershed Management Program pursuant to Part VI.C.

(a) To be considered fully implementing an approved Watershed Management Program, EWMP or implementation plan, a Permittee must be implementing all actions consistent with the approved program and applicable compliance schedules, including structural BMPs.

(b) Structural stormwater BMPs or systems of BMPs should be designed and maintained to treat stormwater runoff from the 85th percentile, 24-hour storm, where feasible and necessary to achieve applicable WQBELs and receiving water limitations, and maintenance records must be up-to-date and available for inspection by the Regional Water Board.

(c) A Permittee that does not implement the Watershed Management Program in accordance with the milestones and compliance schedules shall demonstrate compliance with its final water quality based effluent limitations and/or receiving water limitations pursuant to (1) – (3) above.

(d) Upon notification of a Permittee's intent to develop a WMP, EWMP, or implementation plan and prior to approval of its WMP, EWMP, or implementation plan a Permittee's full compliance with all of the following requirements shall constitute a Permittee's compliance with provisions pertaining to final WQBELs with compliance deadlines occurring prior to approval of a WMP or EWMP.

(1) Provides timely notice of its intent to develop a WMP, EWMP, or implementation plan,

(2) Meets all interim and final deadlines for development of a WMP, EWMP, or implementation plan,

(3) For the area to be covered by the WMP, EWMP, or implementation plan, targets implementation of watershed control measures in its existing stormwater management program, including watershed control measures to eliminate non-stormwater discharges of pollutants through the MS4 to receiving waters, to address known contributions of pollutants from MS4 discharges that cause or contribute to the impairment(s) addressed by the TMDL(s), and

(4) Receives final approval of its WMP, EWMP, or implementation plan within the required timeframes.

Once the Regional Board approves Watershed Management Program, this Order will be amended to include the Watershed Management Program as the final water quality-based effluent limit that is consistent with the WLAs. If the Regional Board does not approve the Watershed Management Program prior to the compliance date(s), the WLAs will become the final water quality-based effluent limits on the applicable compliance date and will remain in effect until a Watershed Management Program is approved by the Regional Board. The Regional Board will schedule a public hearing to consider approving the Watershed Management Program, as a final water quality-based effluent limitation for a TMDL, no more than 120 days after the final program is submitted by the Permittees. Once approved by the Regional Board, the program shall be incorporated into this Order as the final WQBELs for the subject pollutant.

Additionally, Part VI.C of the LA Permit should be modified to include requirements that would allow an implementation plan for a specific TMDL to be utilized as the final WQBELs if a full WMP is not being developed for the watershed.

5 CONCLUSIONS

This document has been designed to meet the required contents of an ROWD covering the characterization of the discharge, and description of facilities and BMPs. Beyond meeting the Permit requirement, this ROWD serves to inform the Regional Board and the public on the accomplishments achieved by the Ventura Countywide Program, the individual Permittees, and the broader watershed management groups towards improving water quality in Ventura County. These many accomplishments do not need to be summarized here, but have been included to demonstrate the progress made to date, the clear understanding of stormwater priorities, and forward thinking of the Ventura Countywide Program. Also included in the ROWD are the lessons learned over the last twenty years of monitoring and addressing runoff pollution, the challenges identified for the future, along with recommended actions to help meet those challenges.

Recommendations identified within this ROWD are based on the assumption that the Regional Board will develop the updated Permit for Ventura County based on the current MS4 Permit for Los Angeles County (LA Permit). Many of the recommendations are based on a foundational understanding of runoff quality across Ventura County from years of implementing land use, outfall, and receiving water monitoring.

5.1 GOALS AND GUIDING PRINCIPLES

Building on past experience and recognizing the challenges ahead, Permittees felt the need to develop a more proactive and comprehensive view of water quality management, capable of addressing the complex water quality regulations facing the Program. To that point several common themes are threaded throughout the document. Key themes include:

- Program Priority Setting: Programs should be focused and driven by receiving water priorities and pollutants of concern and should be prioritized by their effectiveness in reducing those pollutants;

- Flexibility in Watershed Planning and Implementation: Flexibility should be provided where possible, recognizing that the watersheds in the County each have unique water quality challenges, priorities, and all are at different stages in watershed planning;

- Question Driven Monitoring: Monitoring should be question driven and focused on obtaining key information, with a well-defined purpose and goals for the use of the data; and

- Options for Permit Compliance: An achievable pathway for permit compliance is necessary.

Permittees developed a set of guiding principles for the ROWD that are centered around these core themes. These principles are more specific to the local watersheds and we hope that each is reflected in the new MS4 Permit for the Ventura Program.

- The Program supports an improved watershed focus and more holistic management where appropriate; however, considering the unique nature of each watershed within the Region, it is necessary to keep all program planning and implementation options available.
- Program efforts should be coordinated with existing watershed plans and other entities that affect water quality in the region as appropriate. Permit language should not hinder holistic watershed management.
- Where watershed programs are in place, existing efforts should be allowed to replace permit requirements if equivalent.
- There should be an increased emphasis on strategic planning, including the ability to prioritize and implement actions to focus on identified pollutants of concern. Permit language should be supportive of these concepts and conflicting requirements should be eliminated.
- The Program supports the evolution of MS4 program elements through the adaptive management process. The Permit should facilitate meaningful, timely assessments that will lead to improved program efficiency and effectiveness through integration and streamlining where possible.

5.2 RECOMMENDATIONS

5.2.1 Receiving Water Driven Priorities

Prioritizing based on how MS4s are potentially impacting beneficial uses of receiving waters, then focusing the needed resources on those issues creates a more efficient effort with a higher chance of success.

5.2.1.1 *Receiving Water Limitations*

The Program strongly supports the use of a watershed management planning and implementation process as an optional path for compliance with receiving water limitations and would appreciate that this option be included in the next MS4 Permit for Ventura County. However, the Program has concerns over the lack of connection between the Receiving Water Limitations language and the compliance pathways offered through Watershed Management Programs, and TMDLs. Additionally, we feel that compliance with Receiving Water Limitations should also be achievable through traditional permit programs and implementation of minimum control measures (MCMs). Recommendations to improve the Receiving Water Limitations language are identified below.

- A clear linkage between the compliance provisions and the prohibitions, receiving water limitations, and effluent limitations must be established.
- Language needs to be included to clarify that in instances where a TMDL is in place, or a TMDL is being developed, the permittees shall achieve compliance with receiving water limitations as outlined in the specific provisions for TMDLs.
- Language currently in Part V.A.3 of the LA Permit should be revised such that exceedances of “non-priority” constituents trigger inclusion on a watch list to be considered in the subsequent adaptive management process. The language should

indicate that where Permittees continue to implement programs in support of priorities, exceedances of "non-priority" constituents should not constituent immediate violations of receiving water limitations.

- The language in Part V.A.3 of the LA Permit should be modified to specify that exceedances of priority pollutants addressed within the current stormwater management programs would not trigger further action until TMDL compliance schedules have come due; instead the Permittees should complete the implementation of actions identified in the stormwater management plan(s).
- Language should be developed and included in Stormwater Management Program Minimum Control Measures to provide an alternative compliance pathway for jurisdictions which choose not to participate in a watershed planning process.

The Program understands the intent of the RWL language and is supportive of the inclusion of alternative compliance pathways as discussed above. However, we feel that there are several shortcomings within the current LA Permit language that could lead to non-compliance and legal implications for the Permittees. It is critical that some assurance of compliance is included in the RWL language. Simple changes to the language in Part V.A can result in an achievable compliance pathway for Permittees while keeping our sites firmly set on attaining water quality standards in receiving waters, consistent with the intent of the precedential receiving water limitations language, and with the Clean Water Act.

5.2.1.2 *Bacteria*

Elevated stormwater FIB concentrations have been consistently observed in Ventura County MS4s and receiving waters. While decreasing concentrations trends were found in some cases in the receiving waters, compliance with water quality standards has not been achieved. Further reductions in storm water FIB concentrations will require large scale implementation of storm water treatment or infiltration across all watersheds, which will take many years, and involve significant costs. While addressing bacteria is a high priority of the program, it is important that implementation resources be focused on addressing sources that pose the highest risk to human health. Therefore, the Program recommends modifying the monitoring program to focus on bacteria source identification and risk assessment studies. Based on this monitoring, BMP implementation during this permit term will focus on areas and sources that pose the highest risk to human health (i.e. human sources of bacteria). However, the prevalence of FIB from sources that pose less risk to human health suggest that exceedances may still occur regardless of Permittee efforts. As a result, appropriate regulatory mechanisms (e.g. natural source exclusion approach, quantitative microbial risk assessment, or high-flow suspension of beneficial use) may need to be considered to address lower risk sources.

To support the proposed changes to the monitoring program, a few modifications to the existing monitoring requirements are requested. The Program supports continuing FIB monitoring to support trend analyses and determine compliance. However, to partly off-set the proposed additional stormwater FIB monitoring efforts, the Program recommends discontinuing fecal coliform monitoring in stormwater, and implementing an 18-hr holding time for Enterococcus, E. coli and total coliform grab sampling for stormwater. The latter changes will results in no loss of useful information, and will not impact the Program's ability to assess water quality discharged from outfalls and compliance with Water Quality Objectives in the receiving waters.

5.2.1.3 *Aluminum*

The exceedingly high level of total aluminum detected in runoff from undeveloped areas suggests that wet weather aluminum will routinely exceed water quality objectives regardless of Permittee efforts. Since high background concentrations of aluminum appear to be a primary source contributing to the routine water quality objective exceedances observed in Ventura County surface waters an appropriate regulatory mechanism (e.g., reference stream/antidegradation approach, natural source exclusion approach, water-effects ratio approach, or high-flow suspension of beneficial use) is needed that would limit the Permittees' liability for controlling such background concentrations. A sound scientific and regulatory approach to managing the elevated concentrations of aluminum observed in Ventura County surface waters will be needed to sufficiently protect beneficial uses potentially impacted by this naturally occurring metal.

5.2.1.4 *Outfall Action Levels*

Non-Stormwater Action Levels and Municipal Action Levels should be removed from the Permit, or only be used as one of several pollutant prioritization tools. Action levels for pollutants that are not detected at environmentally significant levels in receiving waters or outfalls divert resources away from previously identified priorities towards issues where there is no identified water quality problem, and will therefore not likely result in improved water quality.

If action levels are incorporated into the next Ventura County MS4 Permit, they must be incorporated as a tool to assist in the prioritizing of various aspects of the Watershed Management Programs. Constituents considered for action levels should be based on known priorities and a comparison to water quality objectives applicable to the selected watersheds.

5.2.2 Minimum Control Measures

Experience gained over the last twenty years of implementing stormwater programs has been used to direct efforts and improve effectiveness within the confines of Permit compliance. That is to say, the Permittees hold Permit compliance as the priority, and resources are directed toward compliance first. However, other potentially effective measures may not always get implemented due to the inflexibility and resource intensiveness of current Permit requirements. Despite this limitation, the Permittees have accomplished many achievements beyond Permit the requirements. Key areas of improvement in the Permit structure or language would allow the Permittees to create more effective and efficient programs for reducing pollutants discharged from their MS4s are detailed below.

- Program Management: A well-defined pathway for compliance necessary to provide assurance that extensive implementation efforts will result in compliance with Receiving Water Limitations; flexibility and scalability of program elements are necessary to perform true adaptive management;
- Public Information and Participation: Identified pollutants of concern should guide efforts; the Permit should allow Permittees the flexibility to use source identification studies to identify target audiences for public outreach.
- Industrial / Commercial Discharges: The Permit should provide flexibility to identify additional critical sources beyond those listed in the Permit. This allows for Permittees to recover inspection costs from additionally targeted critical sources. Critical sources

that have been inspected and identified to have no exposure to stormwater should be allowed some relief from annual inspections, with re-inspections required not more frequent than once every five years.

- New Development and Re-development: The recently approved Technical Guidance Manual (TGM) was developed through a broad stakeholder process and should continue to guide land development programs. The categories subject to new and re-development criteria in the Los Angeles and Long Beach Permits are very similar to the current Ventura Countywide Permit, and there is no requirement for 95% effective impervious surfaces on the subject categories. Because of this it could be argued that the Los Angeles Permit is actually less prescriptive. However, the Permittees would prefer not to have any changes at this time. The primary reason is any change, no matter how minor, will require a revised Technical Guidance Manual with a new effective date. This will create two very similar sets of rules to communicate to the development community that will result in confusion and extra effort for very little water quality improvement. New Permit requirements should not add to, nor conflict with, the current TGM.
- Construction: The Permit should provide for reasonable site inspection frequencies based on risk to receiving waters.
- Illicit Discharges and Illicit Connections: The Permit should allow for focused pollutant source identification efforts to replace less effective, but resource intensive, approaches of storm drain screening. Using land use data and detailed storm drain maps along with local knowledge will more effectively lead to the identification and elimination of these pollutant contributions than a broad screening effort.

5.2.3 Monitoring and Assessment

The Ventura Program has been performing monitoring at key receiving water locations within the watersheds for more than ten years, and at multiple outfalls since 2009. The current Permit requires sampling at one representative station (Major Outfall) for each Permittee's MS4. Many of the monitoring requirements for Major Outfall stations are similar to those for the Mass Emission stations, as are the reasons for undertaking this monitoring. Four of the stations were monitored beginning with the 2009/10 monitoring season and seven of the stations were new to the 2010/11 monitoring season.

Using the data from the Major Outfall monitoring in conjunction with the Mass Emission monitoring, the Stormwater Monitoring Program has helped the Program determine if an MS4 is potentially contributing to exceedances of water quality objectives by comparing results to applicable water quality objectives in the Basin Plan and the CTR. This provides the Ventura County Permittees with a much greater understanding of the quality of their discharge than was known about MS4 discharges in the Los Angeles region when the Los Angeles Countywide Stormwater Permit was adopted. This current monitoring effort should be considered the basis for future monitoring, and the existing data should be evaluated for ability to answer new questions prior to requirements for additional monitoring. Building on this experience, the monitoring provisions of the new Permit should:

- Be question driven, ensuring each monitoring effort is designed to provide useful and necessary data. Continued monitoring for questions already answered is not as useful as a refined program that can answer new questions.
- Include flexibility to allow programs to focus resources on prioritized pollutants. Once a pollutant is identified as a priority the next step is an increased effort on identifying sources and how to reduce them. Continued efforts to confirm the priority are not useful until efforts have been implemented to affect a change in the water quality.
- Allow multiple party regional monitoring and reporting if proposed by the Permittees and approved by the Executive Officer. These may be through implementing TMDL monitoring plans, or projects brought to bear from organizations such as the Southern California Stormwater Monitoring Coalition. Regional monitoring programs are more cost effective, and provide consistency which improves the value of local data by allowing it to be viewed in a larger context.

5.2.4 TMDL Related Recommendations

Having implemented multiple TMDLs over the current permit term, water quality data has demonstrated several successes in the Santa Clara and Calleguas Creek Watersheds leading to a few recommendations for the upcoming MS4 Permit. These watersheds have well organized and active watershed programs contributing to water quality improvements. The following recommendations should be included in the next iteration of the MS4 Permit for the VCSQMP.

- Upper Santa Clara River Chloride TMDL: The Upper Santa Clara River Chloride TMDL should be removed from the Ventura County MS4 Permit. Although a WLA is assigned to MS4 Permittees discharging to the Upper Santa Clara River, there is no MS4 within the Ventura County portion of the watershed.

- Delisted Waterbodies: The Permit should acknowledge that delisted waterbodies have no reasonable potential to exceed established WLAs, therefore where delisting(s) for TMDL constituents have occurred, no further actions should be required of the named Responsible Parties. Data collected indicates that this may be applicable to the following TMDLs:
    - TMDL for Nitrogen Compounds in the Santa Clara River;
    - Sediment and several organochlorine pesticides under the TMDL for OC Pesticides, PBCs, and Siltation in Calleguas Creek;
    - Select OP Pesticides under the TMDL for Toxicity, Chlorpyrifos, and Diazinon in Calleguas Creek, its Tributaries, and Mugu Lagoon; and
    - Multiple metals under the TMDL for Metals and Selenium in Calleguas Creek, its Tributaries, and Mugu Lagoon.

- Pollutant Prioritization Process: The prioritization process within the watershed management programs should account for and lower the priority for TMDL pollutants in two key circumstances:
    - Where MS4s are acknowledged to be a minor contributing source, as written in the TMDL or demonstrated through monitoring;
    - Where sufficient data exists to delist the waterbody pollutant combination covered under the TMDL.

5.2.5 Watershed Management

The Program supports the inclusion of a watershed management approach as an option for planning and implementation within the next Ventura County MS4 Permit. Inclusion of a watershed management approach option facilitates efficient planning and timely implementation of effective programs and practices to address the highest priority water quality challenges facing the Program. To provide flexibility for individual permittees to select the methods of planning and implementation appropriate for their agency we support the inclusion of the watershed management program as an option, rather than as a strict permit requirement. In an effort to continue to improve on existing permitting efforts, the Program has identified several key modifications to the watershed management program element of the Los Angeles MS4 Permit. These recommendations are briefly described below:

- Use of Existing Watershed Management Planning Efforts: Allow for the use of existing watershed management planning efforts to replace some or all of the permit requirements if equivalent. Recognizing that the Ventura County MS4 permit renewal is upcoming, three watershed TMDL groups have selected to develop plans in accordance with the Los Angeles County MS4 permit watershed management program requirements to the extent possible. Each of the efforts has different focus and some elements will vary from the requirements in the LA Permit. We recommend that the permit include a specific provision in the Watershed Management Program section that states that any existing watershed management plan can be deemed functionally equivalent to a Watershed Management Program for the purposes of complying with the permit and that the Executive Officer can approve the plan for that purpose.

- Pollutant Prioritization Process: Improvements to the prioritization process are need to avoid occasional exceedances of receiving water limitations from being elevated equivalent to TMDL compliance schedules, to consider the frequency or duration of those exceedances, and clearly allow for prioritization of TMDLs will interim and final dates outside of the permit term over occasional receiving water limitation exceedances. Further, the prioritization process must account for understanding of local conditions and sources, especially where TMDLs are in place. In some instances where TMDLs with MS4 WLAs are in the Permit, but the MS4 has little to no contribution to exceedances within the receiving water the constituents should not necessarily be elevated to the level of other TMDLs where MS4s may be contributing significantly. The Program requests modifications to the sections of the permit that discuss prioritization and scheduling to clearly allow prioritization of TMDLs and existing impairments where MS4s are a significant source over infrequent receiving water limitation violations. The water quality priority prioritization process in the permit should also be modified to both allow for existing watershed prioritization processes to be used, and to clarify the prioritization process for receiving water limitation violations.

- Reasonable Assurance Analysis: The Program requests that the RAA requirements should be modified to ensure MS4s are not required to demonstrate that reductions solely from MS4s will bring the waterbody into compliance with water quality standards, and to be better aligned with the prioritization allowed within the permit. Pollutants that have infrequently exceeded receiving water limitations lack data for modeling to assess the impact of control measures, and these constituents are of much lower priority than the TMDLs and 303(d) listings. As a result, the permit should allow for a qualitative or

relative assessment of the ability of the proposed control measures to sufficiently reduce or eliminate the observed receiving water limitation exceedances.

- The Source Assessment Requirements: The source assessment requirements should be modified to only require a baseline determination of whether or not MS4s are a source of the pollutant of concern. If the MS4 is determined to be a potential source, gathering additional source information should be optional if needed to support the watershed management program development. Compiling specific source information should not be required if it does not support that goal.

- Development of Implementation Schedules: Compliance schedules established by TMDLs will be the drivers for establishing priorities and determining when control measures will be implemented. These schedules should be included in the Permit consistent with those established in the TMDLs. However, because the adaptive management process will periodically evaluate these schedules, it is only appropriate to include interim and final compliance deadlines that will occur within the permit term in watershed plans, understanding that extended schedules will be developed with future iterations. It is recommended that the Permit include flexibility in interim and final compliance dates, allowing for the compliance schedules to be modified based on results of the adaptive management process.

- Comprehensive Compliance for BMP Implementation: Compliance with receiving water limitations and TMDLs should be granted anytime all non-stormwater and runoff from the 85th percentile storm event is captured and retained, regardless of the types and combinations of BMPs used to achieve the standard. Where regional BMPs are selected, multiple benefits, although preferred, should not be a requirement for compliance. Depending on watershed constraints, retention of the 85th percentile storm may be achieved by regional BMPs, distributed BMPs such as green infrastructure, site specific BMPs such as cisterns, or a combination of any or all of the above. At this time, watersheds have not determined which approaches are feasible for their situations and all tools should be available to demonstrate retention and resulting compliance. The Permit should allow for 85th percentile as a compliance mechanism regardless of how the 85th percentile storm is captured

- Timing of the Adaptive Management Requirements: The LA Permit requires a comprehensive adaptive management process every two years. This period is too short to perform meaningful re-assessments and evaluation of water quality priorities, compliance schedules, and monitoring programs. Further, there will be too little data collected in the two year timeframe to support modifications to implementation measures. It is appropriate to assess these elements of the watershed management plans on a longer term scale such as once per permit term, coinciding with the development of the Reports of Waste Discharge.

- TMDL and Receiving Water Limitations Based Compliance Options: The Permit should include options for final compliance with TMDLs and receiving water limitations through an alternative compliance pathway such as a watershed management plan. A BMP-based compliance option is warranted due to the established, successful watershed planning and implementation processes already in place and their understanding of the unique nature of the watersheds, pollutants, and contributing sources. The Program supports the approach currently in the LA Permit with respect to interim TMDL

compliance and final compliance for USEPA established TMDLs in that compliance can be achieved through planning and implementation of watershed management plans. The Program also supports the final compliance option for TMDLs and receiving water limitations via the stormwater retention/treatment/diversion approach. Infiltration projects in the Ventura County Watersheds are not always feasible, rendering the incentive and compliance pathway moot. For this reason, it is recommended that the Board broaden the BMP based approach and further incentivize other types of projects and foster creativity within the watersheds. In doing so, it is critical to recognize that many projects will be able to provide multiple benefits to the watershed, even where it is infeasible to capture the 85th percentile storm event.

- All watershed management planning efforts, not just the enhanced watershed management plans, should incentivize infiltration projects, especially green streets and regional projects with multiple benefits.

The Ventura Countywide Stormwater Quality Management Program understands that their fourth term permit will be the foundation for the future of stormwater programs in Ventura County, and are willing to work with Regional Board staff to create a path to that future. A collaborative process will allow the Permittees and Regional Board staff to clearly communicate their needs and expectations, fostering trust and relationships leading to a better outcome for all involved. At the end of the process, we hope to have a permit that provides a clear and achievable path for Permittees to demonstrate compliance that will lead to improved collaboration, innovative management, enhanced understanding of watershed dynamics, and ultimately continue to improve water quality in our watersheds.

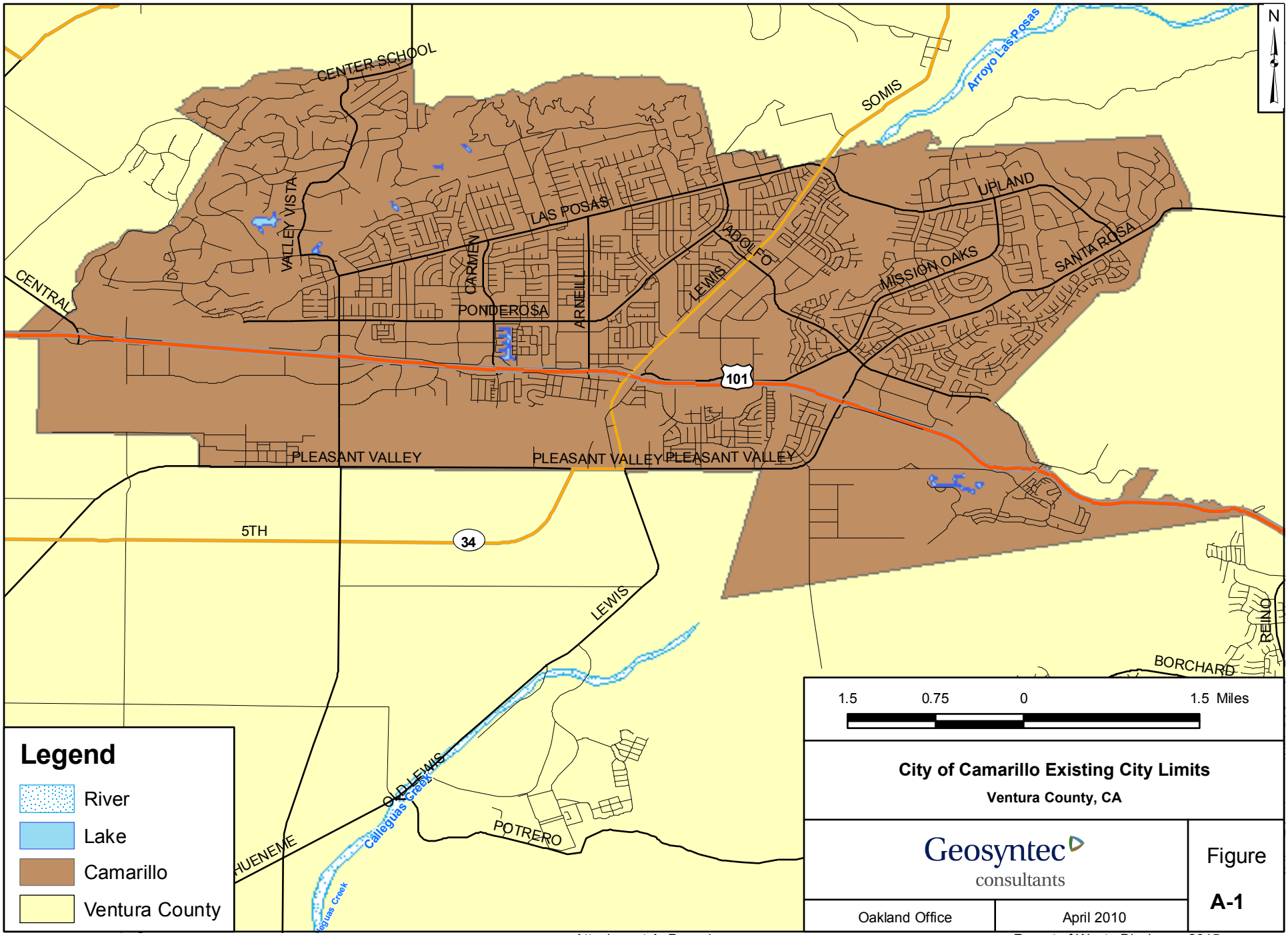
January 2015

REPORT OF WASTE DISCHARGE

Appendix A. City Urban Restriction Boundaries and County Existing Community Designated Areas

