Ventura Countywide
Stormwater Quality
Management Program

2022-2023
Permit Year

Ventura Countywide Stormwater Quality Management Program Attachment A: 2022-23 Annual Monitoring Report

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

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1 Water Quality Monitoring

1.1 OVERVIEW

As required by Order R4-2010-0108 (Permit) issued July 8, 2010, and its replacement, Order R4-2021-0105, adopted July 23, 2021, the Ventura Countywide Stormwater Quality Management Program's (Program) Stormwater Monitoring Program (SMP) monitored water chemistry, toxicity, and biological communities of creeks, rivers, and channels within Ventura County during the 2022/23 monitoring year. Monitoring continued under the 2010 Permit requirements, as the 2021 Permit monitoring requirements take effect after the approval of the Coordinated Integrated Monitoring Program (CIMP), submitted to the Regional Board on September 11, 2023.

Monitoring locations for water chemistry and toxicity included mass emission stations and major outfall stations. Mass emission stations are in the lower reaches of the three major watersheds in Ventura County (Ventura River, Santa Clara River, and Calleguas Creek). Major outfall stations, a component of the SMP since 2009, are in subwatersheds representative of each Permittee's contribution to downstream waters.

Rainfall for the 2022/23 water year was well above average, with a series of storms in December-January and February-March contributing to water year rainfall totals approximately twice the annual average across the county. Water chemistry samples were targeted for collection at the three mass emission and eleven major outfall stations during three rain events per site, per the Permit requirements. The first two sampled storms of the season occurred November 8, 2022 (first flush at all sites except ME-SCR) and December 1, 2022. These storms did not generate sampleable stormwater runoff at ME-SCR due to the very dry antecedent conditions. The first flush event for ME-SCR was December 10, 2022, but this storm was not logistically sampleable at the other stations due to its proximity to the previous sampled event (December 1, 2022). The other sampled rain events occurred on February 24, 2023 (all sites), and March 10, 2023 (ME-SCR only).

Aquatic toxicity samples were collected from all fourteen sites during the first sampled event for each site. No toxicity was observed as all sites were not significantly different in comparison to the control for both growth and reproduction, so no toxicity identification evaluations (TIEs) were required or performed. Most sensitive species (MSS) toxicity testing was completed in the 2022/23 monitoring year, in alignment with 2021 Permit requirements, including wet weather MSS at the new proposed Malibu Creek Watershed receiving water station, and dry weather MSS for two samples collected in August 2022 for each receiving water station.

Dry weather sampling was attempted at all mass emission and major outfall stations during one dry event which was split into three parts: Calleguas Creek Watershed sites (ME-CC, MO-CAM, MO-SIM, MO-MPK, and MO-THO) were sampled on May 15-16, 2023; Santa Clara River Watershed sites (ME-SCR, MO-FIL, MO-SPA, MO-OXN, and MO-VEN) on May 17-18, 2023; and Ventura River Watershed sites (ME-VR2, MO-OJA, and MO-MEI) and the Port Hueneme site (MO-HUE) on May 22-23, 2023. All sites were sampled except MO-SPA and MO-OXN, which were dry. A smaller subset of water chemistry samples was collected at each of the major outfall stations (or alternate outfall location if it was dry) on August 29 and 30, 2023, as part of the dry-season, dry-weather monitoring prescribed in the NPDES Permit. The site for the city of Camarillo was resampled October 17, 2023, after it was determined there were errors during the initial sample collection for that jurisdiction.

E. coli concentrations were above water quality objectives (WQO) at all sites during wet weather and about half the sites with flow during dry weather. Other constituents that were found at elevated levels in relation to applicable WQO during the 2022/23 monitoring year include chloride and/or total dissolved solids (six sites, primarily dry-weather), pH (two sites dry weather), dissolved oxygen (one site, wet and dry weather), total aluminum (two sites wet weather), dissolved copper (three sites wet[1] weather, one site dry weather), dissolved zinc (three sites wet[2] weather), total selenium (two sites dry weather), nitrate + nitrite as nitrogen (one site dry weather), bis(2-ethylhexyl)phthalate (two sites dry weather, one site wet weather), pentachlorophenol (two sites wet weather), and polycyclic aromatic hydrocarbons (PAHs) (two sites wet weather, one site dry weather). The Program is using this information to identify pollutants of concern and direct efforts to reduce their discharge from the storm drain system.

Bioassessment sampling was conducted as part of the Southern California Regional Bioassessment Program (RBP) for the 15th year. The latest five-year study started in 2021 and continues in a similar vein to the previous five-year studies, with monitoring designed and conducted to look at both regional trends over time (by approximately annual revisits to selected sites) and current stream conditions (single visits to randomly generated sites). This 2021-2025 study continues to include perennial and nonperennial streams and adds the opportunity to participate in several special studies. For 2023, the SMP surveyed five randomly generated sites to assess condition (two in the Ventura River Watershed, two in the Calleguas Creek Watershed, and one in the Santa Clara River Watershed), and ten sites that were previously surveyed in 2008/2009 (four in the Ventura River Watershed, three in the Calleguas Creek Watershed, two in the Santa Clara River Watershed, and one in the Santa Monica Bay Watershed), to track trends. The Principal Permittee's fixed (Integrator) sites at the three mass emission stations (ME-CC, ME-VR2, and ME-SCR[3]) were also sampled once each for 2023. Sampling occurred between May 31 and July 11, 2023.

1.2 INTRODUCTION

This Annual Report summarizes the effort undertaken by the Program and the SMP during the 2022/23 monitoring year. Pursuant to NPDES Permit No. CAS0040002, the Program must submit a Stormwater Monitoring Report annually by December 15th, and include the following:

- Results of the SMP
- General interpretation of the results
- Tabular and graphical summaries of the monitoring data obtained during the previous year

Analysis of samples collected at various stations throughout the watershed gives an overall representation of the quality of stormwater discharges. The monitoring also aids in the identification of pollutant sources, as well as the assessment of Program effectiveness. Feedback provided by the SMP allows for changes to be made in the implementation of other Program aspects to resolve any problems and reduce pollutants that may exist. This adaptive management strategy should eventually show improved water quality through the SMP. The SMP includes the following components.

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[1] The dissolved copper objective is calculated using water hardness. The receiving water hardness is used unless it is unavailable (as in Event 1 and 2 for the Santa Clara River Watershed when ME-SCR was dry), in which case the water hardness at the site is used instead. Major outfall water hardness is typically lower than that of the receiving water, resulting in more stringent water quality objective (WQO) than would apply in the associated receiving water.

[2] The dissolved zinc objective is calculated using water hardness. The receiving water hardness is used unless it is unavailable (as in Event 1 and 2 for the Santa Clara River Watershed when ME-SCR was dry), in which case the water hardness at the site is used instead. Major outfall water hardness is typically lower than that of the receiving water, resulting in more stringent water quality objective (WQO) than would apply in the associated receiving water.

[3] The ME-SCR site for bioassessment was moved ~1,300 meters upstream and named ME-SCR2 for 2019 and beyond to avoid the fluctuating wetland conditions behind the Freeman Diversion Dam.

1.2.1 **Mass Emission Monitoring**

Mass emission stations are 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 1.3.2), 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 pollutant concentrations. This type of monitoring, in conjunction with the major outfall monitoring, is also useful in helping to determine if the Municipal Separate Storm Sewer System (MS4) is contributing to exceedances of water quality standards (WQS) by comparing results to applicable WQO in the Los Angeles Region Water Quality Control Plan (Basin Plan) and the California Toxics Rule (CTR), as described in Section 1.7.

During the 2022/23 monitoring year, water quality samples from three wet-weather events and one dry-weather event were targeted for water chemistry analysis at each mass emission station, as required by the NPDES Permit. All mass emission sites were successfully sampled for these events. Due to extremely dry antecedent conditions, the Santa Clara River Watershed mass emission station, ME-SCR, was unable to be sampled during Event 1 and 2 due to a lack of stormwater runoff at the site. The first event with sampleable flow for this station was Event 3 (December 10-11, 2022). Aquatic toxicity samples were collected at each mass emission station during the first sampled wet event of the 2022/23 monitoring year (November 8, 2022 for all stations except ME-SCR, and December 10, 2022 for ME-SCR) 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. Additionally, aquatic toxicity samples were collected during two events in August (historically driest month) 2022 (August 8 and 29, 2022) for most sensitive species screening per the requirements of the new Permit.

1.2.2 **Major Outfall Monitoring**

The Permit requires sampling at one representative station (major outfall) for each Permittee's municipal separate storm sewer system (MS4). Many of the monitoring requirements for major outfall stations are like 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 sampling locations is described in Section 1.3.2.

During the 2022/23 monitoring year, water quality samples from three wet-weather events and one dry-weather event were targeted for water chemistry analysis at each of the eleven major outfall stations, as required by the NPDES Permit. Three wet events were sampled for all eleven stations. All sites were sampled during the dry event except for MO-OXN and MO-SPA, which were dry and could not be sampled. Aquatic toxicity samples were collected at each of the major outfall stations during the first sampled wet event (November 8, 2022). Samples were 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 SMP will help the Program determine if an MS4 is potentially contributing to exceedances of WQS by comparing results to applicable WQO 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 over time. 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.

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

The Permit requires the analysis of pollutant discharges from a representative MS4 outfall in each municipality and in the unincorporated County area during dry weather between May 1 and Sept 30. The SMP met 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. Monitoring was conducted on August 29 and 30, 2023. Camarillo was initially sampled during the August event, however review of the data provided by the consultant sampling team showed that the sample was collected from a receiving water and not the outfall, and the preceding alternate outfall site was not appropriately documented for dry conditions. Camarillo was resampled on October 17, 2023.

1.2.4 **Bioassessment Monitoring**

Prior to the adoption of the 2010 Permit (Orders No. 09-0057 in 2009 and its replacement, R4-2010-0108 in 2010), the SMP 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 SMP has participated in the regional program since 2009.

The first five-year study was conducted from 2009 through 2013 during which time the SMP performed bioassessment surveys at 15 random sites (six in the Ventura River Watershed, six in the Calleguas Creek Watershed, and three in the Santa Clara River Watershed) and three targeted perennial sites (ME-CC, ME-SCR[4], and ME-VR2) throughout the County each year. An interim study was conducted in 2014 to allow the SMC time to review the generated data and to provide information for developing the next five-year study (2015-2019). The 2014 study included revisits to previously sampled sites for trend detection and repeated visits to new nonperennial reference sites to provide information for developing the next five-year study.

The 2015-2019 Study was extended for 2020, included perennial and nonperennial streams, and was designed to look at both current stream condition as well as regional trends. Each year, the SMP surveyed ten randomly generated sites to assess condition (three in the Ventura River Watershed, three in the Calleguas Creek Watershed, three in the Santa Clara River Watershed, and one in the Santa Monica Bay Watershed) and five sites (two open land use and three developed land use) that were previously surveyed in 2008/2009 to track trends. The Principal Permittee's fixed (Integrator) sites at the three mass emission stations (ME-CC, ME-VR2, and ME-SCR[5]) were also sampled annually.

The latest five-year study (2021-2025) began in 2021. It continues to include perennial and nonperennial streams and is designed to look at both current stream condition as well as regional trends but has altered the distribution of trend and condition sites. For 2023, the SMP surveyed five randomly generated sites to assess condition (two in the Ventura River Watershed, two in the Calleguas Creek Watershed, and one in the Santa Clara River Watershed) and ten sites that were previously surveyed between 2008-2014 (four in the Ventura River Watershed, three in the Calleguas Creek Watershed, two in the Santa Clara River Watershed, and one in the Santa Monica Bay Watershed), to track trends. The Principal Permittee's fixed (Integrator) sites at the three mass emission stations (ME-CC, ME-VR2, and ME-SCR) were also sampled once each for 2023. Sampling occurred between May 31 and July 11, 2023. The regional bioassessment effort is ongoing and will be modified and revised as new information becomes available.

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[4] ME-SCR was not perennial in 2015/16 and 2016/17 due to drought conditions.

[5] The ME-SCR site for bioassessment was moved 1,300 meters upstream and named ME-SCR2 for 2019 and beyond to avoid the fluctuating wetland conditions behind the Freeman Diversion Dam.

1.3 MONITORING STATION LOCATIONS AND DESCRIPTIONS

1.3.1 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 remaining above tidal influence. See Figure 1-1 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 contributions 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 in 2014 over the pond behind the diversion so that a gate opening would be noticed. A text message can be automatically sent to sampling team members when the gate is opened to let 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.

1.3.2 Major Outfall Stations

Of the eleven major outfall stations, four were added to the SMP 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 SMP were Camarillo (MO-CAM), Ojai (MO-OJA), unincorporated Meiners Oaks (MO-MEI) and Ventura (MO-VEN).[6] 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

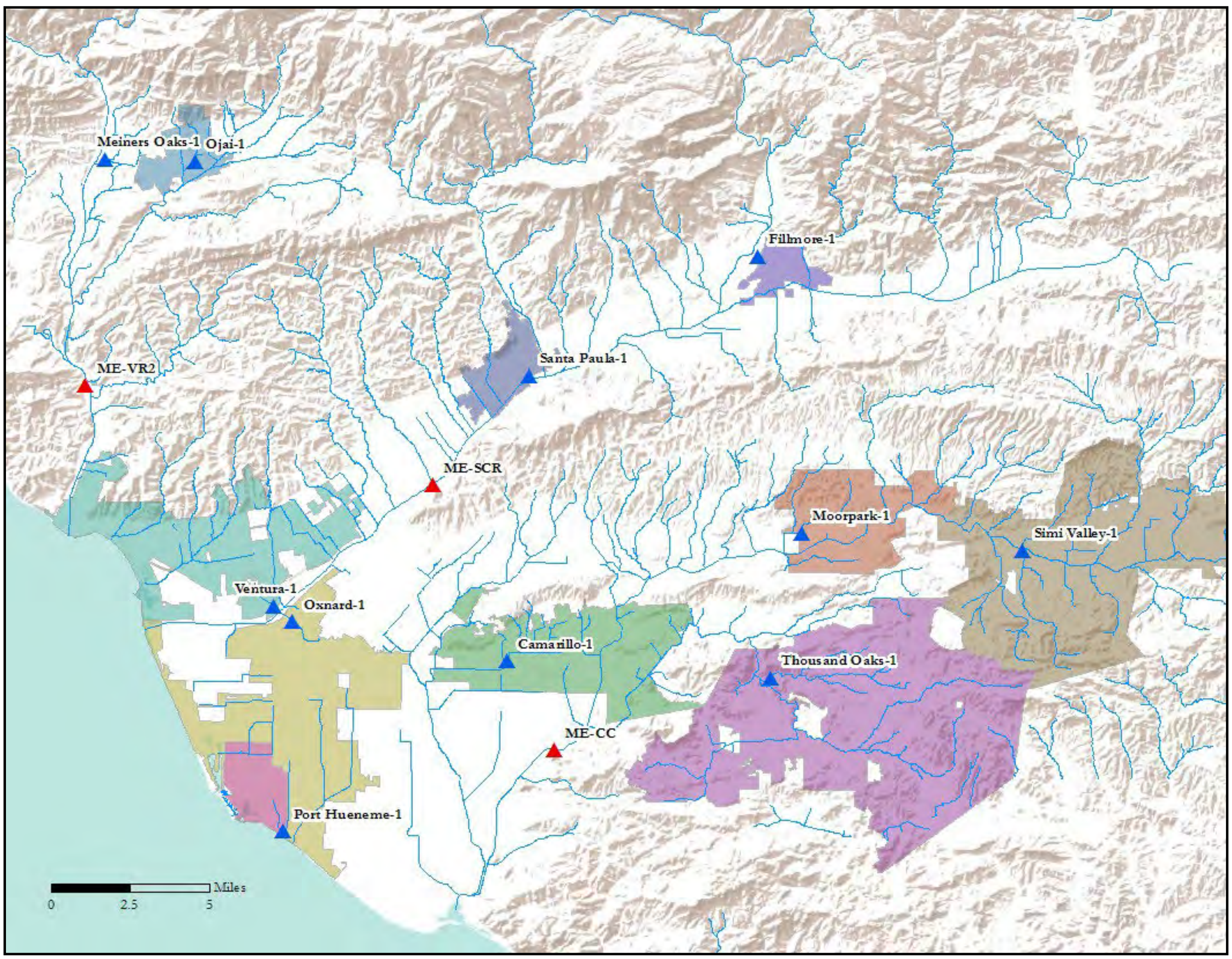
[6] Site names shown on the map in Figure 1-1 reflect the names given to each site in the NPDES permit; site names throughout this report are shortened to those shown on chains-of-custody (COCs) for brevity. Under this naming convention, MO-CAM is synonymous with Camarillo-1, MO-FIL with Fillmore-1, 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.

Thousand Oaks (MO-THO). Figure 1-1 shows the location of the eleven major outfall and three mass emission stations.

In 2018/19 the Program revised the calculated drainage areas to each major outfall using the latest LiDAR topography and updated storm drain system information from the Ventura Countywide Unified Storm Drain Mapping project. In addition to updated drainage boundaries, the land use classification percentages within each drainage area were recalculated using the 2012 Southern California Area Government's (SCAG) Land Use GIS file. Upon inspecting the 2012 SCAG GIS data layer, it was noted that many agricultural parcels were miscategorized as "Rural Residential" when in fact the parcels were primarily used for agriculture. The Ventura County Agricultural Commissioner's (Ag. Commissioner) office provided its most recent GIS file identifying current agricultural parcels as of November 2018. This layer was then merged with the existing 2012 SCAG land use layer, with the Ag. Commissioner identified parcels replacing the existing 2012 SCAG data as land use category 'Agriculture' for those locations. The updated land use layer was also used to generate the citywide land use percentage statistics.

Details of the land use of each city and the representative watershed can be found in Appendix A.

Figure 1-1 Mass Emission and Major Outfall Sampling Locations



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 5% of the watershed is commercial and less than 4% 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. Approximately 37% of the watershed is classified as vacant or open space, with residential land use comprising about 32%. About 5% of the watershed is commercial and about 9% is agricultural.

The MO-MEI station is located on Happy Valley Drain (a tributary of the Ventura River) near Rice Road in Meiners Oaks. Over half of the watershed is classified as residential or rural residential. About 10% is classified as vacant. 4% of the watershed is commercial and about 15% is agricultural.

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. Industrial land uses account for almost 13% 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 over 15% is classified as open space/recreation. Agriculture land uses account for almost 10% of the watershed, while commercial comprises less than 1% of the watershed.

The MO-MPK station is located on the Walnut[7] Canyon Drain (a tributary to Arroyo Las Posas) near the intersection of Los Angeles Avenue and Mira Sol Drive in Moorpark. Over a third of the watershed is classified as open space/recreation, almost a third is residential, and almost 12% of the watershed is used for agriculture.

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 transportation and less than 1% is agricultural.

The MO-HUE station is located on Hueneme Drain (a tributary of Tšumas Creek (formerly J Street Drain) at the Pacific Ocean) southeast of Bubbling Springs Park in Port Hueneme. The land use is predominantly residential and transportation, with open space/recreation land use accounting for almost 8%.

The MO-SPA station is located on the 11th Street Drain where it enters the Santa Clara River, east of the Santa Paula airport. Over half of the watershed is classified as residential, less than 20% as transportation, and schools account for approximately 2%.

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 (55%) of the watershed is classified as open space/recreation and about one third is residential.

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 (47%), open space/recreation (26%) and transportation (16%).

1.4 METHODS

The NPDES Permit requires flow-paced sampling at monitoring stations where technically feasible. The reason for this type of sampling is two-fold. First, by collecting sub-samples (aliquots) based on flow, a more accurate representation of the Event Mean Concentration (EMC) of each constituent in the runoff can be achieved. Second,

[7] Incorrectly referred to as Gabbert Canyon in reports and documents prior to the 2012/13 Annual Report.

by multiplying the EMC by the total flow during sample collection, a mass of each constituent discharged during each sampling event can be estimated. Ideally, sampling events represent the entire hydrograph, however difficulties inherent in predicting precipitation quantity, intensity, and resulting runoff may result in partial representation of the complete storm event. Therefore, EMC are only representative of the sampling event duration and not the entire storm and mass emission quantities are calculated accordingly. These benefits are discussed further below.

Flow-paced sampling is not technically feasible at three sites, ME-SCR, MO-FIL, and MO-HUE. Since its installation in 2001, the monitoring station at ME-SCR has been monitored on a time-paced basis, as allowed by the RWQCB. This site is located at the UWCD's Freeman Diversion Dam, where irregular operation of the gates associated with the diversion dam makes it impossible to calculate flow. During most of the year, water is sent through a canal in which it would be easy to calculate flow. However, during rainfall events and periodically throughout the year, the UWCD will close the gates to the diversion canal, allowing water to go through a high-velocity bypass or spill over the dam itself. Computing flow over the latter is difficult, given the breadth of the dam, which spans the entire river bottom. Computing flow through the bypass is impossible due to the wide ranges in water surface elevation and velocity. The MO-FIL station is located at an outfall into Sespe Creek and is subject to backwater due to plant growth and sediment deposition, which makes accurate flow determination impossible. The MO-HUE station is in a canal that is drained via pumps that are triggered based on water surface elevation. The pumps are operated intermittently which makes flow-paced sampling inappropriate.

1.4.1 Precipitation

Precipitation amounts, both historical and predicted, are integral to performing flow-weighted sampling. Historical precipitation data is necessary to determine the relationship between rainfall and runoff. In the major watersheds with long-term mass emission stations, the rainfall-to-runoff (RTR) ratio is based on over 65 years of data and considers antecedent soil moisture conditions. These RTR tables have been used and refined by the SMP since the stations were installed in 2001.

At the time the major outfall stations were installed, the SMP had access to real time precipitation data from the VCWPD's Hydrology Section [part of the Automated Local Evaluation in Real Time (ALERT) network]; however, it was not in a form that was usable by the SMP. Changes to the processing of the ALERT data allowed the SMP to capitalize on the already installed and maintained ALERT rainfall gauges. Most of the monitoring stations were able to use data from nearby ALERT gauges. Those monitoring stations that do not have nearby ALERT gauges or have issues with overhead clearance (ME-SCR, ME-VR2, MO-CAM, MO-MEI, and MO-VEN) have tipping bucket rainfall gauges (0.01" per tip) installed and maintained by the SMP. From 2010 to February 2023, MO-HUE rainfall gauge was maintained by the SMP, however, this rain gauge was changed to an ALERT gauge and is now maintained by VCWPD's Hydrology Section as part of their ALERT network. Rainfall data from sites that use non-SMP rain gauges is considered "best available" at the time of the report. The data is subject to quality control review by the Hydrology Section, during which time the telemetered data (if available) is compared to the data logger and to other rainfall gauges in the area at the time to determine best accuracy prior to storing the data as official "archived" data. This typically occurs after the end of the water year and too late for inclusion in this Annual Report. This may result in some slight differences in rainfall amounts if queried later, but typically will not have a large effect for most storms. The rain gauges typically used for each site are shown in Table 1-1.

Table 1-1. Rain Gauges Used for Each Monitoring Station

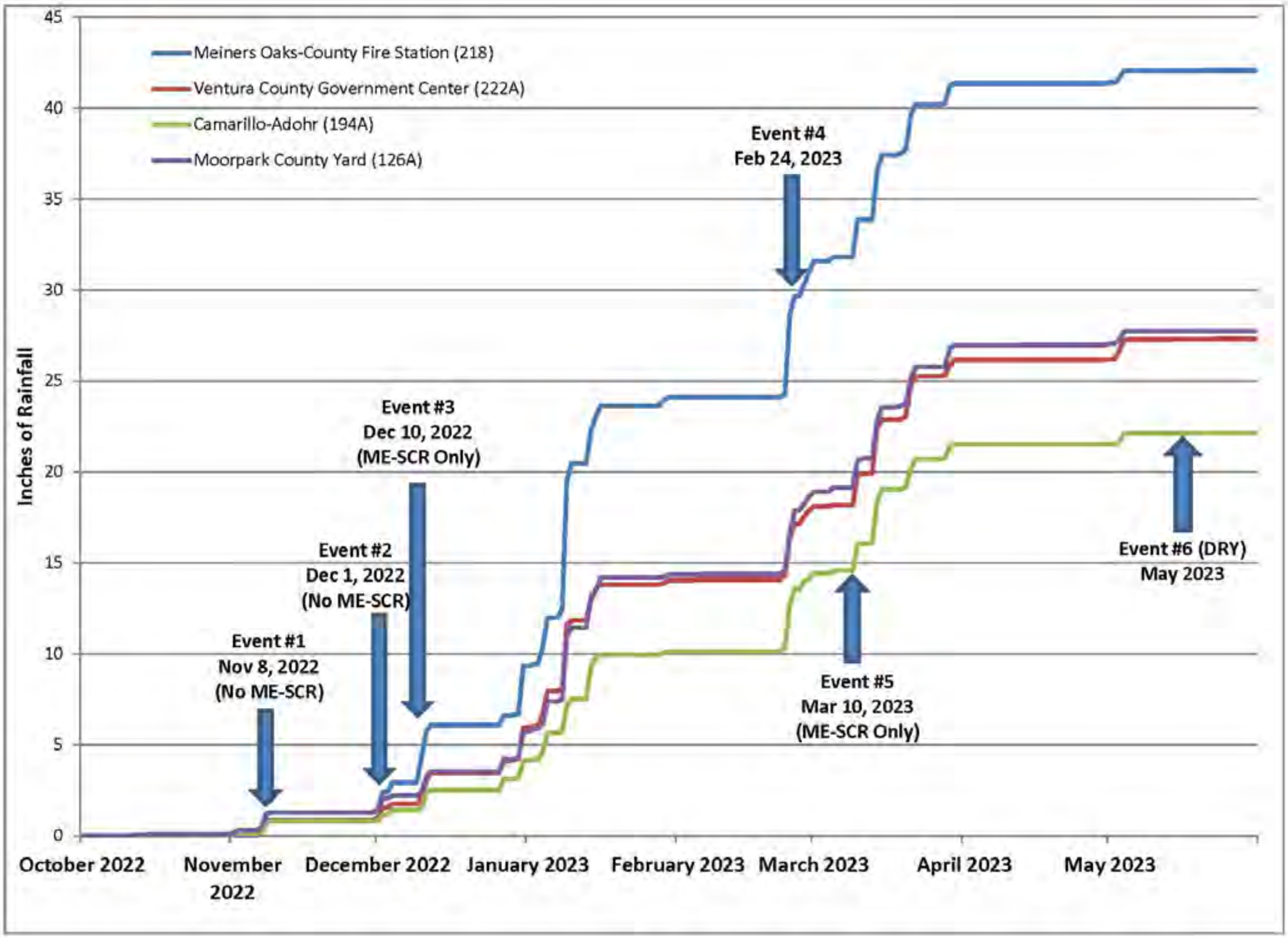
Site	Hydstra ID	Rain Gauge Type*	Rain Gauge Location	Gauge Maintained By	Data Transmission Type
ME-CC	H505	5050P	Calleguas Creek @ CSUCI	VCPWA-WP Hydrology	ALERT2 Radio
ME-SCR	ME-SCR	674	On-site ME-SCR	SMP	Telemetered-Flowlink
ME-VR2	ME-VR2	674	On-site ME-VR2	SMP	Telemetered-Flowlink

Site	Hydstra ID	Rain Gauge Type*	Rain Gauge Location	Gauge Maintained By	Data Transmission Type
MO-CAM	MO-CAM	674	On-site MO-CAM	SMP	Telemetered-Flowlink
MO-MEI	MO-MEI	674	On-site MO-MEI	SMP	Telemetered-Flowlink
MO-OJA	H165	TB3	Stewart Canyon	VCPWA-WP Hydrology	ALERT2 Radio
MO-VEN	MO-VEN	674	On-site MO-VEN	SMP	Telemetered-Flowlink
MO-FIL	H199A	TB3	Fillmore Sanitation	VCPWA-WP Hydrology	ALERT2 Radio
MO-MPK	H126A	TB3	Moorpark – County Yard	VCPWA-WP Hydrology	ALERT2 Radio
MO-OXN	MO-VEN	674	MO-VEN	SMP	Telemetered-Flowlink
MO-HUE**	MO-HUE/ H017	TB3	On-site MO-HUE	SMP/ VCPWA-WP Hydrology	Telemetered-Flowlink/ ALERT2 Radio
MO-SPA	H245B	TB3	Santa Paula – Wilson Ranch	VCPWA-WP Hydrology	ALERT2 Radio
MO-SIM	H246	TB3	Simi Sanitation	VCPWA-WP Hydrology	ALERT2 Radio
MO-THO	H128C	0.01in/ Unknown	Thousand Oaks	APCD	Telephone/ Text file

* Rain gauge types: ISCO 674, Hydrolynx 5050P, and Hydrological Services TB3 rain gauges are electronic tipping buckets. The Hydrolynx 5050P sends a pulse for every 1mm (0.04 inches) of rainfall, and the Hydrological Services TB3 and ISCO 674 send a pulse for every 0.01 inch of rain that is collected.
** The VCWPD-WP Hydrology Section took over maintenance and control for this gauge in February 2023.

While the rainfall gauges purchased and maintained by the SMP are of high quality, the data generated by these gauges are subjected to less stringent quality control measures than the "official" gauges maintained by the Hydrology Section. Therefore, the SMP has opted to show cumulative totals from representative ALERT gauges when indicating dates that actual sampling events occurred, as shown in Figure 1-2. Please note that this is preliminary data as this Annual Report is due before the records from the water year can receive full quality control review, however it does provide a good overview of wet season rainfall. Gauge 218 is in the Ojai Valley near the MO-MEI station. Gauge 222 is located at the County Government Center near the MO-VEN station. Gauge 194 is located at the base of the Conejo Grade, somewhat equidistant from the ME-CC and MO-CAM stations. Gauge 126A is located at the Moorpark County Yard near the MO-MPK station. Rainfall data gathered at specific monitoring stations can be found in Appendix B.

Figure 1-2 Precipitation at Selected Sites

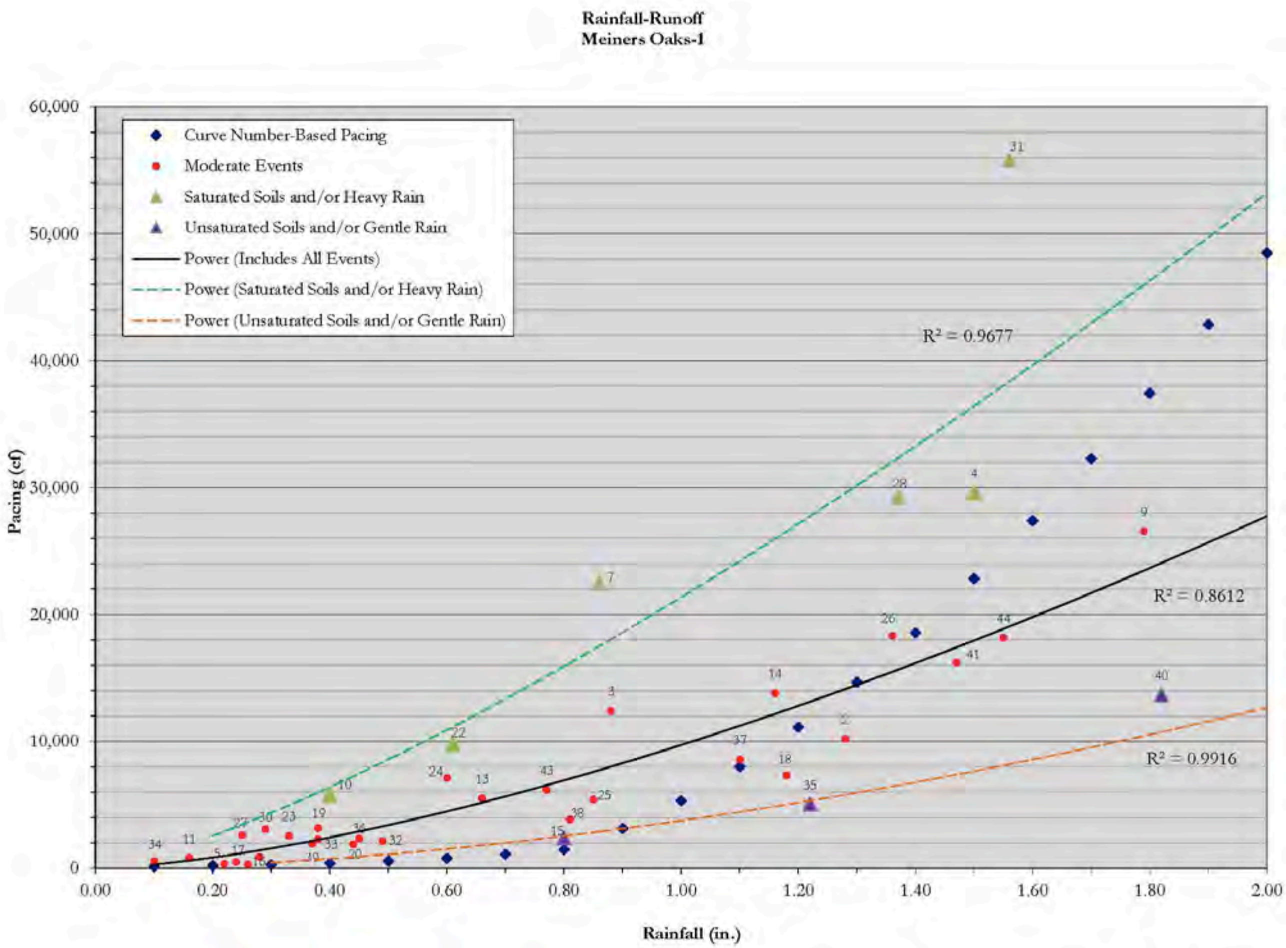


1.4.2 Rainfall-to-Runoff Ratios

Prior to starting monitoring under the new Permit (before monitoring season 2009/10), the SMP enlisted the VCWPD's Hydrology Section to assist in modeling the expected rainfall-to-runoff (RTR) ratio for each new major outfall station. The Hydrology Section used the NRCS Curve Number approach that is commonly used in hydrologic modeling. This model considers land use and soil types within each watershed but relies on using a wetter soil moisture condition than actually exists for all but the largest of rainfall events. Despite these known limitations, these RTR ratios represented a good beginning point for flow-weighted sampler pacing. A further description of the methods and limitations of this approach, as described by the Hydrology Section, can be found in Appendix C.

Since the stations have been in place, the SMP has refined these model results by comparing the runoff generated at each site with the corresponding rainfall, where runoff was sufficient to be sampled by the equipment and rainfall was greater than 0.1 inch. The SMP also tracks the antecedent soil moisture for each event, flagging it as "Dry", "Moderate", or "Wet". This allows the SMP to more accurately pace automated samplers based on the predicted size of each storm. Figure 1-3 shows an example of these pieces of information, as a function of the proper pacing of the automated sampler (see Section 1.4.3 for a further description of sampler pacing).

Figure 1-3. Example of Rainfall-to-Runoff Modeling Versus Actual Rainfall Events



1.4.3 **Flow-Paced Sampling**

To compute flow (or to measure water level at time-paced sites), ISCO flow meters are installed at all stations except MO-HUE (where the pump station prevents water level and flow from being able to be measured accurately).

ISCO 4230 bubblers are used to measure water height (stage) at MO-FIL and all flow-paced stations except MO-SPA, which uses an ISCO 2150 area-velocity meter instead. By measuring pressure head and relating it to a rating table, the 4230s can calculate instantaneous discharge. Measurement accuracy of the 4230 is not affected by wind, steam, foam, turbulence, suspended solids, or rapidly changing head heights. For concrete channels (i.e. MO-CAM, MO-FIL, MO-MEI, MO-MPK, MO-OJA, MO-OXN, MO-SIM, and MO-VEN), the water level must reach the toe of the channel to come into communication with the 4230 tubing for stage measurements and corresponding flow calculations. This means that water levels from the channel invert to the toe are unable to be measured and so sampling begins after water levels rise above this height. Bubbler flow meters are extremely low maintenance and highly reliable and were, therefore, chosen over other contact (ISCO 2150 area-velocity) and non-contact (ISCO 4210 ultrasonic) types of flow measuring devices when possible. 2150 area-velocity meters use Doppler technology to directly measure average velocity in the flow stream, while the integral pressure transducer measures liquid depth to determine flow area. The 2150 then calculates flow rate by multiplying the area of the flow stream by its average velocity. The 2150 is best for applications where weirs or flumes are not practical, or where submerged, full pipe, surcharged, and reverse flow conditions may occur, such as at the MO-SPA monitoring site. Flow meters are installed at two time-paced sites (4230 at MO-FIL and ISCO 4210 ultrasonic at ME-SCR) to provide information about water level only, as flow cannot be calculated at these sites.

Flow-paced sampling involves collecting sub-samples (aliquots) on a volumetric flow interval basis, with a set aliquot volume collected after the passage of each equal, pre-set flow volume, and then compositing these aliquots into one sample for analysis. In its simplest terms, flow-paced sampling can be achieved by estimating the total flow that will pass a sampling location (which, itself, is dependent on predicted rainfall amounts and intensities) and dividing that by the number of aliquots to be taken. Using Figure 1-3 above as an example, an approximate 0.6" rainfall event would generate about 0.25 million cubic feet of runoff, which when divided by 35 (the number of aliquots the SMP attempts to take per event at each site) provides the proper pacing of around 7,000 cubic feet per aliquot (see data point #24). As mentioned above, this pacing volume is highly dependent on other variables such as rainfall intensity and antecedent soil moisture conditions.

Although composite samplers are automated, SMP staff actively monitored storm and flow conditions during each event to adaptively adjust the sampler to capture the best representation of storm flow. This was made possible by the telemetry capabilities of the SMP. Prior to the 2009/10 monitoring season, SMP staff members were required to visit each site as the timing and amounts of predicted rainfall changed. Each site is now equipped with a cellular modem that allows remote changes to sampler pacing, enabling conditions and alarms. Furthermore, the data from each of these sites is pushed via a private static IP address to a centrally located SQL server and is accessible in near real-time format. Due to this set-up, site visits were only necessary to set up the site initially, take grab samples, collect composite sample bottles, and correct physical problems with the site. A schematic of this set-up is shown in Figure 1-4. An example of the data available to SMP staff in the Storm Control Center is shown in Figure 1-5.

Figure 1-4. Schematic of Remote Data Delivery and Access

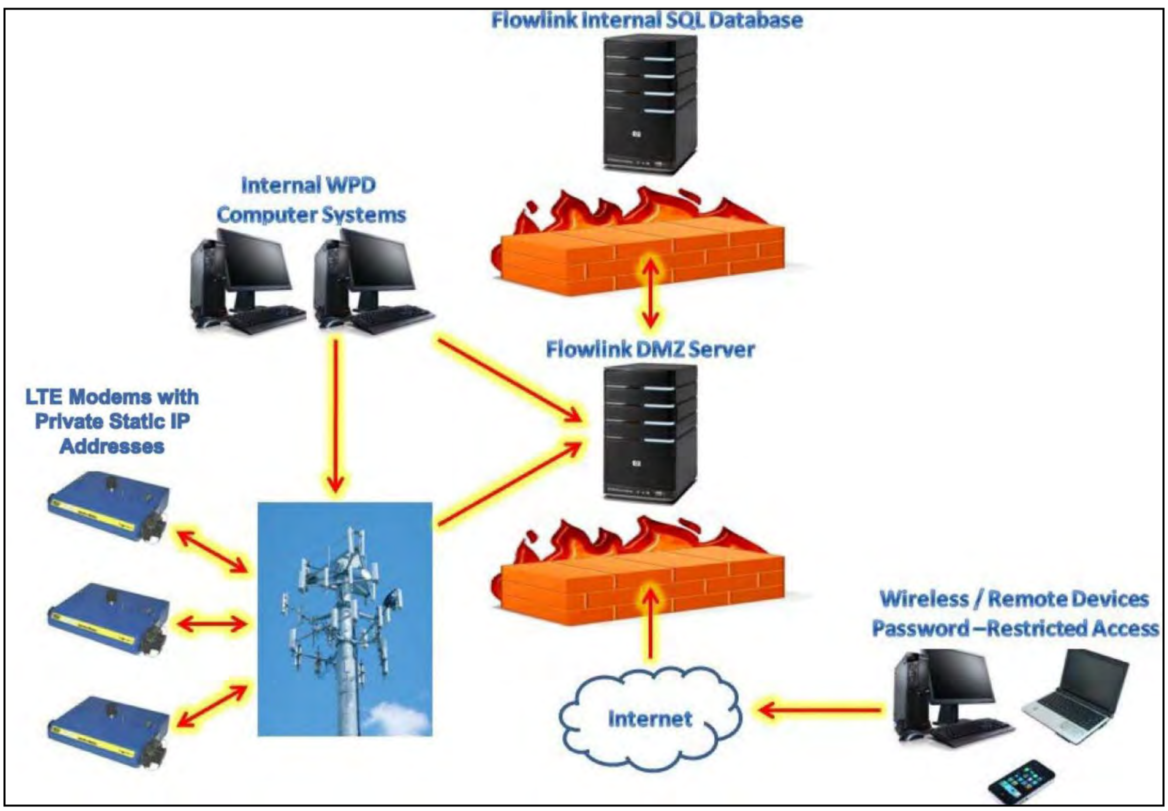


Figure 1-5. Real-Time Data Available in Storm Control Center

1.4.4 **Sample Collection**

As detailed in the 2010 Permit, the SMP is to sample one dry-weather and three wet-weather events at the mass emission and major outfall stations during each Permit year. Wet-weather events are described as “discharge resulting from a storm event that is 0.25 inches or greater” preceded by at least 7 days of dry weather (<0.10” each day). Mass emission station wet-weather events have the additional criteria of a greater than 20% increase in base flow. The Permit emphasizes capturing the first event of the year, as well as the first part of each storm, both of which can be described as the first flush.

