# Santa Margarita River Watershed Management Area
# 2019-2020 Water Quality Improvement Plan
# Annual Report
# January 2021

# APPENDIX 4
## Monitoring and Assessment

# APPENDIX 4 MONITORING AND ASSESSMENT RESULTS

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# APPENDIX 4 MONITORING AND ASSESSMENT RESULTS

This appendix provides the monitoring and assessment results for the 2019-2020 reporting year for the Santa Margarita River (SMR) Watershed Management Area (WMA or Watershed). Whereas **Section 3** of the Annual Report focuses on monitoring results and implications regarding the highest priority water quality conditions (HPWQCs) identified in the Water Quality Improvement Plan (WQIP) for the WMA (i.e., eutrophication and nutrient loading), this appendix presents all of the receiving water and municipal separate storm sewer system (MS4) outfall monitoring data collected during 2019-2020, including monitoring and assessment results for priority water quality conditions (PWQCs). The HPWQCs and PWQCs for the watershed and their geographic extents are listed in **Table A4-1**. Throughout the results presentation, results related to HPWQC and PWQC constituents are noted as a general reference. The specific geographic area of the PWQC is not evaluated in terms of the results.

**Table A4-1. HPWQCs and PWQCs**

| Beneficial Use Category | Water Quality Condition | Wet | Dry | Geographic Area |
|---|---|---|---|---|
| **Highest Priority Water Quality Conditions** | | | | |
| Aquatic Life: Eutrophication | Eutrophication Impacts (elevated algal biomass) | | ✓ | SMR Estuary,[1] Warm Springs, Redhawk Channel[2] |
| | Nutrient loading to waterbodies with an adopted TMDL or listed as impaired | ✓ | | Rainbow Creek |
| | | | ✓ | All Middle and Lower SMR subareas, except Fallbrook Creek and Sandia Creek[1] |
| **Priority Water Quality Conditions** | | | | |
| Aquatic Life: Toxicity | Observed toxicity | | ✓ | Temecula Creek and Redhawk Channel |
| | | ✓ | | Murrieta Creek and Long Canyon |
| Aquatic Life: Physical Habitat | Lowered physical habitat scores (CRAM) or evidence of hydromodification/ erosional impacts | ✓ | | Warm Springs, Murrieta Creek and Long Canyon |
| Aquatic Life Use/ Recreation – Nuisance Conditions | Trash | ✓ | ✓ | All Middle SMR subareas, Fallbrook Creek |
| Recreation | Indicator bacteria concentrations | | ✓ | Temecula Creek and Redhawk Channel and De Luz Creek |
| | | ✓ | | Upper Murrieta Creek, Warm Springs, Murrieta Creek and Long Canyon, Santa Gertrudis Creek, Temecula Creek and Redhawk Channel |

**Table A4-1. HPWQCs and PWQCs**

| Beneficial Use Category | Water Quality Condition | Wet | Dry | Geographic Area |
|---|---|---|---|---|
| Municipal Supply | Constituents of potential concern for drinking water supplies (iron, manganese) | | ✓ | Murrieta Creek and Long Canyon, Temecula Creek and Redhawk Channel, Upper Santa Margarita River, Rainbow Creek, Lower Santa Margarita River, Fallbrook Creek, De Luz Creek |
| | | ✓ | | All Middle SMR subareas, Rainbow Creek |
| Agriculture Supply | Constituents of potential concern for agriculture supply: TDS | ✓ | | Rainbow Creek |
| | | | ✓ | Santa Gertrudis Creek, Murrieta Creek and Long Canyon, Temecula Creek and Redhawk Channel, Rainbow Creek, Lower Santa Margarita River, Fallbrook Creek |

TMDL – total maximum daily load, CRAM – California Rapid Assessment Method, TDS – total dissolved solids
[1] MS4 discharges within the following subareas may reach the Estuary during dry weather and contribute to this HPWQC: Upper Murrieta Creek and Tributaries, Warm Springs, Santa Gertrudis, Murrieta Creek and Long Canyon, Temecula Creek and Redhawk Channel, Upper Santa Margarita River, Lower Santa Margarita River, Rainbow Creek, and De Luz Creek
[2] Other areas may be added as result of TMDL Alternative development during adaptive management process.

This appendix also presents watershed results for Regional monitoring programs for which participation is required, as applicable, by the MS4 Permit[1] (Permit) (San Diego Regional Water Quality Control Board [San Diego Water Board], 2013). For the 2019-2020 monitoring year, this included the Southern California Stormwater Monitoring Coalition (SMC) Regional Monitoring Program. Other Regional monitoring participation requirements of the Permit have been met during earlier monitoring years of the Permit term.