Ventura Countywide Stormwater Quality Management Program

Camarillo
County of Ventura
Fillmore
Moorpark
Ojai
Oxnard
Port Hueneme
Santa Paula
Simi Valley
Thousand Oaks
Ventura
Ventura County
Watershed District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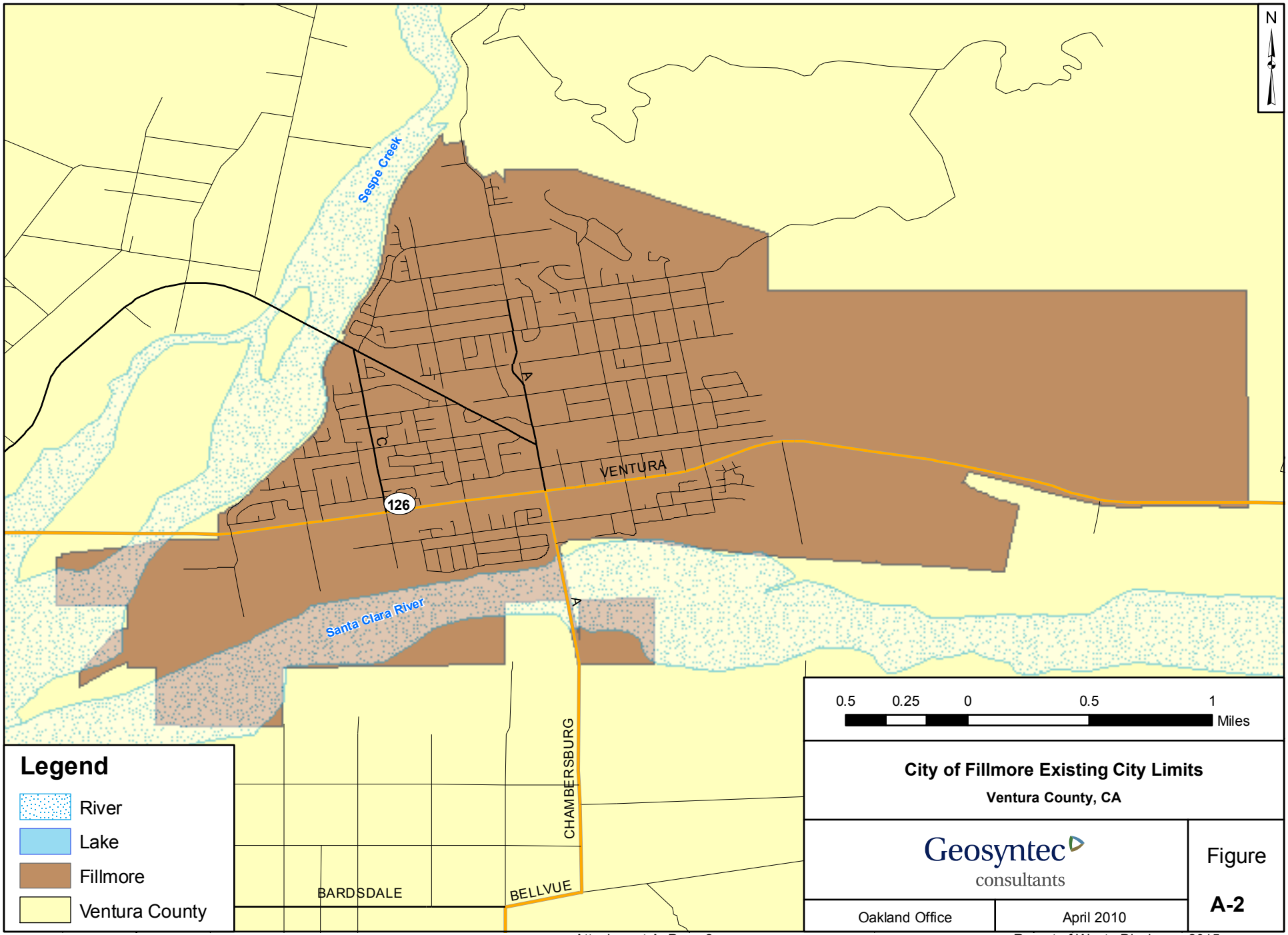
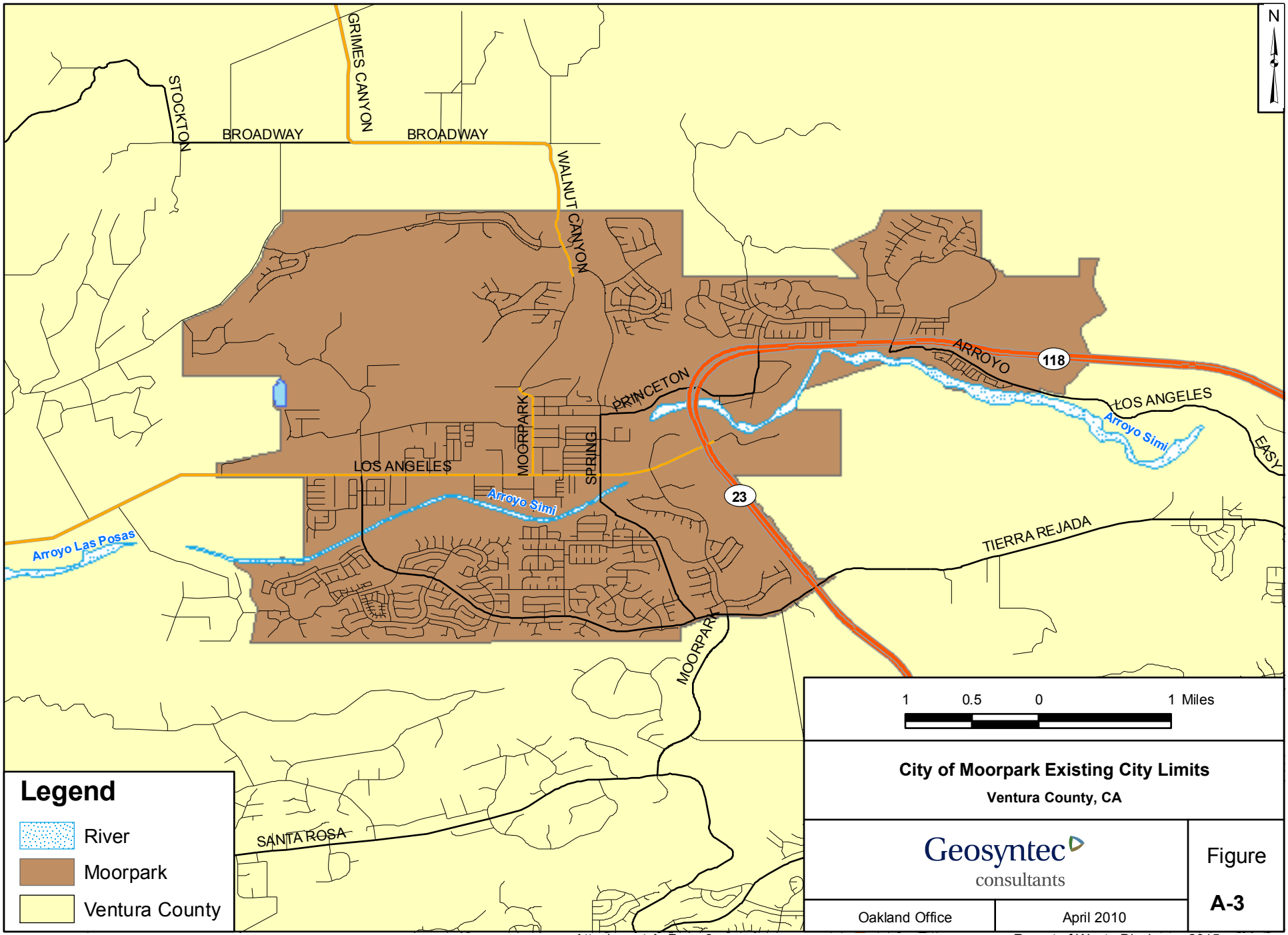
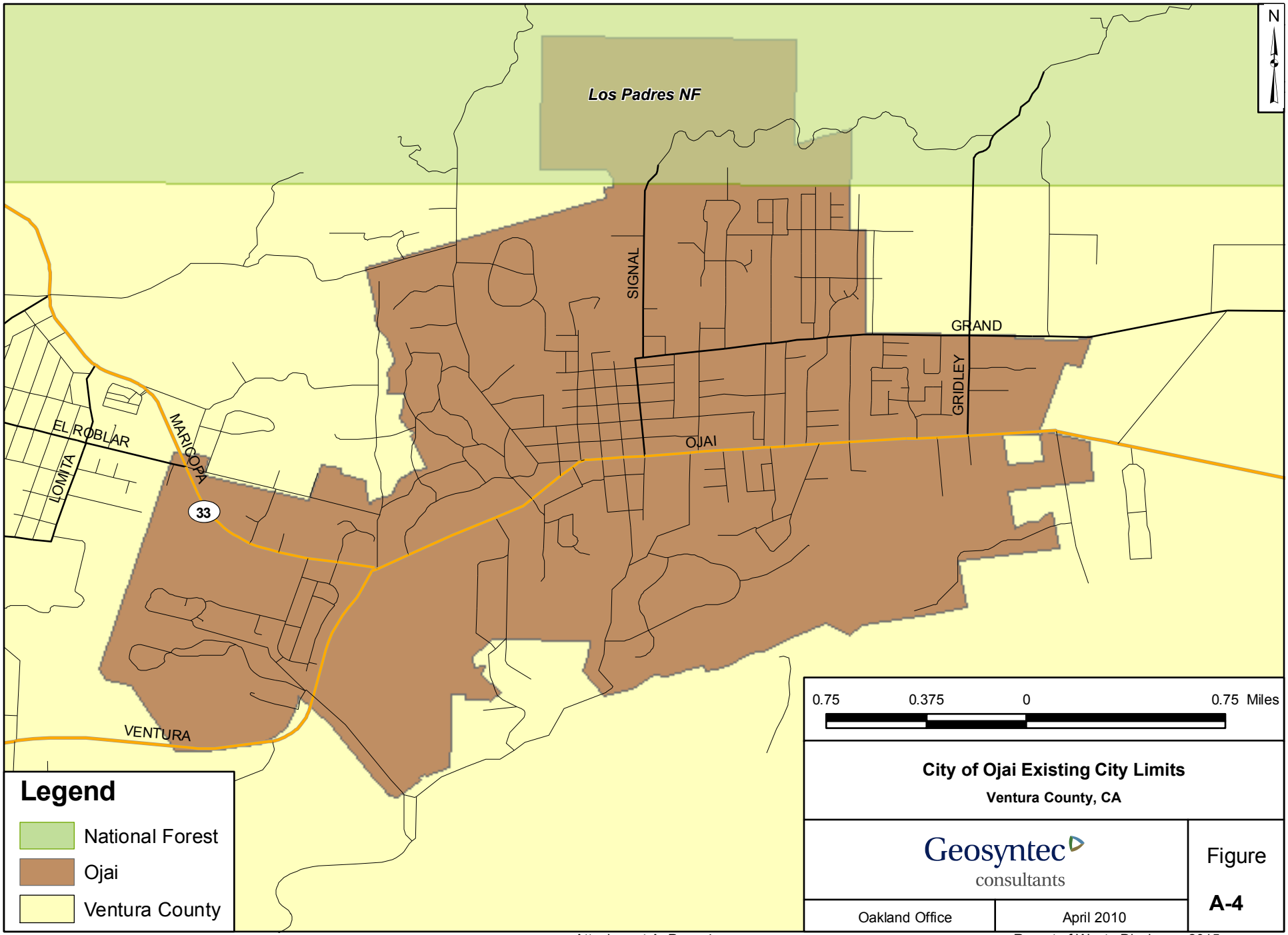
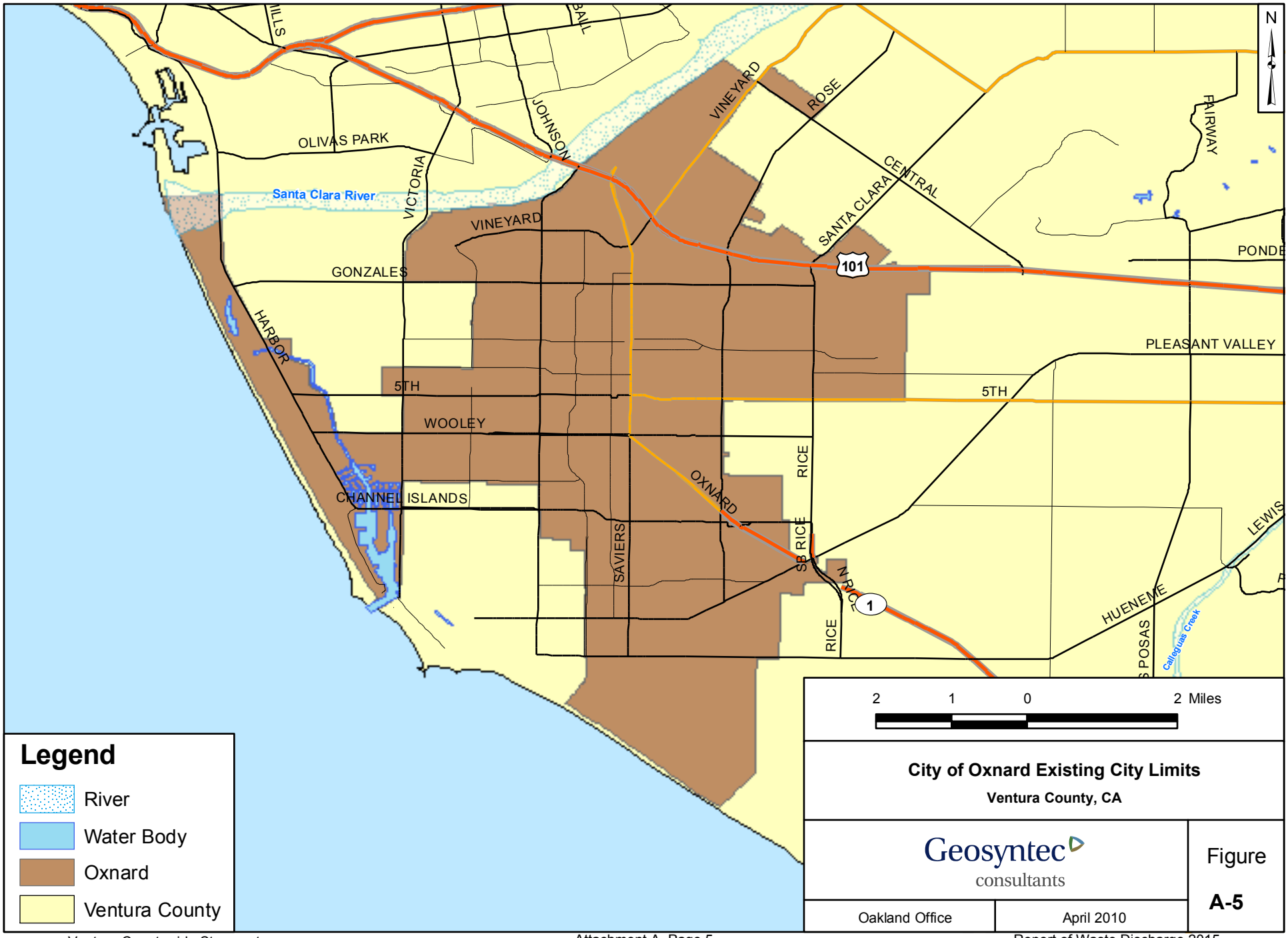
CENTER SCHOOL
SOMIS
Arroyo Las Posas
VALLEY VISTA
LAS POSAS
UPLAND
CARMEN
ADOLFO
MISSION OAKS
SANTA ROSA
CENTRAL
PONDEROSA
ARNEILL
LEWIS
101
PLEASANT VALLEY
PLEASANT VALLEY
PLEASANT VALLEY
5TH
34
LEWIS
RENO
BORCHARD
OLD LEWIS
Calleguas Creek
POTRERO
HUENEME
Legend
River
Lake
Camarillo
Ventura County
1.5
0.75
0
1.5 Miles
City of Camarillo Existing City Limits
Ventura County, CA
Geosyntec
consultants
Oakland Office
April 2010
Figure
A-1


N
Sespe Creek
VENTURA
126
Santa Clara River
CHAMBERSBURG
BARDSDALE
BELLVUE
Legend
River
Lake
Fillmore
Ventura County
0.5 0.25 0 0.5 1
Miles
City of Fillmore Existing City Limits
Ventura County, CA
Geosyntec consultants
Oakland Office
April 2010
Figure
A-2


101
N
STOCKTON
BROADWAY
GRIMES CANYON
BROADWAY
WALNUT CANYON
ARROYO
118
PRINCETON
LOS ANGELES
Arroyo Simi
EASY
MOORPARK
SPRING
LOS ANGELES
Arroyo Simi
23
Arroyo Las Posas
TIERRA REJADA
MOORPARK
SANTA ROSA
1 0.5 0 1 Miles
Legend
River
Moorpark
Ventura County
City of Moorpark Existing City Limits
Ventura County, CA
Geosyntec consultants
Oakland Office
April 2010
Figure
A-3


N
Los Padres NF
SIGNAL
GRAND
GRIDLEY
OJAI
EL ROBLAR
MARICOPA
LOMITA
33
VENTURA
Legend
National Forest
Ojai
Ventura County
0.75
0.375
0
0.75 Miles
City of Ojai Existing City Limits
Ventura County, CA
Geosyntec
consultants
Oakland Office
April 2010
Figure
A-4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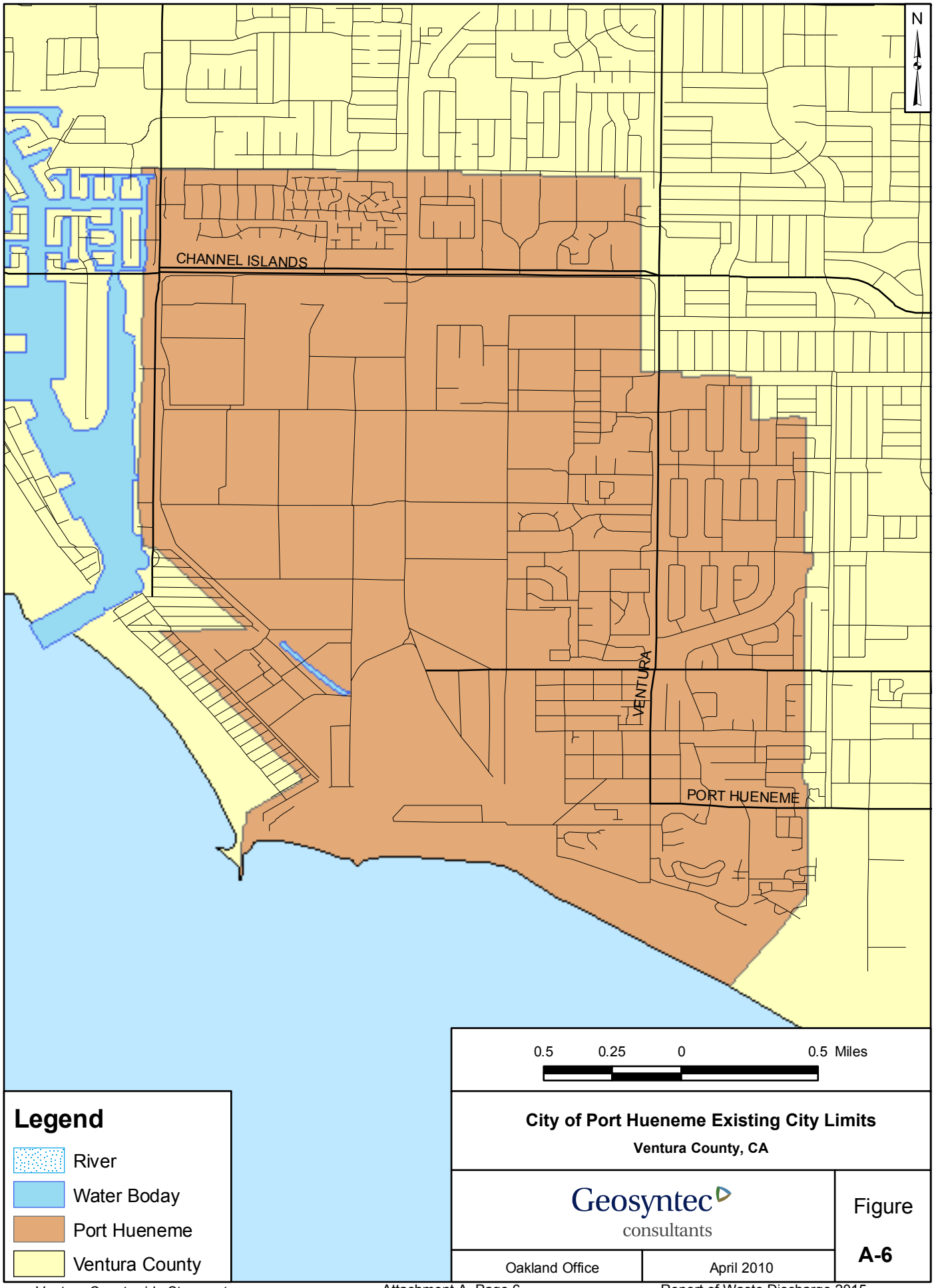
OLIVAS PARK
Santa Clara River
VICTORIA
JOHNSON
VINEYARD
ROSE
FAIRWAY
CENTRAL
SANTA CLARA
VINEYARD
GONZALES
101
PONDE
HARBOR
PLEASANT VALLEY
5TH
5TH
WOOLEY
CHANNEL ISLANDS
OXNARD
RICE
SAVIERS
SB RICE
N RICE
RICE
1
HUENEME
LEWIS
POSAS
Calleguas Creek
2 1 0 2 Miles
Legend
River
Water Body
Oxnard
Ventura County
City of Oxnard Existing City Limits
Ventura County, CA
Geosyntec consultants
Oakland Office
April 2010
Figure
A-5



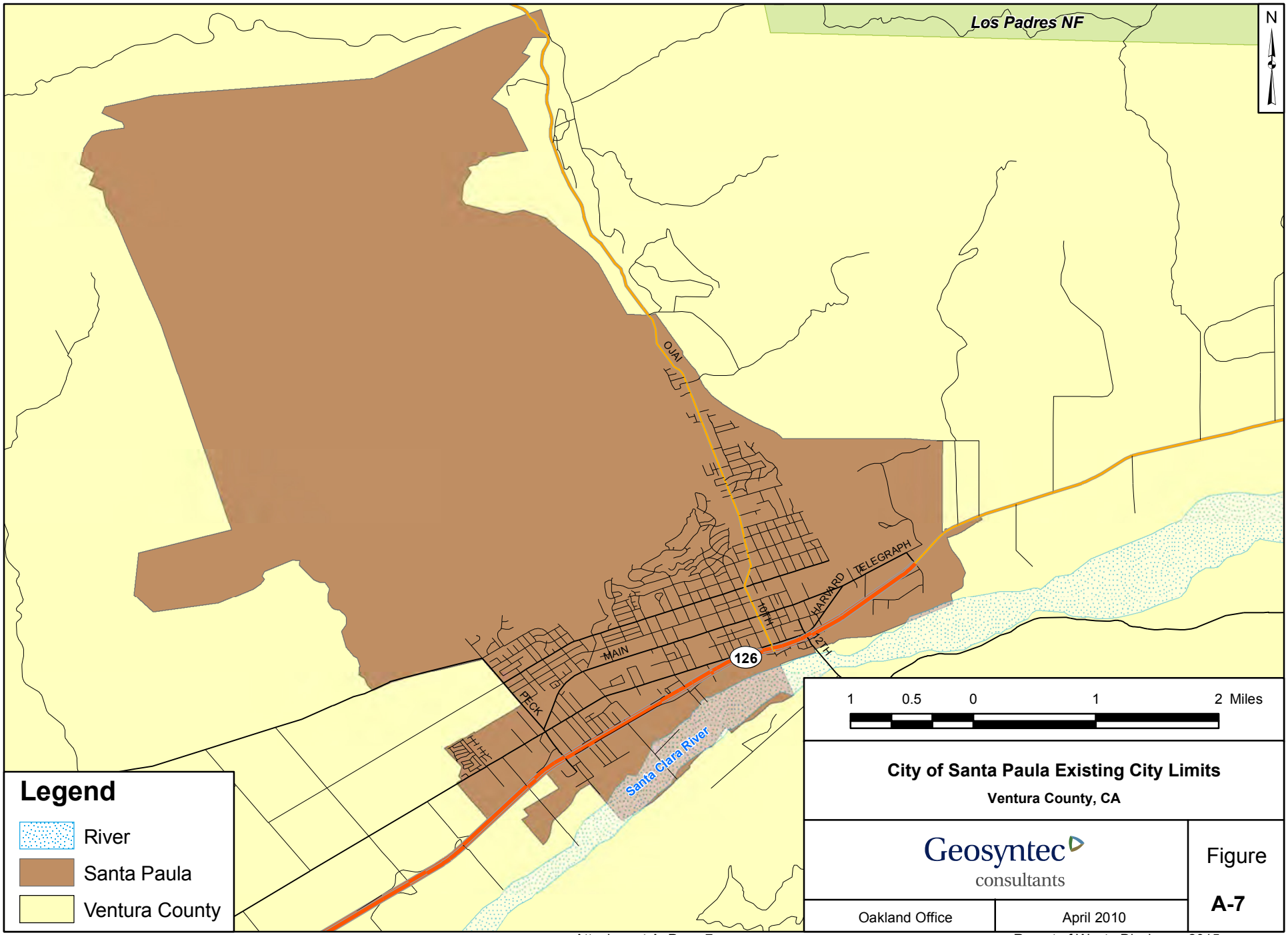
City of Port Hueneme Existing City Limits