Composite and grab samples were collected at all mass emission and major outfall stations, when possible. Composite samples were collected in glass containers and then delivered to the lab, where they were split by agitating the bottle, pouring off the necessary volume into a sample bottle, and repeating as necessary. When the splitting of a composite sample was performed, the composite sample was continually agitated to provide as much "non-invasive" mixing as possible. Sample splitting allows homogeneous aliquots of a single, large water sample to be divided into several smaller sub-samples for different analyses. The volume of sample collected depended upon the volume required by the lab to perform requested water quality and QA/QC analyses.

Grab samples were collected for constituents that are not suitable for composite sampling (e.g. cannot use an intermediary container, are likely to volatilize, or require immediate preservation). Grab samples were taken as close to mid-stream, mid-depth as possible by immersing the sample bottle directly in the water. In some situations, site conditions precluded such sampling and alternative sampling techniques were used. At the larger, deeper mass emission stations, grab samples were often gathered near the bank, but still in positive flow, with the help of a long, extended swing sampler (see Figure 1-6) when necessary. This technique was also employed at some of the major outfall stations where getting into the channel would have compromised personnel safety.

For constituents analyzed from samples required to be collected as “grabs,” samples were ideally taken at the peak runoff flow to provide the best estimate for an event mean concentration (EMC). In practice, it was difficult to both predict the peak flow for each site and to allocate manpower such that all sites were grab-sampled at the storm event peak flow. It should be noted that peak flow times varied for each monitoring station due to the size and inherent characteristics of the watershed in which the site was located, as well as varying durations and intensities of rainfall. All grab and composite wet weather samples collected during the 2022/23 monitoring season are considered best available estimates of storm EMCs.

The chemical analysis of some constituents is not possible to be accurately performed on samples transported to a laboratory setting and must be performed in the field. These constituents were analyzed at the time when grab samples were collected using pre-calibrated field meters. All field meters were calibrated according to manufacturers’ directions, using vendor-supplied calibration solutions where applicable.

Figure 1-6. Grab Sampling Using Extended-Reach Swing Sampler

The SMP also documented the samples it collected at each monitoring site during an event, including the date and time of collection, by completing a chain of custody (COC) form for each sampling event. The COC form not only documented sample collection, but also notified the analytical laboratories about which samples should be analyzed for a certain constituent or group of constituents, oftentimes specifying the analytical method to be employed. Finally, the COC form acted as an evidentiary document noting how many samples were relinquished – and at what date and time – to a particular laboratory by the SMP. All chain of custody forms associated with the 2022/23 monitoring year are presented in Appendix E.

To maintain quality control for the sampling program, the SMP, in cooperation with the analytical laboratories, has minimized the number of laboratories and sample bottles used for analysis. This has minimized bottle breakage, increased efficiency, and reduced the chances for contamination of the samples. Also, dedicated monitoring team leaders were used to provide consistent sample collection and handling.

As a means of documenting all preparatory, operational, observational, and concluding activities of a monitoring event, the SMP produced an event summary for each monitoring event. These event summaries include, but are not limited to, information related to event duration, predicted and actual precipitation, weather conditions, the programming of sampling equipment, equipment malfunctions, sample collection and handling, and sample tracking with respect to delivery to analytical laboratories. All event summaries associated with the 2022/23 monitoring season are presented in Appendix D.

Figure 1-7. Typical Wet-Season, Dry-Weather Sampling Configuration

During the dry sampling events, SMP staff deployed sand-weighted silicone dams where necessary to allow very low flows to pool up to sampleable depths. This provided the depth needed to submerge the grab bottles and/or automated sampler intake line to facilitate successful sample collection (see Figure 1-7). This innovative technique is further discussed in *Ventura Countywide Stormwater Monitoring Program: Water Quality Monitoring Standard Operating Procedures, 2009-2014*.

The QA/QC sampling schedule was designed to be flexible in response to changing conditions, with the analytical chemistry laboratory being instructed to utilize SMP samples for MS/MSD and laboratory duplicate analyses when sample volume was sufficient, rather than for specific sites for each event. This flexibility is of benefit for several reasons. First, as is often the case, rainfall duration and intensity were difficult to predict, especially in the early part of the season. Second, dry antecedent conditions made forecasting flow conditions at the various monitoring locations complicated. Finally, site-specific complications can affect sample volume. An example of this is the operation of the diversion canal at ME-SCR by UWCD, which can leave the primary intake line of the sampler out of contact with the water, thereby causing insufficient sample volume as the sampler pulls air instead of river water. The SMP has attempted to deal with the situation at this site by installing a swing arm intake line, which is designed to stay submerged at changing water levels however the shortage of sampleable events since installation prevented the verification of the new model for all conditions. The flexibility in QA/QC sampling station selection allows the laboratory more options for using SMP samples for QA/QC tests than would otherwise be possible, due to the ability to select sites with surplus sample volume.

The sampling methods and sample handling procedures are described in *Ventura Countywide Stormwater Monitoring Program: Water Quality Monitoring Standard Operating Procedures, 2009-2014*.

1.4.5 Analyses Performed

Attachment G (Minimum Levels) of the Permit lists the constituents to be analyzed for each event[8]. In addition to this broad suite of constituents, Attachment B (Pollutants of Concern) specifies site-specific constituents that have been identified as problematic pollutants in previous years of water quality sampling. These, and any unrequested constituents for which results are obtained during method analysis, were incorporated into the sampling program and appear in the tables below.

[8] For Permit Sections A. Mass Emission and B. Major Outfalls only. The constituents for Section C. Dry Weather Analytical Monitoring are listed separately in that section and are detailed in Section 1.13.1of this report.

Table 1-2 shows those constituents that were gathered as discrete samples. Table 1-3 shows those constituents that were gathered as composite samples. Bolded constituents are required by the Permit. Constituents in italics are also measured by the method so results are available even though they are not required by the Permit. Some constituents are measured by more than one analytical method which can yield significantly different results. Since 2009, the SMP has utilized some non-40 CFR 136 approved analytical methods to target the low Minimum Levels (ML) listed in Attachment G of the Permit. Prior to July 2019, the SMP considered the method with the lowest Reporting Limit (RL) as primary, based on the recommendation of the laboratory at the time. In reviewing this evaluation method and based on updated guidance from the analytical laboratory, the SMP determined that the method with the lowest RL may not be the most representative of the level of the constituent due to differences in the matrices for which the analytical methods are intended; and that in keeping with Section K.4(a) of Attachment F of the Permit, the 40 CFR 136 method should be considered the primary method. A letter explaining the change was sent to the Regional Board Executive Officer on July 19, 2019. As of July 2019, the SMP considers the 40 CFR 136 approved method to be primary. This applies to phenols (including pentachlorophenol), bis(2-ethylhexyl)phthalate, and polycyclic aromatic hydrocarbons (PAHs). The primary method for all affected constituents is now EPA 625.1. The three non-40 CFR 136 methods used to obtain lower RLs for these constituents are EPA 515.3 and EPA 525.2 (drinking water methods), and EPA 8270C (wastewater method). The methods/analytes analyzed for lower detection limits that are not 40 CFR 136 approved are asterisked in the tables below.

All laboratory chemical analyses of environmental samples and preseason equipment blank samples were performed by Weck Laboratories, Inc. Analyses for fecal indicator bacteria were performed by the Ventura County Public Health Laboratory. Toxicity testing was performed by Aquatic Bioassay & Consulting Laboratories, Inc.

Table 1-2. Constituents Derived from Discrete (Grab) Samples

Method	Classification	Constituent
MMO-MUG	Bacteriological	**Total Coliform**
MMO-MUG	Bacteriological	***E. coli***
~~**SM 9221 E**~~	~~Bacteriological~~	~~Fecal Coliform~~[9]
~~**Enterolert**~~	~~Bacteriological~~	~~Enterococcus~~[10]
ASTM D7511	Conventional	**Cyanide**
EPA 624.1[11]	Organic	**2-Chloroethyl vinyl ether**
	Organic	**Methyl tert-butyl ether (MTBE)**
EPA 1664B	Hydrocarbon	**Oil and Grease**
EPA 8260B[12]	Hydrocarbon	*Gasoline Range Organics* (part of **TPH**)
Varies	Toxicity	**Toxicity**
Field Meter	Conventional	Conductivity
	Conventional	DO (%)
	Conventional	**DO (mg/L)**
	Conventional	**pH**
	Conventional	Salinity

[9] Fecal coliform is no longer included in the bacteriological analyses as of May 23, 2018, when the Regional Board authorized the exclusion of fecal coliform from the POC and Minimum Levels list of the Permit, based on the elimination of fecal coliform as a freshwater REC-1 standard in 2010. The authorization occurred after the end of the 2017/18 wet season and prior to the 2017/18 dry event.

[10] Enterococcus is no longer included in the bacteriological analyses as of the end of the 2016/17 monitoring year as it is a marine water requirement (not freshwater), not listed as a Pollutant of Concern (POC) and is not recommended as a fecal indicator bacteria (FIB) for freshwater.

[11] EPA 624.1 replaced EPA 624 beginning in 2020/21-1

[12] EPA 8260B replaced LUFT GC/MS beginning in 2020/21-1

Conventional	**Specific Conductance**
Conventional	**Temperature**

Table 1-3. Constituents Derived from Composite Samples

Method	Classification	Constituent
EPA 160.4	Conventional	**Volatile Suspended Solids**
EPA 180.1	Conventional	**Turbidity**
EPA 200.7	Cation	*Calcium*
	Cation	*Magnesium*
	Conventional	**Hardness as CaCO3**
	Metal	**Iron, total**
	Metal	**Iron, dissolved**
	Nutrient	**Phosphorus as P, total**[13]
	Nutrient	**Phosphorus as P, dissolved**[7]
EPA 200.8	Metal	**Aluminum, total**
	Metal	**Aluminum, dissolved**
	Metal	**Antimony, total**
	Metal	**Antimony, dissolved**
	Metal	**Arsenic, total**
	Metal	**Arsenic, dissolved**
	Metal	**Beryllium, total**
	Metal	**Beryllium, dissolved**
	Metal	**Cadmium, total**
	Metal	**Barium, total (POC at ME-CC & ME-SCR)**
	Metal	**Cadmium, dissolved**
	Metal	**Chromium, total**
	Metal	**Chromium, dissolved**
	Metal	**Copper, total**
	Metal	**Copper, dissolved**
	Metal	**Lead, total**
	Metal	**Lead, dissolved**
	Metal	**Nickel, total**
	Metal	**Nickel, dissolved**
	Metal	**Selenium, total**
	Metal	**Selenium, dissolved**
	Metal	**Silver, total**
	Metal	**Silver, dissolved**
	Metal	**Thallium, total**
	Metal	**Thallium, dissolved**
	Metal	**Zinc, total**
	Metal	**Zinc, dissolved**
EPA 218.6	Metal	**Chromium VI**
EPA 245.1	Metal	**Mercury, total**
	Metal	**Mercury, dissolved**
EPA 300.0	Anion	**Chloride**
	Anion	**Fluoride**

[13] In the 2018/19 monitoring year, Weck Laboratories, Inc. changed their method for phosphorus from EPA 365.1 to EPA 200.7. EPA 200.7 has a higher reporting limit (0.02 mg/l vs 0.01 mg/L) but requires less dilution and therefore should typically have better reporting limits.

Method	Classification	Constituent
EPA 314.0/331	Anion	**Perchlorate**
EPA 350.1	Nutrient	**Ammonia as N**
EPA 351.2	Nutrient	**TKN**
EPA 353.2	Nutrient	**Nitrate + Nitrite as N**
	Nutrient	**Nitrate as N (ME-CC only)**
EPA 410.4	Conventional	**COD**
EPA 420.4	Conventional	**Phenolics**
EPA 515.4[14]	Pesticide	*2,4,5-T*
	Pesticide	**2,4,5-TP**
	Pesticide	**2,4-D**
	Pesticide	*2,4-DB*
	Pesticide	*3,5-Dichlorobenzoic acid*
	Pesticide	*Acifluorfen*
	Pesticide	*Bentazon*
	Pesticide	*Dalapon*
	Pesticide	*DCPA (Dacthal)*
	Pesticide	*Dicamba*
	Pesticide	*Dichlorprop*
	Pesticide	*Dinoseb*
	Pesticide	**Pentachlorophenol***
	Pesticide	*Picloram*
EPA 525.2	Organic	**Benzo(a)pyrene***
	Organic	*Bis(2-ethylhexyl)adipate*
	Organic	**Bis(2-ethylhexyl)phthalate***
	Pesticide	*Alachlor*
	Pesticide	**Atrazine**
	Pesticide	*Bromacil*
	Pesticide	*Butachlor*
	Pesticide	*Captan*
	Pesticide	*Chloropropham*
	Pesticide	**Cyanazine**
	Pesticide	**Diazinon**
	Pesticide	*Dimethoate*
	Pesticide	*Diphenamid*
	Pesticide	*Disulfoton*
	Pesticide	*EPTC*
	Pesticide	*Metolachlor*
	Pesticide	*Metribuzin*
	Pesticide	*Molinate*
	Pesticide	*Prometon*
	Pesticide	**Prometryn**
	Pesticide	**Simazine**
	Pesticide	*Terbacil*
	Pesticide	*Thiobencarb*
	Pesticide	*Trithion*
EPA 547	Pesticide	**Glyphosate**

[14] The laboratory replaced EPA 515.3 with EPA 515.4 between the end of the 2018/19 wet season and prior to the 2018/19 dry event.

Method	Classification	Constituent
EPA 608.3[15]	PCB	**PCB Aroclor 1016**
	PCB	**PCB Aroclor 1221**
	PCB	**PCB Aroclor 1232**
	PCB	**PCB Aroclor 1242**
	PCB	**PCB Aroclor 1248**
	PCB	**PCB Aroclor 1254**
	PCB	**PCB Aroclor 1260**
	Pesticide	**4,4'-DDD**
	Pesticide	**4,4'-DDE**
	Pesticide	**4,4'-DDT**
	Pesticide	**Aldrin**
	Pesticide	**alpha-BHC**
	Pesticide	**alpha-Chlordane**
	Pesticide	**beta-BHC**
	Pesticide	Chlordane (technical)
	Pesticide	**delta-BHC**
	Pesticide	**Dieldrin**
	Pesticide	**Endosulfan I**
	Pesticide	**Endosulfan II**
	Pesticide	**Endosulfan sulfate**
	Pesticide	**Endrin**
	Pesticide	**Endrin aldehyde**
	Pesticide	**gamma-BHC (Lindane)**
	Pesticide	**gamma-Chlordane**
	Pesticide	**Heptachlor**
	Pesticide	**Heptachlor epoxide**
	Pesticide	**Methoxychlor**
	Pesticide	**Toxaphene**
EPA 625.1[16]	Organic	**1,2,4-Trichlorobenzene**
	Organic	**1,2-Dichlorobenzene**
	Organic	**1,2-Diphenylhydrazine**
	Organic	**1,3-Dichlorobenzene**
	Organic	**1,4-Dichlorobenzene**
	Organic	**2,4,6-Trichlorophenol**
	Organic	**2,4-Dichlorophenol**
	Organic	**2,4-Dimethylphenol**
	Organic	**2,4-Dinitrophenol**
	Organic	**2,4-Dinitrotoluene**
	Organic	**2,6-Dinitrotoluene**
	Organic	**2-Chloronaphthalene**
	Organic	**2-Chlorophenol**
	Organic	**2-Nitrophenol**
	Organic	**3,3'-Dichlorobenzidine**

[15] EPA 608 was replaced by EPA 608.3 on the 40 CFR 136 approved list of methods and so the updated method was used beginning with 2019/20-1.

[16] EPA 625 was replaced by EPA 625.1 on the 40 CFR 136 approved list of methods and so the updated method was used beginning with 2019/20-1.

Method	Classification	Constituent
	Organic	**4,6-Dinitro-2-methylphenol**
	Organic	**4-Bromophenyl phenyl ether**
	Organic	**4-Chloro-3-methylphenol**
	Organic	**4-Chlorophenyl phenyl ether**
	Organic	**4-Nitrophenol**
	Organic	**Acenaphthene**
	Organic	**Acenaphthylene**
	Organic	**Anthracene**
	Organic	**Benz(a)anthracene**
	Organic	**Benzidine**
	Organic	**Benzo(a)pyrene**
	Organic	**Benzo(b)fluoranthene**
	Organic	**Benzo(g,h,i)perylene**
	Organic	**Benzo(k)fluoranthene**
	Organic	**Bis(2-chloroethoxy)methane**
	Organic	**Bis(2-chloroethyl)ether**
	Organic	**Bis(2-chloroisopropyl)ether**
	Organic	**Bis(2-ethylhexyl)phthalate**
	Organic	**Butyl benzyl phthalate**
	Organic	**Chrysene**
	Organic	**Dibenz(a,h)anthracene**
	Organic	**Diethyl phthalate**
	Organic	**Dimethyl phthalate**
	Organic	**Di-n-butylphthalate**
	Organic	**Di-n-octylphthalate**
	Organic	**Fluoranthene**
	Organic	**Fluorene**
	Organic	**Hexachlorobenzene**
	Organic	**Hexachlorobutadiene**
	Organic	**Hexachlorocyclopentadiene**
	Organic	**Hexachloroethane**
	Organic	**Indeno(1,2,3-cd)pyrene**
	Organic	**Isophorone**
	Organic	**Naphthalene**
	Organic	**Nitrobenzene**
	Organic	**N-Nitrosodimethylamine**
	Organic	**N-Nitrosodi-N-propylamine**
	Organic	**N-Nitrosodiphenylamine**
	Organic	**Phenanthrene**
	Organic	**Phenol**
	Organic	**Pyrene**
	Pesticide	**Pentachlorophenol**
EPA 625.1m[17]	Pesticide	*Azinphos methyl*
	Pesticide	*Bolstar*
	Pesticide	**Chlorpyrifos**
	Pesticide	*Coumaphos*

[17] Changed from EPA 525.2m to EPA 625.1m starting with 2020/21-1 for 40CFR136 approved method for chlorpyrifos and malathion.

Method	Classification	Constituent
	Pesticide	*Demeton-O*
	Pesticide	*Demeton-S*
	Pesticide	**Diazinon**
	Pesticide	*Dichlorvos*
	Pesticide	*Dimethoate*
	Pesticide	*Disulfoton*
	Pesticide	*Ethoprop*
	Pesticide	*Ethyl parathion*
	Pesticide	*Fensulfothion*
	Pesticide	*Fenthion*
	Pesticide	**Malathion**
	Pesticide	*Merphos*
	Pesticide	*Methyl parathion*
	Pesticide	*Mevinphos*
	Pesticide	*Naled*
	Pesticide	*Phorate*
	Pesticide	*Ronnel (Fenchlorphos)*
	Pesticide	*Stirophos (Tetrachlorvinphos)*
	Pesticide	*Tokuthion*
	Pesticide	*Trichloronate*
EPA 8015B	Hydrocarbon	*Diesel Range Organics* (part of **TPH**)
	Hydrocarbon	*Oil Range Organics* (part of **TPH**)
EPA 8270C*	Organic	*1-Methylnaphthalene*
	Organic	*2,4,5-Trichlorophenol*
	Organic	**2,4,6-Trichlorophenol**
	Organic	**2,4-Dichlorophenol**
	Organic	**2,4-Dimethylphenol**
	Organic	**2,4-Dinitrophenol**
	Organic	**2-Chlorophenol**
	Organic	*2-Methylnaphthalene*
	Organic	*2-Methylphenol*
	Organic	**2-Nitrophenol**
	Organic	*3-/4-Methylphenol*
	Organic	**4,6-Dinitro-2-methylphenol**
	Organic	**4-Chloro-3-methylphenol**
	Organic	**4-Nitrophenol**
	Organic	**Acenaphthene**
	Organic	**Acenaphthylene**
	Organic	**Anthracene**
	Organic	**Benz(a)anthracene**
	Organic	**Benzo(a)pyrene**
	Organic	**Benzo(b)fluoranthene**
	Organic	**Benzo(g,h,i)perylene**
	Organic	**Benzo(k)fluoranthene**
	Organic	**Chrysene**
	Organic	**Dibenz(a,h)anthracene**
	Organic	**Fluoranthene**
	Organic	**Fluorene**
	Organic	**Indeno(1,2,3-cd)pyrene**
	Organic	**Naphthalene**
	Organic	**Phenanthrene**
	Organic	**Phenol**

Method	Classification	Constituent
	Organic	**Pyrene**
	Pesticide	**Pentachlorophenol**
SM 2320 B	Conventional	**Alkalinity as CaCO3**
SM 2510 B	Conventional	**Specific Conductance**
SM 2540 C	Conventional	**Total Dissolved Solids**
SM 2540 D	Conventional	**Total Suspended Solids**
SM 4500-Cl G	Conventional	**Total Chlorine Residual (ME-CC only)**
SM 5210 B	Conventional	**BOD**
SM 5310 B[18]	Conventional	**Total Organic Carbon**
SM 5540 C	Conventional	**MBAS**

Bold: Permit required constituent
Italics: Constituent not required by Permit.
* Analyzed for lower detection limits, but not 40 CFR 136 approved.

EPA 625.1 vs Non-Primary Methods

EPA 625.1 is a 40 CFR 136 approved gas chromatography mass spectrometry (GCMS) method intended for use with wastewater matrices, which tends to have higher RLs than the other methods and it requires dilutions more frequently, which raises the already typically higher RLs and can obscure the presence of constituents at lower concentrations. It also contains more steps than some of the other methods which introduces greater risk of laboratory contamination (especially phthalates).

The three non-primary methods used to obtain lower RLs that are not 40 CFR 136 approved are EPA 515.3 and EPA 525.2 (drinking water methods), and EPA 8270C (wastewater method). The drinking water methods contain fewer steps and were originally selected because they rarely require dilutions and therefore their reporting limits stay low, however it was recently determined that they may not be accurate for a stormwater matrix (however they would still be appropriate for laboratory/equipment/field blank samples). EPA 525.2 is 40 CFR 136 approved for atrazine, diazinon, prometryn, and simazine (permit-required pesticides) but not for bis(2-ethylhexyl)phthalate or benzo(a)pyrene. EPA 8270C is a GCMS method intended for wastewater matrices and is very similar to EPA 625.1 with similar extraction and analysis steps however while EPA 8270C RLs are typically lower, it is not 40 CFR 136 approved.

1.5 2022/23 MONITORING SEASON

Rainfall for the 2022/23 water year was well above average, which was a marked change from the very dry antecedent conditions resulting from the preceding years, including the driest year record for Ventura County set in the 2020/21 water year. Rain started in November, with a series of storms in December-January and February-March contributing to water year totals of approximately twice the average rainfall across the county. The very dry antecedent conditions at the start of the water year resulted in no sampleable runoff at ME-SCR during the first two sampled storms (November 8, 2022 and December 1, 2022), however these storms charged the watershed sufficiently for sampleable runoff to occur by December 10, 2022 at ME-SCR, but this storm was not logistically sampleable at the other stations due to its proximity to the previous sampled event (December 1, 2022). All stations except ME-SCR were sampled during wet Events 1 and 2, only ME-SCR was sampled during wet Events 3 and 5, and all stations were sampled during wet Event 4. The dry event (Event 6) was sampled for

[18] The laboratory changed its organic and inorganic carbon method from SM 5310 C to SM 5310 B in September 2017.

all sites except MO-OXN and MO-SPA, which were dry, so sampling was not attempted at these sites. These should not be interpreted as missed samples, rather as zero discharge of pollutants since removing dry weather flows is a goal of the Program.

Table 1-4. Monitoring Site Summary

Major Outfall Site ID	Jurisdiction	Receiving Water	Watershed	Receiving Water Site ID
MO-CAM [1]	Camarillo	Revolon Slough	Calleguas Creek	ME-CC
MO-MPK	Moorpark	Arroyo Simi	Calleguas Creek	ME-CC
MO-SIM	Simi Valley	Arroyo Simi	Calleguas Creek	ME-CC
MO-THO	Thousand Oaks	Conejo Creek	Calleguas Creek	ME-CC
MO-FIL	Fillmore	Santa Clara River	Santa Clara River	ME-SCR
MO-SPA	Santa Paula	Santa Clara River	Santa Clara River	ME-SCR
MO-OXN [1]	Oxnard	Santa Clara River	Santa Clara River	ME-SCR
MO-VEN [1]	Ventura	Santa Clara River	Santa Clara River	ME-SCR
MO-MEI	Unincorporated	Ventura River	Ventura River	ME-VR2
MO-OJA	Ojai	San Antonio Creek	Ventura River	ME-VR2
MO-HUE [2]	Port Hueneme	tšumaš (Chumash) Creek	Ormond Lagoon	NA

[1] This major outfall station discharges below the associated receiving water station. For comparison purposes it is assumed that pollutant concentrations in the receiving water downstream of the outfall remain the same as those measured at the receiving water station to represent a hypothetical compliance point below the confluence of the major outfall and the receiving water.
[2] Backwater effects from Ormond Lagoon preclude the installation of a mass emission station for this major outfall.

Table 1-5. Site Summary

Receiving Water Station	ME-CC	ME-SCR	ME-VR2	NA
Associated Major Outfall Station	MO-CAM [1] MO-MPK MO-SIM MO-THO	MO-FIL MO-SPA MO-OXN [1] MO-VEN [1]	MO-MEI MO-OJA	MO-HUE [2]
Sample Media	Water	Water	Water	Water

[1] This major outfall station discharges below the associated receiving water station. For comparison purposes it is assumed that pollutant concentrations in the receiving water downstream of the outfall remain the same as those measured at the receiving water station to represent a hypothetical compliance point below the confluence of the major outfall and the receiving water.
[2] Backwater effects from Ormond Lagoon preclude the installation of a mass emission station for this major outfall.

1.5.1 Monitoring Event Descriptions

Event 1 (Wet)

The first significant storm and first sampled event of the wet season was November 8, 2022. Forecasts were varied, with National Weather Service predicting 1-3" coast/valleys and 2-5" foothills/mountains for a multi-day (36-48-hr) period, which was more than other forecasters. Sites were programmed for 0.75-1.25" rainfall. Actual rainfall at the SMP sites was 0.51-1.25" over 3 days, with most of the rain falling on November 8, 2022. Toxicity, bacteria, and chemistry grab samples were collected on November 8 and chemistry composite samples were collected on November 8 and 9. All sites were sampled for this first flush event except ME-SCR, which did not respond to rainfall due to very dry antecedent conditions so was not sampled. A grab field blank was collected at MO-OJA and field duplicate was collected at MO-CAM.

Event 2 (Wet)

The second monitoring event of the season occurred December 2-3, 2022. Initial forecasts were for 1-2" coast/valleys and 2-4” mountains over a 12-24 hour period but dropped/varied significantly leading up to event to a range of 0-1". Sites were programmed for 0.25". Actual rainfall was 0.3-1” at SMP stations. A field blank and field duplicate were collected at MO-HUE.

Event 3 (Wet)

Event 3 was sampled December 10, 2022 for ME-SCR only. Sufficient rainfall had fallen to result in sampleable first flush stormwater runoff. Forecast rainfall was 1-2" coast/valleys and 2-5” mountains over a 12-24 hour period, and actual rainfall was 1.18" at ME-SCR NPDES monitoring station, ~3-5" in the upper Santa Clara River Watershed. The first flush toxicity sample was collected at ME-SCR. The other stations in the watershed were not sampled due to insuffient time between storms for composite bottle cleaning and return from the laboratory.

Event 4 (Wet)

Event 4 was sampled February 24-25, 2022 for all sites and watersheds. This was the first storm after a series of storms in December and January which included one of the largest storm events for the Ventura River Watershed in recorded Ventura County history. National Weather Service forecast 2-4" coasts and valleys, and 3-6" foothills and mountains with snow down to ~1500'. Actual rainfall was ~2-6” across the County.

Event 5 (Wet)

Event 5 was sampled March 10, 2023 for ME-SCR only as a make-up event due to lack of hydrological response in Events 1 and 2, and toxicity only at the proposed Malibu Creek Watershed receiving water location (RW-LC1) for most sensitive species screening for the 2021 Regional Permit. National Weather Service forecast for Ventura and Los Angeles counties was 0.75 to 1.5” rain with local amounts up to 3” in the foothills and mountains. Actual rainfall was ~1.5”-2” across the county sites, with ~1.6” at ME-SCR and ~1.1” at RW-LC1.

Event 6 (Dry)

The dry-weather sampling was organized and conducted in three parts (by major watershed) during May 2023. Grab sampling did not include EPA 624 (volatile organics) as sites met Permit requirements for reduced monitoring for this constituent.

The Calleguas Creek Watershed sites (ME-CC, MO-CAM, MO-SIM, MO-MPK, and MO-THO) were sampled on May 15-16, 2023, after approximately 10 days of dry weather. All sites were sampled.

Sampling was conducted at the Santa Clara River Watershed sites (ME-SCR, MO-FIL, MO-SPA, MO-OXN, and MO-VEN) May 17-18, 2023, after approximately 12 days of dry weather since the previous storm. ME-SCR, MO-VEN, and MO-FIL were sampled but MO-SPA and MO-OXN were dry so could not be sampled.

The Ventura River Watershed sites (ME-VR2, MO-OJA, and MO-MEI) and the Port Hueneme site (MO-HUE) were sampled May 22-23, 2023, after approximately 17 days of dry weather.

A summary of the site status for each monitored event is provided in Table 1-6.

Table 1-6. 2022/23 Site and Event Status

	Event 1 (wet)	**Event 2 (wet)**	**Event 3 (wet)**	**Event 4 (wet)**	**Event 5 (wet)**	**Event 6 (dry)**
MO-HUE		Field blank Field duplicate	NS		NS	
<u>ME-CC</u>			NS		NS	
MO-CAM	Field duplicate		NS		NS	
MO-MPK			NS		NS	No DRO – lab error
MO-SIM			NS		NS	
MO-THO			NS		NS	
<u>ME-SCR</u>	Dry	Dry				
MO-FIL			NS		NS	No EPA 625.1m (OP Pesticides) - lab error
MO-OXN			NS		NS	Dry
MO-SPA			NS		NS	Dry
MO-VEN			NS		NS	
<u>ME-VR2</u>			NS		NS	No BOD – lab error
MO-MEI			NS		NS	No BOD – lab error
MO-OJA	Field blank		NS		NS	No BOD – lab error

Key:
Blank squares have the full data set available as sampled for that event.
<u>Mass emission station</u>
Dry: There was no or insufficient flow to collect samples.
NS: Not sampled

Table 1-7. Storm Summary

Site ID	Event No.	Storm Start Date	Storm Start Time (PST)	Storm Duration (hours)	Peak Storm Intensity (in/hr)	Total Rainfall (in)	First Significant Storm (Y/N)	Notable Conditions
ME-CC	1	11/8/2022	1:45	21	0.36	0.71	Y	
	2	12/1/2022	21:50	24	0.08	0.43	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/23/2023	22:45	36	0.36	3.31	N	
	5	3/10/2023	NS	NS	NS	NS	N	
ME-VR2	1	11/7/2022	10:10	44	0.26	0.85	Y	
	2	12/1/2022	21:05	28	0.31	1.55	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/23/2023	22:30	31	0.58	3.16	N	
	5	3/10/2023	NS	NS	NS	NS	N	
ME-SCR	1	11/8/2022	NS	NS	NS	NS	Y	Rain did not result in stormwater runoff
	2	12/2/2022	NS	NS	NS	NS	N	Rain did not result in stormwater runoff
	3	12/10/2022	18:05	14	0.39	1.18	N	First flush due to dry antecedent conditions for previous storms
	4	2/23/2023	20:35	38	0.25	2.62	N	
	5	3/10/2023	1:35	24	0.43	1.59	N	
MO-CAM	1	11/8/2022	1:05	15	0.31	0.55	Y	
	2	12/1/2022	21:50	9	0.04	0.26	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/23/2023	20:15	36	0.23	2.07	N	
	5	3/10/2023	NS	NS	NS	NS	N	
MO-FIL	1	11/8/2022	2:25	20	0.35	0.61	Y	
	2	12/1/2022	20:10	19	0.07	0.56	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/23/2023	5:40	61	0.27	4.07	N	
	5	3/10/2023	NS	NS	NS	NS	N	
MO-HUE	1	11/8/2022	2:10	14	0.19	0.56	Y	
	2	12/1/2022	21:35	11	0.10	0.47	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/24/2023	21:35	37	0.29	1.59	N	
	5	3/10/2023	NS	NS	NS	NS	N	

Site ID	Event No.	Storm Start Date	Storm Start Time (PST)	Storm Duration (hours)	Peak Storm Intensity (in/hr)	Total Rainfall (in)	First Significant Storm (Y/N)	Notable Conditions
MO-MEI	1	11/7/2022	9:35	30	0.27	1.07	Y	
	2	12/1/2022	20:50	29	0.15	1.14	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/23/2023	14:55	43	0.52	5.00	N	
	5	3/10/2023	NS	NS	NS	NS	N	
MO-MPK	1	11/7/2022	2:20	50	0.35	0.99	Y	
	2	12/1/2022	21:45	12	0.08	0.55	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/23/2023	6:35	60	0.25	3.49	N	
	5	3/10/2023	NS	NS	NS	NS	N	
MO-OJA	1	11/7/2022	6:45	44	0.22	1.30	Y	
	2	12/1/2022	15:55	37	0.15	1.03	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/23/2023	14:40	47	0.56	5.55	N	
	5	3/10/2023	NS	NS	NS	NS	N	
MO-OXN	1	11/8/2022	2:25	14	0.31	0.45	Y	
	2	12/1/2022	21:40	12	0.10	0.43	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/23/2023	6:05	63	0.37	2.49	N	Time paced due to pacing equipment malfunction
	5	3/10/2023	NS	NS	NS	NS	N	
MO-SIM	1	11/7/2022	7:50	33	0.14	0.93	Y	14-hour gap between sampled bands of rain
	2	12/1/2022	22:00	12	0.10	0.38	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/24/2023	0:05	48	0.41	3.29	N	Period of peak intensity was not sampled
	5	3/10/2023	NS	NS	NS	NS	N	
MO-SPA	1	11/7/2022	8:25	46	0.38	0.86	Y	12-hour gap between sampled bands of rain
	2	12/1/2022	21:05	20	0.07	0.70	N	Sampler malfunction captured less storm than programmed
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/23/2023	6:05	60	0.28	4.18	N	
	5	3/10/2023	NS	NS	NS	NS	N	

Site ID	Event No.	Storm Start Date	Storm Start Time (PST)	Storm Duration (hours)	Peak Storm Intensity (in/hr)	Total Rainfall (in)	First Significant Storm (Y/N)	Notable Conditions
MO-THO	1	11/8/2022	1:00	15	0.21	1.05	Y	
	2	12/1/2022	21:00	13	0.06	0.33	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/24/2023	0:00	33	0.46	4.01	N	Peak storm intensity occurred after sampling completed
	5	3/10/2023	NS	NS	NS	NS	N	
MO-VEN	1	11/8/2022	2:25	14	0.30	0.45	Y	7-hour gap between sampled bands of rain
	2	12/1/2022	21:40	12	0.10	0.43	N	
	3	12/11/2022	NS	NS	NS	NS	N	
	4	2/23/2023	6:05	64	0.38	2.49	N	
	5	3/10/2023	NS	NS	NS	NS	N	

All times PST
NS Not Sampled

1.5.2 Event Flow and Duration

Table 1-8 shows site flow and event durations. In Table 1-8, Start Date/Time and End Date/Time describe the length of time the automated sampler was actually taking samples. The true time of the rainfall and related runoff event was always longer; since the samplers were programmed to begin taking samples after flow had risen to sampleable depths, and greater than 20% of base flow, which takes 0.10” to 0.25” of rainfall, depending on the antecedent conditions and sampling location.[19] Furthermore, flow often continued after the automated sampler had completed its sampling program, because of the SMP’s goal to ensure that enough aliquots were taken to perform the required analyses. Because of this goal, the SMP tried to err on the conservative side, pacing the samplers a bit quicker than the RTR tables dictated. As the RTR tables are refined, this error will become smaller, but will never completely disappear due to the inherent error in rainfall predictive abilities by both commercial and public weather forecasters. The relative timing of the onset of rainfall, commencement of the sampling program and duration of the flow for each site can be found in the event hydrographs located in Appendix B.

[19] This range represents the amount of rainfall needed to generate measurable flow at the monitoring station. Smaller amounts of rainfall generated positive flow in watersheds with proportionally more impervious area. All automated sampling programs were designed to begin when the water in the creek or channel exceeded the elevation of the intake strainer by more than a couple hundredths of a foot, effectively capturing the “first flush.”