## 4.1 Annual Report Review Letters

The SMR WMA Copermittees[2] received comment letters from the San Diego Water Board on July 19, 2019, regarding their review of the 2017-2018 Annual Report[3] and on September 10, 2020, regarding their review of the 2018-2019 Annual Report.[4] The letters request responses to several items, as well as other information and Adaptive Management General Topics, by January 31, 2021 (i.e., with this WQIP Annual Report). A complete list of comments and responses for items due with this WQIP Annual Report can be found in **Appendix 5** and **Attachment 5A**. A monitoring completeness check regarding sample collection is provided in **Table A4-2** to demonstrate monitoring location numbers and frequencies were met, in response to Item 6.b in the 2019 letter. Quality Assurance (QA)/Quality

[1] Order No. R9-2013-0001, as amended by Order Nos. R9-2015-001 and R9-2015-0100. The Permit expired on June 27, 2018; the terms of the Permit are automatically extended until the new permit is issued.
[2] The Copermittees in the SMR WMA include the Counties of Riverside and San Diego, the Riverside County Flood Control and Water Conservation District (District), and the Cities of Murrieta, Temecula, and Wildomar.
[3] *Annual Report Review for Year 2017-2018: Santa Margarita River Watershed Management Area Water Quality Improvement Plan (WQIP).*
[4] *2018-2019 Annual Report Review: Santa Margarita River Watershed Management Area Water Quality Improvement Plan (WQIP).*

Control (QC) reports that further address Item 6.b are provided by monitoring element in attachments to this Appendix.

**Table A4-2. Monitoring Program Percent Completeness for Sample Collection**

| Program | | Total Samples Predicted/ Required Visits | Total Visits or Samples Collected | Percent Required | Percent Completeness[7] |
|---|---|---|---|---|---|
| Receiving Water Monitoring | Dry | 3 | 3 | 90% | 100% |
| | QA[4] | 1 | 2 | 90% | 200% |
| | Wet | 9[6] | 11[6] | 90% | 100% |
| | QA[4] | 2 | 2 | 90% | 100% |
| Regional Monitoring - Bioassessment | Samples | 4 | 4 | 90% | 100% |
| | QA | 1 | 2 | 90% | 200% |
| Rainbow Creek TMDL | Flow Observations | 132 | 132 | 100% | 100% |
| | Samples[1] | 97 | 97 | 90% | 100% |
| Rainbow Creek MS4[2] | MS4 Outfall Inspections | 252 | 252 | 100% | 100% |
| | Samples[1] | 47 | 47 | 90% | 100% |
| Rainbow Creek Program[5] | Field Blanks | 6 | 6 | 90% | 100% |
| | Field Duplicates | 12 | 12 | 90% | 100% |
| Field Screening (FS) and MS4 Outfall Monitoring | FS - City of Murrieta | 52 | 71 | 100% | >100% |
| | FS - City of Temecula | 191 | 204 | 100% | >100% |
| | FS - City of Wildomar | 21 | 25 | 100% | >100% |
| | FS - County of Riverside | 13 | 25 | 100% | >100% |
| | FS - District | 144 | 174 | 100% | >100% |
| | FS - County of San Diego | 23 | 28 | 100% | >100% |
| | Wet Weather Samples | 6 | 6 | 90% | 100% |
| | Wet Data QA[4] | 2 | 2 | 90% | 100% |
| | HPPF Samples[1,3] | 22 | 22 | 90% | 100% |
| | Dry Data QA[4] | * | 1 | 90% | * |

[1] Samples are collected when flow is present. Samples required are based on number of visits when flow is present.
[2] Rainbow Creek MS4 monitoring is not required by the Permit but provides data for MS4 compliance pathways.
[3] 60 visits to 30 sites were completed and 22 visits were sampled. 18 sites visited by Riverside County were not sampled because they were ponded, had trickle flow insufficient for sampling, or were dry. Samples were not taken during ponded or dry conditions pursuant to Permit Provision D.2.(b)(2)(e).
[4] QA sample accounts for one duplicate and one field blank.QA requirements are generally developed programmatically.
[5] The Rainbow Creek TMDL and MS4 samples are combined for QA purposes. The monitoring requirement stated in the QAPP is 1/24 samples for field blanks and 1/12 samples for field duplicates.
[6] Five storm mobilizations were made to Wilson Creek Long-Term Receiving Water (LTRW) Station. No samples were collected due to lack of flow at the monitoring station.
[7] Completeness based upon required monitoring frequencies and includes visited not sampled (VNS) results. This assessment does not consider results of QA/QC data process. QA/QC reports are provided in Appendix 4 attachments.
*QA requirements are determined and met programmatically by the County of San Diego. QA samples were collected in other WMAs to meet overall County of San Diego dry weather monitoring program field QA/QC targets.

## 4.2 Volume and Load Assessment Changes for the 2019-2020 and 2020-2021 WQIP Annual Reports

The Copermittees in the region requested regulatory relief from performing some of the Permit-required assessments for the 2019-2020 monitoring year, including the non-stormwater discharge reduction assessment required by Provision D.4.b.(1)(c)(iv) and stormwater discharge reduction assessment given in D.4.b.(2)(c). Deferral of the obligation to complete these assessments was requested until after the planned reissuance of the Permit, based on the Copermittees' on-going efforts to address the San Diego Water Board's comment in the 2017-2018 WQIP Annual Report Review letter identifying "inconsistencies with the use of the Land Use Factor (C) in the calculation of pollutant loadings." In an email dated August 19, 2020, the San Diego Water Board granted relief by requiring that the Copermittees only calculate pollutant loads at the outfall level rather than using outfall data to extrapolate to the watershed scale in the 2019-2020 and 2020-2021 WQIP Annual Reports. The San Diego Water Board will continue to work with the Copermittees to reevaluate the method by which pollutant loads are calculated and assessed. In addition, the San Diego Board included a new assessment request: "for outfalls that have been monitored for two or more years, tables and figures showing changes in pollutant loads over time from the outfall should also be prepared and reported." The reduced assessments are described in **Section 4.5.3** (dry weather) and **Section 4.5.6** (wet weather). A compilation of pollutant load data for outfalls monitored during the 2019-2020 monitoring year, which have two or more years of data, is provided in **Attachment 4E** for dry weather **and Attachment 4G** for wet weather.