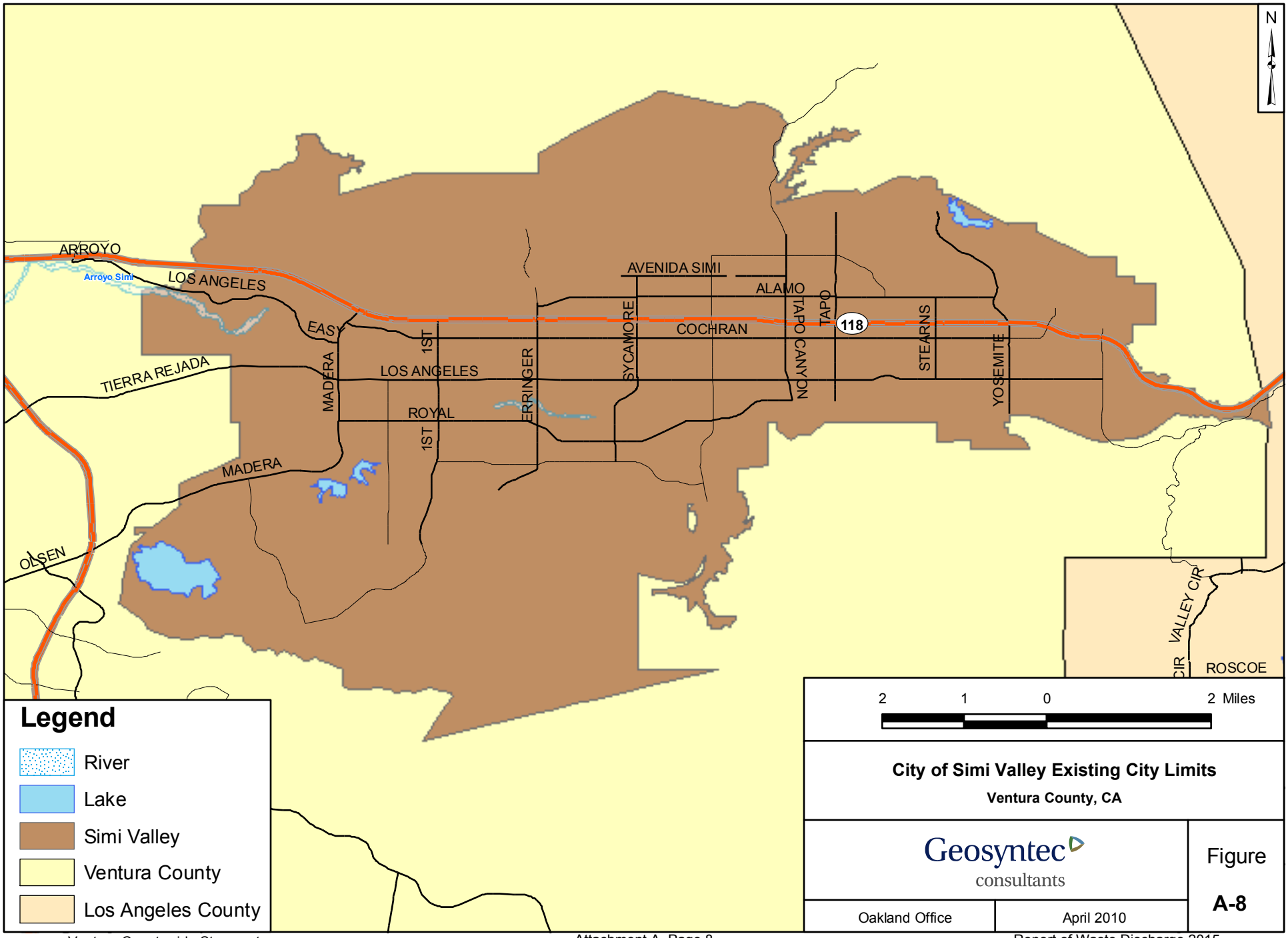
Ventura County, CA

Geosyntec consultants

Oakland Office | April 2010

Figure **A-6**


Los Padres NF
N
OJAI
MAIN
126
10TH
HARVARD
TELEGRAPH
22ND
PECK
Santa Clara River
Legend
River
Santa Paula
Ventura County
1 0.5 0 1 2 Miles
City of Santa Paula Existing City Limits
Ventura County, CA
Geosyntec consultants
Oakland Office
April 2010
Figure
A-7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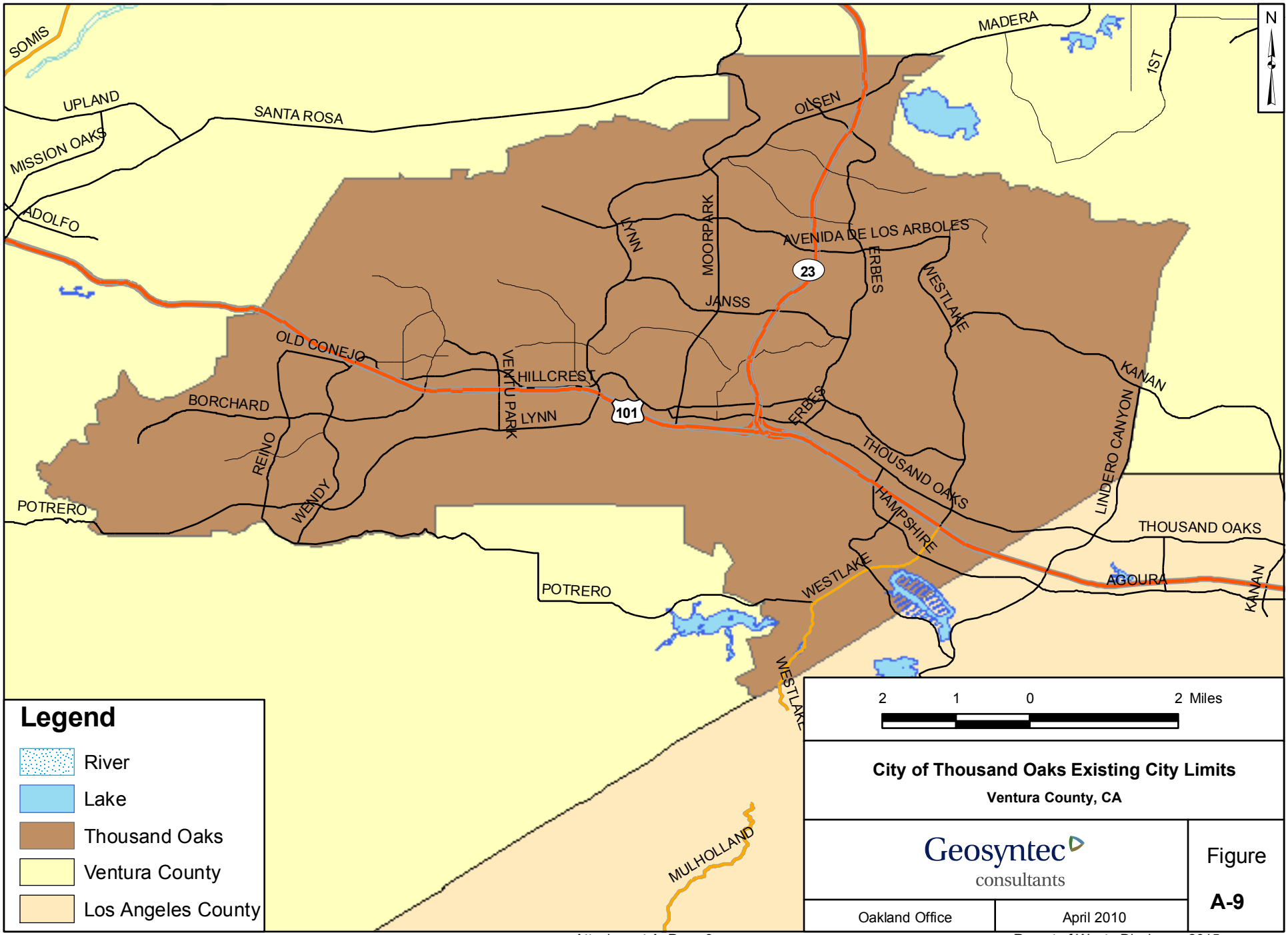
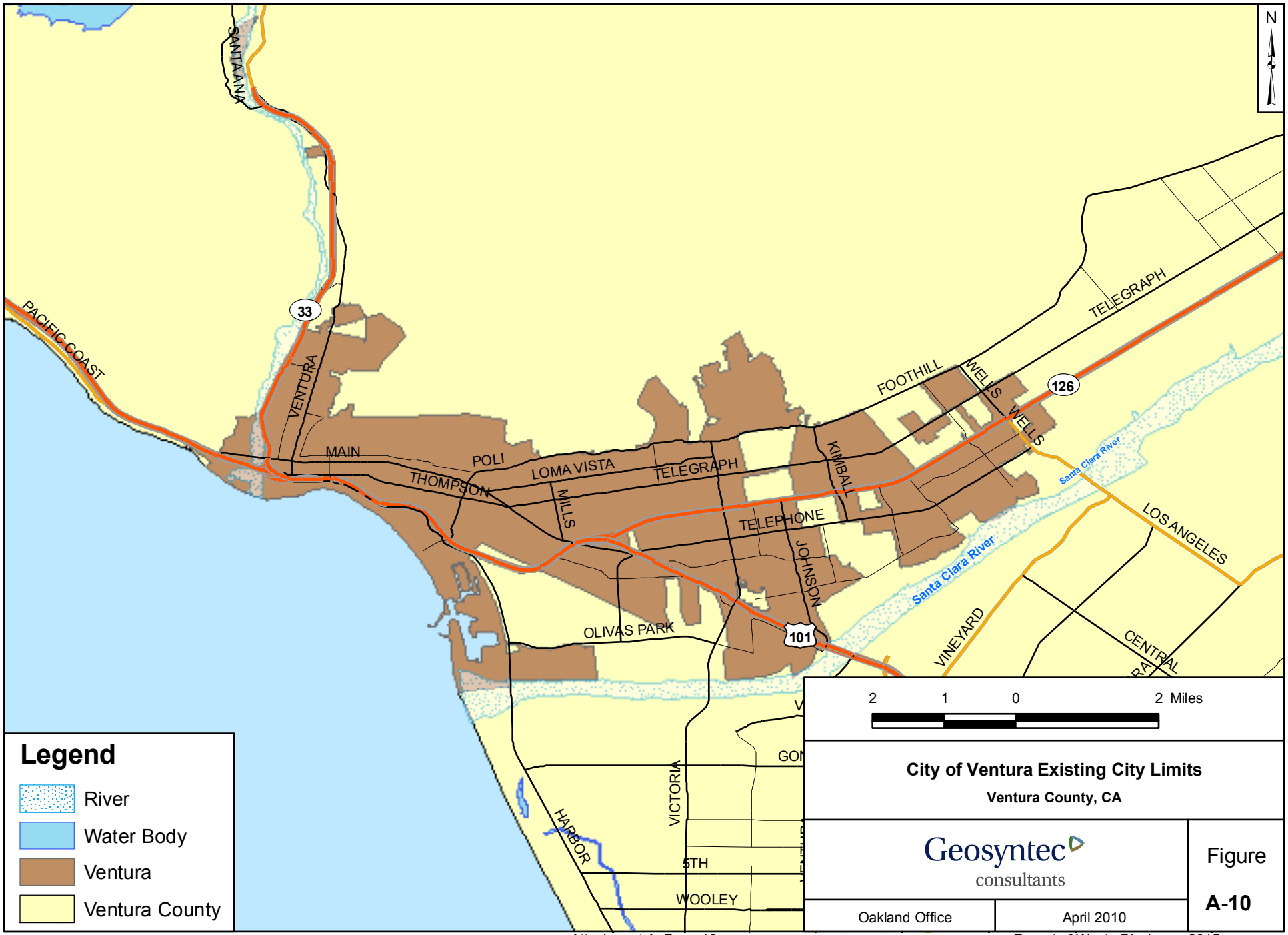
ARROYO
Arroyo Simi
LOS ANGELES
EASY
TIERRA REJADA
MADERA
1ST
LOS ANGELES
ROYAL
1ST
MADERA
OLSEN
ERRINGER
AVENIDA SIMI
SYCAMORE
ALAMO
TAPO CANYON
TAPO
118
COCHRAN
STEARNS
YOSEMITE
VALLEY CIR
CIR
ROSCOE
Legend
River
Lake
Simi Valley
Ventura County
Los Angeles County
2 1 0 2 Miles
City of Simi Valley Existing City Limits
Ventura County, CA
Geosyntec consultants
Oakland Office
April 2010
Figure
A-8


SOMIS
UPLAND
SANTA ROSA
MISSION OAKS
ADOLFO
MADERA
1ST
OLSEN
AVENIDA DE LOS ARBOLES
LYNN
MOORPARK
ERBES
WESTLAKE
JANSS
23
OLD CONEJO
VENTU PARK
HILLCREST
LYNN
101
BORCHARD
REINO
WENDY
POTRERO
KANAN
LINDERO CANYON
THOUSAND OAKS
HAMPSHIRE
AGOURA
WESTLAKE
MULHOLLAND
N
2 1 0 2 Miles
Legend
River
Lake
Thousand Oaks
Ventura County
Los Angeles County
City of Thousand Oaks Existing City Limits
Ventura County, CA
Geosyntec consultants
Oakland Office
April 2010
Figure
A-9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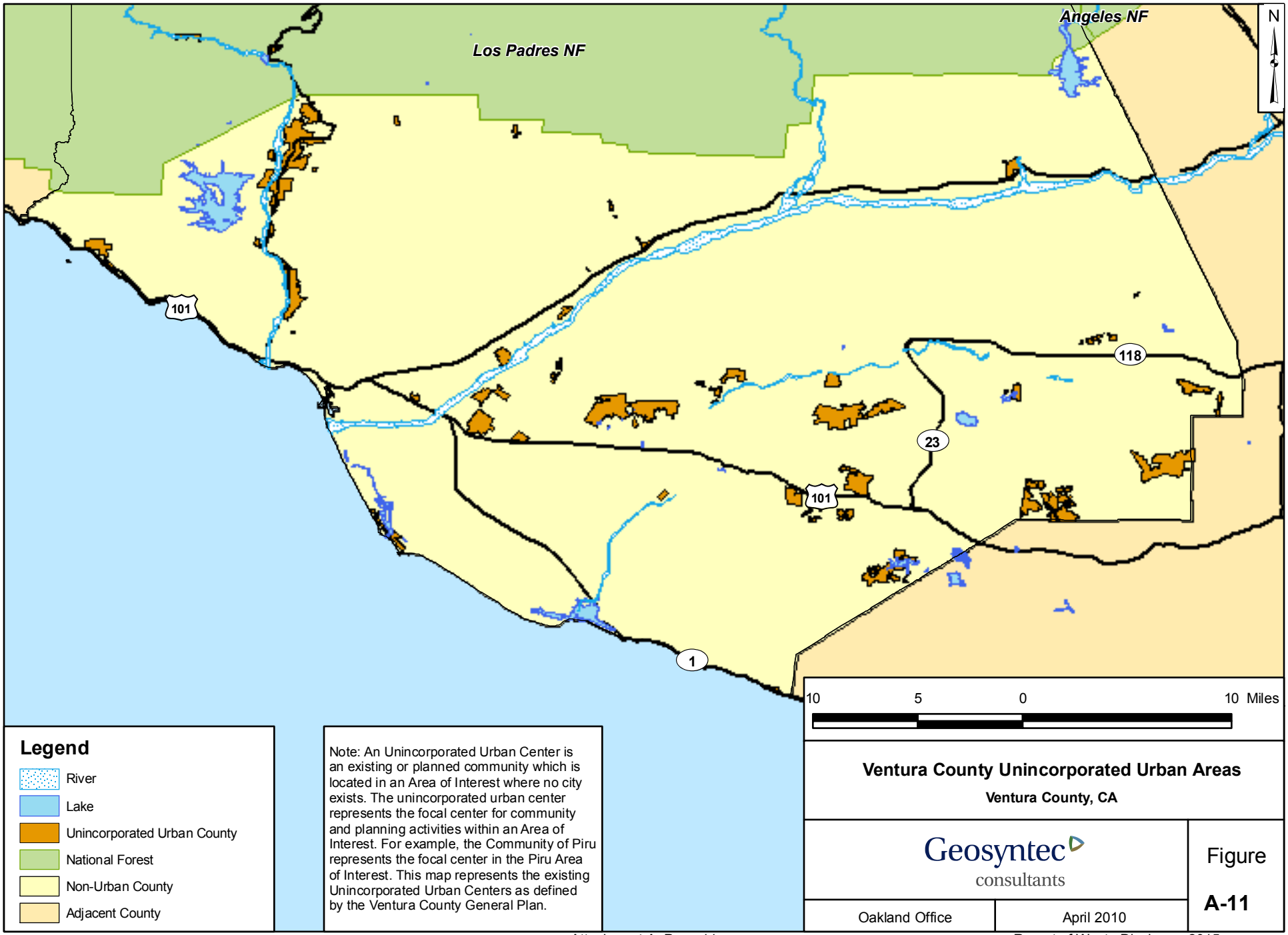
SANTA ANA
PACIFIC COAST
33
VENTURA
MAIN
POLI
THOMPSON
LOMA VISTA
TELEGRAPH
MILLS
KIMBALL
FOOTHILL
WELLS
126
Santa Clara River
TELEPHONE
JOHNSON
LOS ANGELES
OLIVAS PARK
101
VINEYARD
CENTRAL
VICTORIA
HARBOR
5TH
WOOLEY
2 1 0 2 Miles
Legend
River
Water Body
Ventura
Ventura County
City of Ventura Existing City Limits
Ventura County, CA
Geosyntec consultants
Oakland Office
April 2010
Figure
A-10


Los Padres NF
Angeles NF
N
101
118
23
101
1
10 5 0 10 Miles
Legend
River
Lake
Unincorporated Urban County
National Forest
Non-Urban County
Adjacent County
Note: An Unincorporated Urban Center is an existing or planned community which is located in an Area of Interest where no city exists. The unincorporated urban center represents the focal center for community and planning activities within an Area of Interest. For example, the Community of Piru represents the focal center in the Piru Area of Interest. This map represents the existing Unincorporated Urban Centers as defined by the Ventura County General Plan.
Ventura County Unincorporated Urban Areas
Ventura County, CA
Geosyntec consultants
Oakland Office
April 2010
Figure
A-11

January 2015

REPORT OF WASTE DISCHARGE

Appendix B. Monitoring Program Constituents and Reporting Limits

Ventura Countywide Stormwater Quality Management Program

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

Attachment B. Monitoring Program Constituents and Reporting Limits

Classification	Constituent	Fraction	ReportingLimit	Units	Method
Anion	Chloride	n/a	0.5	mg/L	EPA 300.0
Anion	Fluoride	n/a	0.1	mg/L	EPA 300.0
Anion	Perchlorate	n/a	2	mg/L	EPA 314.0
Bacteriological	E. Coli	n/a	10	MPN/100ml	MMO-MUG
Bacteriological	Enterococcus	n/a	10	MPN/100ml	Enterolert
Bacteriological	Fecal Coliform	n/a	2	MPN/100ml	SM 9221 E
Bacteriological	Total Coliform	n/a	10	MPN/100ml	MMO-MUG
Cation	Calcium	Total	0.1	mg/L	EPA 200.7
Cation	Magnesium	Total	0.1	mg/L	EPA 200.7
Conventional	Alkalinity as CaCO3	n/a	2	mg/L	SM 2320 B
Conventional	BOD	n/a	2	mg/L	SM 5210 B
Conventional	COD	n/a	5	mg/L	EPA 410.4
Conventional	Conductivity	n/a	1	µmhos/cm	Field Meter
Conventional	Cyanide	Total	0.002	mg/L	ASTM D7511
Conventional	Cyanide	Total	0.005	mg/L	EPA 335.4
Conventional	DO	n/a	0.1	%	Field Meter
Conventional	DO	n/a	0.3	mg/L	Field Meter
Conventional	Hardness as CaCO3	Total	0.66	mg/L	EPA 200.7
Conventional	MBAS	n/a	0.05	mg/L	SM 5540 C
Conventional	pH	n/a	0.01	pH Units	Field Meter
Conventional	Phenolics	n/a	0.01	mg/L	EPA 420.4
Conventional	Salinity	n/a	100	mg/L	Field Meter
Conventional	Specific Conductance	n/a	1	µmhos/cm	Field Meter
Conventional	Specific Conductance	n/a	2	µmhos/cm	SM 2510 B
Conventional	Temperature	n/a	0.1	°C	Field Meter
Conventional	Total Chlorine Residual	n/a	0.05	mg/L	SM 4500-Cl G
Conventional	Total Dissolved Solids	n/a	10	mg/L	SM 2540 C
Conventional	Total Organic Carbon	n/a	0.3	mg/L	SM 5310 C
Conventional	Total Suspended Solids	n/a	5	mg/L	SM 2540 D
Conventional	Turbidity	n/a	0.1	NTU	EPA 180.1
Conventional	Volatile Suspended Solids	n/a	5	mg/L	EPA 160.4
Hydrocarbon	Diesel Range Organics	n/a	0.1	mg/L	EPA 8015B
Hydrocarbon	Gasoline Range Organics	n/a	0.1	mg/L	EPA 8015B
Hydrocarbon	Oil and Grease	n/a	5	mg/L	EPA 1664A
Hydrocarbon	Oil Range Organics	n/a	0.5	mg/L	EPA 8015B
Hydrocarbon	TPH	n/a	5	mg/L	EPA 1664A
Metal	Aluminum	Total	5	ug/L	EPA 200.8
Metal	Aluminum	Dissolved	5	ug/L	EPA 200.8
Metal	Antimony	Total	0.5	ug/L	EPA 200.8
Metal	Antimony	Dissolved	0.5	ug/L	EPA 200.8
Metal	Arsenic	Total	0.4	ug/L	EPA 200.8
Metal	Arsenic	Dissolved	0.4	ug/L	EPA 200.8
Metal	Barium	Total	0.5	ug/L	EPA 200.8
Metal	Beryllium	Total	0.1	ug/L	EPA 200.8
Metal	Beryllium	Dissolved	0.1	ug/L	EPA 200.8
Metal	Cadmium	Total	0.1	ug/L	EPA 200.8
Metal	Cadmium	Dissolved	0.1	ug/L	EPA 200.8
Metal	Chromium	Total	0.2	ug/L	EPA 200.8
Metal	Chromium	Dissolved	0.2	ug/L	EPA 200.8
Metal	Chromium VI	n/a	0.3	ug/L	EPA 218.6
Metal	Copper	Total	0.5	ug/L	EPA 200.8
Metal	Copper	Dissolved	0.5	ug/L	EPA 200.8

Attachment B. Monitoring Program Constituents and Reporting Limits

Classification	Constituent	Fraction	ReportingLimit	Units	Method
Metal	Iron	Total	10	ug/L	EPA 200.7
Metal	Iron	Dissolved	10	ug/L	EPA 200.7
Metal	Iron	Total	20	ug/L	EPA 200.8
Metal	Iron	Total	20	ug/L	EPA 200.8
Metal	Iron	Dissolved	20	ug/L	EPA 200.8
Metal	Iron	Dissolved	20	ug/L	EPA 200.8
Metal	Lead	Total	0.2	ug/L	EPA 200.8
Metal	Lead	Dissolved	0.2	ug/L	EPA 200.8
Metal	Mercury	Total	50	ng/L	EPA 245.1
Metal	Mercury	Dissolved	50	ng/L	EPA 245.1
Metal	Nickel	Total	0.8	ug/L	EPA 200.8
Metal	Nickel	Dissolved	0.8	ug/L	EPA 200.8
Metal	Selenium	Total	0.4	ug/L	EPA 200.8
Metal	Selenium	Dissolved	0.4	ug/L	EPA 200.8
Metal	Silver	Total	0.2	ug/L	EPA 200.8
Metal	Silver	Dissolved	0.2	ug/L	EPA 200.8
Metal	Thallium	Total	0.2	ug/L	EPA 200.8
Metal	Thallium	Dissolved	0.2	ug/L	EPA 200.8
Metal	Zinc	Total	5	ug/L	EPA 200.8
Metal	Zinc	Dissolved	5	ug/L	EPA 200.8
Nutrient	Ammonia as N	n/a	0.1	mg/L	EPA 350.1
Nutrient	Nitrate + Nitrite as N	n/a	0.1	mg/L	EPA 353.2
Nutrient	Nitrate as N	n/a	0.1	mg/L	EPA 353.2
Nutrient	Phosphorus as P	Total	0.01	mg/L	EPA 365.1
Nutrient	Phosphorus as P	Dissolved	0.01	mg/L	EPA 365.1
Nutrient	TKN	n/a	0.1	mg/L	EPA 351.2
Organic	1,2,4-Trichlorobenzene	n/a	1	ug/L	EPA 625
Organic	1,2-Dichlorobenzene	n/a	1	ug/L	EPA 625
Organic	1,2-Diphenylhydrazine	n/a	1	ug/L	EPA 625
Organic	1,3-Dichlorobenzene	n/a	1	ug/L	EPA 625
Organic	1,4-Dichlorobenzene	n/a	1	ug/L	EPA 625
Organic	1-Methylnaphthalene	n/a	0.1	ug/L	EPA 8270Cm
Organic	2,4,5-Trichlorophenol	n/a	1	ug/L	EPA 8270Cm
Organic	2,4,6-Trichlorophenol	n/a	1	ug/L	EPA 625
Organic	2,4,6-Trichlorophenol	n/a	1	ug/L	EPA 8270Cm
Organic	2,4-Dichlorophenol	n/a	1	ug/L	EPA 625
Organic	2,4-Dichlorophenol	n/a	1	ug/L	EPA 8270Cm
Organic	2,4-Dimethylphenol	n/a	1	ug/L	EPA 625
Organic	2,4-Dimethylphenol	n/a	2	ug/L	EPA 8270Cm
Organic	2,4-Dinitrophenol	n/a	10	ug/L	EPA 625
Organic	2,4-Dinitrophenol	n/a	2	ug/L	EPA 8270Cm
Organic	2,4-Dinitrotoluene	n/a	1	ug/L	EPA 625
Organic	2,6-Dinitrotoluene	n/a	1	ug/L	EPA 625
Organic	2-Chloroethyl vinyl ether	n/a	1	ug/L	EPA 524.2
Organic	2-Chloroethyl vinyl ether	n/a	1	ug/L	EPA 624
Organic	2-Chloronaphthalene	n/a	1	ug/L	EPA 625
Organic	2-Chlorophenol	n/a	1	ug/L	EPA 625
Organic	2-Chlorophenol	n/a	1	ug/L	EPA 8270Cm
Organic	2-Methylnaphthalene	n/a	0.1	ug/L	EPA 8270Cm
Organic	2-Methylphenol	n/a	1	ug/L	EPA 8270Cm
Organic	2-Nitrophenol	n/a	1	ug/L	EPA 625
Organic	2-Nitrophenol	n/a	1	ug/L	EPA 8270Cm

Attachment B. Monitoring Program Constituents and Reporting Limits

Classification	Constituent	Fraction	ReportingLimit	Units	Method
Organic	3,3'-Dichlorobenzidine	n/a	5	ug/L	EPA 625
Organic	3-/4-Methylphenol	n/a	1	ug/L	EPA 8270Cm
Organic	4,6-Dinitro-2-methylphenol	n/a	5	ug/L	EPA 625
Organic	4,6-Dinitro-2-methylphenol	n/a	1	ug/L	EPA 8270Cm
Organic	4-Bromophenyl phenyl ether	n/a	1	ug/L	EPA 625
Organic	4-Chloro-3-methylphenol	n/a	1	ug/L	EPA 625
Organic	4-Chloro-3-methylphenol	n/a	1	ug/L	EPA 8270Cm
Organic	4-Chlorophenyl phenyl ether	n/a	1	ug/L	EPA 625
Organic	4-Nitrophenol	n/a	5	ug/L	EPA 625
Organic	4-Nitrophenol	n/a	2	ug/L	EPA 8270Cm
Organic	Acenaphthene	n/a	1	ug/L	EPA 625
Organic	Acenaphthene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Acenaphthylene	n/a	1	ug/L	EPA 625
Organic	Acenaphthylene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Anthracene	n/a	1	ug/L	EPA 625
Organic	Anthracene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Benz(a)anthracene	n/a	1	ug/L	EPA 625
Organic	Benz(a)anthracene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Benzidine	n/a	10	ug/L	EPA 625
Organic	Benzo(a)pyrene	n/a	0.1	ug/L	EPA 525.2
Organic	Benzo(a)pyrene	n/a	1	ug/L	EPA 625
Organic	Benzo(a)pyrene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Benzo(b)fluoranthene	n/a	1	ug/L	EPA 625
Organic	Benzo(b)fluoranthene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Benzo(g,h,i)perylene	n/a	2	ug/L	EPA 625
Organic	Benzo(g,h,i)perylene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Benzo(k)fluoranthene	n/a	1	ug/L	EPA 625
Organic	Benzo(k)fluoranthene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Bis(2-chloroethoxy)methane	n/a	1	ug/L	EPA 625
Organic	Bis(2-chloroethyl)ether	n/a	1	ug/L	EPA 625
Organic	Bis(2-chloroisopropyl)ether	n/a	1	ug/L	EPA 625
Organic	Bis(2-ethylhexyl)adipate	n/a	5	ug/L	EPA 525.2
Organic	Bis(2-ethylhexyl)phthalate	n/a	3	ug/L	EPA 525.2
Organic	Bis(2-ethylhexyl)phthalate	n/a	5	ug/L	EPA 625
Organic	Butyl benzyl phthalate	n/a	1	ug/L	EPA 625
Organic	Chrysene	n/a	1	ug/L	EPA 625
Organic	Chrysene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Dibenz(a,h)anthracene	n/a	2	ug/L	EPA 625
Organic	Dibenz(a,h)anthracene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Diethyl phthalate	n/a	1	ug/L	EPA 625
Organic	Dimethyl phthalate	n/a	1	ug/L	EPA 625
Organic	Di-n-butylphthalate	n/a	1	ug/L	EPA 625
Organic	Di-n-octylphthalate	n/a	1	ug/L	EPA 625
Organic	Fluoranthene	n/a	1	ug/L	EPA 625
Organic	Fluoranthene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Fluorene	n/a	1	ug/L	EPA 625
Organic	Fluorene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Hexachlorobenzene	n/a	1	ug/L	EPA 625
Organic	Hexachlorobutadiene	n/a	1	ug/L	EPA 625
Organic	Hexachlorocyclopentadiene	n/a	5	ug/L	EPA 625
Organic	Hexachloroethane	n/a	1	ug/L	EPA 625
Organic	Indeno(1,2,3-cd)pyrene	n/a	2	ug/L	EPA 625