Table 1-8: Site Flow Data, Precipitation Data, and Event Durations

Site ID	Event No.	Event Date [A]	Average Flow (CFS) (Calc)	Total [B] Rainfall (inches)	Sampler Start [C] Date, Time	Sampler End [C] Date, Time	Event Duration (HH:MM)	Days since end of previously measurable (≥0.25") rain [D]	Total Rainfall (inches) Previous Storm [D]
ME-CC	1	11/8/2022	137	0.71	11/8/2022 13:19	11/8/2022 19:32	6:13	201	0.35
	2	12/2/2022	60.58	0.43	12/2/2022 10:26	12/3/2022 5:35	19:09	24	0.71
	3	12/11/2022	NS	NS	NS	NS	NS	NS	NS
	4	2/24/2023	712	3.31	2/24/2023 2:18	2/25/2023 2:31	24:13	25	0.43
	5	3/10/2023	NS	NS	NS	NS	NS	NS	NS
	6	5/15/2023	7.35	NA	5/15/2023 10:17	5/16/2023 8:56	22:39	11	0.63
ME-VR2	1	11/8/2022	1.73	0.85	11/8/2022 13:45	11/9/2022 3:30	13:45	226	2.10
	2	12/2/2022	1.51	1.55	12/2/2022 1:17	12/2/2022 9:28	8:11	24	0.58
	3	12/11/2022	NS	NS	NS	NS	NS	NS	NS
	4	2/24/2023	4008	3.16	2/24/2023 4:45	2/24/2023 23:02	18:17	25	0.39
	5	3/10/2023	NS	NS	NS	NS	NS	NS	NS
	6	5/22/2023	60.23	NA	5/22/2023 8:46	5/23/2023 9:07	24:21	18	0.71
ME-SCR [E]	1	11/8/2022	NA	0.49	NA	NA	NA	201	0.26
	2	12/2/2022	NA	1.00	NA	NA	NA	24	0.39
	3	12/11/2022	NA	1.18	12/10/2022 22:47	12/11/2022 7:16	8:29	8	1.00
	4	2/24/2023	NA	2.62	2/24/2023 0:43	2/24/2023 23:23	22:40	25	0.45
	5	3/10/2023	NA	1.59	3/10/2023 3:10	3/11/2023 1:49	22:39	9	0.45
	6	5/17/2023	NA	NA	5/17/2023 10:33	5/18/2023 6:22	19:49	13	0.45

Site ID	Event No.	Event Date [A]	Average Flow (CFS) (Calc)	Total [B] Rainfall (inches)	Sampler Start [C] Date, Time	Sampler End [C] Date, Time	Event Duration (HH:MM)	Days since end of previously measurable (≥0.25") rain [D]	Total Rainfall (inches) Previous Storm [D]
MO-CAM	1	11/8/2022	21.69	0.55	11/8/2022 5:23	11/8/2022 14:11	8:48	225	0.77
	2	12/2/2022	16.35	0.26	12/2/2022 1:55	12/2/2022 2:32	0:37	24	0.55
	3	12/11/2022	NS	NS	NS	NS	NS	NS	NS
	4	2/24/2023	45.03	2.07	2/24/2023 0:48	2/25/2023 2:45	25:57	25	0.64
	5	3/10/2023	NS	NS	NS	NS	NS	NS	NS
	6	5/15/2023	<0.01 [F]	NA	5/15/2023 10:45	5/16/2023 10:45	24:00	11	0.71
MO-FIL [E]	1	11/8/2022	NA	0.61	11/8/2022 5:42	11/9/2022 4:56	23:14	225	2.13
	2	12/2/2022	NA	0.56	12/2/2022 1:14	12/2/2022 6:53	5:39	24	0.61
	3	12/11/2022	NA	NS	NS	NS	NS	NS	NS
	4	2/24/2023	NA	4.07	2/24/2023 0:24	2/24/2023 23:03	22:39	25	0.37
	5	3/10/2023	NA	NS	NS	NS	NS	NS	NS
	6	5/17/2023	NR	NA	5/17/2023 8:03	5/18/2023 6:42	22:39	13	0.57
MO-HUE [E]	1	11/8/2022	NA	0.56	11/8/2022 3:26	11/9/2022 2:39	23:13	201	0.51
	2	12/1/2022	NA	0.47	12/1/2022 22:10	12/2/2022 3:49	5:39	24	0.56
	3	12/11/2022	NA	NS	NS	NS	NS	NS	NS
	4	2/24/2023	NA	1.59	2/24/2023 0:47	2/24/2023 23:26	22:39	25	0.41
	5	3/10/2023	NA	NS	NS	NS	NS	NS	NS
	6	5/22/2023	NA	NA	5/22/2023 9:29	5/23/2023 8:08	22:39	18	0.45

Site ID	Event No.	Event Date [A]	Average Flow (CFS) (Calc)	Total [B] Rainfall (inches)	Sampler Start [C] Date, Time	Sampler End [C] Date, Time	Event Duration (HH:MM)	Days since end of previously measurable (≥0.25”) rain [D]	Total Rainfall (inches) Previous Storm [D]
MO-MEI	1	11/8/2022	2.04	1.07	11/8/2022 4:59	11/8/2022 14:17	9:18	225	1.74
	2	12/2/2022	4.45	1.14	12/2/2022 23:07	12/2/2022 23:47	0:40	24	1.25
	3	12/11/2022	NS	NS	NS	NS	NS	NS	NS
	4	2/24/2023	42.40	5.00	2/24/2023 1:21	2/24/2023 19:06	17:45	25	0.45
	5	3/10/2023	NS	NS	NS	NS	NS	NS	NS
	6	5/22/2023	0.25 [F]	NA	5/22/2023 8:06	5/23/2023 6:46	22:40	18	0.62
MO-MPK	1	11/8/2022	1.20	0.99	11/8/2022 6:00	11/8/2022 14:52	8:52	225	1.13
	2	12/2/2022	0.25	0.55	12/2/2022 1:42	12/2/2022 8:49	7:07	24	0.73
	3	12/11/2022	NS	NS	NS	NS	NS	NS	NS
	4	2/24/2023	8.29	3.49	2/23/2023 23:53	2/25/2023 3:24	27:31	40	0.28
	5	3/10/2023	NS	NS	NS	NS	NS	NS	NS
	6	5/15/2023	<0.01 [F]	NA	5/15/2023 19:06	5/16/2023 8:26	13:20	12	0.70
MO-OJA	1	11/8/2022	0.47	1.30	11/7/2022 17:30	11/8/2022 13:54	20:24	225	1.71
	2	12/2/2022	8.42	1.03	12/2/2022 23:40	12/3/2022 0:04	0:24	25	1.31
	3	12/11/2022	NS	NS	NS	NS	NS	NS	NS
	4	2/24/2023	69.18	5.55	2/24/2023 1:34	2/24/2023 19:48	18:14	25	0.59
	5	3/10/2023	NS	NS	NS	NS	NS	NS	NS
	6	5/22/2023	1 [F]	NA	5/22/2023 7:39	5/23/2023 7:34	23:55	18	0.66

Site ID	Event No.	Event Date [A]	Average Flow (CFS) (Calc)	Total [B] Rainfall (inches)	Sampler Start [C] Date, Time	Sampler End [C] Date, Time	Event Duration (HH:MM)	Days since end of previously measurable (≥0.25") rain [D]	Total Rainfall (inches) Previous Storm [D]
MO-OXN	1	11/8/2022	4.36	0.45	11/8/2022 5:14	11/8/2022 14:13	8:59	225	2.32
	2	12/2/2022	4.02	0.43	12/1/2022 22:29	12/2/2022 2:34	4:05	24	0.47
	3	12/11/2022	NS	NS	NS	NS	NS	NS	NS
	4	2/24/2023	21.19	2.49	2/24/2023 2:00	2/25/2023 0:40	22:40	39	0.84
	5	3/10/2023	NS	NS	NS	NS	NS	NS	NS
	6	5/17/2023	DRY	NA	DRY	DRY	DRY	13	0.78
MO-SIM	1	11/8/2022	4.95	0.93	11/7/2022 11:47	11/8/2022 14:54	27:07	200	0.26
	2	12/2/2022	8.41	0.38	12/2/2022 1:03	12/2/2022 3:00	1:57	24	0.82
	3	12/11/2022	NS	NS	NS	NS	NS	NS	NS
	4	2/24/2023	46.59	3.29	2/24/2023 2:03	2/24/2023 17:58	15:55	39	0.72
	5	3/10/2023	NS	NS	NS	NS	NS	NS	NS
	6	5/15/2023	2 [F]	NA	5/15/2023 8:42	5/16/2023 7:22	22:40	11	0.64
MO-SPA	1	11/8/2022	3.68	0.86	11/7/2022 10:30	11/8/2022 2:47	16:17	138	0.26
	2	12/2/2022	2.50	0.70	12/1/2022 22:02	12/2/2022 1:17	3:15	24	0.70
	3	12/11/2022	NS	NS	NS	NS	NS	NS	NS
	4	2/24/2023	7.38	4.18	2/23/2023 16:21	2/25/2023 2:44	34:23	25	0.48
	5	3/10/2023	NS	NS	NS	NS	NS	NS	NS
	6	5/17/2023	DRY	NA	DRY	DRY	DRY	13	0.91

Site ID	Event No.	Event Date [A]	Average Flow (CFS) (Calc)	Total [B] Rainfall (inches)	Sampler Start [C] Date, Time	Sampler End [C] Date, Time	Event Duration (HH:MM)	Days since end of previously measurable (≥0.25”) rain [D]	Total Rainfall (inches) Previous Storm [D]
MO-THO	1	11/8/2022	54.71	1.05	11/8/2022 6:49	11/8/2022 17:30	10:41	201	0.48
	2	12/2/2022	8.50	0.33	12/2/2022 4:44	12/2/2022 8:18	3:34	24	1.14
	3	12/11/2022	NS	NS	NS	NS	NS	NS	NS
	4	2/24/2023	287	4.01	2/24/2023 10:40	2/24/2023 20:53	10:13	40	0.73
	5	3/10/2023	NS	NS	NS	NS	NS	NS	NS
	6	5/15/2023	<0.1 [F]	NA	5/15/2023 9:23	5/16/2023 8:03	22:40	11	0.69
MO-VEN	1	11/8/2022	7.08	0.45	11/8/2022 5:32	11/8/2022 14:00	8:28	225	2.32
	2	12/2/2022	6.09	0.43	12/1/2022 22:37	12/2/2022 3:23	4:46	24	0.47
	3	12/11/2022	NS	NS	NS	NS	NS	NS	NS
	4	2/24/2023	20.06	2.49	2/23/2023 15:11	2/25/2023 0:55	33:44	39	0.84
	5	3/10/2023	NS	NS	NS	NS	NS	NS	NS
	6	5/17/2023	<0.1 [F]	NA	5/17/2023 10:20	5/18/2023 9:00	22:40	13	0.78

NA Not Applicable NS Not Sampled NR Not Recorded
DRY Site dry or insufficient flow to sample.
[A] Event Date describes the sampling event date.
[B] Rainfall data from sites that use non-Program rain gauges is considered “best available” at the time of the report. The data is subject to quality control review by the Hydrology Section, during which time the telemetered data (if available) is compared to the data logger and to other rainfall gauges in the area at the time to determine best accuracy prior to storing the data as official “archived” data. This typically occurs after the end of the water year and too late for inclusion in this Annual Report. This may result in some slight differences in rainfall amounts if queried later, but typically will not have a large effect for most storms.
[C] Start Date/Time and End Date/Time describe the period during which composite sample aliquots were taken. All times PST.
[D] Changed from 0.10" to 0.25" for the 2016/17 season and beyond to better comply with 2010 Permit requirements A.3.a and B.1.b.
[E] Time-paced as flows cannot be accurately measured at these sites. ME-SCR: During wet weather the Santa Clara River flows through the river diversion gate and over the diversion dam. Currently, there is no flow meter installed at the river diversion gate where most of the wet weather flow passes. MO-FIL: Site experiences ponding and backwater effects due to natural bottom channel. MO-HUE: Flow is dependent on the release of water at the Hueneme pump station.
[F] Flow is estimated as it was below the threshold levels for automated measurement or cannot be measured continuously at this site.

1.5.1 Recent Fires

2022/23 Fires

There was one recorded wildfire in Ventura County during the 2022/23 year according to CalFire (https://www.fire.ca.gov/incidents/), which was the Howard Fire in the Los Padres National Forest in the Sespe Creek watershed near Rose Valley. This fire was not located near a municipal area.

The Holser and Cornell Fires (2020)

The largest fire for the 2020/21 year was the 3,000-acre Holser fire near Piru in August 2020. The area burned was unlikely to have directly impacted the SMP monitoring stations, however, the 174-acre Cornell Fire on December 12, 2020, was upstream of the ME-SCR station and burned within the Santa Clara riverbed, so ME-SCR samples could have been impacted by the fire and fire-fighting operations.

The Easy and Maria Fires (2019)

The Easy Fire started on the west end of Simi Valley on October 30, 2019 and burned 1,806 acres before it was extinguished on November 2, 2019. It burned in an open space area next to the Arroyo Simi and two structures were destroyed. The Program does not have monitoring stations directly in or adjacent to the burn area, but ash could have spread to stations, including MO-SIM, MO-MPK, and MO-THO.

The Maria Fire started on South Mountain between Somis and Santa Paula on October 31, 2019 and burned close to 10,000 acres before being contained on November 6, 2019. It burned in a mostly agricultural and open space area and within the Santa Clara River bottom, including upstream of the ME-SCR mass emission station. Four structures were destroyed. The area burned was most likely to impact ME-SCR and MO-SPA.

Both fires were wildfires and smoke and ash from the fires may have spread beyond the areas most directly impacted by the fire.

The Woolsey and Hill Fires (2018)

The Woolsey and Hill Fires both started on November 8, 2018 and burned 96,949 and 4,531 acres before being 100% contained on November 21 and 16, 2018, respectively, and declared out on January 4, 2019. As with the Thomas Fire in 2017/18, the burned areas became highly susceptible to erosion and landslides due to the bare ground resulting from the burning of vegetation. Monitoring stations in the Calleguas Creek watershed were the most directly impacted, however smoke and ash from both fires may have impacted all sites.

The Woolsey Fire began in Ventura County in the Santa Susana Mountains south of Simi Valley but spread quickly into Los Angeles County. Tens of thousands of acres within the Santa Monica Mountains Recreation Area burned and 1,841 structures were damaged or destroyed in Ventura and Los Angeles County communities, including Agoura Hills, Calabasas, and Malibu. The burn area included Bus Canyon, which drains to MO-SIM and heavy ash was observed at ME-CC.

The Hill Fire burned mostly open space from Hill Canyon to the west and south within Ventura County and met up with the Springs Fire (2013) footprint, where the reduced vegetation/fuel load at the Hill-Springs boundary helped firefighters prevent further spread. The hillsides around the MO-THO monitoring station burned, and the fire denuded the canyon/hillsides along the access road to MO-THO resulting in an increased risk of landslide/rockfall/debris flow to crews accessing the area during the 2018/19 monitoring year. The fire damaged four structures and destroyed two.

The Thomas Fire (2017-2018)

The Thomas Fire started on December 4, 2017 and burned 281,893 acres, mostly in Ventura County, before being contained on January 12, 2018. Low humidity, dry vegetation, a hot and dry summer, and strong and persistent Santa Ana winds contributed to the speed and magnitude of the fire. The Thomas Fire was declared the largest recorded fire in California history at that time, after burning through forests, grasslands, orchards, and housing tracts, eventually impacting the area from Fillmore to Santa Barbara, and from Ventura north, through Matilija Canyon, Ojai, and beyond destroying 1,063 structures and damaging 280 others.

The monitoring sites in the Ventura River watershed were the most directly affected by the fire as the fire ringed the Ojai Valley for several days, however parts of the Santa Clara River watershed also burned and all of Ventura County, including the Calleguas Creek watershed, received fallout from the ash. The burn areas became highly susceptible to erosion and landslides due to the bare ground resulting from the burning of vegetation.

1.6 QUALITY ASSURANCE / QUALITY CONTROL

The following is a discussion of the results of the quality assurance and quality control (QA/QC) analysis performed on the 2022/23 stormwater quality monitoring data. The data were evaluated for overall sample integrity, holding time exceedances, contamination, accuracy, and precision using field- and lab-initiated QA/QC sample results according to the SMP's *Data Quality Evaluation Plan* (DQEP) and *Data Quality Evaluation Standard Operating Procedures* (DQESOP). The DQEP describes the process by which water chemistry data produced by the SMP are evaluated. Data quality evaluation is a multiple step process used to identify errors, inconsistencies, or other problems potentially associated with SMP data. The DQEP contains a detailed discussion of the technical review process, based on U.S. Environmental Protection Agency (EPA) guidance and requirements set forth by the SMP used to evaluate water quality monitoring data. The DQEP provides a reference point from which a program-consistent quality assurance/quality control (QA/QC) evaluation can be performed by the SMP. The DQESOP document provides a set of written instructions that documents the process used by the SMP to evaluate water quality data. The DQESOP describes both technical and administrative operational elements undertaken by the SMP in carrying out its DQEP. The DQESOP acts as a set of prescriptive instructions detailing in a step-by-step manner how SMP staff carry out the data evaluation and data quality objectives (DQO) set forth in the DQEP. QA/QC sample results from the 2022/23 monitoring season are presented in Appendix F.

QA/QC sample collection and analysis relies upon QA/QC samples collected in the field (such as equipment blank, field duplicate, and matrix spike samples), as well as QA/QC samples prepared and analyzed by the analytical laboratory (i.e. lab-initiated samples, such as method blanks, filter blanks, and laboratory control spikes) performing the analysis. The actual chemical analysis of field-initiated and lab-initiated QA/QC samples is conducted in an identical manner as the analysis of field-collected environmental samples. After all analyses are complete, the results of the field-initiated and lab-initiated QA/QC sample results are compared to DQO, also commonly referred to as "QA/QC limits." These limits are typically established by the analytical laboratory based on EPA protocols and guidance. However, in some cases, the SMP will set a DQO, such as the QA/QC limit for field duplicate results.

QA/QC sample results are evaluated to compare them to their appropriate QA/QC limits and identify those results that fall outside of these limits. The QA/QC evaluation occurs in two separate steps as the laboratory will review those results that fall outside of its QA/QC limits and typically label these results with some type of qualification or note. If a QA/QC sample result falls grossly outside of its associated QA/QC limit, and thus indicates that there is a major problem with the lab's instrumentation and/or analytical process, then the laboratory should re-run both the affected QA/QC and environmental samples as necessary. The second step in the QA/QC evaluation process occurs when the SMP performs an overall sample integrity evaluation, as well as specific holding time, contamination, accuracy, and precision checks. This second evaluation step provides an opportunity to thoroughly review the SMP's data to identify potential errors in a laboratory's reporting of analytical data and/or recognize any significant data quality issues that may need to be addressed. After this evaluation the SMP is ready to qualify their environmental data as necessary based on the findings of the QA/QC assessment.

Data qualification occurs when the SMP assigns a program qualification to an analytical result to notify data users that the result was produced while one or more DQO or QA/QC limitations were exceeded. Environmental sample results are qualified to provide the user of these data with information regarding the quality of the data. Depending on the planned use of the data, qualifications may help to determine whether the data are appropriate for a given analysis. In general, data that are qualified with anything other than an “R” (used to signify a rejected data point) are suitable for most analyses. However, the qualifications assigned to the data allow the user to assess the appropriateness of the data for a given use. The SMP used its NDPES Stormwater Quality Database to conduct a semi-automated QA/QC evaluation of the current season’s data contained in the database. The use of the database allows the SMP to expedite and standardize the QA/QC evaluation of its monitoring data in conjunction with the use of the DQEP and DQESOP. After reviewing the qualifications assigned to each qualified data point in the 2022/23 monitoring year data set, the environmental data are considered to be of high quality and sufficient for all future general uses. However, all data qualifiers should be reviewed and considered prior to the use of the data in a specific analysis or application. Environmental data from the 2022/23 monitoring season are presented in Appendix G.

Both environmental and field-initiated QA/QC samples were collected in the field using clean sampling techniques. To minimize the potential for contamination, Weck Laboratories cleaned all bottles used for composite sample collection with laboratory detergent, a nitric acid rinse, and ultrapure water. Only new containers were used for grab sample collection (except for Oil and Grease, for which previously used, laboratory-cleaned containers are sometimes used) with the appropriate preservative added to chemistry grab bottles by Weck Laboratories, Inc. Intake lines for the automated samplers were flushed with 1% nitric acid and distilled water prior to the first event of the season, except for MO-HUE, which was flushed with distilled water only as the sample intake is inaccessible preventing nitric acid recovery. Intake lines were flushed with distilled water before and after each successive event for the remainder of the season. Designated sampling crew leaders were used to ensure that consistent sample collection and handling techniques were followed during every monitoring event.

Field-initiated QA/QC samples performed by the SMP during the 2022/23 monitoring season included equipment blanks, field blanks, and field duplicates. Equipment blanks are typically prepared prior to the start of the monitoring season to check that tubing, strainers, and sample containers aren’t sources of contamination for the SMP’s environmental samples. Tubing equipment blanks were collected from the sampling equipment by passing ultrapure blank water through cleaned tubing and into brand new sample bottles. Composite bottle equipment blanks were collected by adding ultrapure blank water to a composite bottle and allowing it to sit at <4°C for 24 hours before being split at the laboratory into brand new sample bottles for analysis. Equipment blanks were submitted to the analytical laboratory and analyzed using the same methods as those employed for routine environmental sample analysis.

1.6.1 Equipment Blanks

Equipment blanks, often referred to as pre-season blanks, were collected prior to the monitoring season to test for contamination in sample containers (e.g., composite bottles) and sample equipment (e.g., intake lines, tubing, and strainers). This process consists of running laboratory-prepared blank water through sampler tubing to identify potential contamination of field-collected samples as a result of “dirty” tubing. The blank water (ultrapure deionized water) used to evaluate contamination of composite bottles and tubing can also be analyzed to check for contamination of this analytical sample medium. Equipment blank “hits” or measured concentrations above the laboratory’s quantitation limit (RL, PQL, etc.) for a constituent are assessed and acted upon using the guidelines listed below:

1. The SMP requests that the laboratory confirm the reported results against lab bench sheets or another original analytical instrument output. Any calculation or reporting errors should be corrected and reported by the laboratory in an amended laboratory report.

2. If the previous step does not identify improperly reported results, then the analytical laboratory should be asked to identify any possible sources of contamination in the laboratory.

3. If no laboratory contamination is identified, then a note should be made that documents that the equipment blank results indicate that the sample equipment may have introduced contamination into the blank samples.

When practical, remedial measures are initiated by the SMP to replace or re-clean sampling equipment and re-analyze equipment blank samples in an effort to eliminate field contamination. Only the results of field-initiated and laboratory-initiated QA/QC samples associated with the environmental samples collected for any given monitoring event are used to qualify SMP environmental samples. However, pre-season analyses provide useful information regarding possible sources of environmental sample contamination and insight into how contamination issues might be resolved.

Preseason equipment blank "Tubing Blank" (intake line cleaned with 1% nitric acid (HNO_3) and distilled water) and "Carboy Blank" (composite bottle) samples were collected for the 2022/23 monitoring year on August 23 and 24, 2022 respectively. The "Tubing Blank" sample was collected through the intake line at MO-MPK after flushing the line with 1 liter of 1% HNO_3 and 4 liters of distilled water. The Carboy Blank samples were split off at the laboratory from 8L of ultrapure deionized water that had been added to a clean composite bottle and left to sit in a cooler on ice (at 0 - 4 degrees Celsius) for 24 hours. The blanks were analyzed by EPA 200.8 for total metals (iron by EPA 200.7), EPA 245.1 for total mercury, EPA 353.2 for nitrate + nitrite as nitrogen, and for semi-volatile organics by EPA 625.1 and EPA 525.2.

For the tubing blank, organics, nitrate + nitrite as nitrogen, aluminum, antimony, arsenic, beryllium, cadmium, lead, mercury, nickel, selenium, silver, thallium, and zinc were all non-detects. A DNQ amount of chromium, and a quantifiable amount of copper and iron were detected. For the carboy blank, all organics were not detected except a DNQ amount of butyl benzyl phthalate. Aluminum, antimony, arsenic, beryllium, cadmium, iron, lead, mercury, nickel, selenium, silver, thallium, and zinc were all non-detects. Chromium and nitrate + nitrite were DNQ, and a small amount of quantifiable copper was detected.

With the exception of copper, all detections were well below any applicable water quality objectives and did not require follow up analysis as they would not significantly affect environmental results. For copper in the tubing and carboy blanks, the result was above the reporting limit, so a sample of the blank water was sent to the laboratory for copper analysis. Copper was detected in the blank water sample above the reporting limit and at a similar concentration to that measured in the tubing and carboy blanks, so the source of the copper in the equipment blanks was likely from the blank water and no further follow up is needed. The total fraction of the metal was measured in the equipment blank samples, but it is the dissolved component that is used for the CTRO, which further supports the conclusion that the detections would not significantly affect environmental results.

The blank water was also tested for the metals that were detected in the pre-season samples (chromium and iron), even though their detections were low enough to not require follow-up analyses. Chromium was detected in the blank water but iron was not. The chromium detected in the pre-season samples was likely due to contamination in the blank water, but the iron may have been contamination in the equipment. As previously discussed, these amounts were well below applicable water quality objectives and no further investigation into these detections was needed.

Table 1-a. Constituents Detected in Preseason Equipment Blanks

		WQO		Detections		Conclusion
Constituent	Reporting Limit (µg/L)	CTRO Wet/Dry (µg/L)	BPO (µg/L)	Carboy Blank Concentration (µg/L)	Tubing Blank (MO-MPK) Concentration (µg/L)	Follow up required? Yes/No
Chromium, total [f]	0.2	(III [f]) 148 [d,e,f]/48 [d,e,f] (VI [f]) 16/11	50 [b]	0.10 [a]	0.14 [a]	No
Copper, total	0.5	2.99 [d,e]/2.29 [d,e]	NA	0.83	0.74	Yes
Iron, total	20	NA/NA	NA	<3.9	21 [h]	No
Nitrate + nitrite as nitrogen	200	NA	5,000-10,000 [g]	41 [a]	<36	No
Butyl benzyl phthalate [c]	1	3,000 [b,c]/5,200 [c]	NA	0.63 [a]	<0.49	No

WQO: Water Quality Objective
NA: Not Applicable
CTRO: California Toxics Rule WQO
BPO: Basin Plan WQO
[a] DNQ (detected but not quantifiable)
[b] Waters with a “MUN” designation, i.e. municipal supply
[c] Objective only applies in dry weather
[d] Dissolved fraction of the metal
[e] CTRO are for the dissolved fraction of the metals and are calculated using the water hardness measured at the site (or at the site’s corresponding receiving water station, if available). For this table, they are calculated using a water hardness of 20.3 mg/L, the lowest hardness detected at an ME or MO site (the objective is proportional to the water hardness) through the end of the 2022/23 monitoring year. Receiving water sites tend to be over 100 mg/L of hardness.
[f] Total chromium measured for preseason samples and includes chromium (III) and Chromium (VI). BPO is for total chromium. CTR does not have a total chromium objective but has separate chromium (III) and Chromium (VI) WQO. Chromium (VI) was not analyzed during the preseason event. CTRO for chromium (VI) are lower than for chromium (III) and so are listed here.
[g] Site Specific Objective (SSO)
[h] Analyte also detected in method blank (8.13 µg/L DNQ)

Table 1-b. Constituents Detected in Blankwater compared to Preseason Equipment Blank Concentrations

		Detections	Detections	Detections	Conclusion	Follow-Up
Constituent	RL (µg/L)	Blank Water Concentration (µg/L)	Carboy Blank Concentration (µg/L)	Tubing Blank (MO-MPK) Concentration (µg/L)	Blank water Source of Contamination?	Further action needed?
Copper	0.5	0.51	0.83	0.74	Yes	No
Chromium	0.2	0.11 [a]	0.1 [a]	0.14 [a]	Yes	No
Iron	20	<3.9	<3.9	21	No	No

[a] DNQ (detected but not quantifiable)

Based on these results, the SMP determined that cleaning procedures were adequate for preventing contamination from sampling equipment for the 2022/23 monitoring season. No environmental samples were qualified by the SMP based on the results of pre-season equipment blank analyses. The cleaning procedures will be reexamined during the preseason tests prior to the 2023/24 monitoring season.

1.6.2 Field and Laboratory Duplicates

Duplicate samples – both field duplicates and lab duplicates – are collected in the field using the same techniques as used for all environmental sample collection. For composite samples, a larger volume of water is collected during the monitoring event and then the duplicates are split either in the field (when generating a field duplicate) or in the lab (when generating a lab duplicate) while constantly mixing the contents of the composite containers to ensure the production of homogeneous duplicate samples. The SMP does not collect field duplicates for composite samples as samples are not split in the field due to the risk of sample contamination and breakage. In the case of grab samples, two samples are collected side-by-side or in immediate succession into separate sample bottles when collecting an environmental sample and its field duplicate. Depending on the volume of water required to perform an analysis, a lab duplicate analysis of a grab sample may require the collection of an additional sample or may be run on a single environmental sample.

Field duplicate grab samples were collected during Event 1 at MO-CAM and Event 2 at MO-HUE. Field duplicates achieved a 100% success rate for all constituents. Results are shown in Table 1-9.

Table 1-9. Field Duplicate Success Rates

Classification	Constituent	Method	Total Samples	Samples Outside DQO	Success Rate
Bacteriological	Total coliform / *E. coli*	MMO-MUG	2/2	0	100
Conventional	Cyanide	ASTM D7511	2	0	100
Hydrocarbon	Gasoline Range Organics	EPA 8260B	2	0	100
Hydrocarbon	Oil and grease	EPA 1664B	2	0	100
Organic	2-Chloroethyl vinyl ether	EPA 624.1	2	0	100
Organic	Methyl tert-butyl ether (MTBE)	EPA 624.1	1	0	100

Laboratory-initiated laboratory duplicate samples were analyzed on non-project samples for all events. Laboratory duplicate samples were also analyzed for one or more constituents at ME-CC (Events 1, 2, and 4), ME-SCR (Event 3,5, and 6), ME-VR2 (Event 4 and 6), MO-CAM (Event 2,4, and 6), MO-HUE (Events 2, 4, and 6), MO-MEI (Event 6), MO-MPK (Event 1), MO-OXN (Event 2 and 4), MO-OJA (Event 1 and 2), MO-SIM (Event 1, 2, 4, and 6), and MO-VEN (Event 6). All 123 laboratory duplicates were within the limits for relative percent difference (RPD) except one for SM 2510 B, as shown in Table 1-10.

Table 1-10. Laboratory Duplicate Success Rates

Classification	Constituent	Method	Total Samples	Samples Outside DQO	Success Rate
Conventional	Alkalinity as CaCO3	SM 2320 B	9	0	100
Conventional	Biochemical Oxygen Demand	SM 5210 B	8	0	100
Conventional	Chemical Oxygen Demand	EPA 410.4	11	0	100
Conventional	Specific Conductance	SM 2510 B	12	1	92
Conventional	Total Chlorine Residual	SM 4500-Cl G	6	0	100
Conventional	Total Dissolved Solids	SM 2540 C	27	0	100
Conventional	Total Suspended Solids	SM 2540 D	20	0	100
Conventional	Turbidity	EPA 180.1	11	0	100
Conventional	Volatile Suspended Solids	EPA 160.4	13	0	100
Nutrient	Ammonia as N	EPA 350.1	3	0	100
Nutrient	Nitrate + Nitrite as N	EPA 353.2	1	0	100
Nutrient	Total Kjeldahl Nitrogen	EPA 351.2	2	0	100

1.6.3 Holding Time Exceedances

Most analytical methods used to analyze water quality samples specify a certain time period in which an analysis must be performed in order to ensure confidence in the result provided from the analysis.[20] A holding time can be either the time between sample collection and sample preparation (the preparation holding time limit) or between the sample preparation and sample analysis (the analysis holding time limit). If a sample doesn't require any pre-analysis preparation, then the analysis holding time is the time between sample collection and sample analysis.

These elapsed times are compared to holding time values (typically provided in EPA guidance for analytical methods) to determine if a holding time exceedance has occurred. Elapsed times greater than specified holding time limits are considered to exceed the SMP's DQO for this QA/QC sample type. All holding times for environmental samples, field blanks, and field duplicates were met by laboratories during the 2022/23 monitoring season, with the exceptions as shown in Table 1-11.

Table 1-11. Holding Time Success Rate

Classification	Environ Samples	FD & FB Samples	Total Samples	Total Samples Outside DQO	Success Rate (%)
Anion	162	0	162	0	100
Bacteriological	128	4	132	0	100
Cation	128	0	128	0	100
Conventional	1216	4	1220	28 [a]	97.7 [a]
Hydrocarbon	214	8	222	24	89.2
Metal	1758	0	1758	0	100
Nutrient	286	0	286	1	99.7
Organic	4943	4	4947	0	100
PCB	378	0	378	0	100
Pesticide	4296	0	4296	0	100

[a] Total chlorine residual is a Pollutant of Concern for ME-CC due to the contributions of wastewater treatment plants. The method requires that this constituent be analyzed "immediately", and the Permit requires that it be sampled as a composite sample, which combined results in an exceedance of the hold time for each event. All the conventional results outside of the DQO were for total chlorine residual.

1.6.4 Other QA/QC Methods and Analyses

A variety of other QA/QC methods are used by the SMP and associated laboratories to determine the quality of the data. These include method blanks, matrix spikes and matrix spike duplicates (MS/MSD), surrogate spikes, and laboratory control samples. For many of these, the relative percent difference between two separate samples is computed to determine whether the laboratory has achieved the necessary DQO, as described in Section 1.6.2. Results of QA/QC analyses performed on individual samples can be found in Appendix F and Appendix G.

1.6.5 QA/QC Summary

In summary, a total of 13,509 environmental results were obtained during the 2022/23 monitoring season. Of these, 13,170 met the above DQOs for that sample, which translates into the SMP achieving a 97.4 % success rate in meeting program DQO. Stormwater matrices are typically highly turbid and 2022/23 was no exception, with 5,117

[20] A sample that remains unanalyzed for too long sometimes shows analytical results different from those that would have been observed had the sample been analyzed earlier in time. This difference is due to the breakdown, transformation, and/or dissipation of substances in the sample over time.

analyses requiring laboratory dilutions (to meet analytical requirements), of which 4,544 were non-detects. There is the potential that the dilutions may have obscured the presence of some of these constituents.

Overall, the wet-weather and dry-weather events monitored during the 2022/23 monitoring season produced a high-quality data set in terms of the low percentage of qualified data, however dilutions of samples continued to result in high laboratory reporting levels for some samples, although for fewer samples than the previous year. COCs always instruct the laboratory to minimize sample dilution as much as possible to obtain low reporting levels. The laboratory states that stormwater matrices are the reason for the dilutions and is having their organics leads carefully monitor the dilutions being made, if any, to ensure that they dilute as little as possible without putting their instruments at risk. The SMP will continue to pursue low reporting limits for samples.

1.7 WATER QUALITY STANDARDS[21] AND IMPACTS

The NDPES Permit requires the SMP to report the results of stormwater monitoring to the Regional Board in two ways. First, within 90 days of a monitoring event, analytical results must be submitted electronically and must highlight elevated constituent levels relative to Basin Plan and CTR acute criteria. The SMP met this requirement for all monitoring events during the 2022/23 monitoring year. Second, an Annual Storm Water Report must be submitted by December 15th and must highlight those same elevated levels relative to applicable water quality objectives (WQO)[22]. The contents of this report fulfill that requirement.

1.7.1 Urban Runoff Impacts on Receiving Waters

Pursuant to Part 2 of the Permit, the Permittees are required to determine whether discharges from their municipal separate storm sewer systems are causing or contributing to a violation of water quality standards (WQS). Additionally, Permittees are responsible for preventing discharges from the MS4 of stormwater or non-stormwater from causing or contributing to a condition of nuisance. Specifically, the Order contains the following Receiving Water Limitations Language:

1. Discharges from the MS4 that cause or contribute to a violation of WQS are prohibited.

2. Discharges from the MS4 of stormwater, or non-stormwater, for which a Permittee is responsible, shall not cause or contribute to a condition of nuisance.

Compliance with the above Receiving Water Limitations is achieved by the Permittees through implementation of control measures and other actions to reduce pollutants in stormwater and non-stormwater discharges in accordance with the requirements of the Permit.

1.7.2 "Cause or Contribute" Evaluation Methodology

The evaluation used to determine if a pollutant is persistently causing or contributing to the exceedance of a WQS in receiving waters consists of three steps:

[21] Water quality standards (WQS) are "State Water Quality Standards, which are comprised of beneficial uses, water quality objectives, and the State's Antidegradation Policy." Order No. R4-2010-0108 Part 6 p. 116

[22] Water quality objectives (WQO) are "water quality criteria contained in the Basin Plan, the California Ocean Plan, the National Toxics Rule, the California Toxics Rule, and other state or federally approved surface water quality plans." Order No. R4-2010-0108 Part 6 p. 116

1. The water quality data collected at a mass emission site in the same watershed is used as the receiving water to compare to relevant WQO contained in the CTR and Basin Plan.

2. When a receiving water concentration exceeded a WQO for a constituent, the urban runoff concentration of said constituent measured at a major outfall in that watershed was compared to the WQO. If an elevated level relative to the associated WQO for said constituent was observed in both urban runoff and the receiving water, then the WQS exceedance in the receiving water was determined "likely caused or contributed to by urban runoff." However, this comparison does not consider the frequency or persistence of WQS exceedances for a given constituent.

3. The persistence of a WQS exceedance was determined by evaluating the number of times (frequency) that a constituent was observed at an elevated level in urban runoff and above the WQO for the receiving water for a particular type of monitoring event (wet or dry) over the course of the monitoring season. If two or more elevated levels in urban runoff and WQS exceedances in the receiving water were observed for a constituent over the course of the monitoring season, then the WQS exceedances of said constituent were determined to be persistent. Ideally, an assessment of persistency would be based on a larger data set (e.g., 10 events or more) and an assumed percentage of exceedances (e.g., 50%), but given the need for an annual assessment two or more exceedances from the existing, limited data set were used as the criterion to determine persistence.

1.7.3 Water Quality Objective Calculations for Reporting of Exceedances

The SMP uses its water quality database to identify water quality monitoring results that are above California Toxics Rule (CTR) and Basin Plan WQO (CTRO and BPO, respectively). The database performs these calculations using a pre-programmed set of reference values for CTRO and BPO, including site specific objectives. The reference values are stored in the CTRO and BPO reference tables and are used for these calculations to reduce the likelihood of human error.

Ammonia BPO Calculations

Basin Plan Ammonia BPO are determined differently for freshwater and saltwater. Freshwater WQO are expressed as total ammonia as nitrogen and are used for samples that are at or below 1 ppt salinity and are calculated for each site/sample based on pH, and in the case of dry weather samples, temperature. Saltwater WQO are used for samples that are at or above 10 ppt salinity and are fixed concentrations of un-ionized ammonia set at a maximum 4-day average concentration of 0.035 mg un-ionized ammonia/L and a maximum 1-hour average concentration of 0.233 mg un-ionized ammonia/L, which correspond to dry weather and wet weather, respectively. Samples that are between 1 ppt and 10 ppt use the more stringent of the freshwater or saltwater WQO.

SMP samples are analyzed for total ammonia as nitrogen, which is made up of both ionized and un-ionized ammonia. When salinity at a site is >1 ppt, then the concentration of un-ionized ammonia (as mg un-ionized ammonia/L) must be calculated from the total ammonia as nitrogen result, to compare to the Basin Plan un-ionized ammonia (saltwater) objectives. SMP staff developed a flow chart to determine which ammonia BPO formulas should be used to calculate the appropriate objective for each site for both wet (acute objective) and dry (chronic objective) monitoring events. The flow charts are included in Appendix K. There are two formulas for calculating freshwater dry weather (chronic) WQO and the selection of the appropriate formula depends on whether Early Life Stages (ELS) of fish are present or absent in the reach. ELS are presumptively present unless listed as absent in the Basin Plan or a site-specific study is conducted. For the Ventura County mass emission and major outfall stations, the sites that are designated COLD and/or MIGR are also designated "ELS Present", conversely, the sites that are not designated COLD/MIGR are designated "ELS Absent".

For Ventura County, waters within the Calleguas Creek Watershed, except for Mugu Lagoon, the estuary, and Reach 2 (estuary to Potrero Rd), are not designated COLD/MIGR, therefore SMP stations without a COLD/MIGR designation in this watershed include the mass emission station (ME-CC) and major outfall stations (MO-CAM, MO-MPK, MO-SIM, and MO-THO). Waters within Ventura County that are designated COLD and/or MIGR, include the reaches applicable to the remaining SMP mass emission stations (ME-SCR and ME-VR2) and major outfall stations (MO-FIL, MO-SPA, MO-OXN, MO-VEN, MO-HUE, MO-OJA, and MO-MEI).

The correct calculation of ammonia BPO requires the collection of salinity, pH, and temperature data in addition to the total ammonia as nitrogen analysis. Salinity, pH, and temperature are measured in situ in the field using handheld meters at the time that event grab samples are collected, as the samples require immediate measurement to reflect the site conditions to which the organisms are exposed. Ammonia is collected as a composite sample and is analyzed at the laboratory within 28 days of sample collection (28-day holding time). Comparisons of the composite ammonia value to the grab BPO provide the best available assessment of compliance, given the restraints in collecting relevant sample data.

The WQO and comparisons are determined using the flow charts and formulas provided in Appendix K.