## 4.3 Precipitation

Annual rainfall totals at five County of San Diego and Riverside County precipitation gauges within the SMR WMA are shown in **Figure A4-1** for 2019-2020 and the prior three years. Annual rainfall totals were similar to 2018-2019 totals, and both the 2019-2020 and 2018-2019 totals were much higher than those from the 2017-2018 monitoring year, where totals ranged from 3.14 to 6.16 inches. Rainfall amounts can influence monitoring results in various ways including effects on outdoor water usage and interactions with groundwater, as well as pollutant loading and antecedent dry weather periods.

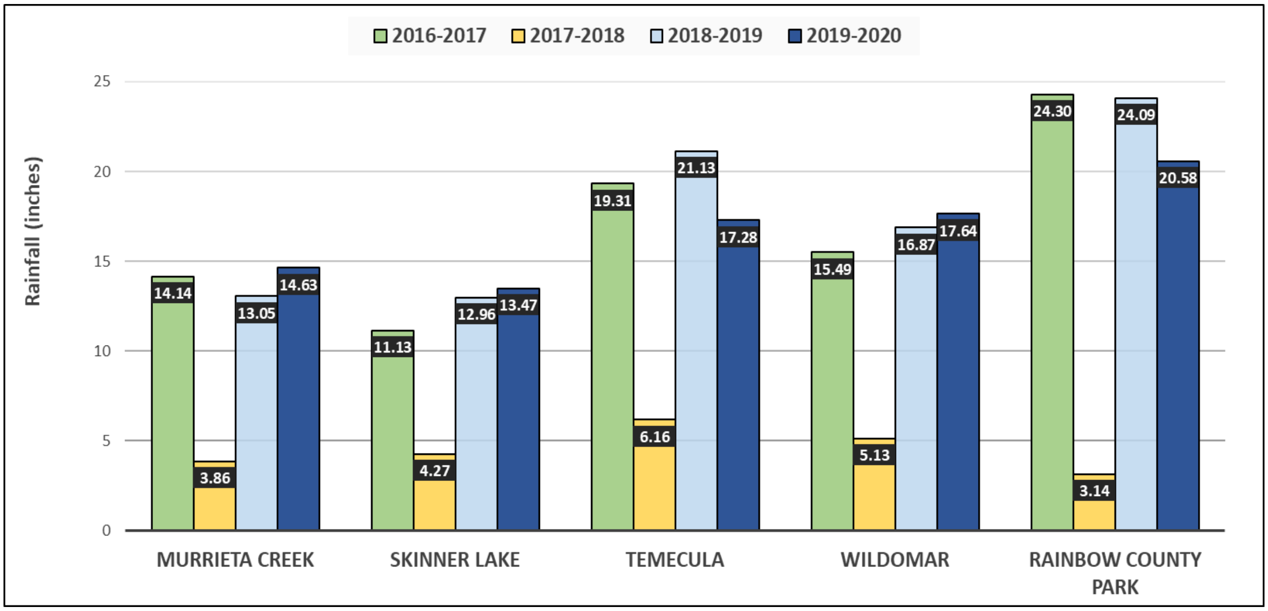



**Figure A4-1. Rainfall Amounts for Fiscal Year 2019-2020 and Three Previous Years at County Rain Gauge Stations**

## 4.4 Receiving Water Monitoring

In accordance with the WQIP Monitoring and Assessment Program (MAP), water quality monitoring at the long-term receiving water (LTRW) stations in the WMA was initiated during the 2019-2020 monitoring year (October 1, 2019 to September 30, 2020). The LTRW station in the WMA are summarized in **Table A4-3** and are shown in **Figure A4-2**. The Lower SMR Subwatershed is represented by SMR-MLS-2, the Middle SMR Subwatershed by 902USM828, and the Upper SMR Subwatershed by 902WLC650. In accordance with the schedule provided in Section 5.3.1 of the WQIP, LTRW station monitoring during the 2019-2020 monitoring year was conducted during wet weather at all three LTRW stations and during dry weather at the LTRW station representing the Lower SMR Subwatershed. Dry weather monitoring at the LTRW station representing the Middle and Upper SMR Subwatersheds is scheduled to be conducted during the 2020-2021 monitoring year.

During the 2019-2020 monitoring year, bioassessment monitoring in receiving waters continued following the study design of the SMC Regional Monitoring Program in accordance with *Bioassessment Survey of the Stormwater Monitoring Coalition Workplan for Years 2015 through 2019* (SMC Workplan) (Southern California Coastal Water Research Project [SCCWRP], 2015).[5] Monitoring in Rainbow Creek and tributaries was conducted in the Rainbow Creek Watershed in compliance with the Rainbow Creek Nutrient Total Maximum Daily Load (TMDL)[6] and provisions of Permit Attachment E.3.

[5] The next five-year study design was still under development in 2020; therefore, as an interim measure the Copermittees continued to participate in the regional monitoring under the existing study design.
[6] Total Maximum Daily Loads for Total Nitrogen and Total Phosphorus in the Rainbow Creek Watershed, San Diego County. Resolution No. R9-2005-0036. Approved February 9, 2005.