Attachment B. Monitoring Program Constituents and Reporting Limits

Classification	Constituent	Fraction	ReportingLimit	Units	Method
Organic	Indeno(1,2,3-cd)pyrene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Isophorone	n/a	1	ug/L	EPA 625
Organic	Methyl tert-butyl ether (MTBE)	n/a	2	ug/L	EPA 524.2
Organic	Methyl tert-butyl ether (MTBE)	n/a	1	ug/L	EPA 624
Organic	Naphthalene	n/a	1	ug/L	EPA 625
Organic	Naphthalene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Nitrobenzene	n/a	1	ug/L	EPA 625
Organic	N-Nitrosodimethylamine	n/a	1	ug/L	EPA 625
Organic	N-Nitrosodi-N-propylamine	n/a	1	ug/L	EPA 625
Organic	N-Nitrosodiphenylamine	n/a	1	ug/L	EPA 625
Organic	Phenanthrene	n/a	1	ug/L	EPA 625
Organic	Phenanthrene	n/a	0.1	ug/L	EPA 8270Cm
Organic	Phenol	n/a	1	ug/L	EPA 625
Organic	Phenol	n/a	1	ug/L	EPA 8270Cm
Organic	Pyrene	n/a	1	ug/L	EPA 625
Organic	Pyrene	n/a	0.1	ug/L	EPA 8270Cm
PCB	PCB Aroclor 1016	n/a	0.5	ug/L	EPA 608
PCB	PCB Aroclor 1221	n/a	0.5	ug/L	EPA 608
PCB	PCB Aroclor 1232	n/a	0.5	ug/L	EPA 608
PCB	PCB Aroclor 1242	n/a	0.5	ug/L	EPA 608
PCB	PCB Aroclor 1248	n/a	0.5	ug/L	EPA 608
PCB	PCB Aroclor 1254	n/a	0.5	ug/L	EPA 608
PCB	PCB Aroclor 1260	n/a	0.5	ug/L	EPA 608
Pesticide	2,4,5-T	n/a	0.2	ug/L	EPA 515.3
Pesticide	2,4,5-TP	n/a	0.2	ug/L	EPA 515.3
Pesticide	2,4-D	n/a	0.4	ug/L	EPA 515.3
Pesticide	2,4-DB	n/a	2	ug/L	EPA 515.3
Pesticide	3,5-Dichlorobenzoic acid	n/a	1	ug/L	EPA 515.3
Pesticide	4,4'-DDD	n/a	0.05	ug/L	EPA 608
Pesticide	4,4'-DDE	n/a	0.05	ug/L	EPA 608
Pesticide	4,4'-DDT	n/a	0.01	ug/L	EPA 608
Pesticide	Acifluorfen	n/a	0.4	ug/L	EPA 515.3
Pesticide	Alachlor	n/a	0.1	ug/L	EPA 525.2
Pesticide	Aldrin	n/a	0.005	ug/L	EPA 608
Pesticide	alpha-BHC	n/a	0.01	ug/L	EPA 608
Pesticide	alpha-Chlordane	n/a	0.01	ug/L	EPA 608
Pesticide	Atrazine	n/a	0.1	ug/L	EPA 525.2
Pesticide	Azinphos methyl	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Bentazon	n/a	2	ug/L	EPA 515.3
Pesticide	beta-BHC	n/a	0.005	ug/L	EPA 608
Pesticide	Bolstar	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Bromacil	n/a	1	ug/L	EPA 525.2
Pesticide	Butachlor	n/a	0.2	ug/L	EPA 525.2
Pesticide	Captan	n/a	1	ug/L	EPA 525.2
Pesticide	Chlordane (technical)	n/a	0.1	ug/L	EPA 608
Pesticide	Chloropropham	n/a	0.1	ug/L	EPA 525.2
Pesticide	Chlorpyrifos	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Coumaphos	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Cyanazine	n/a	0.1	ug/L	EPA 525.2
Pesticide	Dalapon	n/a	0.4	ug/L	EPA 515.3
Pesticide	DCPA (Dacthal)	n/a	0.1	ug/L	EPA 515.3
Pesticide	delta-BHC	n/a	0.005	ug/L	EPA 608

Attachment B. Monitoring Program Constituents and Reporting Limits

Classification	Constituent	Fraction	ReportingLimit	Units	Method
Pesticide	Demeton-O	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Demeton-S	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Diazinon	n/a	0.01	ug/L	EPA 525.2
Pesticide	Dicamba	n/a	0.6	ug/L	EPA 515.3
Pesticide	Dichlorprop	n/a	0.3	ug/L	EPA 515.3
Pesticide	Dichlorvos	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Dieldrin	n/a	0.01	ug/L	EPA 608
Pesticide	Dimethoate	n/a	0.01	ug/L	EPA 525.2
Pesticide	Dinoseb	n/a	0.4	ug/L	EPA 515.3
Pesticide	Diphenamid	n/a	0.1	ug/L	EPA 525.2
Pesticide	Disulfoton	n/a	0.01	ug/L	EPA 525.2
Pesticide	Endosulfan I	n/a	0.02	ug/L	EPA 608
Pesticide	Endosulfan II	n/a	0.01	ug/L	EPA 608
Pesticide	Endosulfan sulfate	n/a	0.05	ug/L	EPA 608
Pesticide	Endrin	n/a	0.01	ug/L	EPA 608
Pesticide	Endrin aldehyde	n/a	0.01	ug/L	EPA 608
Pesticide	EPTC	n/a	1	ug/L	EPA 525.2
Pesticide	Ethoprop	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Ethyl parathion	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Fensulfothion	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Fenthion	n/a	0.01	ug/L	EPA 525.2m
Pesticide	gamma-BHC (Lindane)	n/a	0.02	ug/L	EPA 608
Pesticide	gamma-Chlordane	n/a	0.01	ug/L	EPA 608
Pesticide	Glyphosate	n/a	5	ug/L	EPA 547
Pesticide	Heptachlor	n/a	0.01	ug/L	EPA 608
Pesticide	Heptachlor epoxide	n/a	0.01	ug/L	EPA 608
Pesticide	Malathion	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Merphos	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Methoxychlor	n/a	0.02	ug/L	EPA 608
Pesticide	Methyl parathion	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Metolachlor	n/a	0.1	ug/L	EPA 525.2
Pesticide	Metribuzin	n/a	0.1	ug/L	EPA 525.2
Pesticide	Mevinphos	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Molinate	n/a	0.1	ug/L	EPA 525.2
Pesticide	Naled	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Pentachlorophenol	n/a	0.2	ug/L	EPA 515.3*
Pesticide	Pentachlorophenol	n/a	1	ug/L	EPA 625
Pesticide	Pentachlorophenol	n/a	1	ug/L	EPA 8270Cm
Pesticide	Phorate	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Picloram	n/a	0.6	ug/L	EPA 515.3
Pesticide	Prometon	n/a	0.2	ug/L	EPA 525.2
Pesticide	Prometryn	n/a	0.1	ug/L	EPA 525.2
Pesticide	Ronnel (Fenchlorphos)	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Simazine	n/a	0.1	ug/L	EPA 525.2
Pesticide	Stirophos (Tetrachlorvinphos)	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Terbacil	n/a	2	ug/L	EPA 525.2
Pesticide	Thiobencarb	n/a	0.2	ug/L	EPA 525.2
Pesticide	Tokuthion	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Toxaphene	n/a	0.5	ug/L	EPA 608
Pesticide	Trichloronate	n/a	0.01	ug/L	EPA 525.2m
Pesticide	Trithion	n/a	0.1	ug/L	EPA 525.2

January 2015

REPORT OF WASTE DISCHARGE

Appendix C. Aluminum Historical Data Analysis and Study Findings

Ventura Countywide Stormwater Quality Management Program

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

June 2014

Historical Data Evaluation of Aluminum in the Ventura River, Santa Clara River, and Calleguas Creek Watersheds

Prepared for:

Ventura Countywide Stormwater Quality Management Program

Prepared by:

LARRY WALKER ASSOCIATES

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Executive Summary

The total aluminum concentrations observed by the Ventura Countywide Stormwater Quality Management Program (VCSQMP) in Ventura County surface waters and urban runoff during wet weather events routinely exceed the Title 22 Drinking Water Primary Maximum Concentration Level (MCL) cited in the Los Angeles Region Water Quality Control Plan (Basin Plan). Such exceedances have been observed since early 2004, when VCSQMP began analyzing for aluminum in its routine water quality monitoring.

To investigate the high concentrations of total aluminum identified in urban runoff and surface waters in Ventura County, primarily during storm events, VCSQMP conducted a historical data evaluation, and initiated new monitoring during the 2013/14 monitoring season.

The majority (74.2 percent) of all wet weather water quality samples collected by the VCSQMP exceed the Title 22 Primary MCL for total aluminum of 1,000 µg/L. However, upstream from anthropogenic activities 100% of wet weather samples exceeded the objective. In comparison, concentrations of total aluminum in dry weather samples appear to be a much smaller issue, with approximately six percent of samples exceeding the Title 22 Primary MCL.

Required to protect municipal and domestic supply (MUN) beneficial uses of receiving waters, the VCSQMP is investigating the geospatial and seasonal trends in aluminum concentrations measured in the Ventura River, Santa Clara River, and Calleguas Creek watersheds. A better understanding of the major sources and factors contributing to elevated aluminum concentrations is needed to identify potential solutions. As aluminum occurs naturally in soils and sediments and is the most abundant metal in the earth's crust it is suspected that naturally occurring aluminum is the primary source, and sampling was designed to confirm this hypothesis.

Data evaluation for total aluminum is ongoing and includes surface water quality samples and soil samples. Data sources include the Ventura Countywide Stormwater Monitoring Program, Calleguas Creek Watershed Total Maximum Daily Load (TMDL) Compliance Monitoring Program (CCWTMP), Surface Water Ambient Monitoring Program (SWAMP), Southern California Stormwater Monitoring Coalition, and the Southern California Bight Monitoring Program. Recent monitoring was also performed on river sediments and on wet weather flows from pristine upstream areas in the three watersheds and included in this analysis.

A summary of the main conclusions of this evaluation are provided below.

- Wet weather exceedance rates of the Title 22 Primary MCL were greater than 50% for eleven of the fourteen individual VCSQMP monitoring sites. The three exceptions included the current mass emission station in the Ventura River Watershed, the City of Fillmore's major outfall, and the Port Hueneme major outfall.
- Average and median total aluminum concentrations measured in the Santa Clara River and Calleguas Creek watersheds were noticeably higher than those observed for the Ventura River watershed and the Port Hueneme major outfall that discharges to the Pacific Ocean.
- Agricultural discharges contribute higher levels of total aluminum to receiving waters than urban discharges (based on the CCCWTMP data set, which distinguished between runoff from different land use types).

- For dry weather monitoring, publically owned treatment works (POTWs) contribute very little total aluminum to surface waters (also based on the CCCWTMP data set). During wet weather events, POTW discharges are not monitored.
- Within the Calleguas Creek Watershed, upstream agricultural land use discharges appear to appreciably influence surface water total aluminum concentrations measured downstream of such discharges within a subwatershed.
- Correlation analyses of total aluminum and TSS, and total aluminum and flow:
    - Measured total aluminum and TSS concentrations were strongly correlated for both wet weather and combined dry and wet weather data.
    - Measured water column aluminum concentrations were more dependent on the amount of solids suspended in the water column than the flow transporting the aluminum and TSS (based on total aluminum concentrations at the mass emission sites correlating more strongly with TSS than with flow).
- Review of soils data in the three watersheds:
    - The total aluminum measured in water quality samples appears to be derived from the erosion of soil (based on the consistency between the average mass of total aluminum per mass of TSS in the water column and the range of total aluminum soil concentrations in Ventura County; and on the high correlation between total aluminum and TSS concentrations measured in VCSQMP water quality samples).
- Data gaps in historical monitoring and additional monitoring:
    - Data gaps were identified for upstream portions of the three watersheds where sediment and runoff is little influenced by anthropogenic activities. Monitoring was initiated at new upstream locations in each of the three watersheds in December 2013 and February 2014 to help fill this gap.
    - Natural background sites were monitored for water (December 2013 and February 2014) and sediment (December 2013) and data showed that upstream locations in each of the three watersheds also possess elevated water column and sediment aluminum concentrations. Wet weather aluminum at these background sites was seen from 19,000 µg/L to 250,000 µg/L.
    - Limited stormwater runoff data collected from parking lots at the Ventura County Government Center in February and March 2014 also revealed elevated aluminum and TSS concentrations in half of the samples collected, even so these were much lower than the natural background with the highest concentration being only 2,100 µg/L.

The exceedingly high level of total aluminum detected in runoff from undeveloped areas suggests that wet weather aluminum will routinely exceed water quality objectives regardless of Permittee efforts. Since high background concentrations of aluminum appear to be a primary source contributing to the routine water quality objective exceedances observed in Ventura County surface waters, VCSQMP will need to discuss with the Los Angeles Regional Board the implementation of an appropriate regulatory mechanism (e.g., reference stream/antidegradation approach; natural source exclusion approach; water-effects ratio approach; or high-flow suspension of beneficial use) that would limit the Copermittees' liability for controlling such background concentrations. As part of the effort to provide support in selecting a possible regulatory off-ramp and to otherwise develop a sound scientific approach for managing the elevated concentrations of aluminum measured in urban runoff, VCSQMP will need to continue

evaluating historical and new aluminum data collected in the three watersheds, in particular, from monitoring locations that represent land uses little affected by human activities.

Introduction

In Ventura County, aluminum has been identified in high concentrations during storm events in both urban runoff and in the rivers and streams of the County. Aluminum that naturally occurs in soils and sediments in the region has the potential to become mobilized in stormwater runoff during wet weather events. Pollutant generating activities in urban areas can also contribute to aluminum concentrations measured in the runoff. The Ventura County Watershed Protection District is the Principal Permittee for the Ventura Countywide Stormwater Quality Management Program (VCSQMP or Program). As Principal Permittee they are responsible for the monitoring and reporting under the MS4 NPDES Permit. The VCSQMP added aluminum to the suite of trace metals it analyzes as part of its routine wet and dry weather water quality monitoring in Ventura County beginning in February 2004. Since that time, the VCSQMP has routinely observed total aluminum concentrations in wet weather stormwater runoff samples that exceed the Title 22 Primary Maximum Concentration Level (MCL) for total aluminum of 1000 µg/L that is incorporated by reference into the Water Quality Control Plan, Los Angeles Region (Basin Plan). The Title 22 Primary MCL exists to protect the municipal and domestic supply (MUN) beneficial use designated for all surface water bodies in California. Total aluminum concentrations in wet weather environmental water quality samples collected by the VCSQMP exceed the Title 22 Primary MCL for total aluminum in greater than 74 percent of samples. By comparison, total aluminum concentrations in dry weather environmental water quality samples exceed the Title 22 Primary MCL for the metal in slightly less than 6 percent of the samples collected. The VCSQMP reports these exceedances of water quality standards in its annual monitoring reports and in post-event water quality monitoring summaries provided to the Regional Water Quality Control Board, Los Angeles Region (Regional Water Board).

The VCSQMP is currently reviewing total aluminum concentrations in its water quality samples, those collected by the Calleguas Creek Watershed Total Maximum Daily Load (TMDL) Compliance Monitoring Program (CCWTMP), and aluminum levels measured in the local geology to gain a better understanding of the geospatial and seasonal aluminum concentrations observed in the surface waters of the Ventura River, Calleguas Creek, and Santa Clara River watersheds. This evaluation of historical aluminum data, along with an assessment of additional data to be collected by the Ventura Countywide Stormwater Monitoring Program, the CCWTMP, and the Southern California Coastal Water Research Project (SCCWRP), are intended to provide the VCSQMP with insight into the major sources of aluminum – naturally occurring and anthropogenic – that contribute to the elevated aluminum concentrations primarily measured in wet weather water quality samples.

Total aluminum data evaluated in this report were collected by the Ventura Countywide Stormwater Monitoring Program, the CCWTMP (as part of the Calleguas Creek Metals and Selenium TMDL), and other sources. Available data were compiled, reviewed, and analyzed to identify geographical and/or seasonal trends in the three watersheds of interest: Ventura River, Calleguas Creek, and Santa Clara River. Total aluminum concentrations were characterized by watershed and season to determine if any aluminum "hot spots" exist among the current locations monitored by the VCSQMP and the CCWTMP during either the wet or dry season. Relationships between co-occurring total aluminum and total suspended solids concentrations

measured in surface waters and between total aluminum and flow were also evaluated. In addition, an area map showing aluminum soil concentrations measured in the three watersheds was generated to inform the VCSQMP of the potential for sediments upstream and downstream of urban areas to contribute to observed surface water total aluminum concentrations. Finally, locations where future monitoring efforts could prove useful in determining the extent of anthropogenic contributions to observed aluminum concentrations in surface waters were identified.

The National Pollutant Discharge Elimination System (NPDES) Permit for Ventura County's Municipal Separate Storm Sewer System (MS4), for which the VCSQMP is the Principal Permittee, requires the Copermittees[1] to reduce aluminum in stormwater discharges within their respective jurisdictions through the implementation of best management practices (BMPs). Current BMPs employed by Copermittees, including Enhanced Construction BMP Implementation, illicit discharge screening, and industrial and commercial inspections, have not resulted in noticeable decreases in wet weather aluminum concentrations in recent years. In addition to considering additional BMPs to reduce aluminum concentrations in wet and dry weather flows, the VCSQMP is performing the current evaluation to determine if naturally occurring aluminum levels in the native geology of Ventura County support the use of a regulatory mechanism or "off ramp" (e.g., reference stream/antidegradation approach; natural source exclusion approach; water-effects ratio approach; or high-flow suspension of beneficial use) that would limit the Copermittees' liability for controlling high background concentrations of aluminum. The VCSQMP will use the information contained in this report and that generated by future aluminum assessment efforts carried out by itself and others, along with guidance provided by the Regional Water Board to craft a prudent approach to managing the elevated concentrations of aluminum observed in Ventura County surface waters.

HISTORICAL DATA EVALUATION BACKGROUND

Aluminum is the most abundant metal in the earth's crust and is widely distributed (DHHS, 2008). The metal is very reactive and is never found as the free metal in nature. It is found combined with other elements, most commonly with oxygen, silicon, and fluorine. These chemical compounds are commonly found in soil, minerals (e.g., sapphires, rubies, and turquoise), rocks (especially, igneous rocks), and clays (DHHS, 2008). Aluminum occurs naturally in soil, water, and air. High levels of aluminum in the environment can potentially occur with the mining and processing of aluminum ores or in the production of metal, alloys, and associated compounds. Small amounts of aluminum are released into the environment from coal-fired power plants and incinerators (DHHS, 2008). Agriculture can contribute aluminum to surface waters through aluminum-laden sediment contained in its runoff. Based on a limited data set for treated wastewater effluent, it appears that publically owned treatment works (POTWs) in the Calleguas Creek Watershed are minor contributors of aluminum to surface waters (CCWTMP, unpublished data, August 2008 – May 2013). Most aluminum-containing compounds do not dissolve to a large extent in water unless the water is acidic or very alkaline. On average, the VCSQMP's wet weather dissolved aluminum results comprise less than 2 percent of the concentration measured in the total fraction of any given water quality sample

[1] The Copermittees currently covered under the NPDES MS4 permit include the County of Ventura, and the cities of Camarillo, Fillmore, Moorpark, Ojai, Oxnard, Port Hueneme, San Buenaventura (Ventura), Santa Paula, Simi Valley, and Thousand Oaks.

analyzed, supporting the assertion that very little aluminum in wet weather water quality samples exists in the dissolved form. In contrast, just over 12 percent of the aluminum measured in dry weather water quality samples, on average, is present in the dissolved fraction.

STUDY AREA

The Study area includes the Ventura River, Calleguas Creek, and Santa Clara River watersheds. These watersheds and the various water quality monitoring stations monitored by the VCSQMP are listed in **Table 1** and shown in **Figure 1**. The various TMDL monitoring sites monitored by the CCWTMP are listed in **Table 2** and shown in **Figure 2**. Because the County's NPDES stormwater monitoring program was generally designed to assess the impact of urban and other land uses on receiving water quality, the VCSQMP has not historically monitored locations in the upper parts of the Ventura River, Santa Clara River, and Calleguas Creek watersheds that would experience little to no anthropogenic impacts.

Table 1: Current and Historical Sampling Locations Monitored for Aluminum by the Ventura Countywide Stormwater Monitoring Program.

Site ID[1]	Site Description	Latitude	Longitude
Ventura River Watershed			
MO-MEI	Major outfall	34.44554	-119.29
MO-OJA	Major outfall	34.44474	-119.241
ME-VR	Mass emission	34.35194	-119.307
ME-VR2	Mass emission	34.34305	-119.299
Santa Clara River			
MO-FIL	Major outfall	34.40459	-118.931
MO-SPA	Major outfall	34.34861	-119.056
ME-SCR	Mass emission	34.29917	-119.107
R-1	Residential land use	34.25861	-119.195
I-2	Industrial land use	34.24917	-119.228
MO-VEN	Major outfall	34.24356	-119.195
MO-OXN	Major outfall	34.23614	-119.184
Calleguas Creek			
MO-MPK	Major outfall	34.27905	-118.905
MO-SIM	Major outfall	34.2721	-118.784
W-3	Receiving water	34.26583	-119.093
MO-CAM	Major outfall	34.21952	-119.066
MO-THO	Major outfall	34.21331	-118.921
ME-CC	Mass emission	34.17917	-119.039
A-1	Agricultural land use	34.17051	-119.095
W-4	Receiving water	34.17045	-119.095
Pacific Ocean			
MO-HUE	Major outfall	34.14081	-119.188

1. Site IDs within watersheds are listed in upstream to downstream order.

Stations currently monitored by the VCSQMP are shown in bold type.

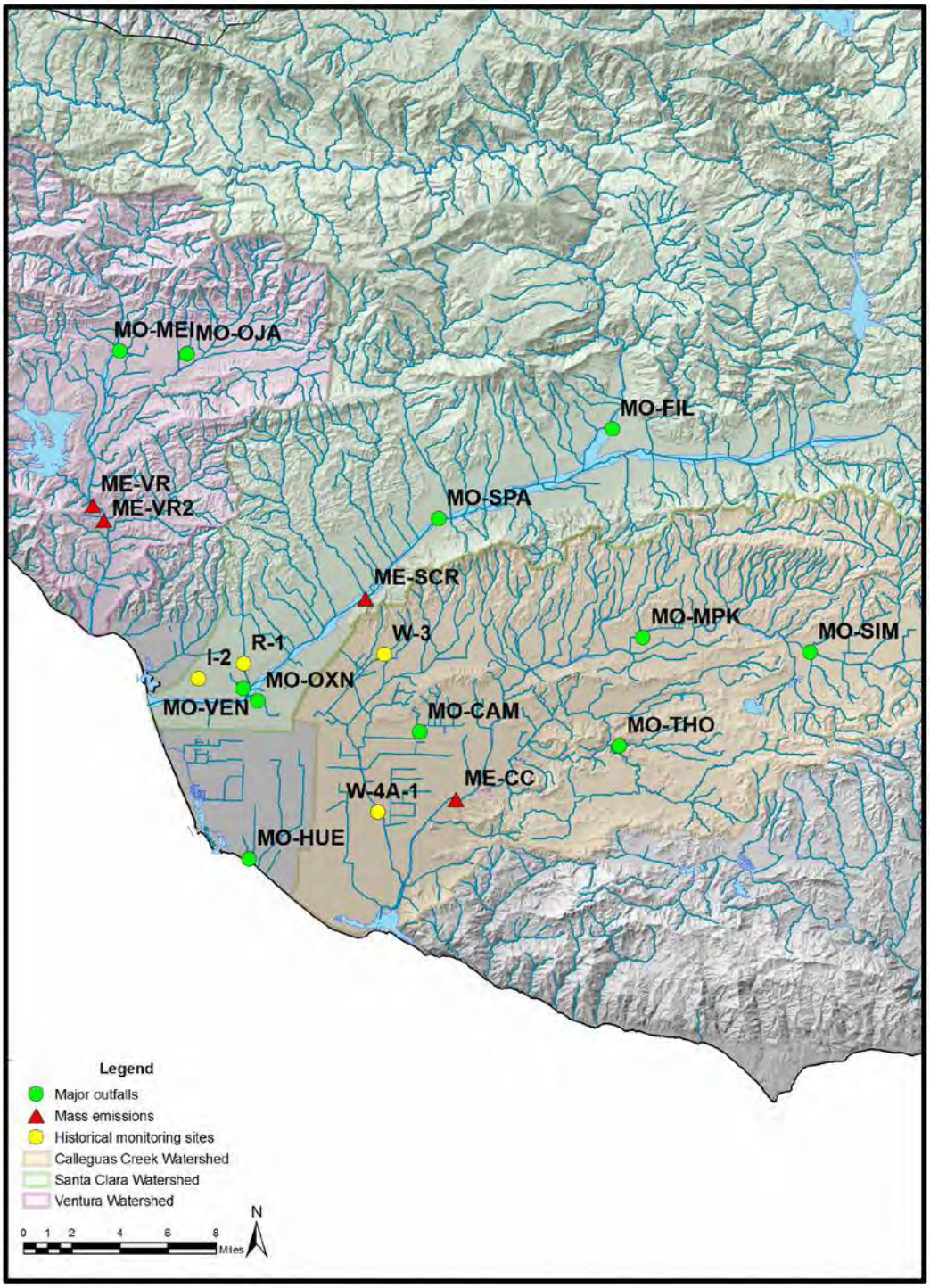


Figure 1: Stormwater NPDES Monitoring Locations in the Ventura River, Santa Clara River, and Calleguas Creek Watersheds.

Table 2: Sampling Locations Monitored for Aluminum by the Calleguas Creek Watershed TMDL Compliance Monitoring Program.