Municipal and Domestic Supply (MUN) Beneficial Use

Historically, the SMP considered all receiving waters it monitors as having at least a potential Municipal and Domestic Supply (MUN) beneficial use and, therefore, compared water quality data collected at each of its monitoring sites to WQO applicable to the MUN beneficial use. However, the SMP was informed by Regional Board staff in 2016 that this "blanket" approach may not be appropriate, given that beneficial use designations (established in the Basin Plan) are identified in multiple ways such as "existing," "potential," or conditional for various reasons. More specifically, based upon several findings and decisions by the pertinent regulatory agencies (the State Water Board, Regional Board, and USEPA), MUN beneficial uses designated with an asterisk ("*") in the Basin Plan are considered to be conditional and requirements based on the WQO that apply to the MUN beneficial use are not to be used to impose requirements in Waste Discharge Requirements, including the Ventura County MS4 permit.[23] As some waterbodies in Ventura County have MUN beneficial uses designated with an asterisk and others do not, the SMP conducted a review of the specific MUN beneficial use designation for the receiving waters into which the Program discharges stormwater runoff and dry weather flows, along with their tributaries, to determine the waterbodies for which comparisons to WQO applicable to the MUN beneficial use are unnecessary.

The CTR Human Health Water & Organisms criteria (HHWO) historically have been considered by the SMP to be applicable to the MUN beneficial use because of the "water consumed by humans" nexus to these criteria, as well as the potential for fish consumption. Water quality data collected at the various SMP monitoring sites that are designated as "*" in the Basin Plan will no longer be compared to HHWO; instead, they will be compared to CTR Human Health Organisms Only criteria (HHOO).

As a result of the evaluation, it was determined that most of the SMP's water quality monitoring sites (including the three mass emission stations and nine of eleven major outfall stations) are located on waterbodies identified in the Basin Plan as having a conditional MUN beneficial use designation. Only program monitoring data collected at two sites (major outfall stations MO-OJA and MO-MEI) need to be compared to WQO applicable to the MUN beneficial use, while similar comparisons for the other twelve monitoring stations are unnecessary at this time.

[23] Related to State Board Resolution No. 88-63 (Sources of Drinking Water) and Regional Board Resolution 89-03 (Incorporation of Sources of Drinking Water Policy into the Water Quality Control Plans (Basin Plans).

Table 1-12. Cause or Contribute Evaluation Methodology for MUN vs non-MUN Sites

Ventura Countywide Stormwater Quality Management Program "Cause or Contribute" Evaluation Methodology

WQO Exc = water quality objective exceedance

Old method for water quality objectives comparisons (ALL data compared to WQOs applicable to MUN Beneficial Use)

Major Outfall (urban runoff)	Mass Emission (receiving water)	Cause or Contribute Determination
WQO Exc	---	*Urban runoff not causing or contributing to observed WQO Exc in receiving water*
WQO Exc	WQO Exc	**Urban runoff likely caused or contributed to observed WQO Exc in receiving water**
---	WQO Exc	*Urban runoff not causing or contributing to observed WQO Exc in receiving water*
---	---	*Urban runoff not causing or contributing to observed WQO Exc in receiving water*

New method for water quality objectives comparisons (Only data from SOME monitoring stations compared to WQOs applicable to MUN Beneficial Use)

Major Outfall site with Existing MUN: MO-OJA & MO-MEI	Mass Emission site with Existing MUN: None	Cause or Contribute Determination
---	---	*Urban runoff not causing or contributing to observed WQO Exc in receiving water BASED ON PROGRAM NO LONGER COMPARING RECEIVING WATER DATA TO WQOs APPLICABLE TO MUN B.U.*
WQO Exc	---	*Urban runoff not causing or contributing to observed WQO Exc in receiving water BASED ON PROGRAM NO LONGER COMPARING RECEIVING WATER DATA TO WQOs APPLICABLE TO MUN B.U.*

1.7.4 WQS Evaluation Methodology

For the analysis of wet-weather data (Events 1-5), the BPO and the acute, freshwater WQO in the CTR –Criteria Maximum Concentration (CMC) were used. For some constituents, the CTR does not contain acute criteria. Prior to the 2011/12 Annual Report, the SMP used the HHOO for these cases because these constituents had no other objectives for comparison. However, since these objectives are based on long-term exposure and stormwater discharges are infrequent and of short duration, it was decided that comparing short term stormwater discharges to the long-term chronic criteria was not an accurate representation of the risk of stormwater discharges to human health. CTR chronic criteria were not used for wet-weather analyses because acute criteria better reflect the short-term storm event exposure experienced by organisms, as compared to the long-term exposure considered by chronic criteria.

For the analysis of dry-weather data (Event 6 and 20223-DRY), the applicable BPO and the most stringent of the applicable CTR chronic freshwater objectives, e.g. Criteria Continuous Concentration (CCC), HHOO, or HHWO were used. Prior to 2011, if the CTR did not contain chronic freshwater objectives for a constituent, the HHOO was used. In 2011, this was revised to include HHWO in the determination of the most stringent objective exceedances due to their potential for long-term exposure. In December 2016, this was revised to the current method as described above based on the re-evaluation of the applicability of MUN beneficial use designations for these waters.

Table 1-13. Applicable Water Quality Standards

Site and MUN Beneficial Use Designation Status	Wet Weather Standards	Dry Weather Standards
MUN (MO-MEI and MO-OJA)	Basin Plan including Title 22 (drinking water) standards CTR-CMC	Basin Plan including Title 22 (drinking water) standards CTR - most stringent of CCC, HHOO, HHWO
Non-MUN (ME-CC, ME-SCR, ME-VR2, MO-CAM, MO-FIL, MO-HUE, MO-MPK, MO-SIM, MO-SPA, MO-THO, MO-VEN)	Basin Plan excluding Title 22 (drinking water) standards CTR-CMC	Basin Plan excluding Title 22 (drinking water) standards CTR - most stringent of CCC and HHOO

Section 1.8 presents a discussion of WQS exceedances that occurred during the wet-weather and dry-weather monitoring events during the 2022/23 monitoring year.

1.7.5 Pollutants of Concern

The Permit (Section 1.A.I.16 of Attachment F - Monitoring Program No. CI 7388,) requires that Pollutants of Concern (POC) that exceed the BPO and CTRO for acute criteria for all mass emission test results be highlighted and submitted to the Regional Board. Attachment B of the Permit lists the POC for each watershed. The POC include constituents that have limits in the Basin Plan that are only applicable to sites designated for MUN beneficial use, and constituents in the CTRO that do not have acute objectives but do have CCC, HHWO, and/or HHOO (which are only applicable to dry weather (chronic) conditions). The POC lists also include fecal coliform, which does not have a limit in either document. Therefore, there are not always applicable POC limits for comparison with sample results (e.g. sites without MUN designations in wet and dry weather, wet weather samples for CTR POC, etc.). Table 1-14 shows the POC from Attachment B that only have MUN or CTR dry weather criteria and the associated watershed for which they are listed. The Program will continue to compare sample results to applicable criteria per the approach explained in the preceding sections.

Table 1-14. Applicability of Attachment B - Pollutants of Concern

POC	MUN (µg/L)	CTR HHWO (µg/L)	CTR HHOO (µg/L)	CTR Chronic (µg/L)	Calleguas Creek	Santa Clara River	Ventura River
Fecal Coliform [a]					X	X	X
Aluminum, total	1000				X	X	X
Arsenic, total	10					X	
Barium, total	1000				X	X	
Beryllium, total	4				X		
Cadmium, total	5				X	X	X
Chromium, total	50				X	X	X
Mercury, total	2				X	X	X
Nickel, total	100	610	4600		X	X	X
Selenium, total	50			5.0		X	
Benzo(a)anthracene		0.0044	0.049		X	X	
Benzo(a)pyrene	0.2	0.0044	0.049		X	X	X
Benzo(b)fluoranthene		0.0044	0.049		X	X	X
Benzo(k)fluoranthene		0.0044	0.049		X	X	
Bis(2-ethylhexyl)phthalate	4	1.8	5.9		X	X	X
Chrysene		0.0044	0.049		X	X	X
Dibenz(a,h)anthracene		0.0044	0.049		X	X	
Hexachlorobenzene	1	0.00075	0.00077		X		X
Indeno(1,2,3-cd)pyrene		0.0044	0.049		X	X	
4,4’-DDD		0.00083	0.00084		X		
4,4’-DDE		0.00059	0.00059		X	X	

Note: Blank spaces indicate limits do not apply.

[a] The Regional Board authorized the exclusion of fecal coliform from the POC and Minimum Levels list of the Permit on May 23, 2018, based on the elimination of fecal coliform as a freshwater REC-1 standard in 2010. The authorization occurred after the end of the 2017/18 wet season and prior to the 2017/18 dry event. Fecal coliform is no longer included in the bacteriological analyses however *E. coli* continues to be analyzed to track potential fecal pollution.

1.8 2022/23 WATER QUALITY STANDARD EVALUATIONS

1.8.1 Primary Method Determination

Some constituents are measured by more than one analytical method which can yield significantly different results. Since 2009, the SMP has utilized some non-40 CFR 136 approved analytical methods to target the low Minimum

Levels (ML) listed in Attachment G of the Permit. Prior to July 2019, the SMP considered the method with the lowest Reporting Limit (RL) as primary, based on the recommendation of the laboratory at the time. In reviewing this evaluation method and based on updated guidance from the analytical laboratory, the SMP determined that the method with the lowest RL may not be the most representative of the level of the constituent due to differences in the matrices for which the analytical methods are intended; and that in keeping with Section K.4(a) of Attachment F of the Permit, the 40 CFR 136 method should be considered the primary method.

As of July 2019, the SMP considers the 40 CFR 136 approved method to be primary. In all cases, any result above a WQO by any method triggered the inclusion of that constituent in the Elevated Levels Report and Annual Report with the results from all available methods. A footnote to the table in the reports explained which method was considered primary.

This redetermination applies to phenols (including pentachlorophenol), bis(2-ethylhexyl)phthalate, and polycyclic aromatic hydrocarbons (PAHs). The primary method for all affected constituents is now EPA 625.1. It is a 40 CFR 136 approved gas chromatography mass spectrometry (GCMS) method intended for use with wastewater matrices and as such has been determined to be the most appropriate method for the SMP. The downside is that it tends to have higher RLs than the other methods and it requires dilutions more frequently, which raises the already typically higher RLs and can obscure the presence of constituents at lower concentrations. It also contains more steps than some of the other methods which introduces greater risk of laboratory contamination (especially phthalates).

The three methods used to obtain the lower RLs that are not 40 CFR 136 approved are EPA 515.3 and EPA 525.2 (drinking water methods), and EPA 8270C (wastewater method). The drinking water methods contain fewer steps and were originally selected because they rarely require dilutions and therefore their reporting limits stay low, however it was determined in the 2018/19 monitoring year that they may not be accurate for a stormwater matrix (however they would still be appropriate for laboratory/equipment/field blank samples). EPA 525.2 is 40 CFR 136 approved for atrazine, diazinon, prometryn, and simazine (permit-required pesticides) but not for bis(2-ethylhexyl)phthalate or benzo(a)pyrene. EPA 8270C is a GCMS method intended for wastewater matrices and is very similar to EPA 625.1 with similar extraction and analysis steps; however, while EPA 8270C RLs are typically lower, it is not 40 CFR 136 approved.

A letter explaining the change was sent to the Regional Board Executive Officer on July 19, 2019.

1.8.2 2022/23 WQS Updates and Corrections

There were no changes to California Toxics Rule Objectives (CTRO) or Basin Plan Objectives (BPO) during the 2022/23 monitoring year.

Hexavalent Chromium Update

The State Water Board has not yet adopted a new Title 22 (drinking water) maximum contaminant level (MCL) for hexavalent chromium. The Superior Court of Sacramento County judged the previous one to be invalid in May 2017 due to the failure to “properly consider the economic feasibility of complying with the MCL” prior to adoption. The adoption was expected to take 18-24 months to complete, so may be in effect for the next annual report. The CTR hexavalent chromium and Basin Plan total chromium WQO remain in effect.

1.8.3 2022/23 Water Quality Standard Evaluation Summary

Table 1-15 presents WQO exceedances at mass emission stations based on an analysis of the 2022/23 stormwater monitoring data. Constituents that were found at elevated levels[24] at sites upstream (i.e., related major outfall

[24] “Elevated levels” is used to describe those concentrations that are above a WQS. These amounts are not referred to as “exceedances,” as has been done for the mass emission stations, since, technically, those standards are only applicable to receiving waters, not to the outfalls

stations) are shown in bold (see Sections 1.8.4 through 1.8.7 for a discussion of the relationship between the mass emission and major outfall stations). Table 1-16 presents the elevated levels of constituents at major outfall stations based on an analysis of the 2022/23 wet-season stormwater monitoring data. Constituents that exceeded the WQO at sites downstream (i.e., related mass emission stations) are shown in bold. Table notes are provided below Table 1-16.

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that were monitored.

Table 1-15. Water Quality Objective Exceedances at Mass Emission Stations

Site	Constituent	2022/23-1 (Wet)[a]	2022/23-2 (Wet)[a]	2022/23-3 (Wet)[a]	2022/23-4 (Wet)	2022/23-5 (Wet)[a]	2022/23-6 (Dry)	Applicable WQO
ME-CC	*E. coli*	**1,989**		NS	**3,225**	NS		320 MPN/100 mL (BPO)
	Chloride ^		**180**	NS		NS	**210**	SSO: 150 mg/L (BPO)
	Total Dissolved Solids ^			NS		NS	**1,100**	SSO: 850 mg/L (BPO)
	Bis(2-ethylhexyl)phthalate[b]			NS		NS	<0.41 11*	5.9 µg/L (CTRO HHOO) EPA 525.2 RL=3 EPA 625.1 RL=5
ME-SCR	*E. coli*	Dry	Dry	7,700[a]	**2,064**	799[a]		235[d] MPN/100 mL (BPO)
	Bis(2-ethylhexyl)phthalate[b]	Dry	Dry				<0.41 6*,[c]	5.9 µg/L (CTRO HHOO) EPA 525.2 RL=3 EPA 625.1 RL=5
ME-VR2	*E. coli*	**2,613**		NS	**15,531**	NS		320 MPN/100 mL (BPO)

Table 1-16. Elevated Levels at Major Outfall Stations

Site		2022/23-1 (Wet)[a]	2022/23-2 (Wet)[a]	2022/23-3 (Wet)[b]	2022/23-4 (Wet)	2022/23-5 (Wet)[b]	2022/23-6 (Dry)	Applicable WQO
	Constituent	Value	Value	Value	Value	Value	Value	
MO-CAM	*E. coli*	**6,630**	8,664	NS	**857**	NS	471	320 MPN/100 mL (BPO)
	pH			NS		NS	9.68	6.5 -8.5 pH Units (BPO)
	Copper, dissolved			NS		NS	42	29.29 µg/L (CTRO) RW Hardness=400 mg/L
MO-FIL	*E. coli*	18,500	3,076	NS	**3,255**	NS	809	235[d] MPN/100 mL (BPO)
MO-HUE	*E. coli*	12,997	11,199	NS	8,164	NS	4,611	320 MPN/100 mL (BPO)
	Dissolved Oxygen	3.79		NS		NS	4.48	5 mg/L (BPO)
MO-MEI	*E. coli*	**32,550**	4,352	NS	**12,033**	NS	891	320 MPN/100 mL (BPO)
	Chloride ^			NS		NS	260	SSO: 60 mg/L (BPO)
	Total Dissolved Solids ^			NS		NS	1,400	SSO: 800 mg/L (BPO)

Site	Constituent	2022/23-1 (Wet)[a] Value	2022/23-2 (Wet)[a] Value	2022/23-3 (Wet)[b] Value	2022/23-4 (Wet) Value	2022/23-5 (Wet)[b] Value	2022/23-6 (Dry) Value	Applicable WQO
	Aluminum, total[e]	5,300	2,000	NS	3,200	NS		1,000 µg/L (BPO[e])
	Unionized Ammonia (calc. from NH3-N)			NS		NS	0.063	0.035 µg/L (BPO) SW 4-day (Calculation) [Salinity 1.2 ppt, Temp 17.2°C, pH 8.12, NH3-N 1.3 mg/L]
	Pentachlorophenol[b,e]	1 5.1(DNQ)* 6(DNQ)	0.73 1.3(DNQ)* 2.1	NS		NS		1 µg/L (BPO[e]) EPA 515.4 RL=0.2,0.2 EPA 625.1 RL=10,2 EPA 8270C RL=10,2
MO-MPK	*E. coli*	**111,990**	5,794	NS	**9,208**	NS	1,789	320 MPN/100 mL (BPO)
MO-MPK	Chloride ^			NS		NS	**350**	SSO: 150 mg/L (BPO)
MO-MPK	Total Dissolved Solids ^			NS		NS	**1,300**	SSO: 850 mg/L (BPO)
MO-OJA	*E. coli*	**41,060**	9,606	NS	**2,014**	NS	988	320 MPN/100 mL (BPO)
MO-OJA	Chloride ^			NS		NS	160	SSO: 60 mg/L (BPO)
MO-OJA	Total Dissolved Solids ^			NS		NS	1,300	SSO: 800 mg/L (BPO)
MO-OJA	Nitrate+Nitrite as N			NS		NS	6	SSO: 5 mg/L (BPO)
MO-OJA	Aluminum, total[e]	6,300	2,300	NS	9,600	NS		1,000 µg/L (BPO[e])
MO-OJA	Benzo(a)pyrene[b,e]	<0.2 <3.9* 0.52(DNQ)		NS		NS	<0.045 <0.82* 0.093(DNQ)	0.2 µg/L (BPO[e]) EPA 525.2 RL=1,0.1 EPA 625.1 RL=10,1 EPA 8270C RL=1,0.1
MO-OJA	Benzo(b)fluoranthene[b,f,g]			NS		NS	<0.46* 0.23	0.0044 µg/L (CTR HHWO) EPA 625.1 RL=1 EPA 8270C RL=0.1
MO-OJA	Benzo(k)fluoranthene[b,f,g]			NS		NS	<0.72* 0.25	0.0044 µg/L (CTR HHWO) EPA 625.1 RL=1 EPA 8270C RL=0.1
MO-OJA	Dibenz(a,h)anthracene[b,f]			NS		NS	0.8(DNQ)* 0.81	0.0044 µg/L (CTR HHWO) EPA 625.1 RL=2 EPA 8270C RL=0.1
MO-OJA	Indeno(1,2,3-cd)pyrene[b,f]			NS		NS	0.75(DNQ)* 0.71	0.0044 µg/L (CTR HHWO) EPA 625.1 RL=2 EPA 8270C RL=0.1
MO-OJA	Bis(2-ethylhexyl)phthalate[b,e]	<4.1 51[h],*		NS	<0.82 16*	NS		4 µg/L (BPO[e]) EPA 525.2 RL=30,6 EPA 625.1 RL=50,5

Site	Constituent	2022/23-1 (Wet)[a] Value	2022/23-2 (Wet)[a] Value	2022/23-3 (Wet)[b] Value	2022/23-4 (Wet) Value	2022/23-5 (Wet)[b] Value	2022/23-6 (Dry) Value	Applicable WQO
	Pentachlorophenol[b,e]	0.64 4.7(DNQ)* 5.8(DNQ)		NS		NS		EPA 515.3 RL=0.2 1 µg/L (BPO[e]) EPA 625.1 RL=10 EPA 8270C RL=10
MO-OXN	*E. coli*	14,136	36,540	NS	**1,396**	NS	Dry	320 MPN/100 mL (BPO)
MO-OXN	Copper, dissolved	7.7[i]	16[i]	NS		NS	Dry	CTRO: 7.43[i], 8.65[i] µg/L Hardness as CaCO3: 53.3[i], 62.6[i] mg/L
MO-OXN	Zinc, dissolved		110[i]	NS		NS	Dry	CTRO: 78.79[i] µg/L Hardness as CaCO3: 62.6[i] mg/L
MO-SIM	*E. coli*	**1,267**	17,329	NS	**6,488**	NS		320 MPN/100 mL (BPO)
MO-SIM	Chloride ^			NS		NS	**270**	SSO: 150 mg/L (BPO)
MO-SIM	Total Dissolved Solids ^			NS		NS	**2,800**	SSO: 850 mg/L (BPO)
MO-SIM	Selenium, total			NS		NS	22	5 µg/L (CTRO)
MO-SPA	*E. coli*	10,462	5,794	NS	**2,987**	NS	Dry	235[d] MPN/100 mL (BPO)
MO-SPA	Copper, dissolved	21[i]	10[i]	NS		NS	Dry	CTRO: 11.73[i], 9.26[i] µg/L Hardness as CaCO3: 86.6[i], 67.4[i] mg/L
MO-SPA	Zinc, dissolved		100[i]	NS		NS	Dry	CTRO: 83.91[i] µg/L Hardness as CaCO3: 67.4[i] mg/L
MO-THO	*E. coli*	**14,136**		NS	**2,187**	NS		320 MPN/100 mL (BPO)
MO-THO	Chloride ^		**260**	NS		NS	**280**	SSO: 150 mg/L (BPO)
MO-THO	Total Dissolved Solids ^		1,300	NS		NS	**1,400**	SSO: 850 mg/L (BPO)
MO-VEN	*E. coli*	19,863	57,940	NS	**2,603**	NS		320 MPN/100 mL (BPO)
MO-VEN	pH			NS		NS	8.63	6.5 -8.5 pH Units (BPO)
MO-VEN	Copper, dissolved		16[i]	NS		NS		CTRO: 9.59[i] µg/L Hardness as CaCO3: 69.9[i] mg/L
MO-VEN	Zinc, dissolved		110[i]	NS		NS		CTRO: 86.55[i] µg/L Hardness as CaCO3: 69.9[i] mg/L
MO-VEN	Selenium, total			NS		NS	10	5 µg/L (CTRO)

Notes:

Bolded: Elevated level of same constituent in one or more related major outfalls

Blank cells indicate the result was within WQO limits or was not required to be analyzed.
DNQ: Detected below the RL and therefore concentration cannot be confidently quantified.
NS: Not sampled.
*: Primary method
^ Site Specific Objectives
Dry: Channel dry or insufficient flow to sample.
[a] Stormwater runoff did not occur at ME-SCR during Event 1 or Event 2 due to very dry antecedent conditions so sample could not be collected. Event 3 was the first flush event at ME-SCR. The other Program stations were not sampled in Event 3 due to logistical issues resulting from the short amount of time between Event 2 and Event 3, so a cause or contribute relationship evaluation is not available for this event. Three events had been sampled at the major outfalls prior to sampling Event 5 at ME-SCR, so a cause or contribute relationship evaluation is not available for this event.
[b] This constituent is measured by more than one analytical method, which can yield significantly different results. Prior to July 2019, the SMP considered the method with the lowest Reporting Limit (RL) as primary, but as of July 2019, the SMP considers the 40 CFR 136 approved method (EPA 625.1) as primary, but reports all results as required. The other method(s) are not 40 CFR 136 approved for the constituent but are analyzed to provide a lower detection limit and/or are analyzed for other constituents. RLs are indicated in order by event in the "Applicable WQO" column. Only levels above the WQO for the primary method are assessed for cause or contribute.
[c] Sample result is considered an upper limit due to contamination in the laboratory method blank.
[d] The 2019 Bacteria Provisions changed the REC-1 E. coli objective from 235 MPN/100 mL to 320 CFU/100 mL STV (statistical threshold value). Per the Regional Board, MPN/100 ml is used with equivalency to CFU/100 ml. This change of objective does not apply to sites with an existing TMDL, therefore the objective for ME-SCR, MO-FIL, and MO-SPA is still 235 MPN/100 ml.
[e] The BPO for aluminum, bis(2-ethylhexyl)phthalate, benzo(a)pyrene, and pentachlorophenol only apply to sites with a MUN designation for municipal or domestic water supply. Only MO-MEI and MO-OJA have an existing MUN designation. [Bis(2-ethylhexyl)phthalate and benzo(a)pyrene also have a non-MUN dry weather CTRO and pentachlorophenol also has a wet and dry CTRO, which apply to all samples.]
[f] The HHWO for this constituent only applies to sites with a MUN designation for municipal or domestic water supply. Only MO-MEI and MO-OJA have an existing MUN designation. The HHOO objective applies at ME-VR2.
[g] Sample results for structural isomers may have contribution from their isomeric pair.
[h] This result was flagged as high-biased and estimated based on the result for the laboratory LCS QAQC for this analyte in this batch, therefore this result is considered high-biased and an upper limit.
[i] CTRO is calculated using water hardness. The receiving water hardness is used unless it is unavailable (as in Event 1 and 2 for the Santa Clara River Watershed when ME-SCR was dry), in which case the water hardness at the site is used instead. Major outfall water hardness is typically lower than that of the receiving water, resulting in more stringent water quality objective (WQO) than would apply in the associated receiving water.

1.8.4 Ventura River Watershed Receiving Water Limit Evaluation[25]

Urban stormwater runoff and urban non-stormwater flows were evaluated at two major outfall locations in the Ventura River Watershed during the 2022/23 season: Unincorporated-1 (MO-MEI) and Ojai-1 (MO-OJA). Both major outfalls are located upstream of the ME-VR2 mass emission station (see Figure 1-1), and therefore water quality data collected at ME-VR2 were used to represent receiving water quality in the "cause or contribute" evaluation conducted for both major outfalls. Table 1-17 and Table 1-18 show the constituents that exceeded WQS in the downstream receiving water and compares them to the levels measured at the major outfalls, MO-MEI and MO-OJA, respectively. Receiving water exceedances where the urban runoff from the applicable major outfalls was outside of WQS are shown in bold. Since ME-VR2 is not designated MUN beneficial use, the MUN WQO elevated levels at MO-MEI and MO-OJA are not included in Table 1-17 or Table 1-18.

Table 1-17. Comparison of MO-MEI and ME-VR2 Relative to Water Quality Standards

Constituent (Unit)	Unincorporated-1 Major Outfall (MO-MEI)	Receiving Water (ME-VR2)	WQO (BPO or CTRO)	
2022/23-1 (Wet) – November 8-9, 2022				
E. coli (MPN/100 mL)	**32,550**	**2,613**	320	BPO
2022/23-2 (Wet) – December 2-3, 2022				
No exceedances at ME-VR2 during this event				
2022/23-4 (Wet) – February 24-25, 2023				
E. coli (MPN/100 mL)	**12,033**	**15,531**	320	BPO
2022/23-6 (Dry) – May 22-23, 2023				
No exceedances at ME-VR2 during this event				

[25] The Ventura River mass emission station (ME-VR2) was installed during the 2004/05 monitoring year when the original station, ME-VR was decommissioned due to safety concerns because of landslide activity. The station was moved approximately one mile downstream to a safe location, while still representative of the runoff of the Ventura River watershed. The new location for the station put it into a different reach of the river according to the Basin Plan (between the confluence with Weldon Canyon and Main Street rather than between Casitas Vista Road and the confluence with Weldon Canyon), with higher limits for total dissolved solids (TDS), sulfate, chloride, boron, and nitrogen. Of these constituents, TDS, chloride, and nitrogen are monitored as part of the NPDES Permit by the SMP. The limits in the SMP's database were not updated for the new location until the 2011 annual report, and they are now correct for the current location. These changes and revised exceedances were explained in the 2011 annual report.

Table 1-18. Comparison of MO-OJA and ME-VR2 Relative to Water Quality Standards

Constituent (Unit)	Ojai-1 Major Outfall (MO-OJA)	Receiving Water (ME-VR2)	WQO (BPO or CTRO)	
2022/23-1 (Wet) – November 8-9, 2022				
E. coli (MPN/100 mL)	**41,060**	**2,613**	320	BPO
2022/23-2 (Wet) – December 2-3, 2022				
No exceedances at ME-VR2 during this event				
2022/23-4 (Wet) – February 24-25, 2023				
E. coli (MPN/100 mL)	**2,014**	**15,531**	320	BPO
2022/23-6 (Dry) – May 22-23, 2023				
No exceedances at ME-VR2 during this event				

1.8.5 Santa Clara River Watershed Receiving Water Limit Evaluation

Urban stormwater runoff and urban non-stormwater flows were evaluated at four major outfalls in the Santa Clara River Watershed during the 2022/23 monitoring year: Fillmore-1 (MO-FIL), Santa Paula-1 (MO-SPA), Oxnard-1 (MO-OXN), and Ventura-1 (MO-VEN). Two of these stations, MO-FIL and MO-SPA, are located upstream of the ME-SCR mass emission station (see Figure 1-1), and therefore water quality data collected at ME-SCR were used to represent receiving water quality in the "cause or contribute" evaluation conducted for both major outfalls. The other two stations, MO-OXN and MO-VEN, are located downstream of the ME-SCR mass emission station (see Figure 1-1). Because the ME-SCR station is located upstream of MO-OXN and MO-VEN, an assumption was required so that water quality data collected at ME-SCR could be considered to adequately represent Santa Clara River water quality downstream of the confluence of both MO-OXN and MO-VEN with the river. For comparison purposes it was assumed that pollutant concentrations in the Santa Clara River downstream of ME-SCR remain unchanged to those measured at ME-SCR to represent a hypothetical compliance point below the confluence of MO-OXN and MO-VEN and the Santa Clara River. With this assumption in effect, water quality data collected at ME-SCR were used to represent receiving water quality in the "cause or contribute" evaluation conducted for the MO-OXN and MO-VEN stations. Constituents exceeding WQS at the receiving water were compared to the urban runoff levels at the MO-FIL, MO-SPA, MO-OXN, and MO-VEN stations and are shown in Table 1-19 through Table 1-22. Column order is presented to show whether a site is upstream or downstream of the receiving water station, i.e. if a site is upstream of the receiving water station then the site column is listed first (MO-FIL, MO-SPA) and if a site is downstream of the receiving water station (MO-OXN, MO-VEN) then the site column is listed second.

Stormwater runoff did not occur at ME-SCR during 2022/23 Event 1 (Wet) or 2022/23 Event 2 (Wet) due to very dry antecedent conditions so sample could not be collected. 2022/23 Event 3 (Wet) was the first flush event at ME-SCR and the other Program stations were not sampled in Event 3 due to logistical issues resulting from the short amount of time between Event 2 and Event 3. 2022/23 Event 4 (Wet) was the first event sampled for ME-SCR concurrently with its associated major outfall stations (MO-FIL, MO-OXN, MO-SPA, and MO-VEN) for the 2022/23 water year and was the 3rd storm event sampled at the major outfalls, which completed the wet weather sampling requirements for the outfall stations for the 2022/23 water year. 2022/23 Event 5 (Wet) is the 3rd wet event sampled for ME-SCR for this water year which completes the wet weather sampling requirements for the 2022/23 water year, but since the major outfall stations were not sampled a cause or contribute relationship evaluation is not available for this event.

Receiving water exceedances where the urban runoff from the applicable major outfalls was outside of WQS are shown in bold. NS – indicates that a site was not sampled. Dry – indicates that the site was dry at the time of sampling for that constituent so a sample could not be collected.

Table 1-19: Comparison of MO-FIL and ME-SCR Relative to Water Quality Standards

Constituent (Unit)	Fillmore-1 Major Outfall (MO-FIL)	Receiving Water (ME-SCR)	WQO (BPO or CTRO)	
2022/23-1 (Wet) – November 8-9, 2022				
No runoff at ME-SCR so no cause or contribute for this event				
2022/23-2 (Wet) – December 2-3, 2022				
No runoff at ME-SCR so no cause or contribute for this event				
2022/23-3 (Wet) – December 10-11, 2022				
E. coli (MPN/100 mL)	NS	7,700	235	BPO
2022/23-4 (Wet) – February 24-25, 2023				
E. coli (MPN/100 mL)	**3,255**	**2,064**	235	BPO
2022/23-5 (Wet) – March 10-11, 2023				
E. coli (MPN/100 mL)	NS	799	235	BPO
2022/23-6 (Dry) – May 17-18, 2023				
Bis(2-ethylhexyl) phthalate	5[a]	6[a]	5.9	CTR HHOO

[a] Sample result is considered an upper limit due to contamination in the laboratory method blank.

Table 1-20. Comparison of MO-SPA and ME-SCR Relative to Water Quality Standards

Constituent (Unit)	Santa Paula-1 Major Outfall (MO-SPA)	Receiving Water (ME-SCR)	WQO (BPO or CTRO)	
2022/23-1 (Wet) – November 8-9, 2022				
No runoff at ME-SCR so no cause or contribute for this event				
2022/23-2 (Wet) – December 2-3, 2022				
No runoff at ME-SCR so no cause or contribute for this event				
2022/23-3 (Wet) – December 10-11, 2022				
E. coli (MPN/100 mL)	NS	7,700	235	BPO
2022/23-4 (Wet) – February 24-25, 2023				
E. coli (MPN/100 mL)	**2,987**	**2,064**	235	BPO
2022/23-5 (Wet) – March 10-11, 2023				
E. coli (MPN/100 mL)	NS	799	235	BPO
2022/23-6 (Dry) – May 17-18, 2023				
Bis(2-ethylhexyl) phthalate	Dry	6[a]	5.9	CTR HHOO

[a] Sample result is considered an upper limit due to contamination in the laboratory method blank.

Table 1-21. Comparison of MO-OXN and ME-SCR Relative to Water Quality Standards

Constituent (Unit)	Receiving Water [a] (ME-SCR)	Oxnard-1 Major Outfall (MO-OXN)	WQO (BPO or CTRO)	
2022/23-1 (Wet) – November 8-9, 2022				
No runoff at ME-SCR so no cause or contribute for this event				
2022/23-2 (Wet) – December 2-3, 2022				
No runoff at ME-SCR so no cause or contribute for this event				
2022/23-3 (Wet) – December 10-11, 2022				
E. coli (MPN/100 mL)	7,700	NS	235[c]	BPO
2022/23-4 (Wet) – February 24-25, 2023				
E. coli (MPN/100 mL)	**2,064**	**1,396**	235[c]	BPO
2022/23-5 (Wet) – March 10-11, 2023				
E. coli (MPN/100 mL)	799	NS	235[c]	BPO
2022/23-6 (Dry) – May 17-18, 2023				
Bis(2-ethylhexyl) phthalate	6[b]	Dry	5.9	CTR HHOO

[a] Water quality monitoring data collected at ME-SCR were used in the receiving water "cause or contribute" evaluation as downstream surrogate data to represent the water quality in the Santa Clara River at a compliance point below the confluence of MO-OXN and the Santa Clara River. The site column is listed after the receiving water column to represent this difference.

[b] Sample result is considered an upper limit due to contamination in the laboratory method blank

[c] The 2019 Bacteria Provisions changed the REC-1 *E. coli* objective from 235 MPN/100 mL to 320 CFU/100 mL STV (statistical threshold value). Per the Regional Board, MPN/100 ml is used with equivalency to CFU/100 ml. This change of objective does not apply to sites with an existing TMDL, therefore the objective for ME-SCR, is still 235 MPN/100 ml.

Table 1-22. Comparison of MO-VEN and ME-SCR Relative to Water Quality Standards

Constituent (Unit)	Receiving Water [a] (ME-SCR)	Ventura-1 Major Outfall (MO-VEN)	WQO (BPO or CTRO)	
2022/23-1 (Wet) – November 8-9, 2022				
No runoff at ME-SCR so no cause or contribute for this event				
2022/23-2 (Wet) – December 2-3, 2022				
No runoff at ME-SCR so no cause or contribute for this event				
2022/23-3 (Wet) – December 10-11, 2022				
E. coli (MPN/100 mL)	7,700	NS	235[c]	BPO
2022/23-4 (Wet) – February 24-25, 2023				
E. coli (MPN/100 mL)	**2,064**	**2,603**	235[c]	BPO
2022/23-5 (Wet) – March 10-11, 2023				
E. coli (MPN/100 mL)	799	NS	235[c]	BPO
2022/23-6 (Dry) – May 17-18, 2023				
Bis(2-ethylhexyl) phthalate	6[b]	<4.6	5.9	CTR HHOO

[a] Water quality monitoring data collected at ME-SCR were used in the receiving water "cause or contribute" evaluation as downstream surrogate data to represent the water quality in the Santa Clara River at a compliance point below the confluence of MO-OXN and the Santa Clara River. The site column is listed after the receiving water column to represent this difference.
[b] Sample result is considered an upper limit due to contamination in the laboratory method blank
[c] The 2019 Bacteria Provisions changed the REC-1 *E. coli* objective from 235 MPN/100 mL to 320 CFU/100 mL STV (statistical threshold value). Per the Regional Board, MPN/100 ml is used with equivalency to CFU/100 ml. This change of objective does not apply to sites with an existing TMDL, therefore the objective for ME-SCR, is still 235 MPN/100 ml.

1.8.6 Calleguas Creek Watershed Receiving Water Limit Evaluation

Urban stormwater runoff and urban non-stormwater flows were evaluated at four major outfalls in the Calleguas Creek Watershed during the 2022/23 monitoring year: Camarillo-1 (MO-CAM), Moorpark-1 (MO-MPK), Simi Valley-1 (MO-SIM), and Thousand Oaks-1 (MO-THO). Three of these major outfalls (MO-MPK, MO-SIM, and MO-THO) are located upstream of the ME-CC mass emission station (see Figure 1-1), and therefore water quality data collected at ME-CC were used to represent receiving water quality in the "cause or contribute" evaluation conducted for these major outfalls. As stated earlier, MO-CAM is in a different subwatershed than the closest receiving water location, the ME-CC station, monitored by the Program (see Figure 1-1). MO-CAM is tributary to Revolon Slough, which is tributary to Calleguas Creek several miles downstream of ME-CC. Similar to the ME-SCR station in the Santa Clara River watershed, an assumption was made so that water quality data collected at ME-CC could be considered to adequately represent Calleguas Creek water quality downstream of the confluence of Revolon Slough and the creek. It was assumed that pollutant concentrations in Calleguas Creek downstream of ME-CC remain the same as those measured at ME-CC to a hypothetical compliance point below the confluence of Revolon Slough and Calleguas Creek. With this assumption in effect, water quality data collected at ME-CC were used to represent receiving water quality in the "cause or contribute" evaluation conducted for the MO-CAM major outfall. Constituents exceeding WQS at the receiving water were compared to the urban runoff levels at the MO-MPK, MO-SIM, MO-THO, and MO-CAM stations and are shown in Table 1-23 through Table 1-26. Receiving water exceedances where the urban runoff from the applicable major outfalls was outside of WQS are shown in bold. Column order is presented to show whether a site is upstream or downstream of the receiving water station, i.e. if a site is upstream of the receiving water station then the site column is listed first (MO-MPK, MO-SIM, MO-THO) and if a site is downstream of the receiving water station then the site column is listed second (MO-CAM).