**Table A4-3. Long-Term Receiving Water Stations in the Santa Margarita River WMA**

| Station Identifier | Dates Monitored | Latitude | Longitude |
|---|---|---|---|
| **Lower SMR Subwatershed** | | | |
| SMR-MLS-2 (902.21) | Dry: 9/25/2019, 2/5/2020, 6/9/2020 | 33.398142 | -117.26273 |
| | Wet: 11/22/2019, 2/9/2020, 3/9/2020 | | |
| 902USM828[1] (902.22) | Wet: 11/20/2019, 12/4/2019, 3/10/2020 | 33.47403 | -117.14233 |
| **Upper SMR Subwatershed** | | | |
| 902WLC650 (902.81) | Wet[2]: 11/21/2019, 11/29/2019, 12/5/2019, 3/10/2020, 4/8/2020 | 33.48736 | -116.91659 |

[1] Site 902USM828 is representative of the Middle SMR Subwatershed.
[2] Long-term Monitoring at 902WLC650 results were visited not sampled (VNS) due to lack of flow.

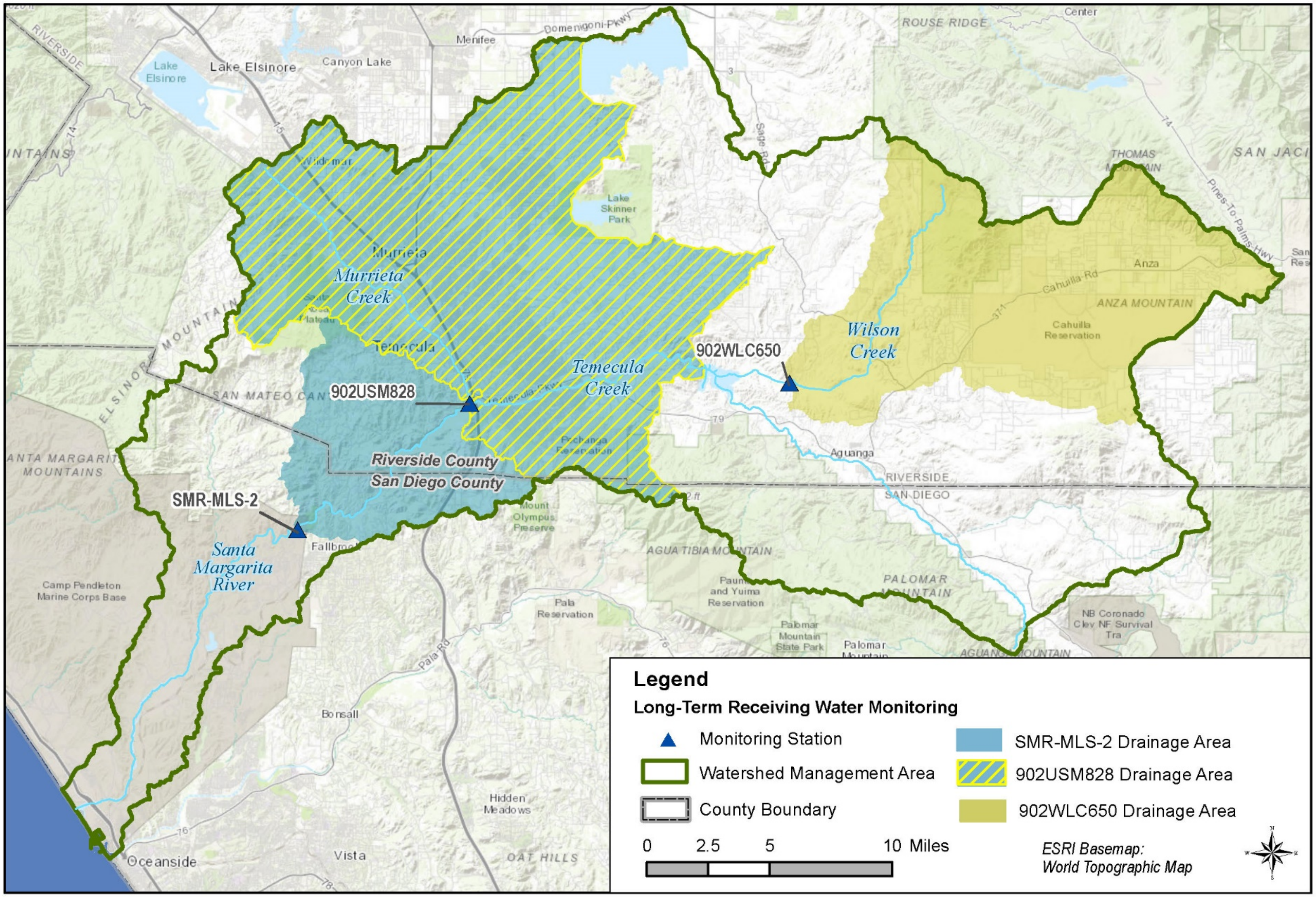



**Figure A4-2. Long-Term Receiving Water Stations in the SMR WMA**

### 4.4.1 Long-Term Receiving Water Monitoring

Five monitored storms did not produce flow at the Wilson Creek (902WLC650) LTRW station in the Upper SMR Subwatershed. The details of these monitoring attempts are documented in a technical memorandum (Alta|NV5, 2020) provided in **Attachment 4I** to this appendix. The memorandum also presents the results of a recent simulation modeling effort for Wilson Creek that was conducted after the 2019-2020 monitoring year in order to develop site-specific mobilization criteria to maximize the ability for the Riverside County Flood Control and Water Conservation District (District) to conduct future sampling when wet weather flows occur at the Wilson Creek LTRW station.