Subwatershed[1]	Site ID	Site Description	Latitude	Longitude
Arroyo Simi	D_SIMI	POTW Effluent	34.2814	-118.815
Conejo	D_GERRY	Agriculture land use	34.2359	-118.95
	D_ADOLF	Urban land use	34.2148	-118.995
	D_HILL	POTW Effluent	34.2131	-118.925
Calleguas	D_CAMA	POTW Effluent	34.1938	-119.002
	UNIV	Receiving Water	34.1793	-119.039
	D_BROOM	Agriculture land use	34.14335	-119.071
	PCH	Receiving Water	34.1119	-119.082
Revolon Slough	D_SANTV	Agriculture land use	34.24267	-119.114
	VENTRA	Urban land use	34.2161	-119.068
	D_WOOD	Agriculture land use	34.1707	-119.096
	WOOD	Receiving Water	34.1703	-119.095
Mugu Lagoon	ODDS	Agriculture land use	34.13951	-119.118
	SG_74	Receiving Water	34.10125	-119.096
	RR_BR	Receiving Water	34.109	-119.092
	BPT_15	Receiving Water	34.10545	-119.093
	BPT_14	Receiving Water	34.10455	-119.117
	BPT_6	Receiving Water	34.10255	-119.109
	BPT_3	Receiving Water	34.1023	-119.091

1. Subwatersheds and Site IDs are listed in upstream to downstream order.

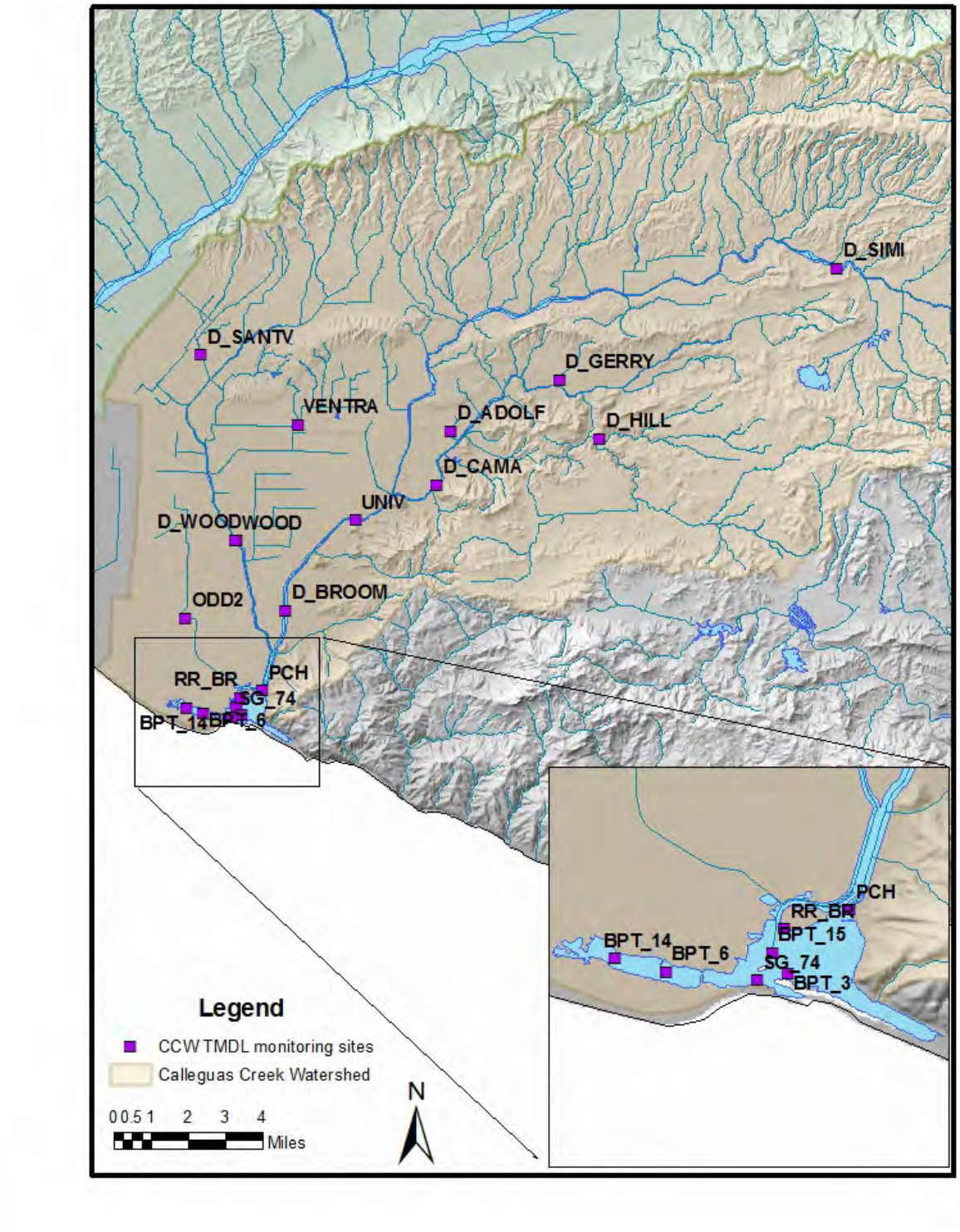


Figure 2: Calleguas Creek Watershed TMDL Compliance Monitoring Program Sampling Location.

Analysis of Historical Data

Total aluminum data evaluated in this report were collected by the Ventura Countywide Stormwater Monitoring Program, the Calleguas Creek TMDL Compliance Monitoring Program, and other sources (CCWTMP). The data were compiled, reviewed, and analyzed by watershed and season or "event type" (i.e., wet or dry season data) to identify geographical and/or seasonal trends in the watersheds. Wet season monitoring typically occurs from October through March, whereas dry season monitoring typically occurs from April through June. In addition, the data were analyzed to determine locations where future monitoring efforts could prove useful in filling existing data gaps and helping to determine the extent of natural and anthropogenic contributions of aluminum in the three subject watersheds. The recommendations for future aluminum monitoring within the three watersheds are not intended to expressly lead to a particular regulatory off ramp, but rather to provide support in making a decision to select an appropriate off ramp.

SOURCES OF DATA

Total aluminum data evaluated in this report were obtained from the following sources:

- Total aluminum data measured in surface waters were obtained from the VCSQMP and the CCWTMP;
- Total aluminum data measured in major outfalls were obtained from the VCSQMP;
- Total aluminum data measured in POTW treated effluent were obtained from the CCWTMP;
- Total aluminum data measured in soils were obtained from the California Environmental Data Exchange Network. Data obtained from the CEDEN Database were collected by the Surface Water Ambient Monitoring Program (SWAMP), the Southern California Stormwater Monitoring Coalition, and the Southern California Bight Monitoring Program.
- In addition, total suspended solids (TSS) and flow data collected at VCSQMP monitoring sites along with total aluminum data were also evaluated to determine the strength of any correlations that may exist between total aluminum and TSS and total aluminum and flow.

It should be noted that the total aluminum data collected by the CCWTMP as part of the Calleguas Creek Metals and Selenium TMDL is not routinely published in the Program's Annual Monitoring Reports because the TMDL only addresses copper, mercury, nickel, zinc, and selenium, the parameters for which the TMDL specifies interim load and waste load allocations. There are no such allocations in the TMDL for aluminum, and therefore, the CCWTMP does not report aluminum data in its annual monitoring reports.

HISTORICAL DATA EVALUATION RESULTS

Between Watershed Comparisons

Total aluminum data collected during dry weather and wet weather monitoring events were separated for comparison between watersheds and statistical analyses were performed. Summary statistics calculated for dry and wet weather monitoring events by watershed (Calleguas Creek, Santa Clara River, Ventura River, and Pacific Ocean) and sampling program (the Program and CCWTMP) are presented in **Table 3** and **Table 4**, respectively. It should be noted that the watershed described as the Pacific Ocean includes only a single Program monitoring location, the Port Hueneme major outfall, that drains to the Pacific Ocean. When this report references the three watersheds monitored by the VCSQMP, the watersheds referred to are the Calleguas Creek, Santa Clara River, and Ventura River watersheds.

Table 3: Summary Statistics by Watershed for Dry Weather Total Aluminum Concentrations Measured by the Program and CCWTMP.

	Dry (µg/L)					
Watershed	**N**	**Median**	**Mean**	**Std Dev**	**Min**	**Max**
Calleguas Creek	29	65	221	589	5	3,170
Santa Clara River	29	57	366	826	3	3,800
Ventura River	25	13	81	204	1	932
Pacific Ocean	3	34	38	15	26	55
CCWTMP(1)	328	105	210	352	3	2,849

1. Data collected in the Calleguas Creek Watershed by the CCWTPM; all other data listed are collected by the Program in the watershed specified.

Summary statistics calculated for total aluminum concentrations measured during dry weather in the three watersheds monitored by the VCSQMP (Ventura River, Santa Clara River, and Calleguas Creek) fall within a similar range, as shown in **Table 3**. A review of the data used to calculate the summary statistics showed that concentrations were higher between 2004 and 2007, then decreased in 2008-2009, and then were followed by a slight increase at some sites during the period 2011 to 2013. Starting in 2010, additional sites (major outfalls) were monitored in each watershed, while other sites were retired from monitoring. Monitoring data from the major outfall sites added to the overall data variability observed within a watershed, and show differences among locations within and between watersheds.

The average dry weather total aluminum concentrations measured in the Ventura River, Calleguas Creek, and Santa Clara River watersheds were 81 µg/L, 221 µg/L, and 366 µg/L, respectively. The median values for the three watersheds were 13 µg/L, 65 µg/L and 57 µg/L, respectively, which indicates that the average values for Calleguas Creek and the Santa Clara River were influenced by a few high concentrations (likely those measured during the early monitoring years). The average, minimum, and maximum dry weather total aluminum concentrations calculated for the Calleguas Creek Watershed using data collected by the CCWTMP are comparable to those summary statistics calculated for the watershed using data collected by the VCSQMP.

Table 4: Summary Statistics by Watershed for Wet Weather Total Aluminum Concentrations Measured by the Program and CCWTMP.

	Wet (µg/L)					
Watershed	**N**	**Median**	**Mean**	**Std Dev**	**Min**	**Max**
Calleguas Creek	89	4,233	6,636	8,228	190	55,500
Santa Clara River	79	2,405	7,311	14,974	22	79,000
Ventura River	56	1,400	3,064	5,360	5	30,300
Pacific Ocean	9	500	562	2,94	230	1,100
CCWTMP(1)	88	2,525	8,204	17,446	50	134,049

1. Data collected in the Calleguas Creek Watershed by the CCWTPM; all other data listed are collected by the Program in the watershed specified.

Summary statistics calculated for total aluminum concentrations measured during wet weather in the three watersheds are shown in **Table 4.** Similar to the summary statistics calculated for dry weather monitoring events, total aluminum concentrations measured in the Santa Clara River Watershed show the highest average concentration and the greatest variability. Total aluminum concentrations were frequently measured above the Title 22 Primary MCL for total aluminum of 1000 µg/L at all monitoring sites in all three watersheds during wet weather events except between 2007 and late 2009 in the Ventura River Watershed. During this period, only a single total aluminum concentration in the Ventura River Watershed was measured above the Title 22 Primary MCL. Overall, wet weather total aluminum concentrations below 1000 µg/L were most frequently measured in the Ventura River watershed.

The average wet weather total aluminum concentrations measured in the Ventura River, Calleguas Creek, and Santa Clara River watersheds were 3064 µg/L, 6636 µg/L, and 7311 µg/L, respectively. The median values were 1400 µg/L, 4233 µg/L, and 2405 µg/L, respectively. The mean total aluminum concentration calculated for the Santa Clara River Watershed was higher than those calculated for the Ventura River and Calleguas Creek watersheds, whereas the highest median concentration was calculated from data collected in the Calleguas Creek Watershed. The average, standard deviation, mininum, and maximum wet weather total aluminum concentrations calculated for the Calleguas Creek Watershed using data collected by the CCWTMP are all greater than those summary statistics calculated for the watershed using data collected by the VCSQMP.

Figure 3 provides box-and-whisker plots by watershed of all total aluminum data collected during dry and wet monitoring events that were considered when calculating the summary statistics shown in **Table 3** and **Table 4**, respectively. The box-and-whisker plots show the distribution of total aluminum concentrations measured in each watershed. Data points above the upper whisker represent those values that fall outside of the following calculated value:

Upper whisker value = 3rd quartile + 1.5 * the interquartile range
(the difference between the 1st and 3rd quartile is called the interquartile range)

This graphical representation of the data lends itself to easy visualization of the greater variability of the total aluminum data collected by the CCWTMP in the Calleguas Creek

Watershed as compared to the data collected by the VCSQMP in the watershed; this is true for data collected during both dry and wet monitoring events. The greater variability of the CCWTMP data set might be explained by the fact that this monitoring program focuses on pollutant contributions from a variety of sources, including agriculture, POTWs, urban inputs, along with receiving water monitoring which is used to characterize all pollutant inputs to the subwatershed.

Table 5 shows the dry and wet weather environmental data percent exceedances of the Title 22 Primary MCL for total aluminum of 1000 µg/L for each watershed. The data show that the percent exceedances observed for the Calleguas Creek Watershed during dry weather monitoring are similar for the Program (3.4%) and CCWTMP (4.0%) monitoring programs. The Program wet weather data show a greater percent exceedance of the water quality objective for the Calleguas Creek Watershed (89.9%) than do wet weather data collected in the watershed by CCWTMP (76.1%).

Table 5: Calculated Percent Exceedances of the Title 22 Primary MCL for Total Aluminum by Event Type and Watershed for Data Collected by the VCSQMP and CCWTMP.

		Dry Weather		Wet Weather	
Monitoring Program	**Watershed**	**Total Samples (n)**	**% Exceedance**	**Total Samples (n)**	**% Exceedance**
VCSQMP	Calleguas Creek	29	3.4	89	89.9
	Santa Clara River	29	13.8	79	77.2
	Ventura River	25	0.0	56	55.4
	Pacific Ocean	3	0.0	9	11.1
	All Watersheds	86	5.8	233	74.2
CCWTMP	Calleguas Creek	328	4.0	88	76.1

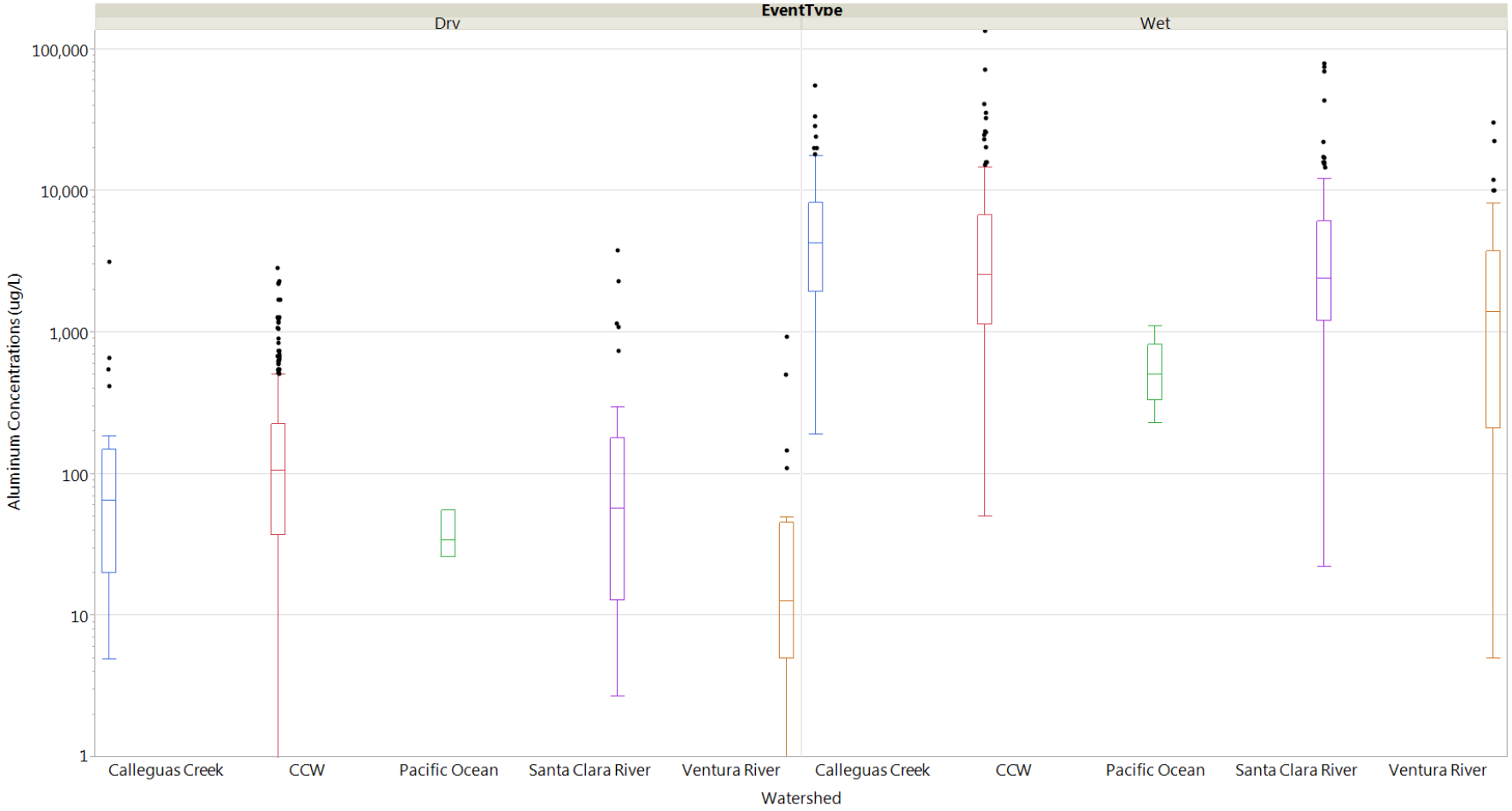


Figure 3: Comparison by Watershed of Total Aluminum Concentrations Measured during Dry and Wet Weather Monitoring Events. (All plotted data collected by VCSQMP except for Calleguas Creek Watershed "CCW" data collected by the CCWTMP)

Within Watershed Comparisons

Ventura River

As shown in the top graph of **Figure 4**, dry weather total aluminum concentrations in the Ventura River Watershed have not exceeded the 1000 µg/L Title 22 Primary MCL for total aluminum between 2004 and 2013. Wet weather total aluminum concentrations are typically much higher than dry weather concentrations, often rising above the Title 22 Primary MCL, as seen in the bottom graph of **Figure 4**. Wet weather total aluminum concentrations at major outfall sites MO-MEI and MO-OJA consistently exceeded the Title 22 Primary MCL during the period monitored (2010-2013). The range of total aluminum concentrations measured at mass emission site ME-VR(2) appears to have narrowed over time, with a wider range of concentrations observed between 2004 and 2009, and a narrower range observed between 2010 and 2013. The cause of this narrowing of the observed variability of total aluminum concentrations at ME-VR2 in recent years in unknown, but could be linked to reduced flows measured at the site during this period. The difference between the total aluminum data collected at ME-VR and ME-VR2 was more pronounced during wet weather events, with no total aluminum results exceeding the Title 22 Primary MCL at site ME-VR2 after 2010.

Santa Clara River

As shown in the top graph of **Figure 5**, only dry weather total aluminum concentrations measured at the Santa Clara River mass emission site (ME-SCR) have exceeded the Title 22 Primary MCL for total aluminum of 1000 µg/L. Dry weather total aluminum concentrations measured at all major outfalls (MO-FIL, MO-SPA, MO-VEN, MO-OXN) monitored in the Santa Clara River Watershed exist below the Title 22 Primary MCL. Wet weather total aluminum concentrations measured in the Santa Clara River Watershed were regularly higher than dry weather concentrations observed between 2004 and 2013, as seen in the bottom graph of **Figure 5.** Samples collected from mass emission site ME-SCR exceeded the Title 22 Primary MCL of 1000 µg/L frequently during wet weather monitoring events. The handful of wet weather total aluminum concentrations measured at historical (i.e., no longer monitored) land use sites I-2 (industrial) and R-1 (residential) are similar to average concentrations observed at the mass emission site ME-SCR. Wet weather total aluminum monitoring results measured at three of the major outfalls (MO-SPA, MO-VEN, MO-OXN) in the watershed site exceeded the Title 22 Primary MCL regularly. The major outfall representing urban discharges from the City of Fillmore, MO-FIL, tended to have lower wet weather total aluminum concentrations than the other major outfalls located in the watershed, and has exceeded the water quality objective for total aluminum infrequently from 2010 to 2013.

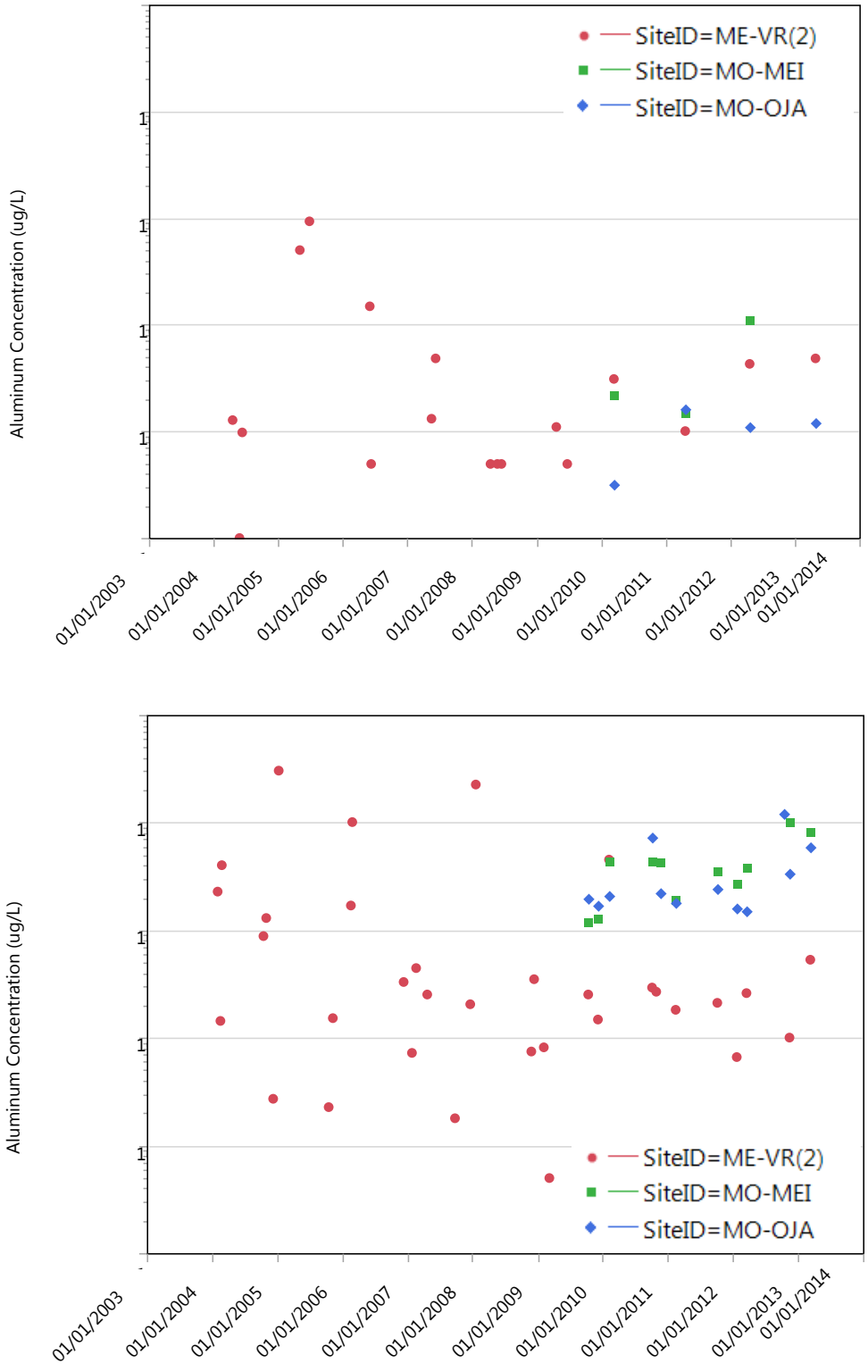


Figure 4: Ventura River Watershed Total Aluminum Concentrations Measured by VCSQMP [Dry Weather (top) and Wet Weather (bottom)].

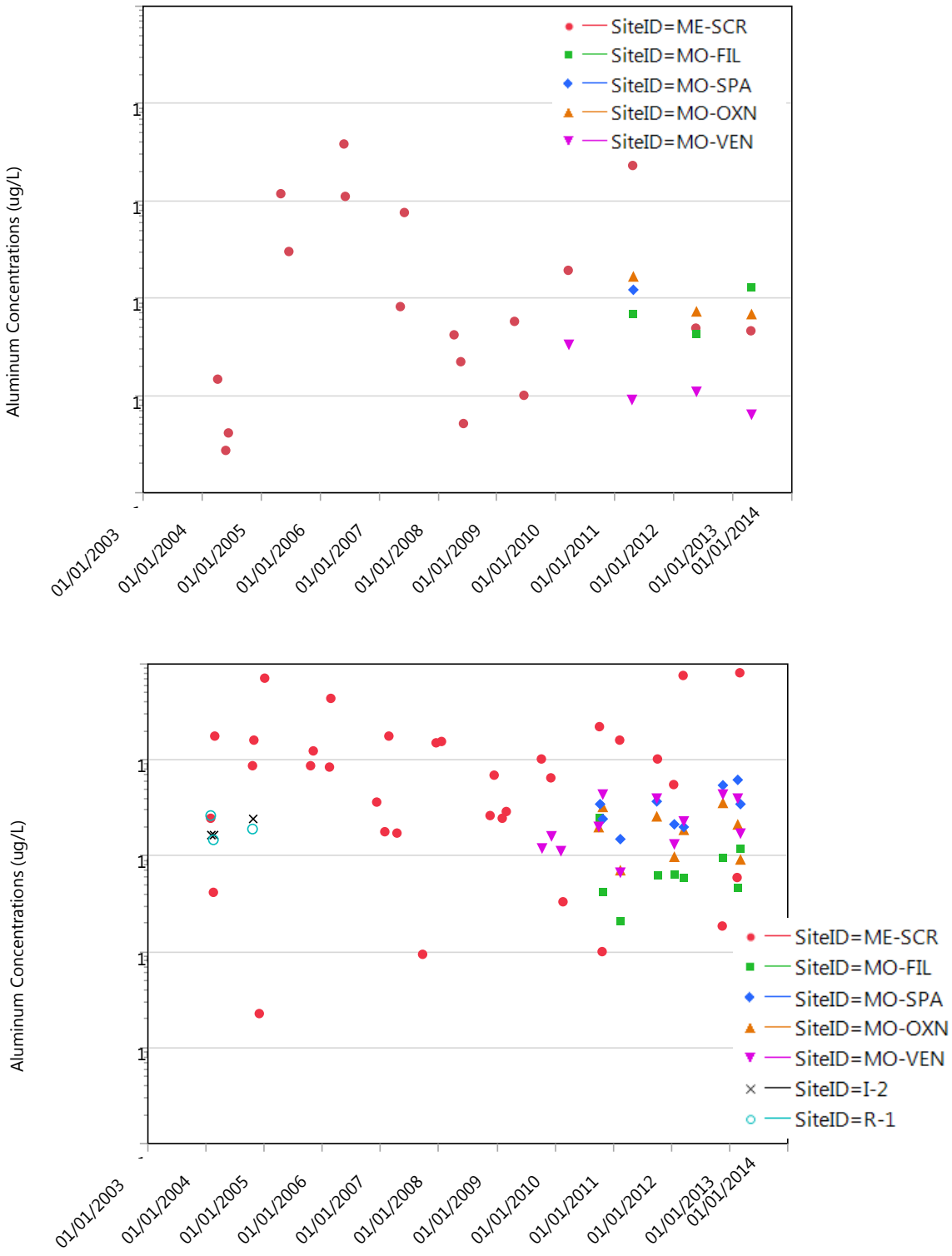


Figure 5: Santa Clara River Watershed Total Aluminum Concentrations Measured by VCSQMP [Dry Weather (top) and Wet Weather (bottom)].