Table 1-23. Comparison of MO-MPK and ME-CC Relative to Water Quality Standards

Constituent (Unit)	Moorpark-1 Major Outfall (MO-MPK)	Receiving Water (ME-CC)	WQO (BPO or CTRO))	
2022/23-1 (Wet) – November 8-9, 2022				
E. coli (MPN/100 mL)	**111,990**	**1,989**	320	BPO
2022/23-2 (Wet) – December 2-3, 2022				
Chloride (mg/L)	29	180	150	BPO
2022/23-4 (Wet) – February 24-25, 2023				
E. coli (MPN/100 mL)	**9,208**	**3,255**	320	BPO
2022/23-6 (Dry) – May 15-16, 2023				
Chloride (mg/L)	**350**	**210**	150	BPO
Total Dissolved Solids (mg/L)	**1,300**	**1,100**	850	BPO
Bis(2-ethylhexyl) phthalate	2.6(DNQ)	11	5.9	CTR HHOO

Table 1-24. Comparison of MO-SIM and ME-CC Relative to Water Quality Standards

Constituent (Unit)	Simi Valley-1 Major Outfall (MO-SIM)	Receiving Water (ME-CC)	WQO (BPO or CTRO)	
2022/23-1 (Wet) – November 8-9, 2022				
E. coli (MPN/100 mL)	**1,267**	**1,989**	320	BPO
2022/23-2 (Wet) – December 2-3, 2022				
Chloride (mg/L)	50	180	150	BPO
2022/23-4 (Wet) – February 24-25, 2023				
E. coli (MPN/100 mL)	**6,488**	**3,255**	320	BPO
2022/23-6 (Dry) – May 15-16, 2023				
Chloride (mg/L)	**270**	**210**	150	BPO
Total Dissolved Solids (mg/L)	**2,800**	**1,100**	850	BPO
Bis(2-ethylhexyl) phthalate	5.6	11	5.9	CTR HHOO

Table 1-25. Comparison of MO-THO and ME-CC Relative to Water Quality Standards

Constituent (Unit)	Thousand Oaks-1 Major Outfall (MO-THO)	Receiving Water (ME-CC)	WQO (BPO or CTRO)	
2022/23-1 (Wet) – November 8-9, 2022				
E. coli (MPN/100 mL)	**14,136**	**1,989**	320	BPO
2022/23-2 (Wet) – December 2-3, 2022				
Chloride (mg/L)	**260**	**180**	150	BPO
2022/23-4 (Wet) – February 24-25, 2023				
E. coli (MPN/100 mL)	**2,187**	**3,255**	320	BPO
2022/23-6 (Dry) – May 15-16, 2023				
Chloride (mg/L)	**280**	**210**	150	BPO
Total Dissolved Solids (mg/L)	**1,400**	**1,100**	850	BPO
Bis(2-ethylhexyl) phthalate	2.4(DNQ)	11	5.9	CTR HHOO

Table 1-26. Comparison of MO-CAM and ME-CC Relative to Water Quality Standards

Constituent (Unit)	Receiving Water[a] (ME-CC)	Camarillo-1 Major Outfall (MO-CAM)	WQO (BPO or CTRO)	
2022/23-1 (Wet) – November 8-9, 2022				
E. coli (MPN/100 mL)	**1,989**	**6,630**	320	BPO
2022/23-2 (Wet) – December 2-3, 2022				
Chloride (mg/L)[b]	180	13	150	BPO
2022/23-4 (Wet) – February 24-25, 2023				
E. coli (MPN/100 mL)	**3,255**	**857**	320	BPO
2022/23-6 (Dry) – May 15-16, 2023				
Chloride (mg/L) [b]	**210**	**670**	150	BPO
Total Dissolved Solids (mg/L) [b]	**1,100**	**1,600**	850	BPO
Bis(2-ethylhexyl) phthalate	11	<2.3	5.9	CTR HHOO

[a] Water quality monitoring data collected at ME-CC were used in the receiving water “cause or contribute” evaluation as downstream surrogate data to represent the water quality in Calleguas Creek at a compliance point below the confluence of Revolon Slough and Calleguas Creek. The MO-CAM station is tributary to Revolon Slough. The site column is listed after the receiving water column to represent this difference.

[b] Site-specific BPO for reach of Calleguas Creek where ME-CC is located. There are no waterbody specific WQO below the confluence of Revolon Slough and Calleguas Creek (the reach to which MO-CAM discharges). Therefore, the level of chloride and total dissolved solids at MO-CAM are not flagged as elevated in Table 1-16 but are included here because they are above the BPO for ME-CC.

1.8.7 Coastal Watershed

Urban stormwater runoff and urban non-stormwater flows were evaluated at one major outfall station that does not have an associated mass emission station located within the watershed. The MO-HUE station is in Port Hueneme and discharges to tšumaš (chumash) creek (formerly named J Street Drain) just upstream of where the drain enters Ormond Beach lagoon. Elevated levels seen at MO-HUE are listed in Table 1-16 and not in a separate table as there is not a mass emission station nearby to which comparisons would be relevant. Backwater effects from Ormond Lagoon preclude the installation of a mass emission station for this watershed.

1.8.8 Discussion of Results above Water Quality Standards

Three wet events were sampled for all sites. All Ventura River Watershed and Calleguas Creek Watershed sites were able to be sampled during the same wet events (events 1, 2, and 4) allowing representative evaluations of the “cause or contribute” status of pollutants for each mass emission station and its associated major outfalls. All major outfall stations in the Santa Clara River Watershed were sampled during the same events as those of the Ventura River and Calleguas Creek watersheds. Stormwater runoff did not occur at ME-SCR during Event 1 or Event 2 due to very dry antecedent conditions so sample could not be collected. Event 3 was the first flush event at ME-SCR. The other Program stations were not sampled in Event 3 due to logistical issues resulting from the short amount of time between Event 2 and Event 3, so a cause or contribute relationship evaluation is not available for these events. All Santa Clara River Watershed sites were sampled during Event 4 so a cause and contribute evaluation is possible for this event. Three events had been sampled at the major outfalls prior to sampling Event 5 at ME-SCR, so a cause or contribute relationship evaluation is not available for this event. One dry event was able to be sampled at all sites except for MO-SPA and MO-OXN, which were dry.

The occurrence of elevated levels varied by site, constituent, and event type (wet or dry) and is summarized below. [Note that Table 1-27 does not include magnitude of exceedance.]

Table 1-27. 2022/23 Occurrences of Elevated Levels by Constituent and Site in Wet and Dry Weather

Watershed	**Calleguas**					**Santa Clara**					**Ventura**			**-**
Constituent	**ME-CC**	**MO-CAM**	**MO-MPK**	**MO-SIM**	**MO-THO**	**ME-SCR**	**MO-FIL**	**MO-OXN**	**MO-SPA**	**MO-VEN**	**ME-VR2**	**MO-OJA**	**MO-MEI**	**MO-HUE**
E. coli	2W	3W 1D	3W 1D	3W	2W	3W	3W 1D	3W -D	3W -D	3W	2W	3W 1D	3W 1D	3W 1D
pH		1D								1D				
Dissolved Oxygen														1W 1D
Chloride	1W 1D		1D	1D	1W 1D							1D	1D	
Total Dissolved Solids	1D		1D	1D	1W 1D							1D	1D	
Aluminum, total, MUN only												3W	3W	
Copper, dissolved		1D						2W* -D	2W* -D	1W*				
Zinc, dissolved								1W* -D	1W* -D	1W*				
Selenium, total				1D						1D				
Nitrate + Nitrite as N												1D		
Unionized Ammonia													1D	
Bis(2-ethylhexyl)phthalate	1D					1D						2W		
Pentachlorophenol												1W	2W	
Benzo(a)pyrene												1W^ 1D^		

Watershed	Calleguas					Santa Clara					Ventura			-
Constituent	ME-CC	MO-CAM	MO-MPK	MO-SIM	MO-THO	ME-SCR	MO-FIL	MO-OXN	MO-SPA	MO-VEN	ME-VR2	MO-OJA	MO-MEI	MO-HUE
Benzo(b)fluoranthene												1D^		
Benzo(k)fluoranthene												1D^		
Dibenz(a,h)anthracene												1D		
Indeno(1,2,3-cd)pyrene												1D		

"W" indicates number of wet weather occurrences
"D" indicates number of dry weather occurrences
"- D" Not sampled during dry weather
^ Not by primary method. The primary method was ND but the primary method MDL was above the BPO so insufficiently sensitive to detect constituent at BPO concentration.
* CTRO is calculated using water hardness. The receiving water hardness is used unless it is unavailable (as in Event 1 for the Santa Clara River Watershed when ME-SCR was dry), in which case the water hardness at the site is used instead. Major outfall water hardness is typically lower than that of the receiving water, resulting in more stringent water quality objective (WQO) than would apply in the associated receiving water.

The Program is using this information to identify pollutants of concern and direct efforts to reduce their discharge from the storm drain system. Actions such as studies or the purchasing of new equipment that each permittee has taken or is committing to take to address pollutants found at elevated levels in their outfalls are detailed in Section 1.8.9.

Pathogen Indicators

Urban runoff concentrations of *E. coli* bacteria in wet weather were detected above the BPO in almost all samples. These indicator bacteria are routinely measured at concentrations above WQS during wet weather events. For dry weather monitoring, six of nine sampled major outfall sites exceeded the *E. coli* WQO during Event 6.

Heal the Bay's 2022/23 Annual Beach Report Card (BRC) assigns beaches a grade on an A to F scale, with higher grades representing lower risk of illness for beachgoers. 97% of Ventura County Beaches earned an A grade for summer dry weather and the BRC stated, "True to form, 100% of Ventura County's beaches received A and B Summer Dry Grades." Wet weather grades were lower than usual, with only 67% of beaches receiving A and B grades. The BRC states that the below average wet weather grades were likely due to the high rainfall, which was more than double the historical average for Ventura County.

Bacteriological contamination is a common occurrence throughout California and the United States. However, several issues make compliance with existing standards challenging:

- The WQS are based on fecal indicator bacteria, not the actual pathogenic micro-organisms that can cause illness. As a result, it is difficult to ascertain whether a water concentration of indicator bacteria is associated with an increased risk of human illness. This complicates establishment of priority watersheds or drainage areas and introduces considerable risk of spending significant resources to comply with bacteria standards but with little to no benefit to recreational beneficial uses.

- Urban (anthropogenic) sources, wildlife, bacterial regrowth and other non-urban sources all potentially contribute fecal indicator bacteria to outfalls and receiving waters. However, identifying the sources of bacteria impairment through sanitary surveys and source identification studies are costly and not always conclusive, as the science is still evolving.

- Even if likely dominant sources of fecal indicator bacteria can be identified, remediation or control of these sources is often difficult, e.g. high volumes of stormwater runoff, bacterial regrowth, and wildlife. There are only a limited number of BMPs that can effectively control fecal indicator bacteria pollution to meet these objectives, and they may not always be technically feasible at a given location.

Implementation of bacteria control strategies and BMPs

The Program has control strategies in place that directly address indicator bacteria concentrations in urban runoff. The existing Program includes a comprehensive residential public outreach program that uses radio, newspaper, online banners, outdoor bulletins, and transit shelters to educate the public about preventing animal waste from entering storm drains. The pollutant outreach campaign was expanded in 2009 to include the mailing of a brochure to horse owners, equestrian supply stores, and horse property owners. The brochure identified BMPs that horse owners should take to reduce bacteria in stormwater runoff. VCSQMP Annual Report Attachment B – PIPP Annual Report describes in detail the outreach conducted during the 2022/23 year. The Permittees also install dispensers for pet waste pickup bags at beaches, parks and trail heads. It is estimated that over 2 million pet waste bags are given out each year and there are now close to 400 pet waste bag dispensers throughout the County encouraging pet owners to pick up after their pets.

The efforts of the Illicit Discharges/Illicit Connections Program likely help to reduce bacteria in stormwater runoff by identifying and stopping illicit wastewater discharges. As indicator bacteria may also grow in natural environments and sediments, measures to prevent sediment transport may also help reduce bacteria in stormwater runoff. Steps to remove sediment from the storm drain system include street sweeping, catch basin cleaning, and maintenance of debris basins and publicly owned BMPs. Industrial and commercial inspections, construction inspection, and illicit discharge response and elimination therefore also represent significant efforts towards reducing the discharge of fecal indicator bacteria. Some Permittees have conducted field efforts to track bacteriological contamination detected at the major outfalls. General conclusions were that the data evaluation did not indicate specific identifiable sources because elevated concentrations were determined throughout the tested subwatershed areas.

In addition to the municipal stormwater program, bacteria are being addressed through TMDL programs in Malibu Creek, Miscellaneous Ventura Coastal Watersheds (Hobie and Kiddie Beaches), and Santa Clara River. Various reaches of Calleguas Creek and Ventura River are also listed on the Section 303(d) list due to indicator bacteria impairment. The Malibu Creek and Ventura Coastal beaches Bacteria TMDLs have been in effect since January 24, 2006 and December 18, 2008, respectively. Implementation Plans for both dry-weather and wet-weather were prepared and submitted for both TMDLs and compliance monitoring has been conducted at Malibu Creek and Ventura Coastal beaches since 2007 and 2009, respectively. The Santa Clara River Bacteria TMDL went into effect on March 21, 2012 and a comprehensive in-stream bacteria water quality monitoring plan and TMDL implementation plan were developed by the responsible parties according to the TMDL schedule. Receiving water and outfall monitoring began in October 2016 and September 2018, respectively, and continue in accordance with the approved monitoring plan. Several BMPs implemented in Calleguas Creek and Ventura River watersheds to meet compliance with other TMDLs also address bacteriological impairment such as prohibition of illicit discharges and implementation of LID/Green Street retrofits. The Calleguas Creek TMDL MOA group developed a draft Bacteria Work Plan to address this problematic pollutant in the Calleguas Creek Watershed.

Developing control measures to reduce observed bacteria concentrations to meet WQS is challenging. Treatment measures to address bacteria are likely to be costly and difficult to implement (especially with respect to the infrequent and short-term but high-volume events that compose stormwater runoff). As a result, implementing measures that will result in compliance with the existing WQS at all times will be extremely difficult. Consequently, the tasks in the Calleguas Creek Draft Bacteria Work Plan are designed to address these complexities to the greatest extent possible and provide mechanisms for protecting the identified beneficial uses in the watershed as is feasible. The strategy outlined in the draft work plan will assess the beneficial uses and risks to human health from bacteria and use that information to develop a TMDL to address bacteriological impairments. In the near-term an educational program focusing on the requirements of local domestic animal waste ordinances and the effects of domestic animal waste on the watershed is being considered. Like the metals TMDL, it is expected that the results from the bacteria TMDL will assist the municipal stormwater program in addressing this problematic pollutant because the successful efforts in Calleguas Creek can be applied throughout the County to address indicator bacteria.

The SMP collected samples for host-specific DNA marker analysis to identify bacteria sources (e.g. humans, dogs, birds) in the 2013/14 – 2015/16 permit years. Knowing which bacteria sources are responsible for high levels of indicator bacteria would assist in the selection of BMPs better suited to control a particular bacteria source. The goal of the county-wide fecal indicator bacteria source identification study was to assess county-wide dry and wet weather sources of fecal pollution in receiving waters, MS4 and control sites, to provide a regional assessment framework, inform future local studies and BMP implementation efforts.

The SMP conducted a dry weather study in 2014 to quantify *E. coli* and look for host-specific DNA markers (human, dog, and bird) in storm drains and outfalls across the County. A hybrid sampling design with probabilistic and targeted stations was developed, with assistance from SCCWRP, and 22 outfall samples, 45 random MS4 samples and 6 random control samples were collected and analyzed. All 73 samples were negative for the sensitive human marker HF 183. Dog markers were only detected in 11% of the samples, and bird in 37% of the samples. None of the three markers were detected in 60% of the samples and the detection proved independent of *E. coli* concentrations. The dominant source of *E. coli* remains unclear.

The SMP collected wet weather samples from major outfalls and mass emission stations during 2014-2016 for DNA marker analysis. A subsample of the wet-weather major outfall samples was sent to Weston Laboratories in 2016 for human, dog, and bird DNA marker analysis. Dog and bird markers were detected in all samples, and the human marker was detected in quantifiable amounts in 12 of 40 samples. The mass emission station samples were analyzed as part of the Bight ’13 Microbiology study for the human DNA marker HF 183.

The Bight ’13 Microbiology study for human DNA markers included wet and dry weather samples. The wet weather samples were collected at the mass emission stations and the dry weather samples were collected from the same receiving waters but lower in the watershed than the mass emission stations. The SMP collaborated with SCCWRP to transfer technology of qPCR-based analysis of host-specific DNA markers to the Ventura County Public Health Laboratory, which then performed the analyses and submitted the data to SCCWRP for analysis. For dry weather, HF 183 was found in quantifiable amounts in 11 of 49 samples. For wet weather, the number of samples was low for drawing conclusions; however ME-SCR and ME-VR2 were near the middle of the field in the Bight ’13 region for detections/amplifications, but ME-CC had a higher percentage of samples that amplified and a very high maximum sample (5 log is equivalent to ~10 % sewage) which indicates a likely human fecal source (or at least for HF183 marker) upstream of ME-CC. Preliminary studies have shown that advanced treatment of wastewater can result in varying levels of marker/pathogen in the treated effluent from day to day and there are two wastewater treatment plants that discharge tertiary treated effluent in this watershed.

These complex issues related to bacteriological contamination and impairment of beneficial uses have been considered and still need to be discussed among the regulators, regulated communities, and environmental groups with a goal to identify cost-effective water quality protective solutions.

Aluminum

The BPO for total aluminum (1,000 µg/L) is a Title 22 Primary MCL standard which is only applicable to MUN designated reaches. MO-OJA and MO-MEI are the only two of the fourteen sites that are in reaches designated as MUN. Elevated levels of aluminum were seen at both sites during wet weather monitoring but dry weather levels were below the objective.

Since the SMP began monitoring for aluminum in 2004, it has frequently observed levels above 1,000 µg/L at all SMP monitoring sites (receiving water and land use). Aluminum is a ubiquitous natural element in sediments throughout Ventura County geology. These sediments are mobilized during stormwater runoff events from urban, agriculture, and natural sources resulting in concentrations of aluminum above the BPO for MUN designated reaches (BPO-MUN). This is clearly shown by the wet weather concentrations of the metal measured in all three watersheds monitored by the SMP. Dry weather aluminum concentrations above WQS have not been observed at MO-OJA or MO-MEI.

To investigate the high concentrations of total aluminum identified in urban runoff and surface waters in Ventura County, primarily during storm events, the SMP conducted a historical data evaluation, and initiated new monitoring during the 2013/14 monitoring season. The findings are summarized below while the full aluminum data evaluation report can be found in the appendices of the 2013/14 Annual Report.

The majority (74.2 percent) of all wet weather water quality samples collected by the SMP for the aluminum study exceeded the BPO-MUN for total aluminum of 1,000 µg/L (this standard only applies to the reaches to which MO-MEI and MO-OJA discharge). However, all wet weather samples collected upstream of anthropogenic activities also exceeded the objective. In comparison, concentrations of total aluminum in dry weather samples appear to be a much smaller issue, since dry weather samples have always been below the BPO-MUN at MO-MEI and MO-OJA.

Required to protect MUN beneficial uses of receiving waters, the SMP investigated 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 included surface water quality samples and soil samples. Data sources include the Ventura Countywide SMP, 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. 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 SMP 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, publicly 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 total suspended solids (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 SMP 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 are 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 sediment and runoff from undeveloped areas suggests that wet weather aluminum will routinely exceed WQO regardless of Permittee efforts. 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.

Copper

The CTRO for copper is calculated for each site using the water hardness at the applicable receiving water station, as that is where the objective applies. If the receiving water hardness is not available, then the water hardness at the site is used instead. Typically, the water hardness at the receiving water stations is higher than at the outfalls, which results in a higher CTRO.

Dissolved copper at MO-CAM was above the CTRO in dry weather (Event 6), but there were no results above the CTRO for dissolved copper in the receiving water. Dissolved copper at MO-OXN, MO-SPA, and MO-VEN was above the CTRO for Events 1 and/or 2, because the water hardness for the receiving water was unavailable, since

ME-SCR did not have sufficient runoff for sampling in Events 1 and 2. The detected amounts would have been below the CTRO at the level of hardness typical of the receiving water.

Based on the "cause or contribute" methodology, copper from urban outfalls was not determined to persistently cause or contribute to WQS exceedances because results for copper were not observed above the CTRO in receiving waters (i.e., measured at the receiving water stations). There is no evidence to conclude that copper in urban runoff appreciably impacted receiving water beneficial uses during the 2022/23 monitoring season.

This conclusion does not mean these data will be ignored by the Program as it is actively addressing copper. Permittees supported the Brake Pad Partnership and Senate Bill (SB) 346 adopted September 27, 2010 – that authorized legislation to phase out the copper contained in vehicle brake pads. SB 346, authored by Senator Christine Kehoe (D-San Diego), requires brake pad manufacturers to reduce the use of copper in brake pads sold in California to no more than 5% by 2021 and no more than 0.5% by 2025. This true source control action will help significantly reduce copper in urban runoff. Several of the major outfall sites are next to freeways or railroad lines (MO-CAM, MO-OXN, MO-SPA, and MO-VEN) where copper-containing dust from vehicles and trains is continually produced and deposited; the SB346 legislation will help address this issue. In the future, similar legislation to address train brake pads may help to further reduce copper in runoff.

Other Metals

Dissolved zinc at MO-OXN, MO-SPA, and MO-VEN was above the CTRO for Event 2. The water hardness at the sites were used for determining the CTRO, because ME-SCR did not have sufficient runoff for sampling in Event 2 so receiving water hardness was unavailable. The detected amounts would have been below the CTRO at the level of hardness typical of the receiving water. Potential sources of zinc include galvanized metals (such as chain link fences, HVAC equipment, roofing, gutters/downspouts, steps, and bay doors), motor oil & hydraulic fluid, and dust from tire wear.

Two sites (MO-SIM and MO-VEN) were above the total selenium dry weather CTRO during Event 6. Since there were no corresponding exceedances at their respective receiving water stations, these sites do not appear to have a cause or contribute relationship within their watersheds. Potential sources of selenium include discharge from petroleum and metal refineries, erosion of natural deposits, and discharge from mines. Selenium is used in electronic and photocopier components, glass, pigments, rubber, metal alloys, textiles, petroleum, medical therapeutic agents, and photographic emulsions. Selenium is known to occur at elevated levels in Monterey Formation rocks (Miocene marine mudstone) which are common in Ventura County. The relative contributions of anthropogenic and natural sources to elevated selenium concentrations are not clear at this point.

Efforts to reduce metals in urban runoff

Because total metal fractions are associated with sediment, the Program has several control measures and BMPs that address metals in general, and sediment specifically. These control measures include steps to remove sediment from the storm drain system through street sweeping, catch basin cleaning, debris basin maintenance and publicly owned BMPs. Preventing sediments containing metals from entering the storm drain system is just as (if not more) important than removing them after they enter the storm drain system. Industrial and commercial inspections, construction inspection, and illicit discharge response and elimination, are significant efforts targeted at eliminating the discharge of metals.

In addition, the construction program element is structured to address sediment from construction sites and includes review of grading plans, requirements for sediment and erosion control BMPs, and field inspections to confirm BMP implementation. More recently the State Water Resources Control Board adopted WDR Order 2022-0057-DWQ, the Construction General Permit, which covers all construction sites that disturb one or more acres of soil or whose projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres. The Construction General Permit incorporates a risk-based approach to address pollutants from construction sites including sediments and associated metals. The Construction General Permit includes rigorous site planning, numeric effluent limits and action levels, and minimum BMPs as a function of the site risk for discharging sediment. It is expected that the Construction General Permit will provide further control of sediment from construction sites within Ventura County.

Although the transport of metals is not usually through direct actions of the public, public education of stormwater pollution prevention can reduce the overall transport of pollutants including sediment and dry weather runoff both which if reduced would also reduce metals. Current efforts can be further tailored to address sources of metals such as promoting household hazardous waste collection events to dispose of mercury containing compact fluorescent light bulbs and thermometers. Other efforts include the Brake Pad Partnership and Senate Bill (SB) 346, legislation that authorizes the phase out of copper from vehicle brake pads discussed above.

Beyond these efforts conducted under our municipal stormwater programs, certain metals (copper, nickel, selenium, and mercury) are being addressed under the various TMDL programs. These constituents have been identified as causing impairment in Calleguas Creek, its tributaries, and Mugu Lagoon. As a result, a Metals Work Plan has been developed by the Calleguas Creek TMDL MOA Parties and is currently being implemented. This multiple year plan provides the framework to (1) determine whether metals impairments still exist in the watershed, (2) develop site-specific objectives for copper and nickel, and (3) if necessary, identify the control measures needed to meet the TMDLs. It will be developed in two phases. A draft of Phase I of the implementation plan was issued in February 2015. The draft Phase I Implementation Plan conveys which pollutants are watershed priorities, the magnitude of reduction necessary to bring the priorities into compliance, where appropriate regulatory strategies may affect the WQO, the BMPs to control the discharge of the priorities, and a framework to develop scenarios of watershed controls. Phase I will provide the Stakeholders with the tools and a roadmap to develop scenarios of regulatory strategies, institutional controls and watershed actions. Phase II of the plan will integrate developed scenarios into the modeling framework to demonstrate that the proposed actions will result in receiving water compliance with standards. Between Phases I and II, the stakeholders will collaboratively develop the implementation scenarios. The complete implementation plan will be comprised of work products developed in Phases I and II. It is expected that the control measures identified under this effort will inform the efforts to address aluminum and mercury in the Calleguas Creek and Santa Clara River watersheds.

Organics and Pesticides

The CTRO for organics and pesticides apply to all sites, although the dry weather Human Health objective may differ for MUN and non-MUN sites. BPO-MUN for pesticides and organics are only applicable to MUN designated reaches. MO-OJA and MO-MEI are the only two of the fourteen sites that are in reaches designated as MUN so they are the only sites to which the BPO-MUN apply.

Several organics/pesticides are measured by more than one analytical method, which often have different reporting limits (RL) and can yield significantly different results[26]. Prior to July 2019, the SMP considered the method with the lowest Reporting Limit (RL) as primary, based on the recommendation of the laboratory at the time. In reviewing this evaluation method and based on updated guidance from the analytical laboratory, the SMP determined that the method with the lowest RL may not be the most representative of the level of the constituent due to differences in the matrices for which the analytical methods are intended; and that in keeping with Section K.4(a) of Attachment

[26] Bis(2-ethylhexyl)phthalate results are obtained from two analytical methods used by the Program, EPA 525.2 and EPA 625.1. Pentachlorophenol results are obtained from three analytical methods used by the Program: EPA 515.4, EPA 625.1, and EPA 8270Cm. PAHs are measured by two to three analytical methods (depending on constituent) used by the Program, EPA 525.2, EPA 625.1, and EPA 8270C.

F of the Permit, the 40 CFR 136 method should be considered the primary method. As of July 2019, the Program considers the 40 CFR 136 approved method to be primary. In some cases, the primary method is below the objective and the secondary method is not and vice versa. The SMP is reporting those results that were above the objective according to the primary (40 CFR 136 approved) method as elevated levels, but also includes non-primary method data for reference, when applicable.

For 2022/23, pentachlorophenol was detected by the primary method at MO-MEI during two wet weather events and at MO-OJA during one weather event. All detections were detected not quantifiable (DNQ) but above the BPO-MUN of 1 µg/L by the primary method. Since the method detection level (MDL) was close to or above the objective, detections can be considered to be above the WQO. All pentachlorophenol results at their corresponding receiving water station ME-VR2 (non-MUN) were non-detects or were DNQ with RLs below the BPO-MUN, therefore there is not an established cause or contribute relationship. Pentachlorophenol is a manufactured chemical that is used industrially as a restricted use pesticide and wood preservative for railroad ties, utility poles, and wharf pilings. It is not available to the general public and its use has been restricted to certified applicators since 1984.

Elevated levels of polycyclic aromatic hydrocarbons (PAH) were seen above the (MUN) CTR HHWO at MO-OJA during the dry weather event (Event 6). Dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene were DNQ at MO-OJA by the primary method, and above the (MUN) CTR HHWO. Benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene were all ND by the primary method but the MDL was well above the WQOs, which would have prevented detection of elevated level concentrations. PAHs are combustion byproducts that are produced by the incomplete combustion of organic matter and is primarily found in gasoline and diesel exhaust, cigarette smoke, coal tar and coal tar pitch, soot, petroleum asphalt, and certain foods, especially smoked and barbecued foods.

Bis(2-ethylhexyl)phthalate levels were above the CTR HHOO by the primary method at ME-CC and ME-SCR during the dry weather event (Event 6). Bis(2-ethylhexyl)phthalate levels at MO-OJA by the primary method were above the (MUN) BPO for two wet weather events, however one result was flagged as high-biased and estimated based on the result for the laboratory LCS QAQC for the analyte in the batch, therefore this result is considered high-biased and an upper limit. Bis(2-ethylhexyl)phthalate is commonly added to plastics to make them flexible and is a common sampling and laboratory contaminant.

Salts

Concentrations above WQS for salts (chloride and/or total dissolved solids) at the stations monitored by the Program mainly occurred during dry weather (Event 6). This is in accordance with historical data from dry weather events, when flows are comprised of a larger groundwater component. Concentrations of salts were also elevated during one wet weather event at ME-CC and MO-THO. Since these occurred in the Calleguas Creek Watershed during the same event (Event 2), a cause or contribute relationship can be inferred. Simultaneous high concentrations of salts also occurred in dry weather during Event 6 in the Calleguas Creek Watershed at ME-CC, MO-MPK, MO-SIM, and MO-THO, so a cause or contribute relationship can be inferred for these sites in dry weather. The Simi Valley area is known to have high ground water levels with natural springs, seeps, and artesian conditions in the western part of Simi Valley. In addition, there is a Salt TMDL that is evaluating monitoring and implementing solutions throughout the Calleguas Creek watershed. More information on this is provided below.

In the Ventura River Watershed, MO-OJA and MO-MEI exceeded salts WQO in dry weather Event 6, but their corresponding receiving water station (ME-VR2) did not exceed the Basin Plan site-specific objectives, therefore there is no cause or contribute relationship for salts in the Ventura River Watershed.

The Program is unable to evaluate if concentrations above salts WQO within the watershed are a persistent issue during any given monitoring season because the Program only samples one dry weather monitoring event for all stations. Additionally, the other dry weather event required to be monitored by the Program, the dry season event in August, represents grab sampling (as opposed to composite sampling), is only conducted at the major outfalls, and does not include a requirement to evaluate chloride and TDS. However, historic monitoring data collected during dry weather sampling events show regular elevated levels of chloride and total dissolved solids concentrations in the Calleguas Creek and Santa Clara River watersheds, therefore it can be concluded that the issue is a persistent one.

Boron, chloride, sulfate, and total dissolved solids ("salts") are currently being addressed in the Calleguas Creek Watershed through the implementation of the Calleguas Creek Salts Total Maximum Daily Load (TMDL), adopted by the Los Angeles Regional Water Quality Control Board in October 2007. The CCW Salts TMDL only applies during dry weather and applies to the receiving water, not at tributary outfalls. During the first three years of the TMDL implementation plan for the watershed, the primary implementation action was water conservation, a program all Permittees have. The goal of the TMDL is to bring the watershed into "salt balance" where the inputs of salts are equal to or less than the amount of salts exported out of the watershed during dry weather. Water conservation on the part of municipalities reduces the input side of the equation. The salts loading calculation is performed on an annual basis and wet weather exports are not considered in the analysis. Beyond water conservation, the proposed implementation plan does not include many options for MS4 dischargers. Most of the planned actions are construction of groundwater desalters and wastewater treatment plants reverse osmosis as these are considered to be the major source of the salts. Municipal stormwater actions to control salts are limited because most salts in runoff come from source water supplies. The primary course of action for municipalities is to reduce outdoor water use, thereby limiting the amount of runoff that may contain high salts from entering urban tributaries and receiving waters. Permittees have also taken steps to the prohibition of discharges from saltwater pools. Camarillo has conducted outreach to pool service companies and provided articles in their local newsletter to residents alerting them that they cannot discharge saltwater pools to the storm drain system. The City of Camarillo is nearing the completion of a desalter plant and is hopeful that it will be fully operational in 2024. The cities of Thousand Oaks and Simi Valley also banned the discharge of saltwater pools to the storm drain system but will allow it to the wastewater system with a permit. Self-regenerating water softeners are a source of salts in the watershed, though not commonly to the storm drain system. Permittees have prohibited their use at commercial and industrial facilities, while education is provided to discourage their use by residents. These are all efforts that should assist with reducing salts in the watershed.

Other Constituents

Two major outfall sites, MO-CAM and MO-VEN, had a pH level above the Basin Plan's 8.5 standard unit upper limit in dry weather (Event 6). Elevated pH is commonly observed during dry weather in concrete lined channels, such as the outfalls. The lack of exceedances for pH at the receiving water stations indicates that pH levels in urban runoff do not typically affect receiving water beneficial uses for this constituent.

Low levels of dissolved oxygen (DO) were seen in one wet and one dry weather event at MO-HUE. Potential causes of low DO include high temperatures; respiration of aquatic organisms; consumption by decomposing bacteria and/or algae and aquatic plants at night; and improper use of a DO meter with a polarographic sensor, which requires minimum water motion of 1 cfs over the sensor during measurement to counteract the consumption of oxygen at the sensor membrane.

Nitrate + nitrite as nitrogen was measured above the BPO at MO-OJA during the dry weather event (Event 6). Unionized ammonia at MO-MEI was also measured/calculated to be above the BPO during the dry weather event (Event 6). Neither constituent was above WQO at the corresponding major outfall station, so a cause or contribute relationship is not demonstrated. Elevated levels of nutrients above BPO have occasionally been recorded by the SMP, but currently nutrients in urban runoff are not determined to be likely to contribute to concentrations observed above WQS for nutrients in receiving waters.

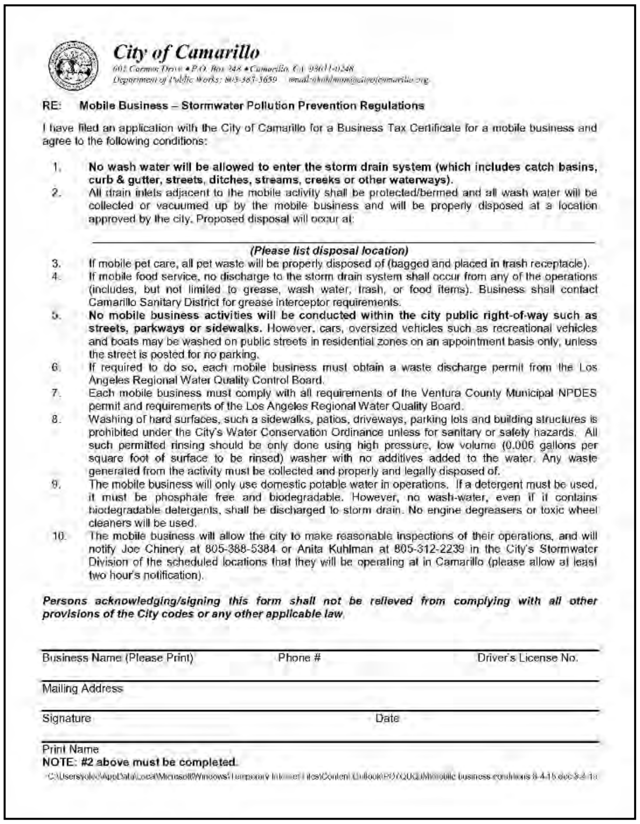
1.8.9 Individual Permittee Efforts on Pollutants Observed at Elevated Levels

Individually, the Permittees have taken, or are committing to take specific actions such as studies or purchasing new equipment to address pollutants found in their outfalls that may be causing or contributing to an exceedance of a WQS or is seen at an elevated level in their outfall but not in the receiving water. These are detailed below.

Camarillo

The City of Camarillo has a population of approximately 70,866 residents and is an active participant in the Countywide Stormwater Quality Management Program and supports the actions that were discussed in the section above. In addition to the countywide discussion in the monitoring section of the annual report, please also refer to the "Public Outreach, Public Agency Activities, Construction, Planning and Land Development, Illicit Discharge, and Business Program" sections of the annual report for a list of actions Camarillo has taken and will continue to implement in the current year and future years to address elevated levels of bacteria, chlorides and other constituents that were found in our urban outfall monitoring station. Some of the many methods that Camarillo uses to educate its residents on pollution prevention controls is through the publishing of articles in the monthly electronic Cityscene Newsletter, the mailout of a utility bill insert to all residents on trash and Coastal Cleanup Day, presentations via the EcoHero at various schools, and hosting two sites during the annual Coastal Cleanup Day event. The following are a few highlights of actions taken by Camarillo:

pH - To address the slightly elevated level of pH in the dry monitoring event #6 at Camarillo's Outfall station, MO-CAM, Camarillo continues to attach stormwater quality conditions to all business tax certificates for mobile detailers and provides the above fact sheet to mobile detailers. Camarillo also publishes information annually via Instagram and CityScene newsletters regarding proper swimming pool maintenance. As stated earlier, the lack of exceedances for pH at the receiving water station in Calleguas Creek indicates that pH levels in the urban runoff did not typically affect receiving water beneficial uses for this parameter.



City of Camarillo

601 Carmen Drive • P.O. Box 248 • Camarillo, CA 93011-0248
Department of Public Works: 805-383-5659

RE: Mobile Business – Stormwater Pollution Prevention Regulations

I have filed an application with the City of Camarillo for a Business Tax Certificate for a mobile business and agree to the following conditions:

1. **No wash water will be allowed to enter the storm drain system (which includes catch basins, curb & gutter, streets, ditches, streams, creeks or other waterways).**
2. All drain inlets adjacent to the mobile activity shall be protected/bermed and all wash water will be collected or vacuumed up by the mobile business and will be properly disposed at a location approved by the city. Proposed disposal will occur at:

   ____
   (Please list disposal location)
3. If mobile pet care, all pet waste will be properly disposed of (bagged and placed in trash receptacle).
4. If mobile food service, no discharge to the storm drain system shall occur from any of the operations (includes, but not limited to grease, wash water, trash, or food items). Business shall contact Camarillo Sanitary District for grease interceptor requirements.
5. **No mobile business activities will be conducted within the city public right-of-way such as streets, parkways or sidewalks.** However, cars, oversized vehicles such as recreational vehicles and boats may be washed on public streets in residential zones on an appointment basis only, unless the street is posted for no parking.
6. If required to do so, each mobile business must obtain a waste discharge permit from the Los Angeles Regional Water Quality Control Board.
7. Each mobile business must comply with all requirements of the Ventura County Municipal NPDES permit and requirements of the Los Angeles Regional Water Quality Board.
8. Washing of hard surfaces, such a sidewalks, patios, driveways, parking lots and building structures is prohibited under the City's Water Conservation Ordinance unless for sanitary or safety hazards. All such permitted rinsing should be only done using high pressure, low volume (0.006 gallons per square foot of surface to be rinsed) washer with no additives added to the water. Any waste generated from the activity must be collected and properly and legally disposed of.
9. The mobile business will only use domestic potable water in operations. If a detergent must be used, it must be phosphate free and biodegradable. However, no wash-water, even if it contains biodegradable detergents, shall be discharged to storm drain. No engine degreasers or toxic wheel cleaners will be used.
10. The mobile business will allow the city to make reasonable inspections of their operations, and will notify Joe Chinery at 805-388-5384 or Anita Kuhlman at 805-312-2239 in the City's Stormwater Division of the scheduled locations that they will be operating at in Camarillo (please allow at least two hour's notification).

Persons acknowledging/signing this form shall not be relieved from complying with all other provisions of the City codes or any other applicable law.

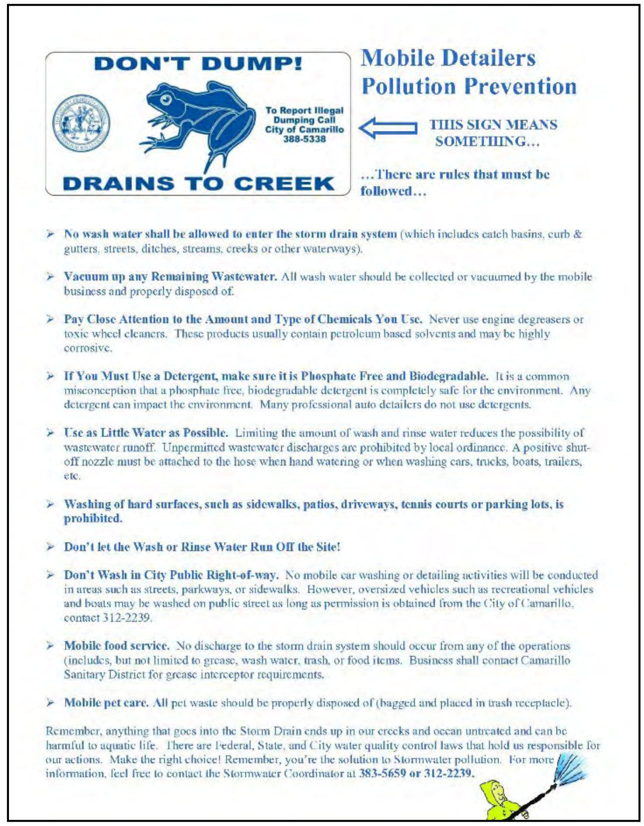
Business Name (Please Print)   Phone #   Driver's License No.

Mailing Address

Signature   Date

Print Name

NOTE: #2 above must be completed.