During each monitoring event, field observations are recorded and composite samples (for chemistry and toxicity) and grab samples (for bacteria) are collected and analyzed as described in Section 2.5 of the WQIP MAP. Grab samples may also be collected for toxicity and hardness if composite samples are not collected.[7] Water quality monitoring results are compared to water quality objectives (WQOs) from the Water Quality Control Plan for the San Diego Region (Basin Plan) (San Diego Water Board, 2016) and the California Toxics Rule (CTR). The Statewide Bacteria Provisions, incorporated into Part 3 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California (California State Water Resources Control Board [State Water Board] and California Environmental Protection Agency, 2019) were used for bacteria WQOs. Toxicity data are analyzed using the Test of Significant Toxicity (TST) (United States Environmental Protection Agency [USEPA], 2010) and given a Pass or Fail assessment. In accordance with Permit Provision D.1.(c)(4)(f), a Toxicity Identification Evaluation (TIE) or Toxicity Reduction Evaluation (TRE) may be required if significant toxicity is repeatedly observed in a sample and the cause has not been previously investigated.

Trend analysis of long-term monitoring data was also conducted where historical data are available at LTRW stations. Provision D.4.a.(2)(d) of the Permit requires the identification of short and/or long-term improvements or degradation of critical beneficial uses. The SMR-MLS-2 has historical data to conduct trend analysis along with data collected this monitoring year. Data were tested for normality to determine the appropriate statistical method for trend evaluation. Data with normal distribution were assessed using linear regression and data with lognormal distribution were log-transformed and assessed with linear regression. The nonparametric Mann-Kendall test for linear trends was used to evaluate data that did not follow normal or lognormal distributions. Statistical significance was based on a 95% confidence level (e.g., a 5% probability of obtaining a test statistic, or a p-value of less than 0.05). To account for differences in reporting limits in historical data, constituent concentrations below reporting limits were standardized to a value close to zero to avoid falsely identifying trends based on changing reporting limits. Trends were not analyzed for constituents with greater than 50% non-detect (ND) results.

Methodology is described in greater detail in the WQIP MAP. Additional information (historical data, hydrographs and flow data, load tables, trends, and a QA/QC report) is provided in **Attachment 4A**.

[7] The Permit and MAP allow for analysis of toxicity from a grab sample.

### 4.4.1.1 *LTRW station Wet Weather Results*

SMR-MLS-2 was monitored on November 22, 2019; February 9, 2020; and March 9, 2020 and 908USM828 was monitored on November 30, 2019; December 4, 2019; and March 10, 2020. The rainfall statistics for each event, based on a regional rain gauge proximate to the station, are presented in **Table A4-4**. Hydrographs and flow data are provided in **Attachment 4A-2**, load tables are provided in **Attachment 4A-3**, and trends are provided in **Attachment 4A-4**. 902WLC650 was visited not sampled (VNS) due to lack of flow on November 21, 2019; November 29, 2019; December 5, 2019; March 10, 2020; and April 8, 2020.

**Table A4-4. 2019-2020 Rainfall and Runoff Statistics for Long-Term Monitoring Storm Events**

| Site | Date | Total Rain (in) | Duration (hours) | Intensity (in/hour) | Antecedent Dry Days | Event Volume (cf) | Peak Flow (cfs) |
|---|---|---|---|---|---|---|---|
| SMR-MLS-2 (902.21)[1] | 11/20/2019-11/22/2019 | 1.01 | 23.1 | 0.04 | 54 | 8,517,688 | 74.9 |
| | 2/9/2020-2/11/2020 | 0.17 | 35.1 | 0.00 | 19 | 4,113,652 | 27.7 |
| | 3/10/2020-3/11/2020 | 1.79 | 38.45 | 0.05 | 16 | 76,885,811 | 1303.2 |
| 902USM828 (902.22)[2] | 11/19/2019-11/20/2019 | 0.85 | 20.25 | 0.04 | 178 | 2,223,261 | 45.8 |
| | 12/4/2019 | 1.27 | 15.5 | 0.08 | 5 | 21,653,910 | 1,200 |
| | 3/9/2020-3/10/2020 | 1.47 | 25.5 | 0.06 | 16 | 55,215,450 | 1,040 |
| 902WLC650 (902.81)[2] | 11/20-11/21/2019 | 0.85 | 8.25 | 0.10 | 178 | 0.0 | 0.0 |
| | 11/27-11/29/2019 | 2.30 | 51.75 | 0.04 | 6 | 0.0 | 0.0 |
| | 12/4-12/5/2019 | 1.28 | 15.5 | 0.08 | 5 | 0.0 | 0.0 |
| | 3/10-3/11/2020 | 1.47 | 25.5 | 0.06 | 16 | 0.0 | 0.0 |
| | 4/6-4/10/2020 | 5.34 | 112.25 | 0.05 | 13 | 0.0 | 0.0 |

in – inches cf – cubic feet cfs – cubic feet per second
[1] Rainfall data from OneRain Station at Fallbrook.
[2] Rainfall data from Temecula NWS 217.