Calleguas Creek

As shown in the top graph of **Figure 6**, only a single dry weather total aluminum sample collected in Calleguas Creek exceeded the Title 22 Primary MCL of 1000 µg/L during the period 2004 – 2013. This exceedance was from a sample collected at the mass emission site ME-CC in June 2006. All dry weather total aluminum concentrations measured at major outfalls in the Calleguas Creek Watershed were below the Title 22 Primary MCL for the metal. Conversely, wet weather total aluminum concentrations measured in the Calleguas Creek Watershed rarely fell below the Title 22 Primary MCL. Total aluminum concentrations in excess of the water quality objective were measured at all sites monitored in the watershed during multiple wet weather monitoring events. Wet weather total aluminum concentrations measured at historical (i.e., no longer monitored) land use (A-1; agriculture) and receiving water (W-3 and W-4) monitoring sites are similar to concentrations observed at the mass emission site ME-CC. The major outfall representing urban discharges from the City of Simi Valley, MO-SIM, reported the lowest total aluminum results during dry weather monitoring that occurred between 2011 and 2013.

Localized Elevated Aluminum Levels

Similar to the percent exceedance information shown in **Table 5** for each watershed, percent exceedance of the Title 22 Primary MCL for total aluminum was calculated for environmental data collected at each VCSQMP monitoring site under both dry and wet weather conditions as a means to identify any "hotspots" within a watershed. For the purpose of this analysis, the term hotspot is used to describe a monitoring location that shows frequent exceedances of the water quality objective, without consideration of the specific total aluminum concentrations that produced an exceedance of the objective. As shown in **Table 6** and described above, dry weather exceedances of the Title 22 Primary MCL for total aluminum were limited to water quality samples collected at the mass emission stations in the Santa Clara River Watershed (ME-SCR) and the Calleguas Creek Watershed (ME-CC). In contrast, wet weather exceedances of the water quality objective are ubiquitous in all watersheds. All monitoring sites showed exceedance levels greater than 50% except for the current mass emission station in the Ventura River Watershed (ME-VR2; 15.4% exceedance), the City of Fillmore's major outfall (MO-FIL; 22.2% exceedance), and the Port Hueneme major outfall (MO-HUE; 11.1% exceedance).

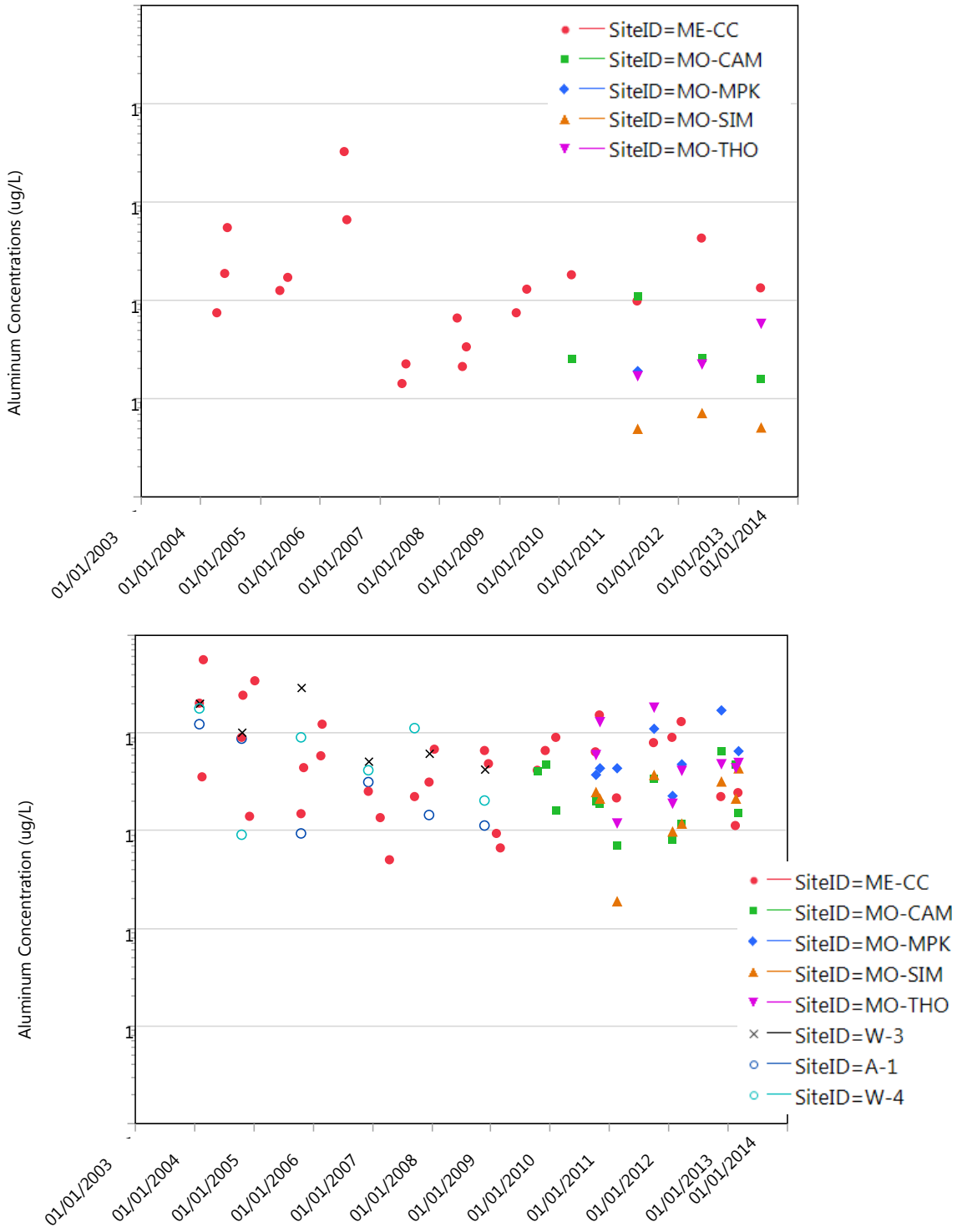


Figure 6: Calleguas Creek Watershed Total Aluminum Concentrations Measured by VCSQMP [Dry Weather (top) and Wet Weather (bottom)].

Table 6: Calculated Percent Exceedances of the Title 22 Primary MCL for Total Aluminum by Event Type and VCSQMP Monitoring Location.

		Dry Weather		Wet Weather	
Watershed	Site ID[1]	Total Samples (n)	% Exceedance	Total Samples (n)	% Exceedance
Ventura River	**MO-MEI**	3	0	11	100
	MO-OJA	4	0	12	100
	ME-VR	3	0	7	57.1
	ME-VR2	15	0	26	15.4
Santa Clara River	**MO-FIL**	3	0	9	22.2
	MO-SPA	1	0	9	100
	ME-SCR	18	22.2	34	79.4
	R-1	---	---	3	100
	I-2	---	---	3	100
	MO-VEN	4	0	12	91.7
	MO-OXN	3	0	9	66.7
Calleguas Creek	**MO-MPK**	1	0	8	100
	MO-SIM	3	0	9	77.8
	W-3	---	---	6	100
	MO-CAM	4	0	12	83.3
	MO-THO	3	0	9	100
	ME-CC	18	5.6	33	90.9
	A-1	---	---	6	83.3
	W-4	---	---	6	83.3
Pacific Ocean	**MO-HUE**	3	0	9	11.1

1. Site IDs within watersheds are listed in upstream to downstream order.

Stations currently monitored by the VCSQMP are shown in bold type.

COMPARISON OF CCWTMP DATA TO VCSQMP DATA COLLECTED IN THE CALLEGUAS CREEK WATERSHED

TMDL compliance monitoring performed in the Calleguas Creek Watershed by the CCWTMP from 2008 to 2013 included sampling at many more locations than monitored by VCSQMP in the watershed. CCWTMP monitored 19 sites that represent pollutant loadings from four different land use characterization types (agricultural runoff, POTW discharge, urban runoff, and receiving water). Receiving water monitoring is meant to capture pollutant loadings from all types of land uses and discharges upstream of a given monitoring point in the receiving water. As shown in the top graph of **Figure 7**, the highest total aluminum concentrations measured during dry weather monitoring occurred at sites representing agricultural runoff and receiving water, and the lowest total aluminum concentrations were measured in POTW discharge. Total aluminum concentrations in urban runoff are less than those measured in agricultural runoff and receiving waters, but appreciably higher than those observed in POTW discharges. These differences in dry weather total aluminum concentrations among the four different land use characterization types are easily visualized in the box-and-whisker plots provided in **Figure 8**.

Similar to the VCSQMP dry weather monitoring results in the Calleguas Creek Watershed, dry weather total aluminum concentrations measured by the CCWTMP rarely (4.0%) exceed the Title 22 Primary MCL.

As shown in the bottom graph of **Figure 7**, wet weather total aluminum concentrations measured in the Calleguas Creek Watershed by the CCWTMP are much higher than dry weather concentrations, often exceeding the Title 22 Primary MCL of 1000 µg/L. Similar to dry weather monitoring, wet weather monitoring shows the highest total aluminum concentrations in agricultural runoff and receiving waters, followed by urban discharges. POTW discharges are not monitored during wet weather events because wastewater effluent quality during storm events can be highly influenced by inflow and infiltration (I & I) in the POTW's collection system. Monitoring from the most recent storm event (January 25, 2013) resulted in lower concentrations than any of the previous storm events, with all but one total aluminum concentration existing below the Title 22 Primary MCL. The box-and-whisker plots in **Figure 8** are useful in visualizing the differences in total aluminum concentrations measured by the CCWTMP for the three land use characterization types monitored during wet weather. Median total aluminum concentrations measured in agricultural runoff and receiving waters are similar. Although there is more variability in total aluminum concentrations measured in agriculture runoff as compared to receiving waters. Dry and wet weather total aluminum results show a wide range of concentrations within each sampling event due to the varying pollutant loadings contributed by the variety of land use characterization sites monitored within the watershed. No trends in total aluminum concentrations are apparent for dry weather samples. The highest wet weather total aluminum concentrations measured by CCWTMP occurred in winter 2011, with lower concentrations observed before and after that period.

In comparing the total aluminum data collected in the Calleguas Creek Watershed by CCWTMP and the VCSQMP, the highest median wet weather concentration of 4233 µg/L (highest among all watershed monitored) was calculated using data collected by VCSQMP (see **Table 4**). That value is significantly higher than the 2525 µg/L median value calculated from wet weather total aluminum samples collected by CCWTMP. The highest average wet weather total aluminum concentration (8,204 µg/L) was calculated using data collected by CCWMP. However, the average was certainly elevated by a single total aluminum concentration of 134,049 µg/L measured during a mid-2011 storm (see **Table 4**). Overall, wet weather total aluminum concentrations measured by VCSQMP in the Calleguas Creek Watershed appear to be slightly higher than those measured by CCWTMP when comparing the VCSQMP Calleguas Creek data distribution shown in **Figure 3** with the CCWTMP receiving water data distribution shown in **Figure 8**.

Percent exceedance of the Title 22 Primary MCL for total aluminum was calculated for environmental data collected at each CCWTMP monitoring site under both dry and wet weather conditions as a means to identify any "hotspots" among the TMDL monitoring sites located within the Calleguas Creek Watershed. As described above with regard to VCSQMP total aluminum data, the term hotspot is used to describe a monitoring location that shows frequent exceedances of the water quality objective, without consideration of the specific total aluminum concentrations that produced an exceedance of the objective. Similar to what was observed for total aluminum samples collected by the VCSQMP, dry weather samples collected by the CCWTMP showed approximately 20% or less exceedance rates of the Title 22 Primary MCL, as shown in **Table 7**.

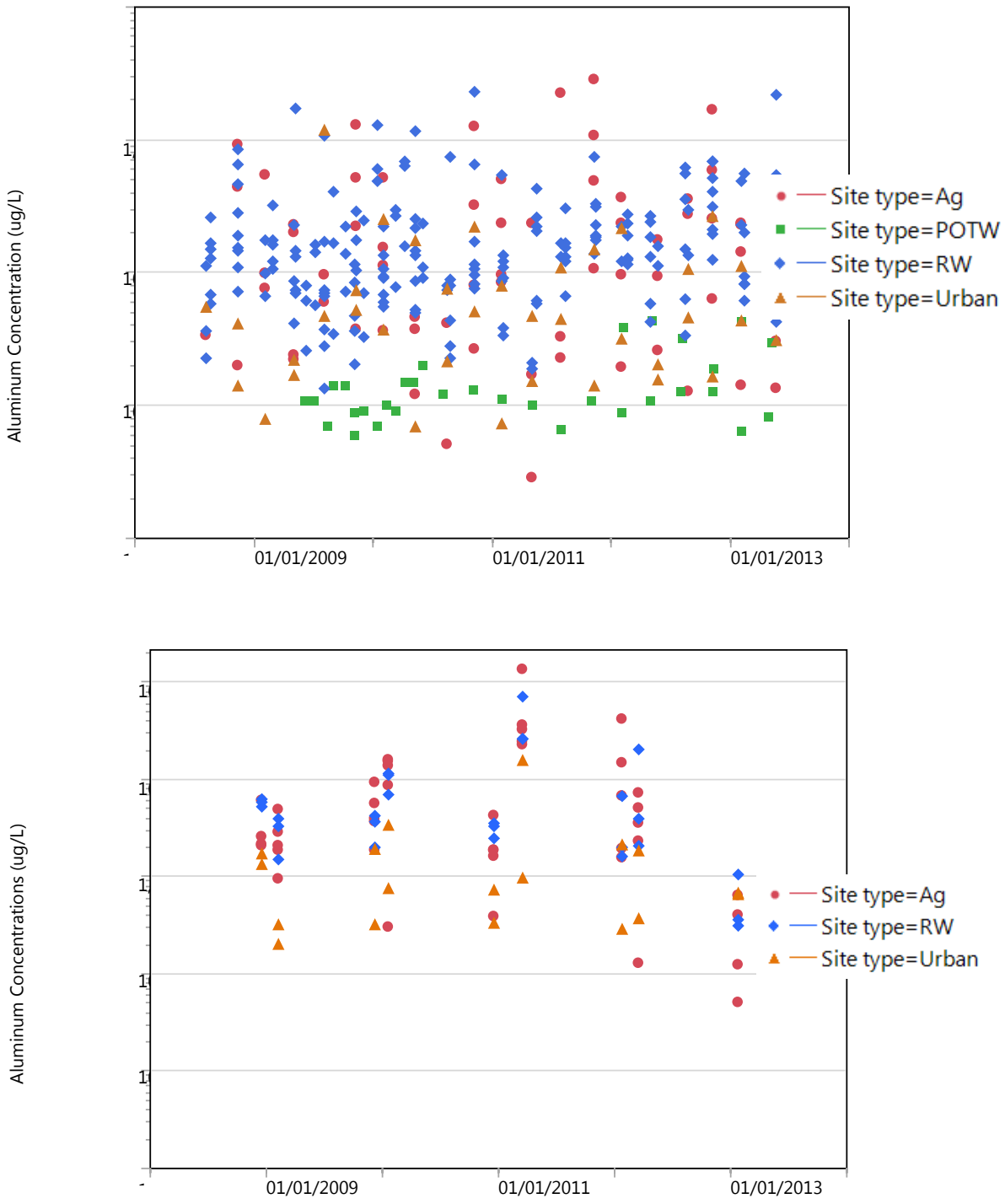


Figure 7: Calleguas Creek Total Aluminum Concentrations Measured by CCWTMP [Dry Weather (top) and Wet Weather (bottom)].

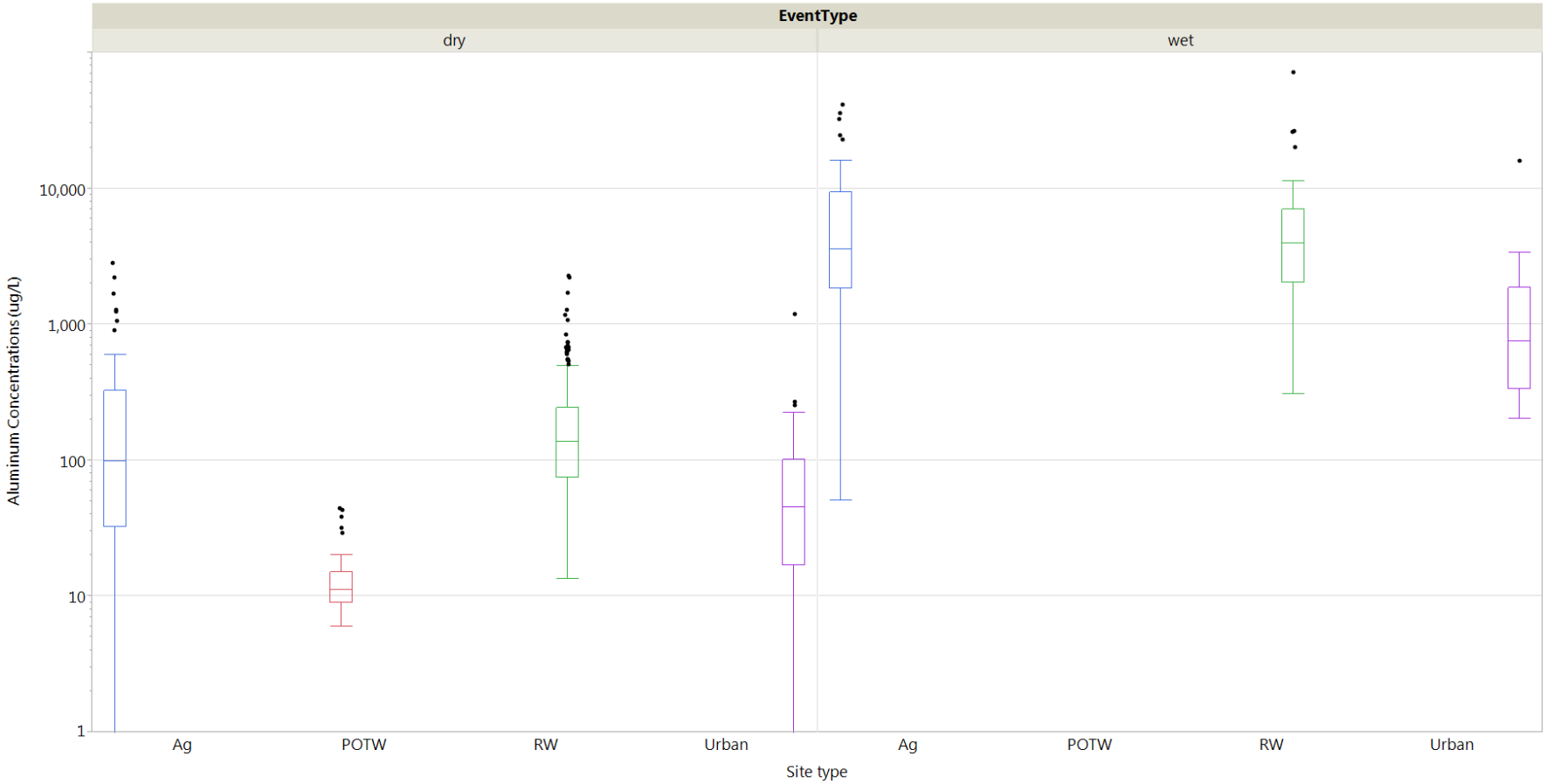


Figure 8: Comparison by Land Use Characterization Type of Total Aluminum Concentrations Measured during Dry and Wet Weather Monitoring Events in the Calleguas Creek Watershed by CCWTMP.

Also similar are the wet weather exceedance rates observed for both monitoring programs. The CCWTMP collected total aluminum data showed exceedances of the water quality objective at each site monitored during wet weather events. All monitoring locations except for D_ADOLF, located in the Conejo subwatershed, posted water quality objective exceedances greater than 50 percent. Generally speaking, there appears to be no upstream-downstream trend to the total aluminum concentrations causing exceedances of the water quality objective. There is much variability in the average concentrations of water quality samples that exceed the Title 22 Primary MCL for total aluminum at those sites where exceedances are observed. Within the Calleguas Creek Watershed, it appears that upstream agricultural land use discharges appreciably influence surface water total aluminum concentrations measured downstream of such discharges within a subwatershed.

Table 7: Calculated Percent Exceedances of the Title 22 Primary MCL for Total Aluminum by Event Type and CCWTMP Monitoring Location in the Calleguas Creek Watershed.

		Dry Weather		Wet Weather	
Subwatershed[1]	Site ID	Total Samples (n)	% Exceedance	Total Samples (n)	% Exceedance
Arroyo Simi	D_SIMI	6	0	---	---
Conejo	D_GERRY	2	0	8	87.5
	D_ADOLF	20	0	9	11.1
	D_HILL	1	0	---	---
Calleguas Creek	D_CAMA	25	0	---	---
	UNIV	29	0	9	88.9
	D_BROOM	14	21.4	8	50.0
	PCH	2	0	---	---
Revolon Slough	D_SANTV	19	15.8	9	88.9
	VENTRA	20	5.0	9	66.7
	D_WOOD	12	0	9	88.9
	WOOD	29	3.4	9	88.9
Magu Lagoon	ODDS	20	0	9	88.9
	SG_74	29	20.0	---	---
	RR_BR	20	3.4	9	100
	BPT_15	20	0	---	---
	BPT_14	20	0	---	---
	BPT_6	20	0	---	---
	BPT_3	20	0	---	---

1. Subwatersheds and Site IDs are listed in upstream to downstream order.

RELATIONSHIP OF ALUMINUM TO TSS AND FLOW

A key observation made clear by the above water quality objective exceedance evaluations is that total aluminum concentrations in surface waters are infrequently observed to exceed the Title 22 Primary MCL for the metal during dry season, low flow conditions when surface waters are low in total suspended solids (TSS). Conversely, exceedances of the water quality objective

are consistently observed during wet season, high flow conditions when surface waters contain elevated levels of TSS. As shown in **Table 8**, dry weather average TSS concentrations are significantly lower than wet weather average TSS concentrations. Furthermore, mass emission and receiving water sites exhibited higher average TSS concentrations under both dry and wet conditions than did major outfalls or other land use sites. To provide a sense of the clarity of the water collected and analyzed for dry weather events, a wastewater treatment plant providing secondary treatment is typically required to produce effluent having a TSS concentration of 30 mg/L or less.

Table 8: Average Dry and Wet Weather TSS Concentrations Measured at VCSQMP NPDES Stormwater Monitoring Sites: 2004 – 2013.

			Dry Weather	Wet Weather
Watershed	**Site ID[1]**	**Site Description**	**Avg TSS (mg/L)**	**Avg TSS (mg/L)**
Ventura River	**MO-MEI**	Major outfall	7	342
	MO-OJA	Major outfall	6	234
	ME-VR	Mass emission	2	1092
	ME-VR2	Mass emission	7	548
Santa Clara River	**MO-FIL**	Major outfall	9	34
	MO-SPA	Major outfall	7	202
	ME-SCR	Mass emission	67	3326
	R-1	Residential land use	---	28
	I-2	Industrial land use	---	99
	MO-VEN	Major outfall	10	227
	MO-OXN	Major outfall	44	192
Calleguas Creek	**MO-MPK**	Major outfall	10	411
	MO-SIM	Major outfall	6	431
	W-3	Receiving water	---	4200
	MO-CAM	Major outfall	7	272
	MO-THO	Major outfall	---	294
	ME-CC	Mass emission	23	743
	A-1	Agricultural land use	---	273
	W-4	Receiving water	---	2106
Pacific Ocean	**MO-HUE**	Major outfall	14	59

1. Site IDs within watersheds are listed in upstream to downstream order.

Stations currently monitored by the VCSQMP are shown in bold type.

As a means to determine the strength of the suspected relationship between total aluminum concentrations measured in the water column and (1) TSS measured in the water column (at a given site during a given event) or (2) flow (event mean flow calculated for a given site during a given event), District staff performed a Kendall correlation analysis to measure the degree of correspondence or association between sets of ranked, non-parametric data. A non-parametric test was used because the aluminum, TSS, and flow data are not normally distributed; they more closely fit a log-normal distribution. A Kendall tau (τ) rank correlation coefficient was

calculated to determine the strength of the correlation between either total aluminum and (1) TSS or (2) flow. District staff performed correlation analyses for data collected at the mass emissions sites (ME-CC, ME-SCR, ME-VR(2)) in each watershed using data combined from wet and dry events and from wet events only. As a check on the Kendall correlation, a simple linear regression of the various data pairs was performed on log-transformed data to calculate a correlation coefficient (r) and coefficient of determination (R^2 or R-squared). Correlation analyses for total aluminum and flow could not be performed for the mass emission site in the Santa Clara River Watershed due to the longstanding inability to accurately measure flow at the ME-SCR site. The statistics for all pairwise analyses are provided in **Table 9**.

Table 9: Kendall Correlation and Simple Linear Regression Analyses Statistics Calculated for Aluminum, TSS, and Event Mean Flow Data Collected at Mass Emission Sites.

		Dry + Wet Weather Data		Wet Weather Data Only	
Site ID	**Statistic**	**TSS**	**Flow**	**TSS**	**Flow**
ME-VR(2)	Tau	0.63	0.16	0.63	0.30
	p-value	<0.0001	0.123	<0.0001	0.019
	r	0.794	0.397	0.830	0.592
	R-squared	0.631	0.158	0.689	0.351
	p-value	<0.001	0.006	<0.001	0.001
ME-SCR	Tau	0.69	---	0.43	---
	p-value	<0.0001	---	0.0008	---
	r	0.870	---	0.725	---
	R-squared	0.757	---	0.526	---
	p-value	<0.001	---	<0.001	---
ME-CC	Tau	0.75	0.63	0.53	0.40
	p-value	<0.0001	<0.0001	<0.0001	0.002
	r	0.924	0.823	0.674	0.620
	R-squared	0.853	0.678	0.454	0.384
	p-value	<0.001	<0.001	<0.001	<0.001
All Mass Emission Sites Combined	Tau	0.74	---	---	---
	p-value	<0.0001	---	---	---
	r	0.876	---	0.841	---
	R-squared	0.768	---	0.707	---
	p-value	<0.001	---	<0.001	---

The statistics provided in **Table 9** from the Kendall correlation and simple linear regression analyses performed on aluminum, TSS, and event mean flow data collected at the VCSQMP's mass emission sites show that measured total aluminum and TSS concentrations are strongly correlated for both wet weather and combined dry and wet weather data at significance levels less than 0.001 or better. Total aluminum and TSS concentrations are more highly correlated at the ME-CC monitoring site, followed by the ME-SCR site and then the ME-VR(2) site. Total aluminum and event mean flow are strongly correlated at the ME-CC monitoring site, but the Kendall correlation analysis shows no significant correlation between the two variables at the

ME-VR(2) site. The simple linear regression analysis of the ME-VR(2) data shows significant correlation of total aluminum and event mean flow, but the association between the two parameters is not as strong as it is for total aluminum and TSS at the monitoring site. The information provided in **Table 9** suggests that total aluminum concentrations at the mass emission sites evaluated are more strongly correlated with TSS than with flow, indicating that measured water column aluminum concentrations are more dependent on the amount of solids suspended in the water column than the flow transporting the aluminum and TSS.