Mobile Detailers Pollution Prevention

THIS SIGN MEANS SOMETHING…

…There are rules that must be followed…

- **No wash water shall be allowed to enter the storm drain system** (which includes catch basins, curb & gutters, streets, ditches, streams, creeks or other waterways).
- **Vacuum up any Remaining Wastewater.** All wash water should be collected or vacuumed by the mobile business and properly disposed of.
- **Pay Close Attention to the Amount and Type of Chemicals You Use.** Never use engine degreasers or toxic wheel cleaners. These products usually contain petroleum based solvents and may be highly corrosive.
- **If You Must Use a Detergent, make sure it is Phosphate Free and Biodegradable.** It is a common misconception that a phosphate free, biodegradable detergent is completely safe for the environment. Any detergent can impact the environment. Many professional auto detailers do not use detergents.
- **Use as Little Water as Possible.** Limiting the amount of wash and rinse water reduces the possibility of wastewater runoff. Unpermitted wastewater discharges are prohibited by local ordinance. A positive shut-off nozzle must be attached to the hose when hand watering or when washing cars, trucks, boats, trailers, etc.
- **Washing of hard surfaces, such as sidewalks, patios, driveways, tennis courts or parking lots, is prohibited.**
- **Don't let the Wash or Rinse Water Run Off the Site!**
- **Don't Wash in City Public Right-of-way.** No mobile car washing or detailing activities will be conducted in areas such as streets, parkways, or sidewalks. However, oversized vehicles such as recreational vehicles and boats may be washed on public street as long as permission is obtained from the City of Camarillo, contact 312-2239.
- **Mobile food service.** No discharge to the storm drain system should occur from any of the operations (includes, but not limited to grease, wash water, trash, or food items. Business shall contact Camarillo Sanitary District for grease interceptor requirements.
- **Mobile pet care. All** pet waste should be properly disposed of (bagged and placed in trash receptacle).

Remember, anything that goes into the Storm Drain ends up in our creeks and ocean untreated and can be harmful to aquatic life. There are Federal, State, and City water quality control laws that hold us responsible for our actions. Make the right choice! Remember, you're the solution to Stormwater pollution. For more information, feel free to contact the Stormwater Coordinator at **383-5659 or 312-2239.**

Business tax conditions and handouts in English and Spanish to mobile detailers in Camarillo

Dissolved Copper – Dissolved Copper was slightly elevated in the dry monitoring event #6 at Camarillo's outfall station, MO-CAM; however, the lack of exceedances for dissolved copper at the receiving water station in Calleguas Creek indicates that copper levels in the urban runoff did not typically affect receiving water beneficial uses for this parameter. This elevated level may have been caused by a structure fire and related scrap metal piles that occurred on property near the outfall station. Through enforcement actions by the City to the construction site, the City was able to have the construction site clear all scrape metals that were related to the fire. To address copper, Camarillo continues to ban the use of architectural copper. In addition, Camarillo continues to support the Brake Pad Partnership and Senate Bill (SB) 346 adopted September 27, 2010 that authorized legislation to phase out the copper contained in vehicle brake pads. SB 346, authored by Senator Christine Kehoe (D-San Diego), requires brake pad manufacturers to reduce the use of copper in brake pads sold in California to no more than 5% by 2021 and no more than 0.5% by 2025. This true source control action will help significantly reduce copper in urban runoff. Several of the major outfall sites are next to freeways or railroad lines (MO-CAM, MO-OXN, MO-SPA, and MO-VEN) where copper-containing dust from vehicles and trains is continually produced and deposited; the SB346 legislation will help address this issue. In the future, similar legislation to address train brake pads may help to further reduce copper in runoff.

Bacteria & Other Constituents - Camarillo continues to educate its residents on pollution prevention controls via our local Cityscene Newsletter that is published electronically on a monthly basis, and through Facebook and Instagram posts. Via the monthly CityScene newsletter, Camarillo included articles on pet waste, yard waste and landscape maintenance, swimming pool maintenance, rainy day preparation, and trash management. These public outreach efforts assist with addressing bacteria, chloride, copper, TDS and other constituents including information on how to control pet waste and construction debris such as sediment, proper use and application of pesticides and disposal of yard waste, proper disposal of swimming pool discharges, trash management, and proper maintenance of vehicles (please refer to the PIPP section of this report for a list of these articles).

Further, since several constituents may be attached to sediment, Camarillo has continued increased inspections of construction sites to quarterly for all private development projects with grading permits, and monthly at higher risk private developments as well as all City capital improvement program projects. This increased inspection level should help to ensure sediment and erosion controls are being properly applied. Further, Camarillo's stormwater program manager is a certified QSD/P with the underlying certification of CPSWQ, and a CPMSM and CESSWI, which assists with ensuring proper controls are being applied at construction and industrial sites. The stormwater inspector is also a certified QSP with the underlying certification of CISEC. As mentioned above, Camarillo continued to notify its residents of the importance of preventing soil erosion from their properties during the wet season through an December 2022 CityScene article "Rainy Season Ahead, Be Prepared" (see below).

Rainy Season Ahead! Be Prepared!

After the warm summer months, you may be looking forward to the cooler weather and rainy days ahead. Instead of waiting for rain to be in the forecast or as a storm starts, prepare your property ahead of time! Stabilize and maintain slopes, clean out storm drain inlets, lines, and v-ditches before that first storm comes. Failure to keep these water flow pathways clear of debris could result in damage to your property or your downhill neighbors. Sediment and pollutants that erode from slopes or private drains can make their way into the storm drain system, our creeks, and ultimately into our ocean where fish and other sea creatures are forced to deal with the consequences.

To ensure public safety and protect the environment as well as prevent erosion, and avoid potential flooding, the City of Camarillo advises that all property owners stabilize, repair, and maintain the slopes, ditches, and drainage facilities on their property. Drought conscious residents who have taken the steps to reduce their water consumption by installing drought tolerant landscaping should apply erosion controls prior to major rain events. Doing so will help prevent loose mulch, woodchips, dirt, or other debris from washing out into the street and storm drain system.

For more about stormwater issues or to report potential stormwater problems, call the City's Stormwater Program Manager at (805) 383-5659.

Interested in Capturing Rain Water? The City of Camarillo does not have a rebate program for barrels, but the Metropolitan Water District offers rebates. Click the button below for details.

Rain Barrel & Cistern Rebates

In October 2012 with assistance from District staff, additional dry weather monitoring of bacteria was conducted; however, there were no standout contributors to the higher levels of bacteria found at the urban outfall station. Camarillo completed the permit required illicit screening of outfalls in 2012. Further, in 2022, Camarillo initiated a source investigation study for salts and bacteria to identify subareas within the drainage area to the Total Maximum Daily Load (TMDL) monitoring program urban land use site 9BD_ADOLF with elevated concentrations of salts, bacteria, and the human marker (HF183) bacteria and support identification of control measures, if feasible. The source investigation of the drainage area to TMDL monitoring location 9BD_ADOLF resulted in the identification of priority subareas for further investigation and potential sources for which mitigation measures could be identified if needed.

Chlorides/Salts/Chlorine & Total Dissolved Solids – Chloride levels were elevated in the dry weather event #6 MO-CAM sample and Total Dissolved Solids (TDS) was elevated in the wet weather event #1 MO-CAM sample.

However, there are no waterbody specific WQO below the confluence of Revolon Slough and Calleguas Creek (the reach to which MO-CAM discharges), therefore, there is not a cause or contribute relationship.

As discussed previously, to address the TDS elevated level, Camarillo has continued increased inspections of construction sites to quarterly for all private development projects with grading permits, and monthly at higher risk private developments as well as all City capital improvement program projects. This increased inspection level should help to ensure sediment and erosion controls are being properly applied.

As discussed in Section 1.8.8, boron, chloride, sulfate, and total dissolved solids ("salts") are currently being addressed in the Calleguas Creek Watershed through the implementation of the Calleguas Creek Salts Total Maximum Daily Load (TMDL), adopted by the Los Angeles Regional Water Quality Control Board in October 2007. The primary implementation action was water conservation, which Camarillo has embraced fully (see section below). Beyond water conservation, the proposed implementation plan does not include many options for MS4 dischargers. Most of the planned actions are construction of groundwater desalters and wastewater treatment plants reverse osmosis as these are considered to be the major source of the salts. The City of Camarillo is nearing the completion of a desalter plant and is hopeful that it will be fully operational in 2024. Municipal stormwater actions to control salts are limited because most salts in runoff come from source water supplies. The primary course of action for municipalities is to reduce outdoor water use, thereby limiting the amount of runoff that may contain high salts from entering urban tributaries and receiving waters. Camarillo continues to conduct public outreach including Cityscene articles published in July 2022 and again in June 2023 on swimming pool discharges (see below). Camarillo continues to require its residents to notify the City before discharging swimming pool water, which allows the City to educate the discharger on the regulations and proper disposal, such as sampling chlorine and pH levels and ensuring the path of discharge is free of any debris that could wash into the storm drain system. Camarillo also continues to distribute information to new pool and spa owners alerting them to the prohibition of salt water pool discharges and proper maintenance of swimming pools. In addition, conditions are applied on all new development and redevelopment projects prohibiting waters from salt-chemistry pools or spas, filter waste and acid-wash or other cleaning waste water from discharging to the storm drain system and outlining requirements for fresh-water swimming pool discharges. To address TDS, Camarillo has also increased the construction site inspection frequency.

Think Before You Drain

As summer approaches, please stay informed of City regulations pertaining to swimming pool discharges. If you own or maintain a swimming pool, please be aware of proper pool maintenance and the harm pool waste can cause to our creeks and ocean.

- Properly maintained pools should require draining no more than once every 10 years.
- Pool filter backwash (diatomaceous earth) should never be washed into the street, gutter or storm drain system; bag it wet and dispose of it in your trash receptacle.
- It is illegal to discharge the water from salt-water chemistry pools into the storm drain or sewer systems. This water must be hauled to an ocean-discharging disposal facility.
- Prior to draining a freshwater pool, ensure water is clean of algae, mosquitoes, leaves and debris, and reduce the chlorine level to .1 ppm and pH to 7-8. Clean the drainage path (curb/gutter/street) to remove any debris that may wash out to the storm drain with the pool water.
- Follow the directions before using any pool chemical.

Pool water contains pollutants that could end up in our waterways if not drained correctly. Before draining your swimming pool, please notify the City at (805) 383-5659 or (805) 388-5373.

Water Conservation/Decreased Dry Weather Runoff. Further, due to the City's stringent water conservation ordinance, dry weather runoff has been significantly reduced. In accordance with the Statewide Drinking Water Systems Discharge Permit WDR 4DW0718, the City continued implementing the following requirements in the 2022/2023 permit year:

a. Established and implemented BMPs, including the capture of potable water discharges with sulfate concentrations above 250 mg/l and sent discharges to the sewer system.

b. Ensured that all planned potable water discharges complied with the applicable effluent limitations for chlorine residual and turbidity.

c. Conducted monitoring and reporting in compliance with the provisions of the permit and maintained self-monitoring reports.

d. Responded to 3 water conservation violations (citations issued) and issued 440 warnings, which is less than last year.

Calleguas Creek TMDL Compliance. In addition to the above actions, Camarillo is an active participant in the Calleguas Creek Watershed Management Program (CCWMP). Please refer to the Calleguas Creek Watershed TMDL Monitoring Program Annual Report for the period of July 2022 to June 2023, which was sent to Los Angeles Regional Water Quality Control Board staff. This report provides details on compliance with the TMDLs in which Camarillo is listed as a responsible party. At this point, the majority of special studies identified in the TMDLs have been completed and almost eleven years of TMDL monitoring data are available for analysis. Recommended actions under consideration include increasing outreach and education to property owners with sediment discharges, coordination with RWQCB on agricultural parcels that may drain into the MS4, and outreach to pest control operators that may still use chlorpyrifos for urban pest control. As mentioned earlier, Camarillo has also increased construction site inspection frequency and may increase inspection/outreach for any commercial agricultural operations covered by the MS4 permit to address potential pollutant discharges. Further, the Calleguas Creek stakeholders-initiated development of an implementation plan to identify the additional actions necessary to meet the remaining TMDL requirements and 303(d) listings. The draft implementation plan outlines the steps Stakeholders will take to address the remaining water quality issues in the Calleguas Creek Watershed. It is being developed in two phases. Phase I of the implementation plan was issued in February 2015. The Phase I Implementation Plan conveys which pollutants are watershed priorities, the magnitude of reduction necessary to bring the priorities into compliance, where appropriate regulatory strategies may affect the water quality objectives, the BMPs to control the discharge of the priorities, and a framework to develop scenarios of watershed controls. Phase I will provide the Stakeholders with the tools and a roadmap to develop scenarios of regulatory strategies, institutional controls and watershed actions. A draft of Phase II of the plan was released in September 2016 which integrates developed scenarios into the modeling framework to demonstrate that the proposed actions will result in receiving water compliance with standards. In September 2023, the City along with the other co-permittees in the current MS4 Permit submitted a comprehensive Watershed Management Plan for review and approval by the Regional Board. This plan incorporates future potential implementation actions to address the TMDLs in Calleguas Creek

Revolon Slough/Beardsley Wash Trash TMDL Compliance. For compliance information for this TMDL, refer to the 2022/2023 Annual Report for the Revolon Slough and Beardsley Wash (RSBW) Trash TMDL, which will be submitted to Los Angeles Regional Board staff in December 2023. This report provides monitoring results and Camarillo's compliance strategies being implemented and proposed for future years.

The Los Angeles Regional Water Quality Control Board revised the RSBW Trash TMDL on June 14, 2017, modifying compliance to align with the Statewide Trash Amendments. The revised RSBW Trash TMDL became effective on May 6, 2020. As required by the revised RSBW Trash TMDL an updated TMRP – Addendum No. 2 was submitted to the Regional Board staff in August 2020. As outlined in the TMRP, the City will continue to comply with the point source requirements via the MFAC/BMP program which consists of quarterly inspection and cleanout as needed of all MS4 drain inlets (priority and non-priority sources) until we have completed the installation of full capture devices in all conveyances draining priority land uses that discharge to RSBW subwatershed, in accordance with the revised Trash TMDL. The City will also continue to implement the suite of BMPs detailed in both addendums of the TMRP.

In 2022-2023 the City removed 77,428 gallons of trash; therefore the City is in compliance with the 100 percent reduction from the baseline WLA of 2,738 gallons/year for all land uses areas; or baseline WLA of 1,653 gallons/year for only the priority land use areas in the RSBW subwatershed. Trash is also addressed within the other subwatersheds in the City via the storm drain maintenance program (catch basins and ditches) and over 6,379 lbs. of trash was removed citywide in 2022-2023.

Further, the City continued the MFAC/BMP compliance quarterly inspections. During quarterly inspections for the 2022-2023 monitoring year, 123 nonpriority catch basins had to be cleaned more than once (total of 295 cleanings), which equates to approximately 28 percent of the total 442 nonpriority catch basins within the RSBW subwatershed not addressed by full capture systems. The remaining 319 nonpriority catch basins without full capture trash devices were cleaned one or fewer times due to non-trash accumulation. Of the 123 catch basins cleaned more than once (total of 295 cleanings), 0 were a Category 3 level (100+ pieces of trash), 189 were found to be Category 2 (10+ pieces of trash) and 84 were found to be in Category 1 (<10 pieces of trash) and 22 were Category 0 (no trash). Camarillo will continue to assess whether additional trash BMPs are needed to address these catch basins. However, based on the fact that the City is in compliance with the 100 percent reduction from the baseline WLA of 2,738 gallons/year for all land uses areas; or baseline WLA of 1,653 gallons/year for only the priority land use areas (indicating that trash is not accumulating in deleterious amounts) and the amount of trash being removed by the existing BMPs is sufficient to meet the WLA, it appears that additional BMPs in these nonpriority catch basins may not be needed.

Further, the City has installed 209 full capture trash devices citywide (this is one less device than last year as one device was removed due to damage, but is scheduled for reinsertion in 2023/24), of which 127 are within the RSBW subwatershed. The City has also installed 15 trash excluders citywide, which includes 3 within the RSBW subwatershed, and will continue installation of full capture trash devices in the remaining high priority land use area catch basins in future years in conjunction with the MFAC/BMP program described above. We are confident that the current trash control measures implemented by the City as well as the point source MFAC/BMP program are meeting the required 100 percent reduction from the baseline WLA.

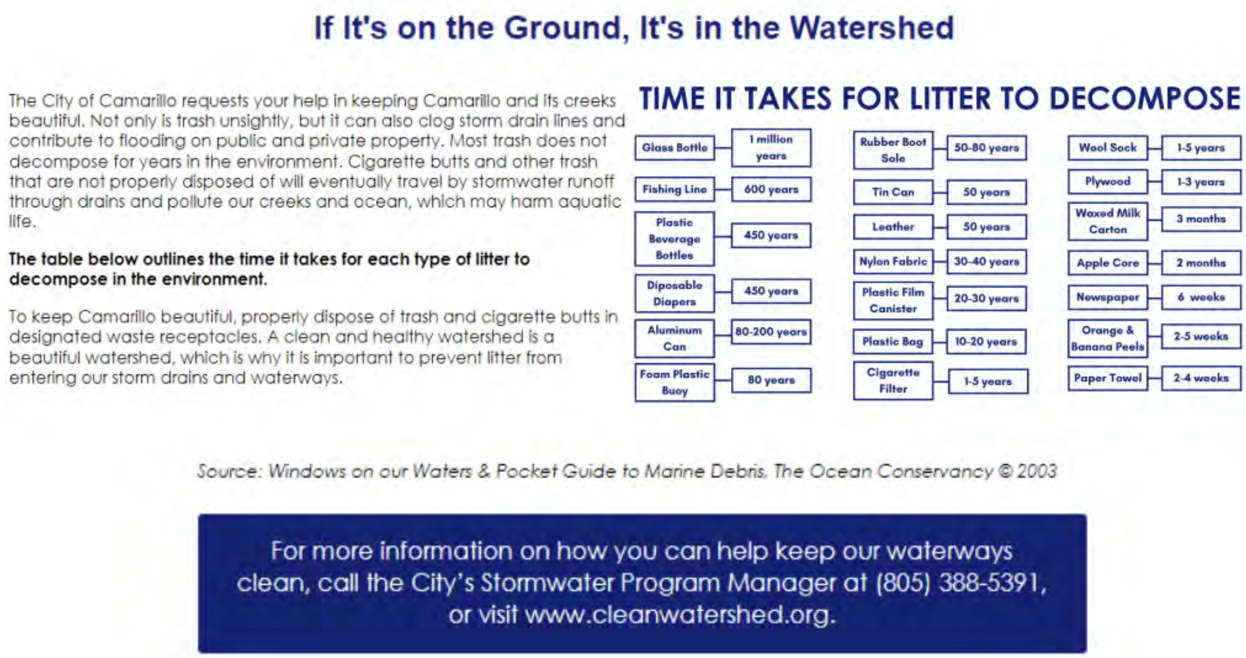
Full Capture Device Cleanout

Additional measures that Camarillo will initiate in 2022/23 to address trash include the following:

In July 2021, Camarillo started weekly curbside collection of all three refuse containers: trash, recycling, and yard waste. Previously, Camarillo's trash and yard waste containers were collected curbside on a weekly basis, while recycle containers were serviced bi-weekly. There has been a notable increase in cardboard due to deliveries during the pandemic, which has contributed to the push in this direction because recycle carts appear to fill up before the scheduled pickup day. Weekly service replaced the alternate-week recycling service that has been standard in Camarillo the past few years.

The City of Camarillo also approved an ordinance banning Styrofoam™ food packaging. Effective January 1, 2022, Camarillo will prohibit the use of expanded polystyrene food and beverage containers, furthering the City's goal of minimizing impacts on the environment.

Outreach via the Camarillo Cityscene Newsletters in 2022-2023, which was electronically published on a monthly basis, as well as City of Camarillo Instagram posts continue to address trash and keeping our waterways beautiful:



If It's on the Ground, It's in the Watershed

The City of Camarillo requests your help in keeping Camarillo and its creeks beautiful. Not only is trash unsightly, but it can also clog storm drain lines and contribute to flooding on public and private property. Most trash does not decompose for years in the environment. Cigarette butts and other trash that are not properly disposed of will eventually travel by stormwater runoff through drains and pollute our creeks and ocean, which may harm aquatic life.

The table below outlines the time it takes for each type of litter to decompose in the environment.

To keep Camarillo beautiful, properly dispose of trash and cigarette butts in designated waste receptacles. A clean and healthy watershed is a beautiful watershed, which is why it is important to prevent litter from entering our storm drains and waterways.

TIME IT TAKES FOR LITTER TO DECOMPOSE

Glass Bottle	1 million years	Rubber Boot Sole	50-80 years	Wool Sock	1-5 years
Fishing Line	600 years	Tin Can	50 years	Plywood	1-3 years
Plastic Beverage Bottles	450 years	Leather	50 years	Waxed Milk Carton	3 months
Diposable Diapers	450 years	Nylon Fabric	30-40 years	Apple Core	2 months
Aluminum Can	80-200 years	Plastic Film Canister	20-30 years	Newspaper	6 weeks
Foam Plastic Buoy	80 years	Plastic Bag	10-20 years	Orange & Banana Peels	2-5 weeks
		Cigarette Filter	1-5 years	Paper Towel	2-4 weeks

Source: Windows on our Waters & Pocket Guide to Marine Debris, The Ocean Conservancy © 2003

For more information on how you can help keep our waterways clean, call the City's Stormwater Program Manager at (805) 388-5391, or visit www.cleanwatershed.org.

To prevent cigarette litter, properly dispose of them in a designated waste receptacle. A clean and healthy watershed is a beautiful watershed. Please help us prevent litter from entering our storm drains.

Stomp Out Cigarette Butts!

Everyone has seen cigarette butts littering our roadways, sidewalks, parks, streams, and beaches. You can help prevent cigarette litter from entering our waterways! Cigarettes constitute a large portion of litter found in our neighborhoods and surrounding ecosystems. Though small, they have a large impact on the health and beauty of the environment.

Cigarette waste contains toxic chemicals that stay present in the environment for many years. If not properly disposed of, they will eventually travel by stormwater runoff through drains to pollute our rivers and ocean, which may harm aquatic life.

For more information on how you can help keep our waterways clean, call the City's Stormwater Program Manager at 805-383-5659, or visit www.cleanwatershed.org.

County of Ventura

The County is an active participant in the Countywide Stormwater Quality Management Program and supports the actions that were discussed in the sections above. In addition, the County participates and leads stakeholder efforts to meet monitoring and implementation requirements of the effective TMDLs in all five Ventura County watersheds. In response to elevated concentrations of some stormwater pollutants at the County's stormwater monitoring station, the County has continued and expanded stormwater treatment efforts in the County unincorporated, urban areas, including efforts to address *E. coli* in the Ventura River watershed, as well as additional efforts in all Ventura County watersheds. The County has successfully secured grant funding for several structural stormwater projects and has independently funded several additional efforts, as detailed in the watershed-specific sections below.

All grant-funded projects completed have included BMP effectiveness monitoring and educational outreach. In addition, free Watershed Friendly Garden™ (WFG) seminars and hands on workshops were conducted in cooperation with Surfrider Foundation and Green Garden Group in the Ventura River, Santa Clara River, and Malibu Creek watersheds. In 2015, the County offered a series of five WFG seminars and hands on workshops at the County Government Center in Ventura. Over 120 participants attended the seminars and workshops, resulting in the transformation of approximately 1,200 square feet of turf into a drought-tolerant garden. The County also offered garden maintenance training for County and other municipal employees. In 2016, a similar workshop series was scheduled in each of the County unincorporated communities of Meiners Oaks in Ventura River watershed and Oak Park in Malibu Creek watershed, in collaboration with local school districts.

The County has also participated in the Countywide Bacteria Special Study. In 2013, dry weather urban runoff and stormwater samples were collected at outfalls in Casitas Springs, Oak View, and Meiners Oaks, which represent discharges from the County urban areas above the receiving water monitoring (i.e., mass emission) station in Ventura River.

In February 2019, the County submitted the Compliance Response to Water Code Section 13383 Order for Implementation of Track 1 of the Statewide Trash Provisions for the Ventura County unincorporated, urban areas. To achieve compliance with the Statewide Trash Provisions, the County has identified 38 additional full capture systems that will be required within unincorporated areas. The County currently has a consultant contract underway to complete design of the remaining required full capture systems to ensure installation of at least 50% of required full capture systems by December 2026.

Ventura River Watershed

The County leads two TMDL MOA groups to implement requirements of the Ventura River Algae and Ventura River Estuary Trash TMDLs. All required monitoring, reporting, and implementation activities are on-going.

To achieve compliance with Ventura River Estuary Trash TMDL, the County installed full trash capture devices to provide complete point source capture in the estuary subwatershed. The County and TMDL Responsible Parties have been conducting the trash monitoring and minimum frequency assessment and collection (MFAC)/BMP program since 2009. Recently, in collaboration with Ventura Land Trust (formerly Ventura Hillside Conservancy), and as approved by the RWQCB, the monitoring program was modified to include monthly volunteer cleanups and weekly patrols to reduce establishment of new transient encampments. On behalf of the MOA group, the County gave a presentation at the Regional Water Board's meeting in June 2019 to provide an overview of TMDL implementation efforts during the reopener hearing. All MFAC/BMP efforts and results are described in the annual trash monitoring report submitted to RWQCB.

The County identified potential stormwater treatment opportunities within its urban areas during development of the TMDL Implementation Plan for the Ventura River Algae TMDL and developed a preliminary concept of an infiltration project in the Ventura River watershed, which was included in the Ventura Countywide Municipal Stormwater Resources Plan, dated September 2016. Completed and ongoing projects in the Ventura River watershed to address observed constituent levels include:

1. The Meiners Oaks Urban Low Impact Development Retrofit Project is located at the Ojai Meadows Preserve in Meiners Oaks, CA. Construction of the hydrodynamic separator and bioswale was completed in February 2016. The project captures nuisance flows and stormwater runoff from 37 acres of the Meiners Oaks community (approximately 40% of the urban Meiners Oaks area) to improve water quality in the Ventura River. The total project cost, including monitoring and educational outreach, was $0.95M. Funding for this project was provided in part by the Proposition 84 Stormwater Grant Program. The County continues operation and maintenance of the project for approximately $29,000/year and Ojai Valley Land Conservancy maintains the Ojai Meadows Preserve. More project information is available at http://uninc.vcstormwater.org/.
    a. In May 2021, the hydrodynamic separator pretreatment system and educational signage were damaged by a DUI accident. The County completed all necessary repairs by September 2021.

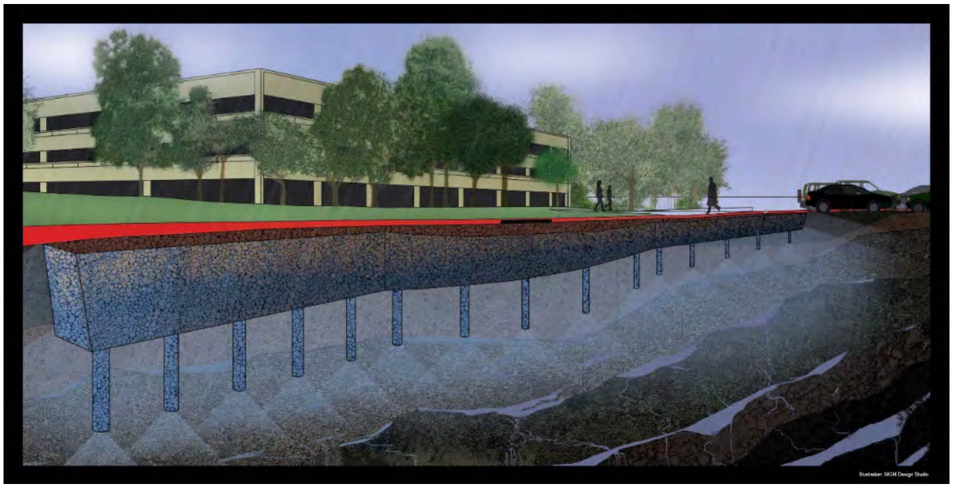
 

2. The County is currently working on a BMP planning and feasibility study in the Ventura River watershed to identify feasible locations and methods for stormwater treatment to address elevated constituent levels at the County's major outfall station. The feasibility study will also evaluate opportunities for bacteria treatment and stormwater diversion to the sanitary sewer, in response to elevated E. coli levels observed at the Ventura River mass emission station and the County's outfall. The project scope includes hydrologic modeling, potential project siting, sewer and storm drain flow monitoring, surveying, geotechnical and infiltration testing, stakeholder outreach, and development of a feasibility study report and conceptual plans. The project is scheduled for completion by June 2024 and will inform further design efforts to reduce pollutant load contributions in the most efficient means feasible.

Santa Clara River Watershed

The County leads the Santa Clara River TMDL memorandum of agreement (MOA) group to complete the required in-stream and outfall monitoring, as well as fulfill reporting requirements. The County continues to work on projects and actions listed in the approved TMDL Monitoring Plan and Draft Implementation Plan for Santa Clara River Bacteria TMDL, dated June 2015, including implementation of grant funded projects. On behalf of the MOA group, the County gave a presentation at Regional Water Board's meeting in October 2017 to provide a requested update on implementation of the SCR Bacteria TMDL requirements. Completed and ongoing projects in the Santa Clara River watershed include:

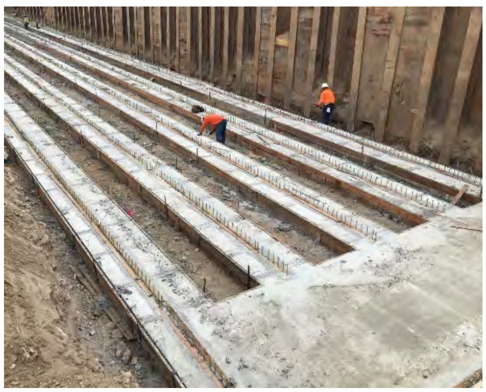
1. The County Government Center Parking Lot Green Streets Urban Retrofit project is located at 800 S. Victoria Ave in Ventura, CA. Construction of the infiltration system design, including pervious concrete gutters, infiltration trenches, and drywells, was completed in September 2014. The project captures 100% of nuisance flows and first flush stormwater discharges from 39 acres of impervious parking lot area for infiltration and groundwater recharge. The total project cost, including effectiveness monitoring and educational outreach, was $1.9M. Funding for this project was provided in part by the Proposition 84 Stormwater Grant Program. The County continues operation and maintenance of the pervious concrete at the County Government Center for approximately $142,000/year. More project information is available at http://uninc.vcstormwater.org/.



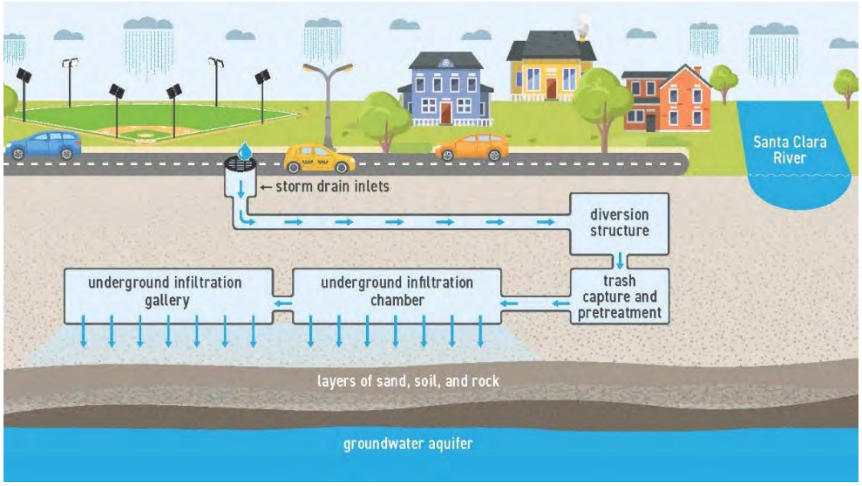
2. The El Rio Retrofit for Groundwater Recharge Project is located in the disadvantaged community of El Rio. Construction of the pervious concrete gutters and infiltration trenches was completed in March 2016. The project captures 100% of nuisance flows and first flush stormwater discharges from 46 acres of the residential community for infiltration, groundwater recharge, and water quality improvement in the Santa Clara River. The total project cost was $1.3M. Funding for this project was provided in part by the Proposition 84 Stormwater Grant Program. The County continues operation and maintenance of the project for approximately $117,000/year. More project information is available at http://uninc.vcstormwater.org/.

3. In the Santa Clara River watershed, the County completed construction of the Piru Stormwater Capture for Groundwater Recharge Project to restore use of the existing Piru Spreading Grounds. The project captures stormwater runoff from 36 acres of urban area in the disadvantaged, unincorporated community of Piru, CA for groundwater recharge and water supply enhancement. The project is estimated to capture 17 acre-feet of stormwater runoff per year; however, with the historic rainfall totals in the 2023 wet season, the project captured over 35 acre-feet. The total project cost was approximately $0.5M. Funding for this project was provided in part by the Proposition 1 Stormwater Grant Program. The County provides operation and maintenance of the project at approximately $25,000/year and United Water Conservation District maintains the Piru Spreading Grounds. More project information is available at http://uninc.vcstormwater.org/.


4. In collaboration with the California Department of Transportation (Caltrans), the County is participating in a stormwater infiltration project to treat 41 acres of mixed land use in the urban, disadvantaged community of Saticoy. The project is currently under construction and scheduled for completion in 2024. The project will capture runoff associated with the 85th percentile event for treatment with a gross-solids removal device and infiltration in an underground infiltration gallery. The project will reduce discharge of pollutants to the Santa Clara River.




5. The County was awarded technical assistance funding in the amount of $268,054 from the Proposition 1 Disadvantaged Community Grant Program to conduct feasibility studies, develop project concepts, and complete 30% design for stormwater capture and groundwater recharge in the disadvantaged, unincorporated communities of El Rio and Saticoy in the Santa Clara River watershed. The feasibility studies were completed in January 2023 and resulted in the development of 30% designs for two projects: an underground infiltration chamber at the Rio Plaza Elementary School and a multi-stage treatment system at Saticoy Park. The Saticoy Park project design includes a pretreatment system, underground detention/infiltration chamber, geohydraulic infiltration tubing, and UV disinfection treatment system. As part of the project scope, community outreach was conducted, educational materials were developed, and project designs were ultimately updated to reflect the needs of the local community. Further efforts, including additional design and construction, are pending additional grant funding. More project information is available at http://uninc.vcstormwater.org/.



6. In late 2017, the County became involved in development of a concept project to divert low flows and stormwater runoff from Central Avenue Drain for infiltration and groundwater recharge at the existing Ferro Basin, owned by United Water Conservation District. Approximately 25% of the 487-acre drainage area is under County's jurisdiction and the remaining 75% is made up of agricultural fields. Agricultural dischargers, the County, United Water Conservation District, nonprofit organizations, and other interested stakeholders met several times to discuss planning and concept design. Further efforts, including construction, are pending grant funding and stakeholder contributions for long-term O&M.

Malibu Creek Watershed

The County collaborates with the Malibu Creek TMDL MOA group to conduct weekly sampling and monthly reporting for the Malibu Creek Bacteria TMDL. All required monitoring, reporting, and implementation activities are on-going.

To achieve compliance with the Malibu Creek Trash and Santa Monica Debris TMDLs, in collaboration with the Malibu Creek TMDL MOA group, the County implements the MFAC/BMP program described in the Trash Monitoring and Reporting Plan. In addition, the County completed installation of trash full capture devices in 2017 to achieve point source capture in the Malibu Creek watershed. On behalf of the upper Malibu Creek watershed Trash TMDL Responsible Parties, the County gave a presentation at the RWQCB's hearing in June 2018. All MFAC/BMP efforts and results are described in the TMDL annual report submitted to the RWQCB. As required by the revised TMDL, a revised Trash Monitoring and Reporting Plan was submitted to the RWQCB on August 6, 2020.

The County successfully secured grant funding to implement the Oak Park Green Streets Urban Retrofit Project to improve water quality for dry weather Bacteria TMDL requirements. Completed and ongoing projects in the Malibu Creek watershed include:

1. Construction of the Oak Park Green Streets Urban Retrofit project was completed in May 2021. Using proprietary Modular Wetlands® by BioClean (https://biocleanenvironmental.com/modular-wetlands-system-linear/), the project provides treatment of approximately 1,520,000 cubic feet per year of nuisance flow runoff from 114 acres of residential area in Oak Park. The biofiltration treatment is designed to improve water quality in Malibu Creek. The total cost for the project was $1.75M. Funding for this project was provided in part by the Proposition 84 Stormwater Grant Program. The County provides operation and maintenance of the project for approximately $83,000/year. More project information is available at http://uninc.vcstormwater.org/.

2. The County is currently working on a feasibility study for upper Malibu Creek low flow and stormwater diversion to evaluate opportunities for diversion and treatment at the local wastewater treatment plants in the upper Malibu Creek watershed. The project scope includes hydrologic modeling, project siting, sewer and storm drain flow monitoring, stakeholder outreach, surveying, permitting assessment, and development of a feasibility study report and conceptual plans. The project is scheduled for completion by June 2024.

Ventura Coastal Watershed

In cooperation with the Channel Island Beach Community Services District (CIBCSD) and City of Oxnard, the County has been diverting dry-weather runoff from the County unincorporated community of Silverstrand from discharge to Kiddie Beach, which is subject to the Ventura Coastal Beaches Bacteria TMDL. In 2018, the County submitted the Bacteria TMDL Final Compliance Report for the Harbor Beaches of Ventura County (Kiddie Beach and Hobie Beach), as required by the TMDL Implementation Plan (copy of this report was provided in the 2019 Annual Report). To address bacteria exceedances previously measured during dry winter weather, an automated system for pump shut-off was installed with the diversion to CIBCSD so that operation of the pump can be extended into dry winter weather days. The County also conducted a die test to ensure that there are no leaks to the beach.

The County has conducted extensive investigations of bacteria sources and pollutant loads in the Silverstrand area. In 2019/20, the County, the Ventura County Watershed Protection District (VCWPD), and the City of Oxnard cost-shared a special study conducted by Southern California Coastal Water Research Project (SCCWRP) to determine the average load of bacteria and human fecal markers being discharged to Kiddie and Hobie beaches and to evaluate the presence of human fecal and chemical sewage markers in stormwater conveyances during rain events from the storm drain system. The study included the County's storm drain system, which discharges from VCWPD's San Nicholas Pump Station, and the City's storm drain, which discharges at the north end of Hobie Beach. Sampling results suggested that pollutant concentrations from the storm drains were not sufficient to explain levels observed across the beaches. Additional dry and wet weather sampling upgradient in the storm drain system similarly yielded inconclusive results and was unable to identify point sources of pollutants, instead suggesting widespread, low-level concentrations.

In 2020, following results of the SCCWRP special study, the County completed CCTV of the County storm drain system. No illicit connections were found; however, minor infiltration into the storm drain was observed. Groundwater was suspected as a potential bacteria source to the harbor beaches, based on CCTV observations and the special study results. In 2021, the County, VCWPD, and the City of Oxnard initiated a groundwater quality investigation along Kiddie and Hobie Beaches. CIBCSD also contributed $20,000 towards the study budget of $372,300. The groundwater study collected samples along the coastline from the south end of Kiddie Beach to the north end of Hobie Beach. The results of the groundwater study were again inconclusive and pointed to an aged, diffuse source of sewage that could potentially contribute to bacteria concentrations.

Concurrently, the County and VCWPD also began collaboration on a consulting contract to conduct a feasibility study for all potential structural solutions to meet wet weather bacteria TMDL requirements for the harbor beaches. In June 2023, the County completed the Feasibility Study for Kiddie Beach Wet Weather Bacteria TMDL

Compliance. The project included a comprehensive scope to review potential project options, complete a sewer capacity study, develop a feasibility ranking matrix, complete stakeholder outreach, identify preliminary permitting needs, and develop a feasibility study report and conceptual plans. Concept plans for two highest-ranked options were developed for elimination of discharge from the San Nicholas Pump Station, up to the 85th percentile event. The County is currently processing a consultant contract to develop 30% design documentation for one of the top ranked options.