Wet weather volume estimates at SMR-MLS-2 were affected by changing environmental conditions throughout the wet season. Large storm events reshaped the channel multiple times between November 2019 and April 2020. SMR-MLS-2 was also vandalized on April 7, 2020 which disrupted flow measurements during the largest storm of the year. However, this storm event was not one of the three monitored events for SMR-MLS-2. During the period following the vandalism and prior to repair, SMR-MLS-2 did not record accurate flow or rain measurements. Weston Solutions, Inc. (WESTON) data were supplemented with data from a regional rain gauge in the area (San Diego County OneRain rain gauge at Fallbrook [27019]) as well as flow data from United States Geological Survey stream gauges. Additional details are provided in **Attachment 4A**.

The constituent list for long-term monitoring is tailored towards issues in the watershed and includes the following in accordance with Provision D.1.d.(3)(f):

- constituents contributing to the HPWQC,
- constituents on the 2014/2016 Clean Water Act Section 303(d) List,
- constituents for implementation plans or load reduction plans where the Copermittees are listed as responsible parties under a TMDL,
- applicable stormwater action level (SAL) constituents, and
- constituents listed in Table D-3 of the Permit.

As shown in **Table A4-5**, exceedances related to HPWQCs at SMR-MLS-2 included total nitrogen for all three events and total phosphorus for one event. Exceedances related to PWQCs included both events for *E. coli*, two of the three events for total iron, and one of the three events for total manganese. Concentrations of dissolved iron and manganese (i.e., the bioavailable portion) were much lower than the total concentrations. Concentrations for other PWQCs were below WQOs, where available. Other constituents with exceedances at SMR-MLS-2 included one event each for turbidity and total aluminum.

Exceedances related to HPWQCs at 902USM828 (**Table A4-6**) included total nitrogen and total phosphorus for all three events. Exceedances related to PWQCs included all three events for *E. coli*, total iron, and total manganese. Concentrations of dissolved iron and manganese (i.e., the bioavailable portion) were much lower than the total concentrations, and dissolved manganese concentrations were below the detection limit during the second and third events. Concentrations for other PWQCs were below WQOs, where available. The only other exceedance at 902USM828 was turbidity (laboratory results) for all three events.

At both LTRW stations, no toxicity was observed and results for organophosphorus pesticides were below detection limits. Results for synthetic pyrethroids were below detection limits, estimated at a concentration above the detection limit but below the reporting limit, or detected at low concentrations.

**Table A4-5. 2019-2020 Wet Weather Receiving Water Monitoring Results for Lower SMR Subwatershed Long-Term Receiving Water Station SMR-MLS-2**

| Analyte | Units | Water Quality Objective (WQO) | Objective Reference | SMR-MLS-2 (902.21) | | |
|---|---|---|---|---|---|---|
| | | | | W1 | W2 | W3 |
| | | | | 11/21/2019-11/22/2019 | 2/10/2020-2/11/2020 | 3/10/2020-3/11/2020 |
| **Physical Chemistry** | | | | | | |
| Dissolved Oxygen | mg/L | <6.0 (a) | Basin Plan | 9.29 | 10.62 | 9.54 |
| pH | pH Units | 6.5-8.5 | Basin Plan | 8.17 | 8.14 | 7.80 |
| Specific Conductivity | µS/cm | NA | | 822 | 991 | 258 |
| Temperature | Celsius | NA | | 13.4 | 16.6 | 16.6 |
| Turbidity | NTU/FNU | 20 | Basin Plan | 4.76 | 0.49 | 128 |
| **Fecal Indicator Bacteria** | | | | | | |
| *E. coli*[2] | MPN/100 mL | 320 (b) | Bacteria Provisions | 410 | NS | 3,500 |
| Enterococcus[2] | MPN/100 mL | NA | | 1,300 | <2 | 20,000 |
| Fecal Coliform[2] | MPN/100 mL | NA | | 400 | 2 | 3,500 |
| Total Coliform[2] | MPN/100 mL | NA | | 3,000 | 9 | 43,000 |
| **Nutrients** | | | | | | |
| Ammonia as N | mg/L | (c) | USEPA Water Quality Criteria (Freshwater) | <0.012 | 0.019J | 0.050J |
| Nitrate as N | mg/L | 10 (d) | Basin Plan | 2.2 | 1.9 | 0.91 |
| Nitrite as N | mg/L | 1 (d) | Basin Plan | 0.027J | 0.023J | 0.056J |
| Total Kjeldahl Nitrogen | mg/L | NA | | 0.5 | 0.2 | 1.3 |
| Total Nitrogen (calc)[1] | mg/L | 1 | Basin Plan | 2.727 | 2.123 | 2.266 |
| Orthophosphate as P | mg/L | NA | | 0.024 | 0.0054 | 0.18 |
| Total Phosphorus[1] | mg/L | 0.1 | Basin Plan | 0.068 | <0.012 | 0.43 |
| **General Chemistry** | | | | | | |
| Dissolved Organic Carbon | mg/L | NA | | 4.9 | 3.3 | 7.0 |
| Total Organic Carbon | mg/L | NA | | 5.2 | 3.6 | 5.9 |
| Sulfate | mg/L | 250 (a) | Basin Plan | 200 | 110 | 54 |
| Surfactants (MBAS) | mg/L | 0.5 | Basin Plan | 0.067 | 0.030J | 0.031J |
| Total Dissolved Solids[2] | mg/L | 750 (a) | Basin Plan | 660 | 750 | 180 |
| Total Suspended Solids | mg/L | NA | | 16 | 2 | 210 |
| Total Hardness | mg/L | NA | | 321 | 379 | 127 |
| **Total Metals** | | | | | | |
| Aluminum | µg/L | 1,000 (d) | Basin Plan | 510 | 19 | 8,900 |
| Arsenic | µg/L | 10 (d) | Basin Plan | 1.6 | 1.0 | 2.7 |
| Cadmium | µg/L | 5 (d) | Basin Plan | <0.041 | <0.041 | 0.08J |
| Chromium | µg/L | 50 (d) | Basin Plan | 0.6 | 0.099J | 8.5 |
| Copper | µg/L | 1,000 (d) | Basin Plan | 2.2 | 0.91 | 12 |
| Iron[2] | µg/L | 300 (d) | Basin Plan | 620 | 63 | 10,000 |
| Lead | µg/L | NA | | 0.5 | <0.031 | 2.6 |
| Manganese[2] | µg/L | 50 (d) | Basin Plan | 43 | 28 | 260 |
| Mercury | µg/L | 2 (d) | Basin Plan | <0.017 | <0.017 | <0.017 |
| Nickel | µg/L | 100 (d) | Basin Plan | 1 | 0.56J | 4.5 |
| Selenium | µg/L | 5 | 40 CFR 131.38 | 0.77 | 0.86 | 0.37J |
| Silver | µg/L | 100 (d) | Basin Plan | <0.062 | <0.062 | <0.062 |
| Thallium | µg/L | 2 (d) | Basin Plan | <0.014 | <0.014 | 0.08J |