Scatter plots of the paired data collected at the Calleguas Creek mass emission site, ME-CC, are provided in **Figure 9** and **Figure 10**. Additional scatter plots for the ME-VR(2), ME-SCR, and all mass emission sites are included in Appendix A.

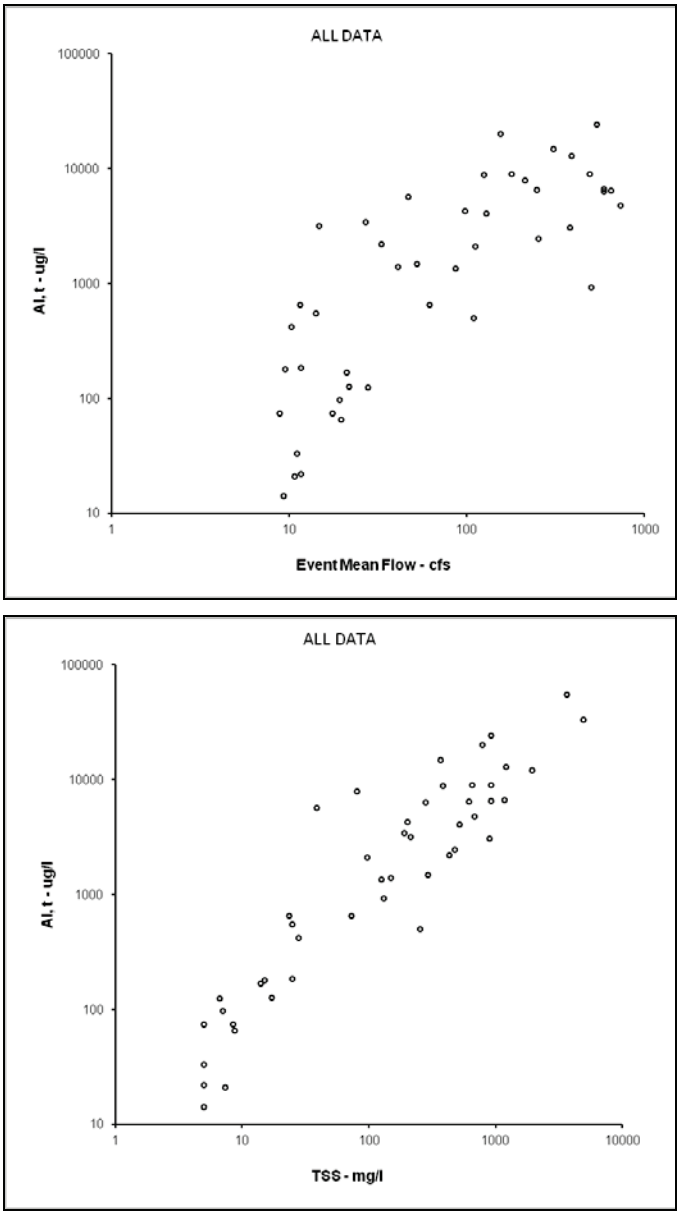
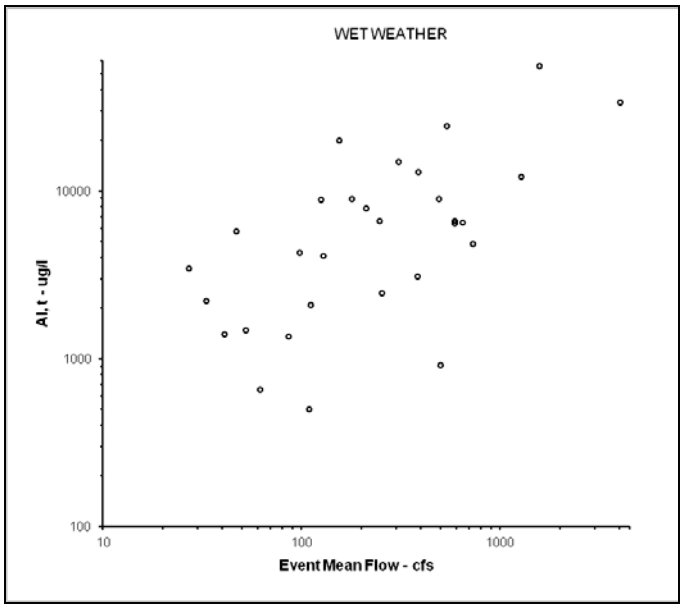


Figure 9: Scatter Plots of Aluminum Vs Event Mean Flow and Aluminum Vs TSS for Combined Dry and Wet Weather Data Collected at the Calleguas Creek Mass Emission Site, ME-CC.



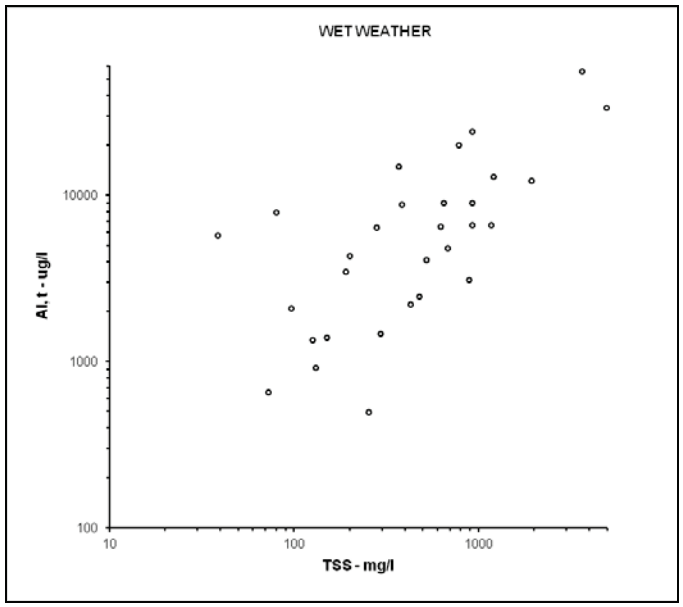


Figure 10: Scatter Plots of Aluminum Vs Event Mean Flow and Aluminum Vs TSS for Wet Weather Data Collected at the Calleguas Creek Mass Emission Site, ME-CC.

Aluminum in Ventura County Soils

Based on the elevated levels of total aluminum measured in Ventura County surface waters, it is useful to have an understanding of total aluminum concentrations measured in the County's soils since the earlier evaluations of average TSS concentrations and the correlation analyses showed that suspended solids, certainly containing soil particles and fine sediments, were observed to increase substantially in combination with total aluminum and flows during wet weather events. An online search for Ventura County soils data containing total aluminum concentrations resulted in the acquisition of data from only three monitoring programs: the Southern California Bight Monitoring Program (lead by SCCWRP), the Southern California Stormwater Monitoring Coalition (SCSWMC), and the State's Surface Ambient Monitoring Program (SWAMP). All soils data were queried from the California Environmental Data Exchange Network (CEDEN) online database. Soils data were available for all three watersheds monitored by the VCSQMP, with most data obtained from the Santa Clara River Watershed. Total aluminum soils data were reported as single or multiple concentration measurements at each monitoring site. An average concentration was calculated for those monitoring sites where multiple measurements were provided in CEDEN. Soil samples were collected adjacent to water bodies in each watershed. **Table 10** shows soil total aluminum concentrations at 14 monitoring sites in Ventura County. The total aluminum concentrations provided in **Table 10** are graphically displayed within discrete concentration ranges in **Figure 11**. The total aluminum concentrations shown in **Table 10** range from 6,820,000 µg/kg (Santa Paula Creek, Santa Clara River Watershed) to 105,692,500 µg/kg (average value at Calleguas Creek Main Stem, Calleguas Creek Watershed).

Table 10: Total Aluminum Soil Concentrations at Monitoring Locations in Ventura County.

Watershed	Monitoring Site	Total Al (µg/kg)	Monitoring Program
Ventura River	Ventura River Bio 0	75,894,500 avg (4)	SWAMP
	Ventura River Estuary	34,764,000	SWAMP
Santa Clara River	Sespe (Upper) 02363	36,080,000	SCSWMC
	Piru Creek 02764	20,646,000	SCSWMC
	Newhall Ranch Blue Cut	38,200,000 avg (2)	SWAMP
	Piru Creek	47,200,000	SWAMP
	Sespe Creek 04868	46,519,000	SCSWMC
	Sepse Creek	75,238,600 avg (5)	SWAMP
	Santa Paula Creek	6,820,000	SCSWMC
	Santa Clara River Estuary	63,869,400 avg (5)	SWAMP
	Ventura Marina 4	64,180,000	SWAMP
Calleguas Creek	Calleguas Ck below Camrosa WWTP	50,195,750 avg (4)	SWAMP
	Calleguas Creek Main Stem	105,692,500 avg (2)	SWAMP
	B08-6543	15,300,000 avg (6)	SoCal Bight

Numbers shown parenthetically for average total aluminum concentrations represent the number of data points used in calculating an average concentration.

As a means to compare total aluminum water column concentrations measured in the surface waters of the three watersheds to total aluminum soil concentrations measured in the watersheds, it is first necessary to determine the mass of total aluminum per mass of TSS measured in a water quality sample. Paired total aluminum and TSS results from wet weather events were used to calculate µg of total aluminum per kg of TSS. These µg/kg results calculated for all paired data were then averaged across each watershed. It was assumed that all aluminum measured in a water quality sample existed in the total fraction, which is close to the average 98.4 percent of measured aluminum that was calculated to exist in the total fraction across all wet weather samples collected across all VCSQMP monitoring sites. The information presented in **Table 11** allows for a comparison of the mass of total aluminum per mass of total solids measured in water column and soil samples collected in the three watersheds.

Table 11: Mass of Total Aluminum per Mass of Total Solids Measured in Water Column and Soil Samples Collected in Ventura County.

Watershed	Average Total Al per TSS (µg/kg) Measured in Water	Range of Total Al Concentrations (µg/kg) Measured in Soil
Ventura River	24,129,972	34,764,000 – 75,894,500
Santa Clara River	29,731,875	6,820,000 – 75,238,600
Calleguas Creek	24,314,428	15,300,000 – 105,692,500

The range of total aluminum soil concentrations shown in **Table 11** is in line with concentrations identified in two separate surveys of California soils. The first is a 1996 California Benchmark Soils Study that reported a mean total aluminum concentration across California soils of 73,000,000 µg/kg, along with a minimum of 30,000,000 µg/kg and a maximum of 106,000,000 µg/kg (Kearney, 1996). The second study[2] is a survey of 14 Air Force installations in 10 California counties that reported a mean, depth-integrated total aluminum concentration of 7,560,000 µg/kg and a 95th percentile concentration of 23,000,000 µg/kg (Hunter and Davis, 2001; Hunter et al., 2005). Hunter et al. reported that total aluminum soil concentrations vary with depth in the soil profile, and measured total aluminum concentrations were greatest in soil samples collected from 3 feet to 15 feet below ground level. Mean total aluminum concentrations were moderately lower in soil samples collected from the surface to a depth of 3 feet, and appreciably lower in soil samples collected deeper than 15 feet from the surface as compared to samples collected in the middle strata (3 – 15 feet). Total aluminum soil concentrations reported between the two studies bookend the range of concentrations measured in Ventura County. Furthermore, the average mass of total aluminum per mass of TSS in the water column that was calculated for the three watersheds appears to be consistent with the range of total aluminum soil concentrations measured in the three watersheds. Stated differently, there do not appear to be total aluminum water column concentrations measured in the various watersheds that are in excess of the concentration of total aluminum that could be contributed from the erosion of area soils. These observations in combination with the earlier evaluation that showed a high correlation between total aluminum and TSS concentrations measured in

[2] The study focused on uncontaminated sample locations to gain an understanding of background (naturally occurring) concentrations of inorganic chemicals to use for comparison against known contaminated sites in risk assessment and risk management work carried out by the Air Force.

VCSQMP water quality samples suggests that the total aluminum measured in water quality samples is derived from the erosion of soil.

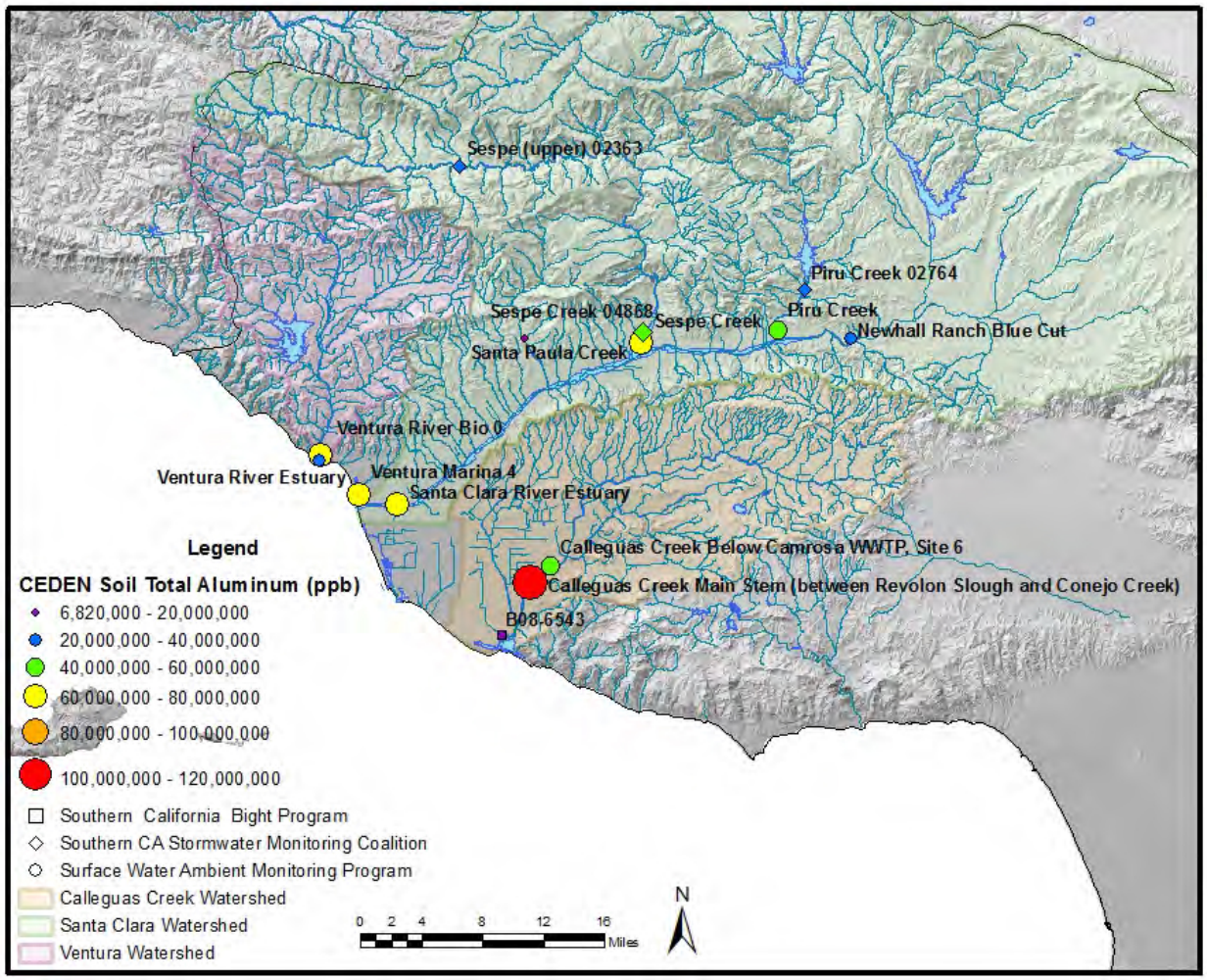


Figure 11: Total Aluminum Soil Concentration Range at Select Monitoring Locations in Ventura County.

Data Gaps and Additional Monitoring

The above analyses suggest that total aluminum measured in dry and wet weather water quality samples collected by the VCSQMP and others is derived from the erosion of area soils. It is currently unknown if anthropogenic activities occurring in the three watersheds hasten the transport of sediments to surface waters at a rate greater than natural erosion processes in the watersheds contribute sediments to local water bodies. In viewing the monitoring sites visited by both the VCSQMP and the CCWTMP, none of them are upstream of areas influenced by anthropogenic activities. This creates a data gap in the VCSQMP's database that would be helpful to close. It has been suggested that additional aluminum data be collected from new monitoring locations that represent land uses little affected by human activities. SCCWRP has recently identified several potential "reference stream" monitoring locations in Ventura County that it may monitor in support of an ongoing project it has in San Diego County. SCCWRP would be looking to monitor sites in Ventura County that meet specific criteria for being undisturbed by human activities. District staff has recently evaluated locations within each of the three watersheds it monitors that lie upstream of existing monitoring sites for the purpose of collecting water quality samples for aluminum and TSS analyses that would be little influenced by anthropogenic activities upstream of the site of collection. The monitoring locations for the collection of additional aluminum data are listed in **Table 12** and shown in **Figure 12**.

Table 12: Monitoring Locations Upstream of Anthropogenic Activities Chosen for Collection of Additional Aluminum Data.

Site Name/Location	Watershed	Monitoring Agency
North Fork Matilija Canyon at Hwy 33 above Wheeler Gorge Campground	Ventura River	VCSQMP, SCCWRP(1)
Matilija Canyon at the Forest Service Gate		
Canada Larga Canyon off of Canada Larga Road		VCSQMP
Sespe Creek near the Piedra Blanca Trailhead (near Rose Valley)	Santa Clara River	VCSQMP
Sisar Creek off of Sisar Road in Upper Ojai		
Sespe Creek at the end of Grand Avenue		
Santa Clara River upstream of Torrey Road		
Upstream of Las Llajas Dam	Calleguas Creek	VCSQMP
Happy Camp Canyon		

1. Matilija Canyon locations potentially to be monitored by SCCWRP in the future.

2013/14 ADDITIONAL ALUMINUM MONITORING

Upstream Sites

With regard to VCSQMP monitoring activities, water and sediment grab samples were collected twice (December 2013 and February 2014) during the 2013/14 monitoring season at the sites shown in **Table 12**. The December 2013 monitoring effort occurred during dry weather and was focused on collecting sediment samples within the streambed and water samples where sites contained water. Results from the December 2013 event are presented in **Table 13**. The

February 2014 monitoring effort occurred during wet weather and was focused on comparing total aluminum and TSS concentrations between mass emission stations and their upstream counterpart locations. Results from the February 2014 event are provided in **Table 14**.

Table 13: Total Aluminum and Total Suspended Solids Concentrations Measured During Dry Weather at Upstream Locations Having Limited Exposure to Anthropogenic Influences – December 18-19, 2013.

Watershed	Site	Matrix	Parameter	Result	Unit
Ventura River	North Fork Matilija Canyon above Wheeler Gorge	sediment	Aluminum, Total	13,000,000	µg/kg
		water	Aluminum, Total	7.4	µg/L
		water	TSS	1 DNQ	mg/L
	Matilija Canyon @ USFS Gate	sediment	Aluminum, Total	14,000,000	µg/kg
	Canada Larga Canyon	sediment	Aluminum, Total	5,100,000	µg/kg
Santa Clara River	Sespe Crk near Piedra Blanca	sediment	Aluminum, Total	8,800,000	µg/kg
	Sisar Creek off Sisar Rd.	sediment	Aluminum, Total	16,000,000	µg/kg
		water	Aluminum, Total	5.9	µg/L
		water	TSS	2 DNQ	mg/L
	Sespe Creek near the end of Grand Ave.	sediment	Aluminum, Total	7,100,000	µg/kg
		water	Aluminum, Total	6	µg/L
		water	TSS	1 DNQ	mg/L
	Santa Clara R. U/S Torrey Rd.	sediment	Aluminum, Total	2,300,000	µg/kg
Calleguas Creek	Upstream of Las Llajas Dam	sediment	Aluminum, Total	7,000,000	µg/kg
	Happy Camp Canyon	sediment	Aluminum, Total	2,000,000	µg/kg

Table 14: Total Aluminum and Total Suspended Solids Concentrations Measured During Wet Weather at Mass Emission Stations and Their Upstream Counterpart Locations – February 28, 2014.

Watershed	Site	Matrix	Parameter	Result	Unit
Ventura River	North Fork Matilija Canyon above Wheeler Gorge	water	Aluminum, Total	19,000	µg/L
		water	TSS	2,600	mg/L
	ME-VR2	water	Aluminum, Total	5,300	µg/L
		water	TSS	100	mg/L
Santa Clara River	Sespe Creek near the end of Grand Ave.	water	Aluminum, Total	30,000	µg/L
		water	TSS	11,000	mg/L
	ME-SCR	water	Aluminum, Total	37,000	µg/L
		water	TSS	3,000	mg/L
Calleguas Creek	Upstream of Las Llajas Dam	water	Aluminum, Total	250,000	µg/L
		water	TSS	17,000	mg/L
	ME-CC	water	Aluminum, Total	24,000	µg/L
		water	TSS	2,300	mg/L

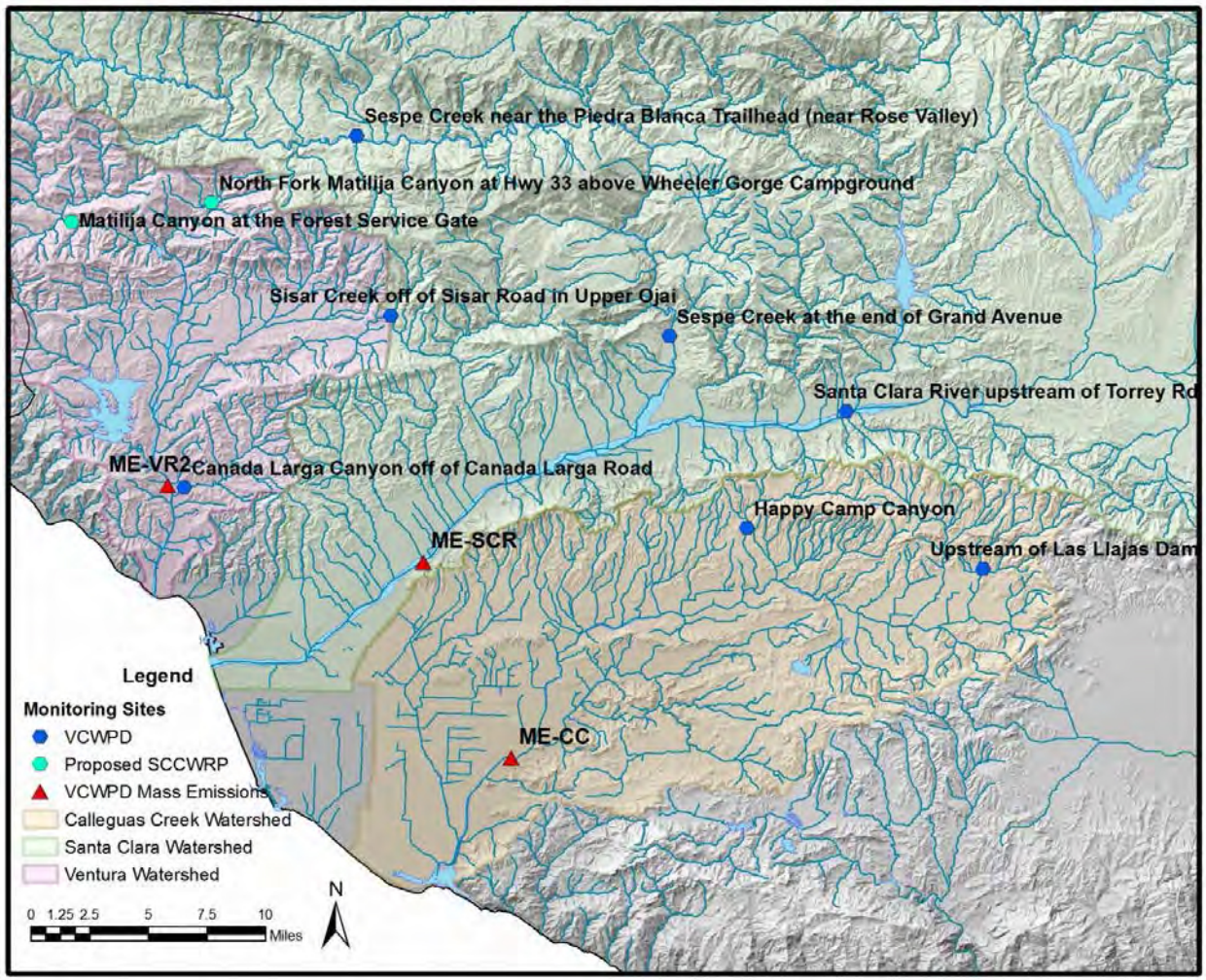


Figure 12: Potential Future Aluminum Monitoring Sites within the Three Subject Watersheds Chosen for Their Limited Exposure to Upstream Anthropogenic Influences.

Results from the December 2013 dry weather monitoring event (see **Table 13**), although limited, show that total aluminum concentrations in streambed sediments are elevated. The total aluminum sediment concentrations measured at the new upstream locations in the Ventura River and Calleguas Creek watersheds were lower than those observed at other sites in each watersheds as measured by other monitoring programs (see **Table 11**). Total aluminum sediment concentrations at the new upstream monitoring sites in the Santa Clara River Watershed are in line with those measured by other programs, with the exception of the Santa Clara River upstream of Torrey Road site. Total aluminum sediment concentrations at this site were lower than those previously measured in this watershed (see **Table 11**). Total aluminum and TSS water column concentrations measured at three of the new upstream sites where water was present during the dry weather monitoring event showed ultra low concentrations of each constituent. The low total aluminum concentrations observed were very much in line with the nearly non-detected TSS concentrations measured, thus supporting the relationship of total aluminum to TSS and flow evaluated earlier. The ultra low base flows observed at the three sites contained ultra low concentrations of total aluminum and TSS.

The February 2014 wet weather monitoring event (see **Table 14**) produced total aluminum and TSS water column concentrations in each of the three watersheds that for the most part were in line with concentrations historically observed in each watershed (see **Table 4**). Precipitation and runoff from the February storm event produced high flows in each watershed that in turn produced mid to upper range concentrations of the two parameters in the water column when compared to historical data. Exceptions to this were the total aluminum and TSS concentrations measured at the new site upstream of the Las Llajas Dam in the Calleguas Creek Watershed that were the highest ever recorded by the VCSQMP for the watershed. Furthermore, the 250,000 µg/L total aluminum concentration observed at the site was the highest aluminum concentration ever measured by the Program across all of its monitoring sites. With the exception of the Santa Clara River Watershed, total aluminum and TSS concentrations measured at the upstream locations were greater than concentrations measured at the downstream mass emission stations within a given watershed. In regard to the Ventura River and Calleguas Creek watersheds, the new upstream monitoring sites with limited exposure to anthropogenic influences were observed to possess higher total aluminum and TSS concentrations than their downstream counterpart locations (i.e., mass emission stations). All total aluminum concentrations measured in samples collected in February 2014 exceeded Title 22 Primary MCL of 1000 µg/L for the parameter. Again, higher flows – having greater erosive and sediment transport capacity – appear to be well-correlated with higher total aluminum and TSS concentrations measured in stormwater runoff.