Calleguas Creek Watershed

The County served as the project manager for the Calleguas Creek TMDL MOA group to conduct TMDL-required sampling and monitoring in the Calleguas Creek watershed. The County continues to work on identifying potential stormwater treatment opportunities within its urban areas as a part of the effort towards the TMDL Implementation Plan.

To achieve compliance with the Revolon Slough/Beardsley Wash (RS/BW) Trash TMDL, the County installed trash full capture devices to address point sources. The County and TMDL Responsible Parties have implemented the trash monitoring and MFAC/BMP program since 2009. All field work is conducted by the California Conservation Corps, under the oversight of the Ventura Land Trust and TMDL Responsible Parties group. On behalf of the TMDL Responsible Parties, the County gave a presentation on these efforts at the RWQCB's hearing in June 2018. All MFAC/BMP efforts and results are described in the TMDL annual report submitted to RWQCB. As required by the revised TMDL, a revised Trash Monitoring and Reporting Plan was submitted to RWQCB on August 6, 2020.

In response to elevated bacteria concentrations measured in the County's outfall in 2016 (outfall ID: Unincorporated-4), County staff conducted an investigation within the drainage area (i.e., Arroyo Santa Rosa Channel and Camelot Estates - see map below). Total coliform and E. coli concentrations were tested at various upstream locations on two occasions to evaluate possible sources of bacteria to the County's outfall. In addition, one set of samples was collected for DNA markers for dogs, gulls, horses, and humans. The purpose of this additional analysis was to provide context regarding potential sources of elevated bacteria, in addition to the specific areas where these sources may be originating. Low levels (below the level of quantification) of the HF183 human marker were detected at Outfall #2 and low levels (quantifiable) of the HumM2 human marker were detected at Outfalls #1 and #6. No human markers were detected at Outfall #3 (i.e., Unincorporated-4). Reclaimed water, used in the Santa Rosa Channel and Camelot Estates, has been shown to contain quantifiable levels of human DNA markers in other areas and could be responsible for the low concentrations of human marker detected. It is also possible that indicator bacteria levels remain high, while the source-specific DNA markers decay more rapidly, resulting in low or absent detections of the source-specific markers. Recent research has shown that DNA markers are best indicators of fresh fecal contamination, whereas indicator bacteria can persist in the environment. The County's consultant prepared a memorandum to document the investigation and testing results. The County also contacted the home-owners associations for the communities that drain to Arroyo Santa Rosa Channel and Camelot Estates to provide educational brochures. No response was received.

Fillmore

The City of Fillmore has addressed the elevated levels of E. coli at the MO-FIL station through active participation in the Countywide Stormwater Program and supports the actions that were discussed in the section above. In addition, the City works in collaboration with the Lower Santa Clara River (LSCR) Watershed Permittees, the cities of Santa Paula, Oxnard, Ventura, and County of Ventura, to address the Santa Clara River Estuary and Reach 3 Watershed Bacteria TMDL (Final In-Stream Compliance Monitoring Plan). The Memorandum of Agreement (MOA) was executed October 5, 2016 and monitoring commenced October 11, 2016. Under the program, additional LSCR bacteria TMDL outfall monitoring commenced in September 2018.

The City of Fillmore, in collaboration with the LSCR Watershed permittees and the WPD, continues to implement public outreach to city residents and commercial businesses in the watershed to target potential sources of high levels of bacteria in our waterways. In addition, the City is currently working on updating the North Fillmore Specific Plan and is working closely with developers to include the implementation of regional post-construction BMPs that most effectively target key pollutants, including bacteria, as a part of the specific plan.

Monitoring results have revealed high bacteria amounts in the past at the MO-FIL outfall. Staff has visited the monitored outfall in the City and observed very little non-stormwater runoff in the drainage area to the outfall. The upper reaches of the watershed are natural, extending into the National Forest lands. This area includes wildlife that can contribute bacteria to stormwater run-off naturally. Staff continues to monitor the bacteria levels and sampling site in addition to providing public outreach to residents. The City also continues to actively respond and resolve reports of illicit discharges in the City. Additionally, the City implements a street sweeping program, cleans out catch basins regularly, and hosted a Coastal Cleanup Day site for the past six years, in which the public had the opportunity to volunteer to remove trash and debris from Sespe Creek, a tributary to the Santa Clara River. By actively participating in the Ventura Countywide Stormwater Program and Lower Santa Clara River Bacteria

TMDL, and through efficient implementation of the MS4 Permit, the City of Fillmore is consistently working to reduce pollutants from urban runoff throughout its jurisdiction.

Moorpark

The City of Moorpark maintains its commitment to collaborate with the Ventura Countywide Stormwater Quality Management Program, addressing surface water contamination from urban/suburban runoff. Employing various strategies—Public Outreach, Public Agency Activities, Construction, Planning and Land Development, Illicit Discharge, and a Business Program—it tackles elevated levels of E. Coli bacteria, Chloride, and Total Dissolved Solids (TDS) detected at the MO-MPK outfall monitoring station.

Continuing its efforts, Moorpark works on stormwater infiltration projects, notably showcased by the revamped Metrolink North Parking Lot to adhere to current stormwater capture standards. Future plans include the construction of a trail along Championship Drive, aimed at enhancing runoff capture and drainage.

Continuous monitoring of bacteria levels and sampling sites persists alongside ongoing public outreach initiatives. The City remains proactive in responding to and resolving reports of illicit discharges, conducting regular street sweeping, maintaining catch basins, and hosting events such as the Coastal Cleanup Day.

Through dedicated participation in the Ventura Countywide Stormwater Program and efficient implementation of the MS4 Permit, Moorpark consistently strives to eliminate urban runoff pollutants across its jurisdiction.

Ojai

The City of Ojai is an active participant in the Countywide Stormwater program and aims to reduce pollutants in the Ventura River Watershed. In private construction developments, the City requires substantial construction and post-construction BMPs including on-site bio-infiltration and detention basins in compliance with the TGM. To reduce E. coli, dry cleaning methods are utilized as a Best Management Practice. Quarterly maintenance is also required at these sites by the property owners and an annual inspection is conducted to ensure compliance with quarterly maintenance and feasibility of bio-infiltration.

Public Works personnel ensure that restaurants effectively maintain trash and grease storage. During business inspections, educational information handouts are provided. Handouts are also available at City offices. Reports of illicit discharges are immediately investigated, halted and cleaned, with a progressive enforcement program implanted. The City continues a twice a month street sweeping program that utilizes regenerative air sweepers. In the reporting year 2022-2023, street sweepers hauled away approximately 235 tons of debris, information can be found in the 2022-2023 Annual Report, Public Agency Activities for Roads and Streets.

In an effort to reduce trash and bacteria in the Ventura River Watershed, the City has installed several permanent public trash containers in the downtown area and within our parks, as well as pet waste bag dispensers. Strategically distributed public trash containers are serviced 4-days a week and are additionally serviced by City staff throughout holidays and for special events. Pet waste stations are added where needed and inspected daily to ensure availability of bags are provided for the public. The City is also actively pursuing the installation of full capture devices in catch basins following the Statewide Trash Amendment's implementation schedule. During rain events, storm water sampling and lab analysis is performed. In 2017, the City began implementing vegetated curb extensions and vegetated curb ramp extensions into their annual paving plan that are designed to capture and promote the infiltration of runoff that otherwise would flow directly to our stormwater collection system (photos below).


Lastly, the City of Ojai monitors the Public Works Yard for trash, sufficient storage, and vehicle fluids. The Annual BMP Inspection was performed in 2023. The Public Works Yard sits above the sampling site and proper maintenance of the yard, such as drying clean methods, adequate storage and disposal of vehicle fluids, and proper maintenance of wash racks. All Public Work staff are trained annually or within 6-months of employment on our Public Works Yard SWPPP.

Oxnard

As indicated by the 2022/23 storm water monitoring results, elevated levels of *E. coli* were detected at the MO-OXN during wet weather sampling. The MO-OXN is located in the El Rio Drain which receives stormwater and non-stormwater runoff from the El Rio, East Vineyard, and North Ventura subwatersheds. The El Rio drain (a tributary to the Santa Clara River) is located near the Oxnard Village-Wagon Wheel Junction development.

Within the Oxnard Village-Wagon Wheel Junction development there are currently 63 acres being converted into a multiple-use redevelopment primarily containing multi-family apartment units. This project is located near Oxnard Blvd and Highway 101 and drains to the Santa Clara River. The project has been conditioned to install post-construction Best Management Practices (BMPs) including a CDS Treatment Device as well as biofiltration as part of an onsite detention basin. The project is required to meet County of Ventura and City of Oxnard SQUIMP requirements. With updated BMPs and land development this project may decrease the amount on bacteria, trash, and other pollutants entering from the area into the Santa Clara River. These updates may also potentially decrease the amount of *E. Coli* detections in the wet weather sampling.

Future multiple use development will be located between N. Ventura Road, Town Center Drive, N. Oxnard Blvd., and Hwy 101. This development is the final development phase of the Riverpark community. Apartments, restaurants, hotels, and a retail gas station are currently under construction. These developments will also incorporate post-construction BMPs that will treat stormwater before being discharged to the Santa Clara River north of Hwy 101. The planned BMPs may have the potential to decrease the amount of E. Coli being discharged to the Santa Clara River. The completed Riverpark neighborhood catch basins all have Contech Stormwater Management Stormfilters installed and maintained on a regular basis. This post-construction BMP targets total suspended solids, hydrocarbons, nutrients, metals, and other common pollutants from entering the Santa Clara River by using rechargeable, media-filled cartridges to absorb and retain the pollutants.

In an effort to prevent or reduce elevated levels of E. coli, the City of Oxnard Technical Services Program –Source Control (TSP-SC) Division implements a stormwater program with established BMPs. Annual reviews of land use data, business inventories, and critical source inspection records within the El Rio, East Vineyard, and North Ventura subwatersheds are conducted to identify and prevent illicit discharges. TSP-SC staff inspected businesses with a focus on outdoor trash enclosures, outdoor storage of waste and materials, and grease interceptor/clarifier maintenance. BMP information was provided regarding surface cleaning, waste management, and grease interceptor/clarifier maintenance. In addition, TSP-SC staff met with Wastewater Collections staff to review sanitary sewer overflow and grease interceptor overflow response protocol and training was provided for illicit discharge response.

TSP-SC, Special Assessments, and Parks Department staff are aware of possible bacteria sources such as excessive dog feces in the subwatersheds. Dog waste bags and dispensers are provided in various parks and neighborhoods throughout the city to reduce the amount of pet waste entering stormwater runoff. TSP-SC staff was trained on illicit discharge response and BMP information forms were put in a share drive so that all City departments could access and download the forms as needed.

The City of Oxnard is a participating agency in a subcommittee to address the requirements of the Santa Clara River TMDL, which became effective March 21, 2012. The City of Oxnard in partnership with the Cities of Fillmore, Santa Paula, Ventura, and the County of Ventura, has prepared an In-Stream Compliance Monitoring Plan and a Draft Implementation Plan for the Estuary and Reach 3 of the Santa Clara River. On April 11, 2016, we received Regional Board approval for the Final In-Stream Compliance Monitoring Plan for the Santa Clara River Estuary and Reach 3 Bacteria TMDL. The City of Oxnard and the other participating agencies have since entered into a memorandum of agreement to actively support the monitoring and reporting efforts as required by the SCR Bacteria TMDL by funding equal contributions of the total cost of the water monitoring described in the Final In-Stream Compliance Monitoring Plan.

As of March 2019, the City of Oxnard installed full capture devices within the Revolon Slough/Beardsley Wash Trash TMDL area. The installation of these devices is in accordance with the requirements as specified in Table 9 of the TMDL, achieving 100% reduction of trash from baseline WLA. The Sakioka Farms drainage area within this TMDL area is currently under development. In 2021, Phase 1 of the development included 27 Contech Filterra devices installed in publicly owned catch basins. These units are not certified full capture devices but do treat the following pollutants per Contech: total suspended solids, total phosphorus, total nitrogen, total copper, dissolved copper, total zinc, dissolved zinc, and total petroleum hydrocarbons. All private development within Phase 1 is being required to install post construction BMPs including full capture trash devices. Phase 2 of the development is being designed to include full capture trash devices in the publicly owned catch basins to further meet compliance of this TMDL.

The Regional Water Quality Control Board gave approval on November 17, 2017, to move forward with a special study to investigate human waste sources to the Harbor Beaches of Ventura County as specified under the Harbor Beaches of Ventura County (Kiddie Beach and Hobie Beach) Bacteria TMDL. This study is in response to recent wet weather single sample exceedances. In 2019-2020 a source tracking study in the storm drains found little flow or contamination during dry weather. In wet weather, high fecal indicator bacteria concentrations were found in the stormdrains. In 2021-2022 several groundwater monitoring wells were installed to study the movement of total coliforms, *E. coli*, *Enterococcus*, and genetic source tracking markers specific to human contamination at various depths in the wells. The City of Oxnard continues to conduct weekly visual catch basin inspections to document any runoff into the catch basins which may contribute to bacteria concentrations.

TSP-SC staff is constantly evaluating what programs and BMPs are most effective. We have enlisted the help of all city departments with the common goal of meeting our water quality standards and maintaining the beneficial uses for our receiving waters. The City of Oxnard has been and will continue to be proactive and diligent in its efforts to implement BMPs to prevent or reduce the discharge of E. coli.

Port Hueneme

Bacteria

The City of Port Hueneme addresses elevated levels of E. coli through active participation in the Countywide Stormwater Program.

Educational outreach is also utilized to help educate on reducing E. coli. The City participates with the countywide media campaign and sponsors outreach at local events, City Hall, and the City website. Messaging includes the importance of collecting and properly disposing of pet waste. The city has multiple pet waste bag dispensers placed along the recreational corridor for the public's use. The City diligently monitors for homeless encampments and offers multiple contact points to assist homeless in getting into sanitary conditions within shelters.

The solid waste division performs routine solid waste audits and ensures the appropriate level of service is being implemented so overflows do not occur.

Additionally, Port Hueneme is participating in the special study to investigate human waste sources to the Harbor Beaches of Ventura County as specified under the Harbor Beaches of Ventura County (Kiddie Beach and Hobie Beach) Bacteria TMDL.

The City contains a creek that is part of the drainage system with unrestricted use by various forms of wildlife. It is the City's belief that controlling bacteria in this area is beyond its control.

Trash

The City of Port Hueneme continues to implement a street sweeping program that exceeds permit requirements, cleans out catch basins quarterly, and served as a participant in a regional 2022 Coastal Cleanup Day to remove trash and debris from Hueneme Beach and Ormond Lagoon. The city also dedicated staff to operate equipment during multiple clean up events on the beach. The City continues to contract with Ventura County Probation and has weekly trash removal from the recreation corridor, beach, medians, and parkways.

The City requires, and provides, both trash and recycle containers for all public events requiring a CUP. Port Hueneme continues to partner with VCWPD and City of Oxnard in monitoring and managing trash removal from the Oxnard West Drain.

The city also implemented a weekend trash collection at all parks throughout the city this past year.

Santa Paula

General. Santa Paula is an active participant in the Countywide Stormwater program and supports the actions that were discussed in the section above. In addition to the countywide discussion in the monitoring section of the annual report, please also refer to the "Public Outreach, Public Agency Activities, Construction, Planning and Land Development, Illicit Discharge, and Business Program" sections of the annual report for a list of actions Santa Paula has taken and will continue to implement in the current year and future years to address any identified constituents above objectives that were found in our urban outfall monitoring station near the south end of 10th Street.

Private Construction. The City conditions private projects to install construction BMPs and post-construction BMPs including onsite biofiltration and detention basins. These BMPs are anticipated to decrease the amount of bacteria, trash, and other pollutants entering from the area into the Santa Clara River. The newly completed East Area 1 Project includes onsite biofiltration and detention basins.

Public Construction. The City conducts inspections at all significant City capital improvement program projects. These inspections are anticipated to ensure sediment and erosion controls are being properly applied and reduce sediment loading into the Santa Clara River. The City monitors to ensure that sediment and erosion control measures are implemented.

Bacteria Special Study. The City has participated in the now completed Countywide Bacteria Special Study. Dry weather urban runoff and storm water samples were collected at the 10th Street storm water outfall and monitoring station, which represents discharges from the City's urban areas upstream of the receiving water monitoring station in Santa Clara River. Total coliform and E. coli were tested to evaluate possible sources of bacteria in City's outfall. In addition, samples were collected for DNA markers for dogs, gulls, horses, and humans. The purpose of this additional analysis was to provide information regarding potential sources of elevated bacteria.

Bacteria TMDL for Santa Clara River. The City works in collaboration with other lower Santa Clara River Watershed Permittees, including the cities of Fillmore, Oxnard, Ventura, and County of Ventura, to address the Santa Clara River Estuary and Reach 3 Watershed Bacteria TMDL (Final In-Stream Compliance Monitoring Plan). Water quality monitoring of two required sample sites within the Santa Clara River commenced October 2016,with permittee outfalls in September 2018,. This sampling continues to present day. A final Bacteria TMDL Implementation Plan was completed and submitted in March 2015.

In addition, the City participated in the Ventura Countywide Stormwater Program Regional Stormwater Conceptual Design Project by Craftwater consultants which evaluated potential regional multi-benefit regional projects throughout Ventura County including the City. Several sites were identified within the City and will move forward for further evaluation during the upcoming development of a Watershed Management Plan for the entire County.

In March the City approved the 3rd Amendment to the existing Memorandum of Agreement (with the Cities of Oxnard, Fillmore, Ventura, County and VCWPD) for the Santa Clara River TMDL Monitoring and Reporting Program.

Trash Removal and Street Sweeping. The City continues to implement an enhanced trash removal and street sweeping program in the downtown commercial district. The City also conducts additional trash removal and street sweeping prior to and following special events (parades, street fairs, etc.) in the downtown district. These BMPs are anticipated to decrease the amount of trash and other pollutants entering from the area into the Santa Clara River. To date the City has installed seven trash excluders (full capture devices). The City continues to evaluate other potential locations for installation of full capture devices in compliance with the SWRCB Trash Amendment in stormdrain inlets within the City.

Water Conservation/Decreased Dry Weather Runoff. Due to the City's stringent water conservation ordinance, dry weather runoff has been significantly reduced. The City's water customers continue to meet or exceed State requirements for water conservation

In addition, the City has implemented the Statewide Drinking Water Systems Discharge Permit WDR 4DW0718, including the following requirements:

a. Established and implemented BMPs.

b. Ensured that all planned potable water discharges complied with the applicable effluent limitations for chlorine residual and turbidity.

c. Conducted monitoring and reporting in compliance with the provisions of the Permit and maintained self-monitoring reports.

Salt Reduction. The City continues to make progress with design and ultimate construction of its Advanced Water Treatment Facility (AWTF). The AWTF is intended to reduce chloride concentrations from effluent produced from the City's Water Reclamation Facility to meet the effluent limit of 110 milligrams per liter. The City is currently performing a chloride source identification study for its wastewater collection system. This study will assist in confirming design criteria for the AWTF. Once operational, the AWTF will produce high quality effluent, reducing salt loads to the Santa Paula groundwater basin, with indirect benefit to the City's water supplies.

Simi Valley

Despite ongoing efforts of participating in all subcommittees, the Calleguas Creek Watershed group, and management group of the Ventura Countywide Stormwater Program, Simi Valley continues to have a cause or contribute relationship with 3 WQS: bacteria, salts and TDS.

While bacteria is an exceedance addressed throughout most of the country, there are conditions in Simi Valley that will be difficult to mitigate, specifically abundant wildlife in and around the populated area, and decaying vegetation from the vast upstream undeveloped landscape surrounding the city. A 2014 SMP sampling study to quantify E. coli took 73 samples throughout Ventura County and found none to have HF 183, dog markers in 11% and bird markers in 37% of the samples- the remaining sources were unidentified. Clearly, we have not yet been able to determine the majority of bacterial sources contributing to sample exceedances. We continue to maintain stringent source control and preemptive line flushing to prevent sanitary sewer overflows, as well as public outreach. The City has a vigorous mutt mitt program, and strives to promote its usage, including handing out packets during public events such as Simi Valley Street Fair and Coastal Cleanup Day.

Salts and TDS are also particularly challenging in Simi Valley, primarily due to a very high groundwater table with natural springs, seeps and artesian conditions contributing to stormwater quality. Further, the Calleguas Creek watershed has historic monitoring data collected during dry weather showing regular elevated levels of chloride and TDS concentrations.

We conduct street sweeping through our landfill MOU with Waste Management and have our CPS units cleaned three times each year, with non-retrofitted catch basins cleaned once every three years. We have trash and catch basin requirements for permitted special events. The City plans to continue increasing the number of CPS units within the city and expand maintenance activities. Simi Valley, along with all co-permittees of the MS4 Permit, will review and implement strategies for improvement of our existing program provided by our consultant, as our program continues to develop.

Thousand Oaks

The City of Thousand Oaks (City) continues to work with the Ventura Countywide Stormwater Quality Management Program (including participating on the Management Committee and all Subcommittees) to find creative and economically achievable ways to eliminate or reduce the contamination of surface waters that can occur from urban/suburban runoff. In addition to the countywide discussion in the monitoring section of the annual report, please also refer to the "Public Outreach, Public Agency Activities, Construction, Planning and Land Development, Illicit Discharge, and Industrial/Commercial Business Inspections" sections of the annual report for a list of actions the City has taken in the reporting year and will continue to implement in future years to address elevated levels of E. Coli bacteria, Chloride and Total Dissolved Solids (TDS) that were found in our urban outfall monitoring station. One of the many methods that City uses to educate its residents on pollution prevention controls is through the City website, City social media sites, Go Green Blog and Newsletter. In addition to urban contaminant sources, there can be other sources of pollutants in runoff waters that are inherently difficult to control. Specifically, challenges should be expected when attempting to control atmospheric deposition, groundwater mineral enrichment from the endemic geology, and wildlife contribution of the fecal indicator (E. coli).

The City of Thousand Oaks operates, maintains, and enforces numerous programs and facilities to minimize pollutant sources that can originate within its developed infrastructure: extensive and additional street sweeping, catch basin trash full capture device retrofits (354 installations), catch basin inspection and cleaning, project conditioning using low impact development (LID) design principles and apparatus; industrial, commercial and residential inspections and outreach; local and Construction General Permit Stormwater Pollution Prevention Plan (SWPPP) requirements and pre- and post-construction BMP inspections; Dog waste collection program; and restrictions on mobile cleaning operations.

Regarding the storm drain emissions that caused or contributed to exceedances of E. Coli, Chloride and TDS in this report, the following may be said:

- E. Coli – Wet Weather

The City takes further efforts to reduce potential sources of fecal bacteria. For example, restaurant inspections verify that facilities use effective garbage control to prevent both dumpster leakage and avian scavenging. The City frequently removes and cleans homeless encampments along stormwater channels and has made it a top priority to identify and advance solutions for emergency sheltering and permanent supportive housing to address homelessness. The City is in the process of constructing a Navigation Center with 30 modular housing units for temporary, emergency housing and is opening a permanent 77-room supportive housing facility. The City conducts local outreach and education and participates in the countywide media campaign that uses messaging to stress the importance of the proper disposal of dog waste. In addition, the City's dog waste collection program provides dog waste bag stations at parks, trailheads, and miscellaneous public open areas where dogs are commonly walked. Despite the many efforts to control indicator bacteria, open channels and creeks in open space areas surrounding the City are part of the natural stormwater drainage system that has unrestricted use by avian and mammalian wildlife. Their indicator bacteria contribution may be significant, but it is beyond the control of an MS4 agency. As the final compliance date for wet weather draws nearer, Thousand Oaks will consider source evaluations of its MS4 outfalls using microbial source tracking or other methods for identifying fecal contamination of human origin. The City is currently studying possible dry weather and first flush wet weather sewer diversions of the MS4 drainage system.

- Chloride and TDS – Dry and Wet Weather

The City has banned commercial and industrial onsite water softener regeneration and discharges from saltwater pools. It also conducts an outreach program that stresses water conservation and has a robust water conservation ordinance in place since 2009. The City lies on marine sediments and fractured volcanic bedrock, which produce multiple areas of natural springs, seeps, and high groundwater around the City. Sampling and analysis of the groundwater exfiltration found chloride and TDS to have an average level above the WQO. It is thought that a combination of marine sediments and accumulated stranded salts in the fractured volcanic bedrock dissolve into the groundwater to contribute to the exceedances of the surface water flow and is beyond the control of an MS4 agency.

Ventura

The City of Ventura is an active participant in the Countywide Stormwater program and supports the actions that were discussed in sections above.

In addition to the countywide discussion in the monitoring section of the 2022/23 annual report, please also refer to the Public Outreach, Public Agency Activities, Construction, Planning and Land Development, Illicit Discharge, and Business Program information of the annual report for a list of actions City of Ventura has taken and will continue to implement in the current year and future years to address elevated levels of bacteria, trash, metals and other constituents that have been found in our urban outfall historically.

Three wet weather sampling events occurred during the 2022/23 monitoring year. *E. coli* concentrations were detected above Basin Plan objective during three wet weather sampling events at MO-VEN and two wet weather sampling events at ME-SCR. MO-VEN appears to be causing or contributing to a persistent ME-SCR exceedance of *E. coli* Basin Plan objective during wet weather. No other cause and contribute relationships were observed for City of Ventura MO-VEN during 2022/23 monitoring year in wet weather.

One dry weather sampling event occurred during the 2022/23 monitoring year. MO-VEN does not appear to be causing or contributing to any exceedance of Basin Plan objectives.

The Lower Santa Clara River Bacteria TMDL became effective on March 21, 2012 with dry and wet weather compliance 11 and 17 years after effective date of TMDL, respectively. The Lower Santa Clara River Bacteria TMDL Implementation Plan was submitted to the Los Angeles Regional Water Quality Control Board on March 20, 2015 and approved December 26, 2017. The City of Ventura is currently implementing BMPs identified in the

Implementation Plan and looking for additional measures to achieve bacteria loading reductions to receiving waters. The City submitted its Draft Watershed Management Program; the Watershed Management Program includes BMPs, not included in the TMDL Implementation Plan, that will mitigate fecal indicator bacteria pollutant loading. Additionally, the City in partnership with the Cities of Fillmore, Oxnard, Santa Paula, and the County of Ventura, implemented an In-Stream Compliance Monitoring Plan for the Estuary and Reach 3 of the Santa Clara River, which commenced October 2016. Outfall monitoring commenced October 2018 in Santa Clara River Bacteria TMDL responsible MS4 agencies' jurisdictions. Since E. coli concentrations in the Santa Clara River Watershed are routinely detected above Basin Plan objectives in both wet and dry weather, the City of Ventura in collaboration with Santa Clara River Watershed permittees implement targeted public outreach to residents and businesses in the watershed to address the causes of high levels of bacteria in our waterway.

As discussed above, the City of Ventura has an industrial and commercial facilities program designed to prohibit unauthorized non-stormwater discharges and reduce pollutants in stormwater runoff from these businesses. Stormwater runoff information and best management practices educational materials are given to business owners during industrial and commercial facilities inspections. Furthermore, the City of Ventura has been working with the business community to enroll required businesses in the General Permit for Stormwater Discharges Associated with Industrial facilities with high success. City of Ventura has a street sweeping program to reduce pollutants, such as metals, salts, gross solids, nutrients, etc. from accumulating in the public right of way and discharging to receiving waters.

In an effort to meet compliance with the Trash TMDL in the Ventura River watershed and Statewide Trash Amendments, the City of Ventura installed trash full capture devices in catch basins following the Trash TMDL implementation schedule and several additional permanent public trash containers along the Ventura River trail in locations where there were documented patterns of uncaptured trash (pictured below). To date the City has installed 602 trash excluders in the public right of way throughout City limits and conditions all new and redevelopment projects to include state certified trash excluders on all storm drain inlets onsite. Furthermore, in December of 2016 City of Ventura, in collaboration with the Surfrider Ventura County Chapter, began installing cigarette butt collection receptacles (pictured below) in high generating cigarette butt areas. Currently over 90 cigarette collection receptacles had been installed with cigarette butt collection totals over 200,000. Cigarette waste collected is being recycled.

City of Ventura staff work with businesses to educate them on general environmental sustainability, which includes stormwater pollution prevention. We provide educational materials and training and run the Green Business Certification program. This program is available currently to office/retail, restaurants, multi-family dwellings, and brewery businesses. To date, the city has certified over 80 businesses, with many other in the process. Stormwater pollution prevention and best management practices play an important role in this program. Furthermore, effective July 1, 2021 the City of Ventura prohibits the use of expanded polystyrene (EPS) containers used by food and beverage providers. This effort is anticipated to reduce waste in the environmental as well as promote the use of reusable containers.

Examples of permanent public trash enclosure, cigarette butt collection receptacles

1.9 MASS EMISSION CALCULATIONS

Mass loadings were estimated for constituents detected at the ME-CC and ME-VR2 mass emission stations during the 2022/23 monitoring season. Mass loadings could not be calculated at the ME-SCR station because total flow could not be accurately measured, as described in Section 1.3.1.

Constituents that are inappropriate for mass emission calculations (e.g. bacteria, alkalinity, DO, conductivity, specific conductance, hardness, salinity, temperature, pH, turbidity, dissolved metals, dissolved phosphorus, etc.) are excluded from the calculations.

Mass loads were calculated by using the average flow [total flow volume between first and last aliquot collection in cubic feet divided by the time elapsed between the first and last aliquots in seconds] measured in cubic feet per second (cfs), estimated over the duration of a monitoring event and the concentrations of detected constituents. For grabs, this is the concentration measured in the grab sample. For composites, this is the concentration measured in the composite bottle, which is a combination of aliquots collected during the event. Event duration was defined as the number of hours elapsed between the collection of the first and the final aliquots by the composite sampler at each site. Event durations during 2022/23 at the ME-CC and ME-VR2 stations lasted from 6 hours (Event 1 at ME-CC) to 24 hours (Event 4 at ME-CC and Event 6 at ME-VR2). Based on the average flow rate for a sampling event, loadings were calculated in lbs/event to allow for comparisons between sites as well as between events (see example in Table 1-28) These mass loading estimates are presented in Table 1-29 and Table 1-30.

Table 1-28. Example Mass Loading Calculation

Event 1 at ME-CC
Chloride concentration: 150 mg/L Event duration: 6 hours, 13 minutes = 6.22 hours
Average flow rate: 136.72 cfs 136.72 cfs x 7.48 gal/cf x 3.785 L/gal = 3,870.79 L/sec
Load = concentration x volume 3,870.79 L/sec x 150 mg/L = 580,618.39 mg/sec 580,618.39 mg/sec x 60 sec/min x 60 min/hr x 6.22 hr/event x 1 kg/10^6 mg x 2.2 lb/kg = **28,600 lb/event** (rounded)

Table 1-29. Estimated Mass Loadings at ME-CC

Classification	Constituent	Event 1 (Wet) 11/8/2022 6.22 hrs. (lbs/event)	Event 2 (Wet) 12/2/2022 19.15 hrs. (lbs/event)	Event 4 (Wet) 2/24/2023 24.22 hrs. (lbs/event)	Event 6 (Dry) 5/15/2023 22.65 hrs. (lbs/event)
Anion	Chloride	28600	46800	120000	7840
Anion	Fluoride	64.8	130	580*	15.7
Anion	Perchlorate	ND	ND	ND	0.03*
Cation	Calcium	11500	18700	105000	3920
Cation	Magnesium	5820	9490	51000	2570
Conventional	BOD	2100	1500	22800	ND
Conventional	COD	3240	8580	116000	747
Conventional	Cyanide	0.4	0.29*	6.2*	ND
Conventional	MBAS	ND	20.3	ND	0.93*
Conventional	Total Chlorine Residual	7.2*[H]	(<[M]) 15.1	ND	1.3*[H]
Conventional	Total Dissolved Solids	139000	219000	812000	41000
Conventional	Total Organic Carbon	1600	2060	19300	161
Conventional	Total Suspended Solids	170000	6500	2090000	261
Conventional	Volatile Suspended Solids	22900	3640	321000	ND
Hydrocarbon	Diesel Range Organics	51.5	36.4	580	4.1[H]
Hydrocarbon	Gasoline Range Organics	(<) 15.4*	19.5*	ND	ND
Hydrocarbon	Oil and Grease	572*	ND	3090*	48.5*
Hydrocarbon	Oil Range Organics	95.3	ND	ND	ND
Metal	Aluminum (Total)	553	312	32000	(<[M]) 9.3
Metal	Antimony (Total)	0.13	0.15	1.9*	0.01*
Metal	Arsenic (Total)	0.78	1.1	15.5	0.14
Metal	Barium (Total)	14.7	10.7	244	1.5
Metal	Beryllium (Total)	0.02	0.02*	1.2	ND
Metal	Cadmium (Total)	0.1	0.06	2.2	0.004*
Metal	Chromium (Total)	1.2	0.83	81.2	0.05
Metal	Chromium VI (Total)	0.03	0.03	1.2	0.02
Metal	Copper (Total)	1.8	1.3	58	0.07
Metal	Iron (Total)	686	442	42500	11.9
Metal	Lead (Total)	0.69	0.21	20.5	0.006*
Metal	Nickel (Total)	1.8	1.8	69.6	0.2
Metal	Selenium (Total)	0.13	0.22	3.1	0.09
Metal	Thallium (Total)	0.007*	ND	0.32*	ND
Metal	Zinc (Total)	6.1	4.4	193	0.23*
Nutrient	Ammonia as N	34.3	5.5*	387	0.93*
Nutrient	Nitrate + Nitrite as N	858	1350	5410	328
Nutrient	Nitrate as N	839	1330	5020[H]	325
Nutrient	Phosphorus as P (Total)	534	550	3590	52.2
Nutrient	TKN	286	338	6960	ND
Organic	Benzo(k)fluoranthene (^EPA 8270C)	0.1*	ND	ND	ND
Organic	Bis(2-ethylhexyl)phthalate	ND	[R]	ND	0.41
Organic	Dibenz(a,h)anthracene (^EPA 8270C)	0.16*	ND	ND	ND
Organic	Diethyl phthalate	ND	ND	13.5	0.03*

Classification	Constituent	Event 1 (Wet) 11/8/2022 6.22 hrs. (lbs/event)	Event 2 (Wet) 12/2/2022 19.15 hrs. (lbs/event)	Event 4 (Wet) 2/24/2023 24.22 hrs. (lbs/event)	Event 6 (Dry) 5/15/2023 22.65 hrs. (lbs/event)
Organic	Fluoranthene (^EPA 8270C)	ND	ND	0.21*	ND
Organic	Fluorene (^EPA 8270C)	ND	ND	ND	0.001*
Organic	Pyrene (^EPA 8270C)	ND	ND	(<) 0.2*	ND
Pesticide	2,4-D	ND	ND	0.81*	0.3
Pesticide	4,4'-DDE	0.007*	ND	0.04*	ND
Pesticide	Dalapon	ND	ND	ND	0.01*
Pesticide	DCPA (Dacthal)	0.07	0.07	6.6	0.007
Pesticide	Diazinon	($>^L$) 0.002*	ND	ND	($>^L$) 0.0003*
Pesticide	Dichlorprop	ND	ND	ND	0.04
Pesticide	Dimethoate	(<) 0.002*	ND	ND	ND
Pesticide	Glyphosate	5.7	ND	ND	ND
Pesticide	Malathion	0.46	0.006	0.09	0.0001*
Pesticide	Metolachlor	0.07*	0.01*	1.5*	ND
Pesticide	Pentachlorophenol (^EPA 515.4)	0.01*	ND	ND	ND
Pesticide	Pentachlorophenol (^EPA 8270C)	ND	ND	2.3*	ND
Pesticide	Prometryn	0.05*	0.06	1.1*	0.003*
Pesticide	Simazine	ND	ND	1.6*	ND

ND - Constituent not detected, and, therefore, no estimated mass loading was calculated.
* Calculation of mass loading derived from result flagged as DNQ
(<) Analyte was detected in the method blank so result is considered an upper limit. Detection in sample may be due to laboratory contamination.
($<^M$) High bias in matrix spike sample for this analyte so result is an upper limit.
($>^L$) Low bias in laboratory control sample for this analyte so result is a lower limit estimate.
^ Non-primary method (not 40 CFR 136 approved)
^{H} Result considered estimated due to holding time exceedance for this sample
^{R} Result rejected due to QAQC failure

Table 1-30. Estimated Mass Loadings at ME-VR2

Classification	Constituent	Event 1 (Wet) 11/8/2022 13.75 hrs. (lbs/event)	Event 2 (Wet) 12/2/2022 8.18 hrs. (lbs/event)	Event 4 (Wet) 2/24/2023 8.80 hrs. (lbs/event)	Event 6 (Dry) 5/22/2023 24.35 hrs. (lbs/event)
Anion	Chloride	533	305	198000	15800
Anion	Fluoride	2.3	1.2	2290	118
Cation	Calcium	736	399	466000	40400
Cation	Magnesium	194	104	196000	11800
Conventional	BOD	17.6	10.8	ND	ND
Conventional	COD	ND	33.2	767000	2430
Conventional	MBAS	0.22*	ND	ND	ND
Conventional	Total Chlorine Residual	ND	0.14^H	ND	ND
Conventional	Total Dissolved Solids	5120	2490	3800000	250000
Conventional	Total Organic Carbon	21.3	10.5	41100	723
Conventional	Total Suspended Solids	64	8.3*	72800000	(<) 98.7*

Classification	Constituent	Event 1 (Wet) 11/8/2022 13.75 hrs. (lbs/event)	Event 2 (Wet) 12/2/2022 8.18 hrs. (lbs/event)	Event 4 (Wet) 2/24/2023 8.80 hrs. (lbs/event)	Event 6 (Dry) 5/22/2023 24.35 hrs. (lbs/event)
Conventional	Volatile Suspended Solids	21.3*	11.1*	5490000	ND
Hydrocarbon	Diesel Range Organics	0.51*	2.5*	609*	46[H]
Hydrocarbon	Gasoline Range Organics	(<) 0.39*	ND	585*	36.2*
Hydrocarbon	Oil Range Organics	1.3*	ND	ND	ND
Hydrocarbon	Oil and Grease	ND	ND	49800	559*
Metal	Aluminum (Total)	1.1	0.2	475000	2.6*
Metal	Antimony (Total)	0.001*	0.0003*	6*	0.03*
Metal	Arsenic (Total)	0.005	0.003	198	0.09*
Metal	Barium (Total)	0.31	0.15	6090	21
Metal	Beryllium (Total)	ND	ND	25.3	ND
Metal	Cadmium (Total)	0.0002*	ND	29.3	ND
Metal	Chromium (Total)	0.003	0.001	870	0.07
Metal	Chromium VI (Total)	ND	ND	0.16	0.03
Metal	Copper (Total)	0.006	0.002	736	0.25
Metal	Iron (Total)	3	1.7	949000	5.6*
Metal	Lead (Total)	0.001	ND	388	ND
Metal	Mercury (Total)	ND	ND	1.5	ND
Metal	Nickel (Total)	0.02	0.01	1190	0.46*
Metal	Selenium (Total)	0.005	0.003	35.6	0.95
Metal	Silver (Total)	ND	ND	4	ND
Metal	Thallium (Total)	ND	ND	7.6	ND
Metal	Zinc (Total)	0.01*	0.005*	2850	ND
Nutrient	Ammonia as N	ND	0.44	1110	6.6*
Nutrient	Nitrate + Nitrite as N	1.4	0.69	7510	1050
Nutrient	Nitrate as N	1.4	ND	ND	ND
Nutrient	Phosphorus as P (Total)	0.51	0.27	15800	6.2*
Nutrient	TKN	1.4	1	38800	21.7*
Organic	Anthracene (^EPA 8270C)	ND	ND	ND	0.009*
Organic	Diethyl phthalate	0.002*	ND	ND	0.13*
Pesticide	Dichlorvos	0.00001*	0.00001*	ND	ND
Pesticide	Malathion	0.00001*	ND	ND	ND
Pesticide	Pentachlorophenol (^EPA 8270C)	ND	ND	4.5*	ND

ND - Constituent not detected, and, therefore, no estimated mass loading was calculated.
* Calculation of mass loading derived from result flagged as DNQ
(<) Analyte was detected in the method blank so result is considered an upper limit. Detection in sample may be due to laboratory contamination.
^ Non-primary method (not 40 CFR 136 approved)
[H] Result considered estimated due to holding time exceedance for this sample

1.10 2021 REGIONAL PERMIT TRENDS ANALYSIS

The 2021 Regional Permit requires quantitative water quality trends[27] analysis (e.g., improving, staying the same, declining) in the receiving water and outfalls, using statistical analysis and/or graphical presentation of data, for wet and dry weather conditions. This analysis was conducted for the three mass emission (receiving water stations) and eleven major outfall stations that are monitored under the requirements of the 2010 Permit.