**Table A4-5. 2019-2020 Wet Weather Receiving Water Monitoring Results for Lower SMR Subwatershed Long-Term Receiving Water Station SMR-MLS-2**

| Analyte | Units | Water Quality Objective (WQO) | Objective Reference | SMR-MLS-2 (902.21) | | |
|---|---|---|---|---|---|---|
| | | | | W1 | W2 | W3 |
| | | | | 11/21/2019-11/22/2019 | 2/10/2020-2/11/2020 | 3/10/2020-3/11/2020 |
| Zinc | µg/L | 5,000 (d) | Basin Plan | 3.9J | <0.94 | 38 |
| **Dissolved Metals** | | | | | | |
| Aluminum | µg/L | NA | | 8.7 | 3J | 52 |
| Arsenic | µg/L | 340 | 40 CFR 131.38 | 1.3 | 1.1 | 1.5 |
| Cadmium | µg/L | (e) | 40 CFR 131.38 | <0.041 | 0.08J | <0.041 |
| Chromium | µg/L | (e) | 40 CFR 131.38 | <0.035 | 0.08J | 0.32 |
| Copper | µg/L | (e) | 40 CFR 131.38 | 1.3 | 0.78 | 3.4 |
| Iron[2] | µg/L | NA | | 16 | 26 | 68 |
| Lead | µg/L | (e) | 40 CFR 131.38 | <0.031 | <0.031 | 0.069J |
| Manganese[2] | µg/L | NA | | 0.87 | 23 | 0.91 |
| Mercury | µg/L | NA | | <0.017 | <0.017 | <0.017 |
| Nickel | µg/L | (e) | 40 CFR 131.38 | 0.72J | 0.57J | 1.7 |
| Selenium | µg/L | NA | | 0.71 | 0.87 | 0.3J |
| Silver | µg/L | (e) | 40 CFR 131.38 | <0.062 | <0.062 | <0.062 |
| Thallium | µg/L | NA | | <0.014 | <0.014 | <0.014 |
| Zinc | µg/L | (e) | 40 CFR 131.38 | 2.0J | 1.5J | 2.5J |
| **Organophosphorus Pesticides** | | | | | | |
| Azinphos Methyl | µg/L | NA | | <0.0055 | <0.0055 | <0.055 |
| Bolstar | µg/L | NA | | <0.0046 | <0.0046 | <0.046 |
| Chlorpyrifos | µg/L | NA | | <0.0069 | <0.0069 | <0.069 |
| Coumaphos | µg/L | NA | | <0.0051 | <0.0051 | <0.051 |
| Demeton-o | µg/L | NA | | <0.010 | <0.010 | <0.10 |
| Demeton-s | µg/L | NA | | <0.010 | <0.010 | <0.10 |
| Diazinon | µg/L | NA | | <0.0052 | <0.0052 | <0.052 |
| Dichlorvos | µg/L | NA | | <0.0029 | <0.0029 | <0.029 |
| Dimethoate | µg/L | NA | | <0.0062 | <0.0062 | <0.062 |
| Disulfoton | µg/L | NA | | <0.010 | <0.010 | <0.10 |
| Ethoprop | µg/L | NA | | <0.0067 | <0.0067 | <0.067 |
| Ethyl Parathion | µg/L | NA | | <0.0054 | <0.0054 | <0.054 |
| Fensulfothion | µg/L | NA | | <0.0029 | <0.0029 | <0.029 |
| Fenthion | µg/L | NA | | <0.0038 | <0.0038 | <0.038 |
| Malathion | µg/L | NA | | <0.0076 | <0.0076 | <0.076 |
| Merphos | µg/L | NA | | <0.0058 | <0.0058 | <0.058 |
| Methyl Parathion | µg/L | NA | | <0.0063 | <0.0063 | <0.063 |
| Mevinphos | µg/L | NA | | <0.0042 | <0.0042 | <0.042 |
| Naled | µg/L | NA | | <0.0076 | <0.0076 | <0.076 |
| Phorate | µg/L | NA | | <0.0030 | <0.0030 | <0.030 |
| Ronnel (Fenchlorphos) | µg/L | NA | | <0.0041 | <0.0041 | <0.041 |
| Stirophos (Tetrachlorvinphos) | µg/L | NA | | <0.0031 | <0.0031 | <0.031 |
| Tokuthion (Prothiofos) | µg/L | NA | | <0.0078 | <0.0078 | <0.078 |
| Trichloronate | µg/L | NA | | <0.0067 | <0.0067 | <0.067 |