If SCCWRP eventually monitors the two sites in the Ventura River Watershed that it has classified as meeting its criteria for a reference stream, then the VCSQMP would use these additional data in its continued background characterization of aluminum in the Ventura River Watershed.

Parking Lot Runoff Characterization

As a means to characterize stormwater quality for aluminum and TSS produced by a common urban runoff contributor, the VCSQMP chose to collect wet weather water quality samples from two Ventura County Government Center parking lots during February and March 2014. District staff collected precipitation-based composite samples and grab samples from a large

(14.26 acres) and small (3.63 acres) parking lot, respectively. Composite sample collection of runoff from the large parking lot was possible due to the permanent installation of an auto-sampler adjacent to this area. Both the large and small parking lots were sampled during the February 2014 monitoring event, whereas only the large parking lot was monitored during the March 2014 event. Aluminum and TSS data collected at the two parking lots during the two wet weather monitoring events are provided in **Table 15**.

Table 15: Wet Weather Stormwater Runoff Quality Measured at Ventura County Government Center Parking Lots.

Site	Date	Sample Representation	Parameter	Result	Unit
Large Parking Lot	2/7/2014	0.010 – 0.10 inches (composite)	Aluminum - Total	2100	µg/L
			Aluminum - Dissolved	43	µg/L
			TSS	210	mg/L
		0.10 – 0.20 inches (composite)	Aluminum - Total	780	µg/L
			Aluminum - Dissolved	49	µg/L
			TSS	61	mg/L
Small Parking Lot	2/7/2014	0.10 – 0.20 inches (grab)	Aluminum - Total	260	µg/L
			Aluminum - Dissolved	61	µg/L
			TSS	20	mg/L
		0.20 – 0.30 inches (grab)	Aluminum - Total	240	µg/L
			Aluminum - Dissolved	63	µg/L
			TSS	17	mg/L
Large Parking Lot	3/8/2014	0.010 – 0.10 inches (composite)	Aluminum - Total	1100	µg/L
			Aluminum - Dissolved	48	µg/L
			TSS	180	mg/L
		0.10 – 0.20 inches (composite)	Aluminum - Total	1700	µg/L
			Aluminum - Dissolved	15	µg/L
			TSS	290	mg/L
		0.20 – 0.30 inches (composite)	Aluminum - Total	1200	µg/L
			Aluminum - Dissolved	12	µg/L
			TSS	150	mg/L
		0.30 – 0.85 inches (composite)	Aluminum - Total	760	µg/L
			Aluminum - Dissolved	15	µg/L
			TSS	89	mg/L

The aluminum and TSS data presented in **Table 15** offer a preliminary characterization of the concentrations of these two constituents measured in stormwater runoff from a typical, well-used urban parking lot. Samples were collected at discrete points throughout a storm event to be representative of a specific pollutant concentration present after a certain volume of precipitation had fallen. The February data show that concentrations of total aluminum and TSS measured at the large parking lot were greater that those measured at the small parking lot. Based only on the

two sample representations for each site, it appears that there was a 'first flush' phenomenon with higher total aluminum and TSS concentrations that occurred at the large parking lot during the first 0.10 inches of precipitation that fell, whereas concentrations of all three parameters were quite similar across the two samples collected at the small parking lot. The March monitoring event shows a peak in concentrations for total aluminum and TSS taken at the second discrete sampling (0.10 – 0.20 inches), and overall concentrations for both parameters that are not dissimilar from those measured in the large parking lot during the February event. Across two sites and both sampling events, dissolved aluminum concentrations were always significantly lower than total concentrations.

Average wet weather total aluminum concentrations at VCSQMP monitoring sites measured from 2004 to 2013 are presented in **Table 16**. Only two monitoring locations – the major outfalls MO-FIL and MO-HUE – possess average total aluminum concentrations less than the 1000 µg/L Title 22 Primary MCL for the metal. The average wet weather concentrations at all other monitoring locations exceed the Primary MCL. The limited parking lot runoff data for total aluminum (see **Table 15**) showed four exceedances of the Title 22 Primary MCL for the metal out of the eight samples analyzed. While the parking lot samples are limited in their number, their measured total aluminum concentrations are generally lower than the average total aluminum concentrations calculated for the major outfall, mass emission, and other land use characterization monitoring sites listed in **Table 16**. In comparing the wet weather concentrations of TSS measured in runoff collected from the Government Center parking lots to wet weather concentrations measured at VCSQMP monitoring locations, particularly major outfalls, the parking lot TSS concentrations shown in **Table 15** are generally lower than the average wet weather TSS concentrations shown in **Table 8**. Furthermore, parking lot TSS concentrations are appreciably lower than the average wet weather TSS concentrations calculated for mass emission and receiving water monitoring sites, also presented in **Table 8**. Because the concentrations of total aluminum and TSS measured in Government Center parking lot runoff represent only single, discrete sources of these pollutants to the overall contributions of these constituents made by urban runoff, additional monitoring and analysis of other parking lot runoff and other urban runoff pollutant sources would be necessary in order to ascertain the overall contribution of total aluminum and TSS from parking lot and urban runoff to area receiving waters.

Table 16: Average Wet Weather Total Aluminum Concentrations Measured at VCSQMP NPDES Stormwater Monitoring Sites: 2004 – 2013.

Watershed	Site ID[(1)]	Site Description	Avg Total Aluminum (µg/L)
Ventura River	**MO-MEI**	Major outfall	4,155
	MO-OJA	Major outfall	3,667
	ME-VR	Mass emission	5,560
	ME-VR2	Mass emission	1,653
Santa Clara River	**MO-FIL**	Major outfall	844
	MO-SPA	Major outfall	3,367
	ME-SCR	Mass emission	14,162
	R-1	Residential land use	1,973
	I-2	Industrial land use	1,913
	MO-VEN	Major outfall	2,373
	MO-OXN	Major outfall	2,001
Calleguas Creek	**MO-MPK**	Major outfall	6,738
	MO-SIM	Major outfall	2,251
	W-3	Receiving water	12,350
	MO-CAM	Major outfall	7,468
	MO-THO	Major outfall	6,478
	ME-CC	Mass emission	8,446
	A-1	Agricultural land use	4,518
	W-4	Receiving water	7,468
Pacific Ocean	**MO-HUE**	Major outfall	562

1. Site IDs within watersheds are listed in upstream to downstream order.

Stations currently monitored by the VCSQMP are shown in bold type.

Conclusions

The VCSQMP regularly observes exceedances of the Title 22 Primary MCL for total aluminum of 1000 µg/L in the wet weather water quality samples it collects at various monitoring locations as required by its NPDES MS4 Permit. Exceedances of the Title 22 Primary MCL also are observed for dry weather water quality samples, but on a much less frequent basis. The MS4 Program is responsible for reducing pollutants concentrations in municipal runoff, and the measurement of concentrations that exceed relevant water quality objectives, in particular, places the District and its fellow Copermittees in a position to investigate the cause(s) of such exceedances and implement actions to limit such exceedances where possible. To better understand the sources of aluminum measured in the various watersheds, monitoring was performed on river sediments, as well as wet weather flows from pristine upstream areas and below urbanized areas. The ubiquitous occurrence of aluminum in the earth's crust makes the metal difficult to prevent from entering surface waters as soil, even from pristine areas, is eroded and washed into water bodies, especially during stormwater runoff events.

The various analyses performed in support of the current background evaluation of aluminum in the Ventura River, Santa Clara River, and Calleguas Creek watersheds found that total aluminum is present in concentrations that exceed the Title 22 Primary MCL for the metal as measured at all VCSQMP monitoring locations during wet weather sampling. On average, 74.2 percent of wet weather samples collected from February 2004 to May 2013 exceeded the water quality objective for aluminum. In contrast, dry weather samples collected during the same period show just under a 6 percent exceedance rate. Because the VCSQMP analyzes for both total and dissolved fractions of aluminum, it is known that over 98 percent of the aluminum contained in wet weather samples is present in the total fraction. On average, over 87 percent of the aluminum measured in dry weather samples is present in the total fraction. A comparison of individual VCSQMP monitoring sites showed wet weather exceedance rates greater than 50% except for the current mass emission station in the Ventura River Watershed (ME-VR2; 15.4% exceedance), the City of Fillmore's major outfall (MO-FIL; 22.2% exceedance), and the Port Hueneme major outfall (MO-HUE; 11.1% exceedance). Only water quality samples collected at two mass emissions sites (ME-SCR and ME-CC) were observed to exceed the water quality objective for total aluminum during dry weather monitoring.

A comparison of total aluminum data collected in the Calleguas Creek Watershed by the VCSQMP with data collected by the CCWTMP in the same watershed showed that both data sets are comparable. The CCWTMP data set includes monitoring of agricultural inputs, POTWs, urban inputs, and receiving waters which are used to characterize all inputs to the subwatershed upstream of the point of collection. The ability to distinguish between different land uses with the CCWTMP data set showed that agricultural discharges contribute higher levels of total aluminum to receiving waters than urban discharges. With respect only to dry weather monitoring, the CCWTMP data show that POTWs contribute very little total aluminum to surface waters. Within the Calleguas Creek Watershed, it appears that upstream agricultural land use discharges appreciably influence surface water total aluminum concentrations measured downstream of such discharges within a subwatershed. A future analysis of TSS concentrations in samples collected by the CCWTMP could provide insight into whether agricultural discharges contribute higher concentrations of TSS to receiving waters than do urban discharges.

Correlation analyses of total aluminum and TSS and total aluminum and flow were performed by District staff using a Kendall correlation test and confirmed independently as part of this evaluation using simple linear regression. Results of the correlation analyses showed that measured total aluminum and TSS concentrations are strongly correlated for both wet weather and combined dry and wet weather data at significance levels less than 0.001 or better. Total aluminum and TSS concentrations are more highly correlated at the ME-CC monitoring site, followed by the ME-SCR site and then the ME-VR(2) site. Total aluminum and event mean flow are strongly correlated at the ME-CC monitoring site, but the Kendall correlation analysis shows no significant correlation between the two variables at the ME-VR(2) site. The simple linear regression analysis of the ME-VR(2) data shows significant correlation of total aluminum and event mean flow, but the association between the two parameters is not as strong as it is for total aluminum and TSS at the monitoring site. The correlation analyses also suggest that total aluminum concentrations at the mass emission sites evaluated are more strongly correlated with TSS than with flow, indicating that measured water column aluminum concentrations are more dependent on the amount of solids suspended in the water column than the flow transporting the aluminum and TSS.

A review of available Ventura County soils data in each of the three watersheds revealed that total aluminum concentrations in the County are in line with those of other published studies conducted in California. The average mass of total aluminum per mass of TSS in the water column that was calculated for the three watersheds appears to be consistent with the range of total aluminum soil concentrations measured in the three watersheds. These observations in combination with the earlier evaluation that showed a high correlation between total aluminum and TSS concentrations measured in VCSQMP water quality samples suggests that the total aluminum measured in water quality samples is derived from the erosion of soil.

Through the evaluation of historical total aluminum monitoring data collected by the VCSQMP and CCWTMP, it was determined that both programs lacked data collected in upstream portions of a watershed where measured total aluminum concentrations would be little influenced by anthropogenic activities. This data gap prompted the Program to initiate the monitoring of locations far upstream in the three watersheds in December 2013 and February 2014. The new monitoring sites were chosen because their locations are believed to have limited exposure to upstream anthropogenic impacts, and thus act as reference sites with regard to "natural" total aluminum inputs to surface waters. Results from the two monitoring events where water and sediment grab samples were collected at these new monitoring sites showed that upstream locations in each of the three watersheds also possess elevated concentrations of the metal.

Dry weather monitoring performed in December 2013 revealed that total aluminum sediment concentrations at upstream sites in the Ventura River and Calleguas Creek watersheds were lower than those observed elsewhere in each watershed as measured by other monitoring programs. Total aluminum sediment concentrations at the new upstream monitoring sites in the Santa Clara River Watershed are in line with those measured by other programs, with the exception of the Santa Clara River upstream of Torrey Road site. Total aluminum sediment concentrations at this site were lower than those previously measured in this watershed. Total aluminum and TSS water column concentrations measured at three of the new upstream sites where water was present during the dry weather monitoring event showed ultra low concentrations of each constituent. The low total aluminum concentrations observed were very much in line with the nearly non-detected TSS concentrations measured, thus supporting the

relationship of total aluminum to TSS and flow revealed through analysis of the Program's historical data.

Wet weather monitoring of upstream natural areas performed in February 2014 showed total aluminum and TSS water column concentrations in each of the three watersheds that were for the most part in line with concentrations historically observed in each watershed. Although the high flows observed for the late February storm event resulted in a total aluminum concentration of 250,000 µg/L measured at the Las Llajas Dam location in the Calleguas Creek Watershed that is not only the highest concentration ever measured in the watershed, but also among all sites monitored by the Program since it began evaluating aluminum in 2004. With the exception of the Santa Clara River Watershed, total aluminum and TSS concentrations measured at the upstream locations were greater than concentrations measured at the downstream mass emission stations within a given watershed. All total aluminum concentrations measured in samples collected in February 2014 exceeded Title 22 Primary MCL of 1000 µg/L for the parameter. The higher flows observed during this wet weather event, with their greater erosive and sediment transport capacity, appear to be well-correlated with the higher total aluminum and TSS concentrations measured in the water quality samples collected at both the new upstream monitoring sites and the existing mass emission stations. A limited evaluation of total aluminum and TSS concentrations measured in wet weather stormwater runoff collected from Ventura County Government Center parking lots showed these two parameters to generally be present in lower concentrations in parking lot runoff as compared to concentrations observed at the Program's major outfalls, mass emission stations, and other land use characterization sites.

The VCSQMP will need to continue to review and analyze historical and new aluminum data collected in the three watersheds, along with initiating discussions with Regional Board staff, in order to support the use of an appropriate regulatory mechanism or "off ramp" that would limit the Copermittees' liability for controlling high background concentrations of aluminum. A sound scientific and regulatory approach to managing the elevated concentrations of aluminum observed in Ventura County surface waters will be needed to sufficiently protect beneficial uses potentially impacted by this naturally occurring metal.

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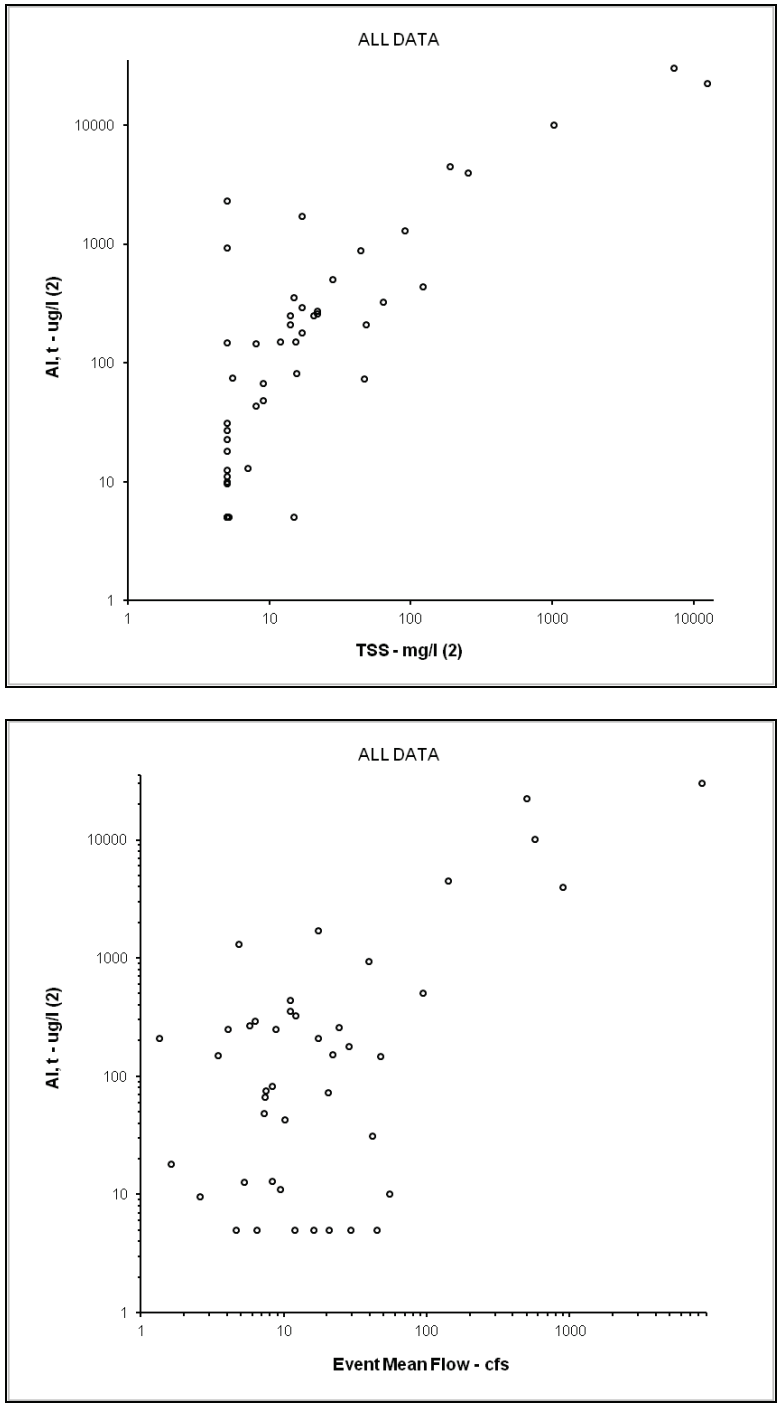

Figure 13: Scatter Plots of Aluminum Vs Event Mean Flow and Aluminum Vs TSS for Combined Dry and Wet Weather Data Collected at the Ventura River Mass Emission Site, ME-VR(2).

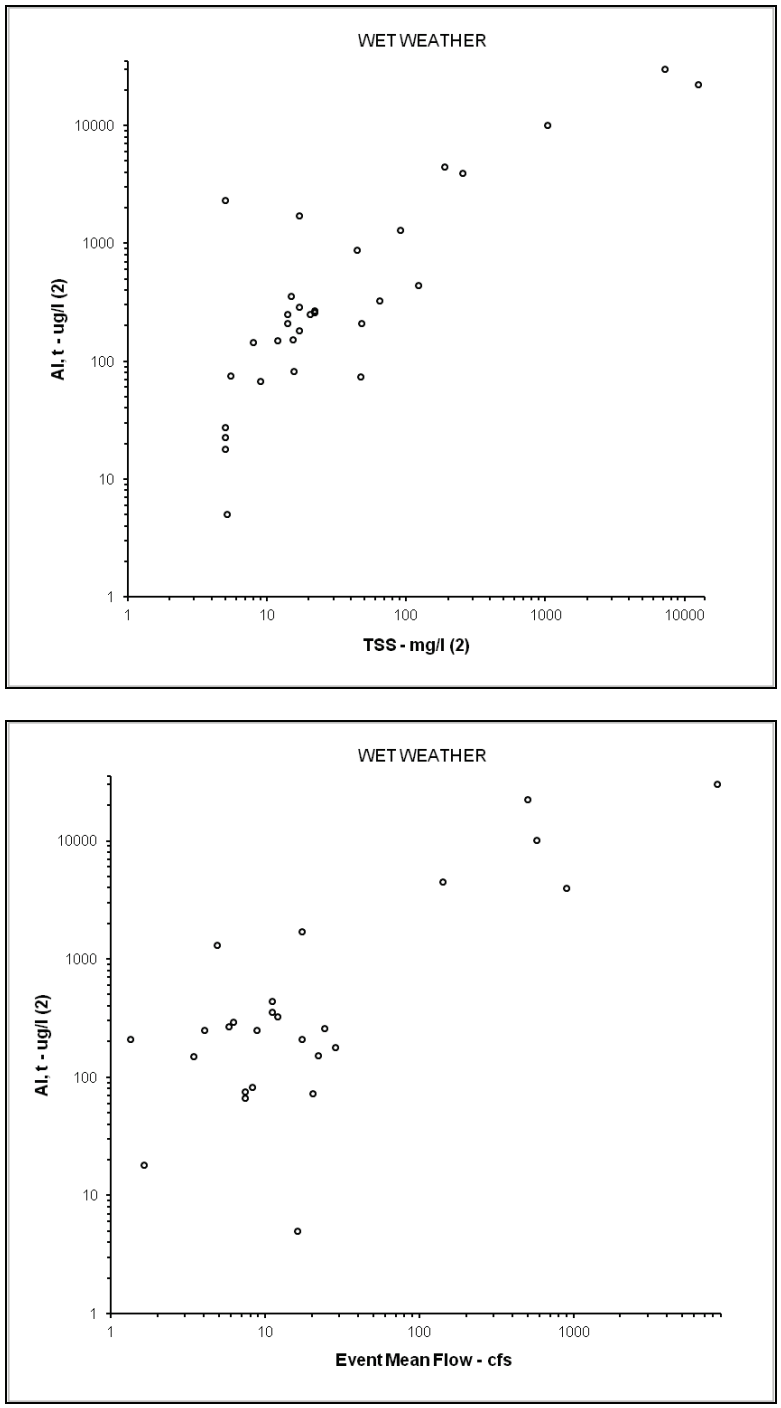

Figure 14: Scatter Plots of Aluminum Vs Event Mean Flow and Aluminum Vs TSS for Wet Weather Data Collected at the Ventura River Mass Emission Site, ME-VR(2).

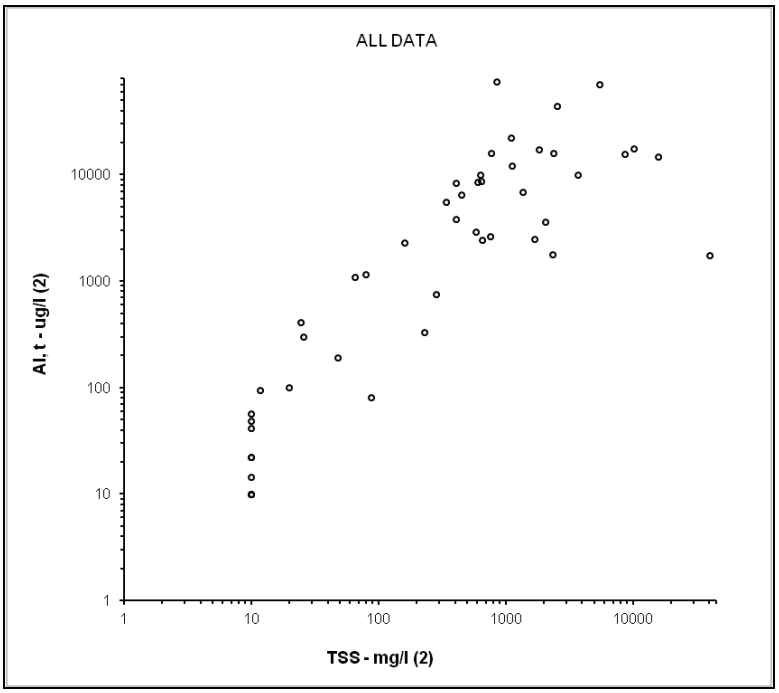

Figure 15: Scatter Plot of Aluminum Vs TSS for Combined Dry and Wet Weather Data Collected at the Santa Clara River Mass Emission Site, ME-SCR.

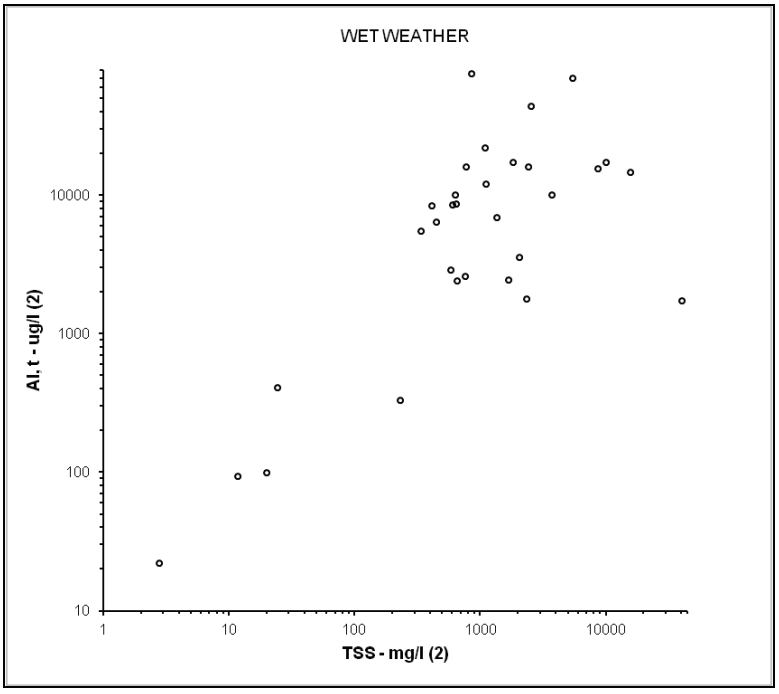

Figure 16: Scatter Plot of Aluminum Vs TSS for Wet Weather Data Collected at the Santa Clara River Mass Emission Site, ME-SCR.

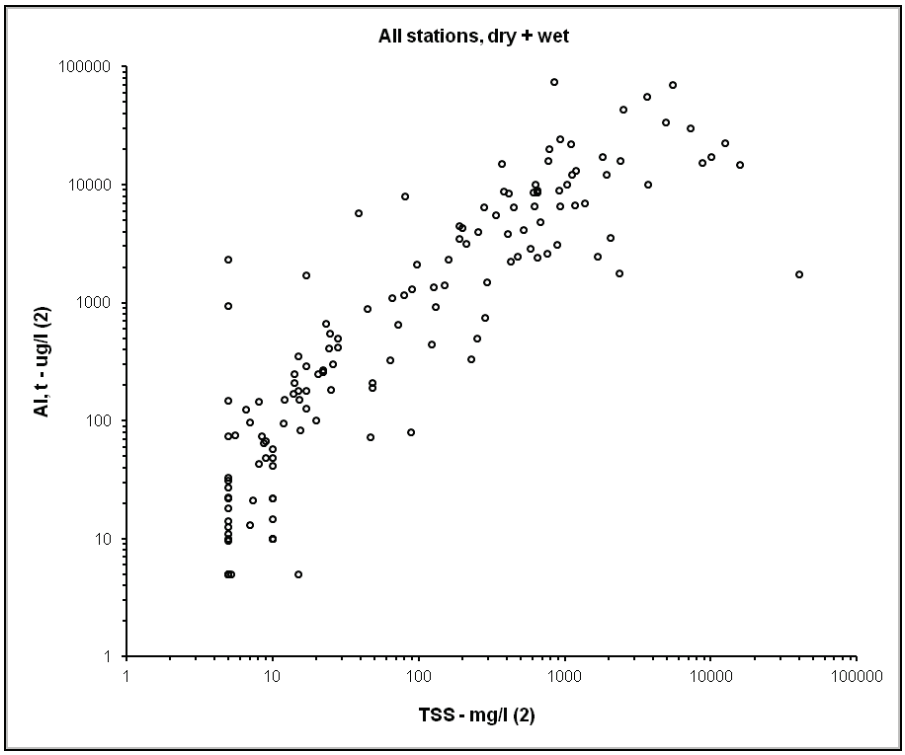

Figure 17: Scatter Plot of Aluminum Vs TSS for Combined Dry and Wet Weather Data Collected Across All Mass Emission Sites.