The trend analysis was conducted using the nonparametric Mann-Kendall statistical test. Data collected during dry and wet events were analyzed separately. The Mann-Kendall test was performed for site-constituent combinations that met the criteria of at least 5 detected samples and a minimum of 20% detected data. Non-detected (ND) and detected not quantified (DNQ) samples were not counted towards the minimum detected sample criteria.

Because some organic constituents were analyzed with more than one laboratory method (40 CFR 136 methods are considered primary for reporting purposes but typically have higher reporting limits so non-40 CFR 136 methods were also analyzed to provide additional information at lower reporting levels) during a sampling event, additional data preprocessing was performed on samples classified as Organics and Pesticides to separate the "parallel" data and prevent duplicated sample results collected on the same date. Therefore, for these two classifications, constituents were additionally separated by method for the analysis.

Method detection limits (MDL) were found to vary significantly by event, which could artificially skew trend results. To avoid the impact of different MDLs, non-detected concentrations were analyzed at the minimum MDL per site-constituent or site-constituent-method combinations.

Constituents with increasing trends were compared to the lowest applicable water quality objectives. The lowest applicable water quality objective was determined by comparing the Basin Plan and the California Toxics Rule (CTR) objectives, when both were available. For dry weather, the lower of the chronic and human health CTR objectives was used. For wet weather, the acute CTR objectives were used. For waterbodies with an asterisked Municipal Water Supply (MUN) beneficial use, comparisons to objectives applicable to the MUN beneficial use were only used if there were no other applicable water quality objectives. The constituents for which this comparison were made are noted in the summary table. Constituents that had no value that had exceeded the objective were given a different symbol in the summary table. Constituents with no applicable water quality objective were given a different symbol in the summary table. Constituents not meeting the criteria for detected data at any site were not included in the summary tables.

For the dry events, dry outfall alternate sites ("DRY-" sites) and major outfalls ("MO-" sites) were treated as different sites and analyzed separately. Note that dry outfall alternate sites are only sampled for a small number of constituents.

The trend summary tables are provided in Appendix L.

1.11 2010 PERMIT AQUATIC TOXICITY RESULTS

The SMP's 2010 NPDES Permit includes chronic toxicity monitoring requirements for the mass emission and major outfall stations. The 2010 Permit specifies that for the first year a station is online for the Permit cycle, chronic

[27] Using available monitoring data since July 8, 2010 for Ventura County Permittees.

toxicity testing is to be conducted using three species during two storm events, the first of the wet season plus one other. For each site, the most sensitive species determined during the initial year of sampling is then to be used for toxicity testing for the first storm of the season for the next four years. The Program has continued to analyze samples from the first storm of the season for aquatic toxicity, even though the requirement was completed in the 2014/15 monitoring year.

The Permit requires that marine/estuarine species [topsmelt (*Atherinops affinis*), giant kelp (*Macrocystis pyrifera*), and purple sea urchin (*Strongylocentrotus purpuratus*)] be used for the mass emission stations and for sites that discharge into marine receiving waters. Freshwater species [fathead minnow (*Pimephales promelas*), water flea (*Ceriodaphnia dubia*), and green algae (*Selenastrum capricornutum*)] must be used for sites that discharge into freshwater receiving waters. This means that marine species are required to be used in freshwaters, such as at the three mass emission stations. Although flow from all sampling sites is ultimately discharged to the ocean, mass emission samples are freshwater with low salt concentrations. The use of marine species for the mass emission sites requires the sample to be greatly manipulated by adding a large quantity of salt. Salt addition results in oxygen uptake and requires the sample to be vigorously aerated. The results from marine organisms for freshwater toxicity tests are less applicable to the existing conditions in the receiving water than freshwater organisms.

The most sensitive species was determined for seven stations (ME-CC, ME-SCR, ME-VR2, MO-CAM, MO-MEI, MO-OJA, and MO-VEN) during the 2009/10 monitoring year. The other seven stations (MO-FIL, MO-HUE, MO-MPK, MO-OXN, MO-SIM, MO-SPA, and MO-THO) were brought online for the 2010/11 monitoring year and the most sensitive species were determined from the results from that year. The most sensitive species for each site are shown in Table 1-31 and will be used for toxicity analysis during the first rainfall event of future years, as required by the NPDES Permit.

Table 1-31. Most Sensitive Species Selected for Annual Toxicity Testing

Site	Most Sensitive Species
ME-CC	Topsmelt*
ME-SCR	Purple sea urchin
ME-VR2	Topsmelt*
MO-CAM	Fathead minnow
MO-OJA	Fathead minnow
MO-MEI	Fathead minnow
MO-VEN	Water flea
MO-FIL	Water flea
MO-HUE	Water flea[28]
MO-MPK	Green alga
MO-OXN	Fathead minnow
MO-SIM	Water flea
MO-SPA	Fathead minnow
MO-THO	Water flea

[28] MO-HUE discharges into tšumaš (chumash) creek (formerly J Street Drain), near where tšumaš (chumash) creek enters the Ormond Lagoon/Pacific Ocean. This area is influenced both by tides and by the status of the sand berm, which can cause backwater effects. Since salinity at MO-HUE is strongly influenced by the ocean, with measured levels of 0.3-7.7 parts per thousand (ppt), a different approach for selecting an organism is sometimes needed for this site. *Cerioadaphnia dubia* (water flea) was determined to be the most sensitive species in 2010, when both the samples used for that determination were below 1 ppt, however it can only tolerate a maximum salinity of 1-2 ppt. When salinity is above 2 ppt, a second test using topsmelt (a euryhaline organism that can tolerate salinities of 3-36 ppt and is the most sensitive species utilized for ME-CC and ME-VR2) is run concurrently with the *Ceriodaphnia* to verify whether salinity is the likely cause of any mortality. The salinity for the MO-HUE grab sample as measured in situ by the field crew was 3 ppt at the time of sample collection for 2022/23, but the laboratory did not analyze topsmelt.

Event 1 was sampled on November 8, 2022 at thirteen sites (all sites except ME-SCR, which was not sampled due to lack of flow) and the samples were delivered on ice to Aquatic Bioassay & Consulting Laboratories, Inc. on the same day. Tests were initiated within the Permit's 36-hour preferred hold time.

Event 2 was sampled on December 11, 2022, at ME-SCR, the first flush event for this station, and the sample was delivered on ice to Aquatic Bioassay & Consulting Laboratories, Inc. on the following day. Tests were initiated within the Permit's maximum 72-hour hold time.

Toxicity was not observed (i.e. there was not a significant reduction in survival or growth compared to the laboratory controls) for any of the undiluted marine or freshwater species tests and all sites passed the test of significant toxicity (TST) analysis.

Marine species toxicity bioassay results are shown in Table 1-32 (mass emission stations) and freshwater species toxicity bioassay results are in Table 1-33 (major outfall stations).

Table 1-32. Chronic Toxicity Testing Results from Mass Emission Stations (Marine Species)

			Topsmelt (*Atherinops affinis*)							
			Survival				**Biomass**			
Site	**Event**	**Event Date**	**NOEC (%)**	**TUc**	**EC25 (%)**	**EC50 (%)**	**NOEC (%)**	**TUc**	**IC25 (%)**	**IC50 (%)**
ME-CC	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	>100.00	>100.00
ME-VR2	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	>100.00	>100.00

			Purple sea urchin (*Strongylocentrotus purpuratus*)			
			Fertilization			
Site	**Event**	**Event Date**	**NOEC (%)**	**TUc**	**IC25 (%)**	**IC50 (%)**
ME-SCR	Event 3 (Wet)	12/11/2022	100.00	1.00	>100.00	>100.00

Table 1-33. Chronic Toxicity Testing Results from Major Outfall Stations (Freshwater Species)

			Fathead minnow (*Pimephales promelas*)							
			Survival				**Reproduction**			
Site	**Event**	**Event Date**	**NOEC (%)**	**TUc**	**EC25 (%)**	**EC50 (%)**	**NOEC (%)**	**TUc**	**IC25 (%)**	**IC50 (%)**
MO-CAM	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	>100.00	>100.00
MO-OJA	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	>100.00	>100.00
MO-MEI	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	>100.00	>100.00
MO-OXN	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	>100.00	>100.00
MO-SPA	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	>100.00	>100.00

			Daphnid (*Ceriodaphnia dubia*)							
			Survival				**Reproduction**			
Site	**Event**	**Event Date**	**NOEC (%)**	**TUc**	**EC25 (%)**	**EC50 (%)**	**NOEC (%)**	**TUc**	**IC25 (%)**	**IC50 (%)**

MO-VEN	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	>100.00	>100.00
MO-FIL	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	>100.00	>100.00
MO-HUE	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	74.87	>100.00
MO-SIM	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	>100.00	>100.00
MO-THO	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00	100.00	1.00	>100.00	>100.00

			Green alga (*Selenastrum capricornutum*)			
			Growth			
Site	**Event**	**Event Date**	**NOEC (%)**	**TUc**	**IC25 (%)**	**IC50 (%)**
MO-MPK	Event 1 (Wet)	11/8/2022	100.00	1.00	>100.00	>100.00

More detailed results are available in Appendix I. All tests were performed as required.

1.12 TOXICITY MOST SENSITIVE SPECIES SCREENING – 2021 REGIONAL PERMIT

The 2021 Regional Permit requires Permittees to conduct a toxicity species sensitivity screening at receiving water stations during the first year of the permit term (September 11, 2021 – September 10, 2022) to determine the most sensitive test species for toxicity testing for each site. The Permittees conducted two wet weather toxicity tests and two dry weather toxicity tests at each site using the species described in the Permit. As required by the 2021 Permit, freshwater species were used for ME-CC and ME-VR2 as their salinities are <1 ppt, and saltwater species were used at ME-SCR, as salinity is > 1 ppt more than 5% of the time at this station. The 2021 Permit also requires a new receiving water station for the Malibu Creek Watershed. The new Malibu Creek Watershed receiving water station (named RW-LC1 during testing, and re-named ME-LC in the CIMP), is expected to have salinities above 1 ppt more than 5% of the time, however freshwater species were utilized to better match the monitoring being done in the Los Angeles County portion of the watershed. The freshwater species are fathead minnow (*Pimephales promelas*), freshwater crustacean (*Ceriodaphnia dubia*), freshwater amphipod (*Hyalella azteca*), and midge (*Chironomus dilutus*). The saltwater species are topsmelt (*Atherinops affinis*), giant kelp (*Macrocystis pyrifera*), and purple sea urchin (*Strongylocentrotus purpuratus*).

Wet weather most sensitive species toxicity screening was conducted in the 2021/22 wet season for the existing mass emission stations and the results were included in the 2022 Annual Report. The location of the new Malibu Creek Watershed station was not determined in time for the 2021/22 monitoring screening, so most sensitive species screening was conducted at this station during the 2022/23 monitoring season (Event 1 on November 8, 2022, and Event 5 on March 10, 2023). Dry weather most sensitive species screening was conducted at all receiving water stations for two events in August 2022.

The 2021 Regional Permit requires that after the screening is conducted, subsequent aquatic toxicity monitoring required per Parts V.A.4.g and V.B.4.g of the MRP be conducted using the most sensitive test species, however, since the Regional Permit also specifies that Ventura County Permittees monitoring is to continue under the 2010 Permit until approval of the CIMP, toxicity monitoring for the 2022/23 monitoring year was conducted according to the 2010 Permit requirements (saltwater species at all receiving water sites) and 2009/10 – 2010/11 monitoring years' most sensitive species results.

The results of the 2021 Permit toxicity species sensitivity screening and the most sensitive test species that will be used for aquatic toxicity monitoring were included in the Permittees' CIMP, which was submitted to the Regional Board on September 11, 2023. The results from the screening conducted during the 2022/23 monitoring year are included below.

Wet Weather Results:

Table 1-34. Toxicity Most Sensitive Species Results –First Wet Weather Event (Event 2022/23-1(wet))

Site	Test	Endpoint	Control	100% Sample	Statistically Different From Control	TST Result	*Percent Effect
ME-LC	Chronic Fathead	Survival (%)	100	100	No	Pass	0.00
		Biomass (mg)	0.3395	0.3407	No	Pass	-0.34
ME-LC	Chronic Ceriodaphnia	Survival (%)	100	100	No	Pass	0.00
		Reproduction # neonates	26.0	30.8	No	Pass	-18.46
ME-LC	Acute Hyalella	Survival (%)	100	100	No	Pass	0.00
ME-LC	Acute Chironomus	Survival (%)	100	90.0	No	Pass	10.00

*Percent Effect at IWC = (Mean Control Response – Mean IWC Response) * 100 / Mean Control Response.
IWC = Instream Waste Concentration

Table 1-35. Toxicity Most Sensitive Species Results – Second Wet Weather Event (Event 2022/23-5(wet))

Site	Test	Endpoint	Control	100% Sample	Statistically Different From Control	TST Result	*Percent Effect
ME-LC	Chronic Fathead	Survival (%)	100	88.33	No	Pass	11.67
		Biomass (mg)	0.3473	0.2927	No	Pass	15.74
ME-LC	Chronic Ceriodaphnia	Survival (%)	100	100	No	Pass	0.00
		Reproduction # neonates	27.8	30.2	No	Pass	-8.63
ME-LC	Acute Hyalella	Survival (%)	100	70	Yes	Fail	30.00
ME-LC	Acute Chironomus	Survival (%)	100	80	No	Pass	20.00

*Percent Effect at IWC = (Mean Control Response – Mean IWC Response) * 100 / Mean Control Response.
IWC = Instream Waste Concentration

Table 1-36. Toxicity Most Sensitive Species Results – Dry Weather Event 1 (August 8 and 10, 2022)

Site	Test	Endpoint	Control	100% Sample	Statistically Different From Control	TST Result	*Percent Effect
ME-CC	Chronic Fathead	Survival (%)	98.33	96.67	No	Pass	1.69
		Biomass (mg)	0.3402	0.3227	No	Pass	5.14
ME-CC		Survival (%)	100.00	100.00	No	Pass	0.00

	Chronic Ceriodaphnia	Reproduction # neonates	21.00	24.20	No	Pass	-15.24
ME-CC	Acute Hyalella	Survival (%)	100.00	100.00	No	Pass	0.00
ME-CC	Acute Chironomus	Survival (%)	100.00	100.00	No	Pass	0.00
ME-VR2	Chronic Fathead	Survival (%)	96.67	91.57	No	Pass	5.17
		Biomass (mg)	0.3093	0.2967	No	Pass	4.09
ME-VR2	Chronic Ceriodaphnia	Survival (%)	100.00	100.00	No	Pass	0.00
		Reproduction # neonates	23.20	28.00	No	Pass	-20.69
ME-VR2	Acute Hyalella	Survival (%)	100.00	100.00	No	Pass	0.00
ME-VR2	Acute Chironomus	Survival (%)	100.00	100.00	No	Pass	0.00
ME-SCR	Chronic Topsmelt	Survival (%)	NA	NA	NA	NA	NA
		Biomass (mg)	NA	NA	NA	NA	NA
ME-SCR	Chronic Kelp	Germination (%)	91.00	91.60	No	Pass	-0.66
		Tube Length	13.18	13.20	No	Pass	-0.15
ME-SCR	Chronic Urchin	Fertilization (%)	93.75	96.00	No	Pass	-2.40
ME-LC	Chronic Fathead	Survival (%)	100.00	100.00	No	Pass	0.00
		Biomass (mg)	0.3440	0.3505	No	Pass	-1.89
ME-LC	Chronic Ceriodaphnia	Survival (%)	100.00	100.00	No	Pass	0.00
		Reproduction # neonates	22.70	22.40	No	Pass	1.32
ME-LC	Acute Hyalella	Survival (%)	100.00	100.00	No	Pass	0.00
ME-LC	Acute Chironomus	Survival (%)	100.00	100.00	No	Pass	0.00

*Percent Effect at IWC = (Mean Control Response – Mean IWC Response) * 100 / Mean Control Response.
IWC = Instream Waste Concentration
NA - Did not meet test acceptability criteria

Table 1-37. Toxicity Most Sensitive Species Results – Dry Weather Event 2 (August 29, 2022)

Site	Test	Endpoint	Control	100% Sample	Statistically Different From Control	TST Result	*Percent Effect
ME-CC	Chronic Fathead	Survival (%)	100.00	100.00	No	Pass	0.00
		Biomass (mg)	0.3407	0.3472	No	Pass	-1.91
ME-CC		Survival (%)	100.00	100.00	No	Pass	0.00

	Chronic Ceriodaphnia	Reproduction # neonates	24.60	27.80	No	Pass	-13.01
ME-CC	Acute Hyalella	Survival (%)	100.00	100.00	No	Pass	0.00
ME-CC	Acute Chironomus	Survival (%)	100.00	100.00	No	Pass	0.00
ME-VR2	Chronic Fathead	Survival (%)	100.00	100.00	No	Pass	0.00
		Biomass (mg)	0.3493	0.3545	No	Pass	0.00
ME-VR2	Chronic Ceriodaphnia	Survival (%)	100.00	100.00	No	Pass	0.00
		Reproduction # neonates	25.30	28.00	No	Pass	-10.67
ME-VR2	Acute Hyalella	Survival (%)	100.00	100.00	No	Pass	0.00
ME-VR2	Acute Chironomus	Survival (%)	100.00	100.00	No	Pass	0.00
ME-SCR	Chronic Topsmelt	Survival (%)	100.00	92.00	No	Pass	8.00
		Biomass (mg)	1.4220	1.4240	No	Pass	-0.17
ME-SCR	Chronic Kelp	Germination (%)	92.80	92.40	No	Pass	0.43
		Tube Length	13.22	13.16	No	Pass	0.45
ME-SCR	Chronic Urchin	Fertilization (%)	93.50	93.50	No	Pass	0.00
ME-LC	Chronic Fathead	Survival (%)	100.00	100.00	No	Pass	0.00
		Biomass (mg)	0.3407	0.3430	No	Pass	-0.68
ME-LC	Chronic Ceriodaphnia	Survival (%)	100.00	100.00	No	Pass	0.00
		Reproduction # neonates	25.30	23.40	No	Pass	7.51
ME-LC	Acute Hyalella	Survival (%)	100.00	100.00	No	Pass	0.00
ME-LC	Acute Chironomus	Survival (%)	100.00	100.00	No	Pass	0.00

*Percent Effect at IWC = (Mean Control Response – Mean IWC Response) * 100 / Mean Control Response.
IWC = Instream Waste Concentration

1.13 DRY-SEASON, DRY-WEATHER ANALYTICAL MONITORING

As described in the NPDES Permit, dry weather monitoring is required once during each dry season (May 1 – September 30) at sites selected to be representative of runoff from each of the Permittees' jurisdictions (each city and the county unincorporated area) in Ventura County.

1.13.1 2023 Dry Season Monitoring (2023-DRY)

For seven jurisdictions, monitoring occurred at the associated major outfall monitoring station; however, as anticipated, inadequate flow was encountered at four of the major outfall stations prompting the sampling of alternate locations for these sites. Receiving water monitoring is not part of this Permit requirement. The seven jurisdictions with sampleable dry-season, dry-weather major outfall stations were: Camarillo[29], Fillmore, Moorpark, Ojai, Simi Valley, Thousand Oaks, and Ventura. For the remaining jurisdictions, the list of alternate sites was used to select a location with suitable flow. The Port Hueneme site was moved upstream to Bubbling Springs Park (Port Hueneme-3) to reduce ocean influence from the tidal/sand berm affected tšumaš (chumash) creek. Dry conditions at the remaining sites triggered the use of the alternate list, with sampling focused on sites that had previously been sampled. The County Unincorporated site was sampled at Medea Creek in Oak Park (Unincorporated-2), Santa Paula was sampled at Peck Road Drain (Santa-Paula-3), and Oxnard was sampled at Stroube Drain (Oxnard-2).

Sampling took place on three days and there was at least 72 hours of dry weather preceding each sampling event. Oxnard-2 (DRY-OXN2), Port Hueneme-3 (DRY-HUE3), Moorpark-1 (MO-MPK), Simi Valley-1 (MO-SIM), and Thousand Oaks-1 (MO-THO), were sampled on August 29, 2023. Fillmore-1 (MO-FIL), Santa Paula-2 (DRY-SPA2), Camarillo-1 (MO-CAM), Ojai-1 (MO-OJA), Unincorporated-2 (DRY-UNI2), and Ventura-1 (MO-VEN) were sampled on August 30, 2023. Camarillo-5 (DRY-CAM5) was sampled on August 29, 2023 but review of the materials provided by the consultant sampling team showed that a receiving water had been sampled instead of the outfall, and that the preceding station had not been appropriately documented as “dry”, so Camarillo was resampled on October 17, 2023 at Camarillo-1 (MO-CAM).

Grab samples for total coliform, *E. coli*, total hardness, total organic carbon, and three dissolved metals (copper, lead, and zinc) were collected and analyzed. Field observations and measurements were also taken. The results are presented in Appendix J and laboratory QA/QC is included in Appendix F. Constituents outside of water quality standards are in Table 1-38. Blank cells indicate the sample met the water quality standard.

[29] Camarillo was initially sampled in August 2023 but review of the data provided by the consultant sampling team showed that the sample was collected from a receiving water and not an outfall, so Camarillo was resampled in October 2023. The Regional Board was notified of the issue.

Table 1-38. Dry Season Constituents Detected above Water Quality Standards

Dry Season 2023 Elevated Levels							
Calleguas Creek Watershed							
Constituent	**MO-CAM**	**MO-MPK**	**MO-SIM**	**MO-THO**	**Units**	**BPO**	**CTRO**
E. coli	2,420	4,611	1,076	495	CFU/100 mL	320	
pH		8.59			pH Units	8.5	
Santa Clara River Watershed							
Constituent	**DRY-SPA3**	**DRY-OXN2**	**MO-FIL**	**MO-VEN**	**Units**	**BPO**	**CTRO**
E. coli	1,130	NA		1,565	MPN/100 mL	235	
E. coli	NA		NA	NA	CFU/100 mL	320	
Dissolved Oxygen			2.09		mg/L	5	
pH				8.95	pH Units	8.5	
Dissolved Copper				46	µg/L		29.29[a]
Dissolved Lead				38	µg/L		10.94[a]
Ventura River Watershed							
Constituent	**MO-OJA**				**Units**	**BPO**	**CTRO**
E. coli	359				CFU/100 mL	320	
Other							
Constituent	**DRY-HUE3**	**DRY-UNI2**			**Units**	**BPO**	**CTRO**
E. coli	57,940				CFU/100 mL	320	
Dissolved Oxygen	1.78				mg/L	5	

[a] Calculated using the water hardness at the site, >400 mg/L)

Note, the units MPN/100mL and CFU/100mL are considered to be equivalent for the purposes of the Bacteria Provisions and the Basin Plan according to the Los Angeles Regional Water Quality Control Board per Response to Comments 2.2 for the incorporation of the SWRCB Bacteria Provisions into the Basin Plan: "The Statewide Bacteria Provisions acknowledge that the United States Environmental Protection Agency (U.S. EPA) recommends using U.S. EPA Method 1603 or other equivalent method to measure culturable *E. coli*, and U.S. EPA Method 1600 or other equivalent method to measure culturable enterococci. Methods listed in 40 CFR Part 136.3, table IH are approved for use in ambient waters (which include recreational waters) and include some methods that report bacteria indicators in MPN. Historically, the Los Angeles Board has accepted compliance reporting using methods that report using either cfu or MPN and intends to continue to do so. The proposed Basin Plan language has been revised to include the applicable language from the Statewide Bacteria Provisions."

1.14 BIOASSESSMENT MONITORING

As written in the Permit, the Principal Permittee continued to participate in the Southern California Stormwater Monitoring Coalition (SMC) Southern California Regional Bioassessment Program (RBP). The RBP is run by the Southern California Coastal Water Research Project (SCCWRP) with the participation and assistance of multiple agencies and organizations. The first five-year study was conducted from 2009-2013 and looked at the trend and condition of perennial waterbodies in southern California. In 2014, while the 2009-2013 data was being reviewed and analyzed, an interim one-year study was performed to: 1) validate and refine assessment tools for use in nonperennial streams by conducting repeat assessments at nonperennial reference sites during the monitoring season, and 2) see if changes in condition could be detected by revisiting perennial sites sampled early in the first RBP study cycle. The second five-year study (2015-2019) built on the preceding work by looking at both trend and condition components of perennial and nonperennial streams in Southern California. New components included measurements of hydromodification and bioanalytical screens for chemicals of emerging concern (2015 & 2016). Sediment sampling for grain size, nutrients, pyrethroid pesticides and fipronils, and total organic carbon, was added in 2017 for Ventura County sites with sufficient sediment for analysis as a pilot study to check the feasibility and outcomes of including these requirements in the RBP. The addition of sediment analysis was expanded to include all RBP participants in 2018. The 2015-2019 study was extended to include 2020, to allow greater time to develop a plan for the next study. The 2021-2025 study continues the work of the previous studies in looking at status and trends but also includes several optional special studies to address knowledge gaps, such as how development affects the ecological potential of streams.

The 2021-2025 study provides flexibility within the workplan to allow participants to reallocate resources depending on participant priorities on an annual basis. The SMP has been allocated an equivalent of 75 bioassessments over the 5-year study. This allocation includes revisiting one of the 2015-2019 trend sites for both the Calleguas Creek and Santa Clara River watersheds (panel 1 trend sites) once during the study period, four years of annual sampling at new trend sites that were previously sampled in 2008-2009 (panel 2 trend sites), and five years of sampling at new condition sites. A targeted number of sites was assigned to each participating agency based on watershed and site type.

The panel 2 trend site allocations for the Principal Permittee include three sites for Calleguas Creek and Ventura River watersheds, two sites for the Santa Clara River watershed, and one site for the Santa Monica Bay watershed, to be sampled annually for four of the five years. The Principal Permittee was allocated a total of seven condition sites for both the Calleguas Creek and Ventura River watersheds, and five for the Santa Clara River watershed, to be spread out over the five years at the Principal Permittee's discretion. Condition sites are probabilistically generated and include both perennial and nonperennial sites. The 2015-2020 list of randomly generated sites was carried over to be used for the 2021-2025 study.

For the trend and condition sites, the Principal Permittee received a list of potential sites for each category and then evaluated the potential sites to ensure they met the requirements of the RBP (e.g. accessible, water present, obtainable landowner permission etc.). The original trend assessments were not all performed by the Principal Permittee; therefore, reconnaissance was performed on those sites as if they were new to the RBP. Alternative trend sites are sampled if one of the trend sites cannot be sampled in any given year.

The 2021-2025 study workplan includes an optional causal assessment special study, in which each participant will work to identify the stressors potentially causing poor conditions at a specific site so that managers can determine appropriate actions for improving conditions. The Principal Permittee has been allocated the equivalent of eighteen sample events towards this study, but could not find appropriate candidate sites. Since no causal assessment monitoring was scheduled for 2021-2023, the Principal Permittee has sampled an additional panel two trend site each year, and has sampled a higher number of condition sites in 2023 than originally allocated, to meet the full number of Permit-required samples (15) for each monitoring season.

In addition to participating in the RBP, the 2010 Permit requires annual monitoring of one fixed site in each of the three major Ventura County watersheds using RBP protocols. The mass emission stations, ME-CC, ME-SCR, and ME-VR2, are monitored to meet this requirement. The bioassessment site for ME-SCR was moved 1,300 meters upstream and named ME-SCR2 for 2019 and beyond to avoid the fluctuating wetland conditions behind the Freeman Diversion Dam.

The completed (2021-23) and projected (2024-2025) allocations are shown in Table 1-39.

Table 1-39. Completed (2021-23) and Projected (2024-2025) Sample Allocations

		Sample Year				
SampleType	**Watershed**	**2021**	**2022**	**2023**	**2024**	**2025**
Condition	Calleguas Creek	2	2	2	1	1
	Santa Clara River	1	1	1	1	1
	Ventura River	2	2	2	1	1
Trend Panel 1	Calleguas Creek					1
	Santa Clara River					1
Trend Panel 2	Calleguas Creek	3	4*	3	3	
	Santa Clara River	2	2	2	2	
	Ventura River	4*	3	4*	3	
	Santa Monica Bay	1	1	1	1	
Mass Emission Station	Calleguas Creek	1	1	1	1	1
	Santa Clara River	1	1	1	1	1
	Ventura River	1	1	1	1	1
Causal Assessment	To Be Determined	0*	0*	0*	3	10
Total # Sites	All	**18**	**18**	**18**	**18**	**18**

* Sampled extra Panel 2 site because causal assessment not started

With help from Aquatic Bioassay & Consulting Laboratories, Inc. (ABC), sampling was conducted May 31 – July 11, 2023. The reconnaissance, water chemistry, California Rapid Assessment Method (CRAM), physical habitat (P-HAB), flow, and other field data were submitted to the SMC in 2023. Taxonomy data is currently due to SCCWRP by February 28, 2024.

Bioassessment reports and the current Workplan (2021-2025) are available at https://www.vcstormwater.org/index.php/publications/reports/technical-reports and include stream survey reports for 2017 and 2018-19, a fact sheet and final report for the 2009-2013 study, and a technical and non-technical report on the first year of the first study (2009). Topic-specific reports utilizing the study data are in development and links to relevant reports will be included in future Annual Water Quality Monitoring Reports, as they become available.

1.15 BEACH WATER QUALITY MONITORING

The Permit requires the Program to fund beach water quality monitoring in accordance with procedures and locations used in AB411 monitoring at ten sites if funding from state and federal sources is not available. Those funds were available during the reporting period, so the County of Ventura Environmental Health Department (EHD) conducted ocean water quality monitoring at 40 sites along the Ventura County coast, including year-round monitoring at the ten sites listed in the Permit. The Program was not involved in the monitoring; however, the results of that monitoring are summarized in Table 1-40.

Heal the Bay's 2022/23 Annual Beach Report Card (BRC) assigns beaches a grade on an A to F scale, with higher grades representing lower risk of illness for beachgoers. 97% of Ventura County Beaches earned an A grade for summer dry weather and the BRC stated, "True to form, 100% of Ventura County's beaches received A and B Summer Dry Grades." Wet weather grades were unusually low, likely due to the unusually high rainfall received across the county (more than double the annual average).

Compliance with limits set by the State of California for all parameters was achieved in over 91.9% of samples. This is lower than usual for Ventura County beaches, likely due to the unusually high rainfall during the 2022/23 water year.

Table 1-40. Beach Water Quality Monitoring Results July 1, 2022 through June 30, 2023

	Total Coliform (TC)	Fecal Coliform (FC*)	Enterococcus (Entero)	FC*:TC
Number of Samples	1,263	1,263	1,263	1,263
SS Limit (MPN/100mL)	10,000	400	104	N/A
SS Limit (Ratio)	N/A	N/A	N/A	Ratio > 0.1 and TC > 1,000
No. Samples > SS Limit	65	17	77	10
% Samples within limits	94.9	98.7	93.9	99.2

SS = Single Sample
* EHD substitutes *E. coli* results for fecal coliform results for reporting and calculations

1.16 TMDL MONITORING

TMDL monitoring is conducted by following the L.A. Regional Board's Executive Officer approved TMDL Monitoring and Reporting Plans prepared and implemented by the TMDL Responsible Parties. The Permit addresses the TMDL monitoring requirements by maintaining the responsibility of monitoring and reporting with the Responsible Parties of the TMDLs. Part 3 Section A.5. of the Permit states:

> *"If TMDL requirements, including Implementation Plans and Reports, address substantially similar requirements as the MS4 permit, the Executive Officer may approve the applicable reports, plans, data or submittals under the applicable TMDL as fulfilling the requirements under the MS4".*

Monitoring for the TMDLs are performed under compliance monitoring plans approved by the L.A. Regional Board's Executive Officer, and the Permit does not include any monitoring or reporting for TMDLs beyond the adopted TMDL requirements. These approved plans detail the monitoring effort involved, including how and when the results are to be reported to the Regional Board, and do not incorporate the Program's SMP.

TMDL monitoring requires significant coordination among multiple Responsible Parties, many of which do not operate MS4s. The Principal Permittee does not collect monitoring data for any TMDLs, but as an appropriate Responsible Party participates in the multi-stakeholder groups focusing on implementing TMDL requirements. Many of the Permittees operate under separate implementing legal instruments for common sharing of monitoring and reporting costs and collection of data and studies. In these cases, the TMDL monitoring programs are designed to meet the requirements of all the Responsible Parties participating in the TMDL monitoring program. As such, monitoring data that is gathered by the TMDL monitoring programs are reviewed, evaluated, and owned by the TMDL monitoring programs. The data cannot be officially used by Permittees for reporting or public release until the final reports have been submitted to the Regional Board.

In the adoption of TMDLs by the Regional Board as Basin Plan Amendments, unique schedules for submittal of data and reports were established. TMDL monitoring is conducted in accordance with requirements and schedules outlined in Basin Plan Amendments and TMDL monitoring plans that are approved by the Regional Board Executive Officer independently of the Program requirements. Routinely, the reporting periods and dates for TMDL weekly, annual, or periodic reports and monitoring data submittals do not always correspond with the Countywide Stormwater Permit Annual Report due by December 15th each year.

During the development of the CIMP, MOA groups discussed developing integrated monitoring and reporting strategies to meet all monitoring and reporting requirements of the 2021 Permit and TMDLs, and the outcome of those discussions was included in the proposed CIMP (submitted to Regional Board September 11, 2023).

1.17 SOCAL BIGHT MONITORING

The Southern California Bight Regional Monitoring Program (Bight) is an ongoing regional marine monitoring collaboration that examines how human activities affect the health of Southern California coastal waters. Participating organizations pool their resources and expertise to investigate the condition of marine ecosystems across both time and space. The Bight Program began in 1994 and runs on a five-year cycle. Bight ’18 finished in 2022 with the publication of the final report/journal article, and Bight ’23 planning began in 2023 with a series of coordinating meetings.

1.17.1 SoCal Bight 2018 (Bight ’18) Monitoring

For Bight Program ’18, the SMP participated in the microbiology study element to research better methods of determining health risk to swimmers, which in turn could result in fewer unnecessary beach closings, and cost savings for compliance with bacteria total maximum daily loads (TMDLs).

The microbiology study tested the use of a new Environmental Protection Agency method (EPA Method 1642) for enumerating male-specific and somatic coliphages (bacterial virus) in recreational waters at Southern California beaches. Coliphage measured by EPA Method 1642 has been proposed by the EPA for use as a new beach water quality indicator. The SMP collaborated with the Southern California Coastal Water Research Project (SCCWRP), California State University Channel Islands (CSUCI), and the Ventura County Environmental Health Division (VCEHD) for sample collection, testing, and analysis. The study is entitled "Evaluation of EPA Method 1642 for Enumeration of Male Specific and Somatic Coliphage in Recreational Waters and Wastewater."

The study questions were: (1) Is Method 1642 performance consistent across Southern California beaches? (2) How do measurements of Enterococcus compare to those of somatic and male-specific coliphages in beach water? (3) Is there a seasonal difference in magnitude and frequency of somatic and male-specific coliphages in beach water between wet and dry weather?

The project targeted collection and analysis of 30 dry weather samples and 30 wet weather (defined as days with 0.1 inch of rain or greater following at least three dry days) samples collected by VCEHD at each of two existing beach water quality monitoring sites: Surfer’s Point at Seaside and Surfer’s Knoll Beach. CSUCI Chemistry and Biology departments worked together to perform EPA Method 1642 on the ocean water samples. Results of their weekly analysis were compared to fecal indicator bacteria Enterococcus results from the same location, as Enterococcus is currently the fecal indicator bacteria enumerated for beach water quality monitoring.

Results from the laboratory intercalibration portion of the Study were published in the Journal of Applied Microbiology in 2022 (http://ftp.sccwrp.org/pub/download/DOCUMENTS/JournalArticles/1268_Abstract.pdf). The final report from these efforts: *Relationship between coliphage and Enterococcus at southern California beaches and implications for beach water quality management*, was published in Water Research in 2022 (https://ftp.sccwrp.org/pub/download/DOCUMENTS/JournalArticles/1330_Abstract.pdf).

1.17.2 SoCal Bight 2023 (Bight ’23) Monitoring

Bight Program ’23 includes seven major study elements: sediment quality, ocean acidification, harmful algal blooms, trash and microplastics, submerged aquatic vegetation, estuaries, and microbiology. The SMP is participating in the microbiology study element to determine the extent and magnitude of human fecal contamination at selected southern California beaches and in the storm drains, creeks, or lagoons which discharge to these beaches in wet and dry conditions.

Culture-based methods for measuring fecal indicator bacteria (FIB) are the primary tool used to monitor microbiological water quality and serve as a proxy for the presence of fecal contamination and associated human pathogens. Recently, culture-based methods for fecal indicator viruses (FIV) have been proposed as better indicators of viral pathogens in recreational waters. However, all culture-based methods suffer from the same limitations. The first limitation is that culture-based methods are slow to generate results, with a minimum 18-hour wait for results while samples incubate. This delay causes contaminated beaches to remain open and delays removal of beach water quality advisories until long after the health risk from contamination events has abated. The second limitation is that these methods are non-specific as to their source. Multiple fecal sources can contribute to elevated FIB or FIV concentrations, including human sources which present a higher health risk, but also non-human sources which tend to present a lower health risk. Last, culture-based methods can be very labor intensive. This is especially true of FIV methods.

To address these limitations, gene-based microbial source tracking (MST) methods for discriminating between different sources of fecal pollution and viral indicators have been developed and have continued to advance in recent years. This approach relies on the measurement of DNA associated with a bacteria or virus that is indicative of a particular source. Human fecal genetic marker HF183 is one such gene-based marker that has been tested extensively and ranked as a highly performing human-associated bacterial marker. Recently CrAssPhage, a human associated phage (a virus that infects bacteria) gene-based marker has been developed and has performed well in environmental waters. Unlike culture-based indicator methods, CrAssPhage and HF183 are specific to human fecal contamination, can produce same day results, and do not require more labor than culture-based methods.

This study aims to use HF183 and CrAssPhage to determine the extent and magnitude of human fecal contamination at selected southern California beaches and in the storm drains, creeks, or lagoons which discharge to these beaches in wet and dry conditions. By understanding the extent and magnitude of human fecal contamination, beach and stormwater managers will be able to better prioritize the higher risk catchments and watersheds to improve microbial water quality.

Dry weather sampling will target a minimum of 30 samples per site over two years during the AB 411 period (April – October). Wet weather sampling will target 30 samples per site and will extend across multiple wet seasons but will depend on the number of qualified storm events. A qualified storm event is defined as at least 0.10” rainfall at the closest rain gauge to the sampling site following an antecedent dry period of three or more days.

Each participating agency will sample at beach sites that are already part of routine beach water quality monitoring efforts, providing a spatially robust survey of the region. A paired outfall site (i.e. an outfall that discharges in the vicinity of the beach site) will also be sampled. Samples will be collected at selected sites and analyzed for HF183 and CrAssPhage. The study design is for two paired sites (beach + nearby outfall = pair) to be targeted per jurisdiction. Site selection is underway. The SMP intends to collaborate with the Ventura County Environmental Health Division (VCEHD) for sample collection, the Ventura County Public Health Laboratory for sample filtration to capture bacteria and viruses, and Los Angeles County Sanitation District Laboratory for analysis (nucleic acid extraction and digital PCR assays for HF183 and CrAssPhage).