**Table A4-5. 2019-2020 Wet Weather Receiving Water Monitoring Results for Lower SMR Subwatershed Long-Term Receiving Water Station SMR-MLS-2**

| Analyte | Units | Water Quality Objective (WQO) | Objective Reference | SMR-MLS-2 (902.21) | | |
|---|---|---|---|---|---|---|
| | | | | W1 | W2 | W3 |
| | | | | 11/21/2019-11/22/2019 | 2/10/2020-2/11/2020 | 3/10/2020-3/11/2020 |
| **Synthetic Pyrethroids** | | | | | | |
| Allethrin | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Bifenthrin | µg/L | NA | | 0.00441 | <0.0005 | 0.01500 |
| Cyfluthrin | µg/L | NA | | <0.0005 | <0.0005 | 0.00116J |
| Cyhalothrin, Total Lambda | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Cypermethrin | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Danitol (Fenpropathrin) | µg/L | NA | | <0.0003 | <0.0003 | 0.00121J |
| Deltamethrin/Tralomethrin | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Esfenvalerate | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Fenvalerate | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Fluvalinate | µg/L | NA | | 0.00137J | <0.0005 | <0.0005 |
| Permethrin | µg/L | NA | | <0.002 | <0.002 | <0.002 |
| Prallethrin | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Resmethrin | µg/L | NA | | <0.005 | <0.005 | <0.005 |
| **Toxicity** | | | | | | |
| *Ceriodaphnia* 7-day survival[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Ceriodaphnia* 7-day reproduction[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Selenastrum* 96-hr[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Pimephales* 7-day survival[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Pimephales* 7-day biomass[2] | TST | Pass/Fail | | Pass | Pass | Pass |

< - Results are less than the method detection limit.
[1] Constituent is a HPWQC for dry weather.
[2] Constituent is a PWQC for dry weather. Note that all PWQCs do not apply to all subareas in the WMA; constituents noted here are PWQCs in at least one subarea in the WMA.
(a) Water quality objectives are based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective on or before May 17, 2016) and may vary by hydrologic area.
(b) Water quality objective for *E. coli* is based on Part 3 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California - Bacteria Provisions and Water Quality Standards Variance Policy (February 4, 2019).
(c) Water quality objective for Ammonia as N is the criterion maximum concentration (CMC) and criterion continuous concentration (CCC) based on pH and water temperature when applicable as described in the U.S. EPA, 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater, EPA-822-R-13-001, April 2013.
(d) Water quality objective is based on the MUN beneficial use as described in the Basin Plan, 1994 (with amendments effective on or before May 17, 2016).
(e) Water quality objective for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The Criterion Maximum Concentration (CMC) was used.
J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
NA - No criterion or published value was available or applicable to the matrix or program.
NS - Not sampled; sampling error.
Shaded results did not meet water quality objectives.

**Table A4-6. 2019-2020 Wet Weather Receiving Water Monitoring Results for Middle SMR Subwatershed Long-Term Receiving Water Station 902USM828**

| Analyte | Units | Water Quality Objective (WQO) | Objective Reference | 902USM828 | | |
|---|---|---|---|---|---|---|
| | | | | W1 | W2 | W3 |
| | | | | 11/20/2019-11/21/2020 | 12/04/2019-12/05/2019 | 03/10/2020-03/11/2020 |
| **Physical Chemistry** | | | | | | |
| Dissolved Oxygen (Field) | mg/L | <6.0 (a) | Basin Plan | 9.36 | 9.91 | 9.6 |
| pH (Field) | pH Units | 6.5-8.5 | Basin Plan | 7.72 | 7.06 | 7.06 |
| Salinity (Field) | ppt | NA | | 0.83 | 0.22 | 0.13 |
| Specific Conductance (Field) | µs/cm | NA | | 1,625 | 457 | 267 |
| Specific Conductance (Lab) | µmhos/cm | NA | | 700 | 310 | 310 |
| Water Temperature (Field) | Celsius | NA | | 15.6 | 12.9 | 13.9 |
| Turbidity (Field) | NTU | 20 | Basin Plan | 2.98 | 37.27 | 114.6 |
| Turbidity (Lab) | NTU | 20 | Basin Plan | 22 | 110 | 83 |
| **Fecal Indicator Bacteria** | | | | | | |
| *E. coli*[2] | MPN/100 mL | 320 (b) | Bacteria Provisions | 200 | 9,200 | ≥1,600 |
| Enterococcus[2] | MPN/100 mL | NA | | 200 | 3,500 | ≥1,600 |
| Fecal Coliform[2] | MPN/100 mL | NA | | 200 | 9,200 | ≥1,600 |
| Total Coliform[2] | MPN/100 mL | NA | | 1,400 | ≥16,000 | ≥1,600 |
| **Nutrients** | | | | | | |
| Ammonia as N | mg/L | (c) | USEPA Water Quality Criteria (Freshwater) | 0.064J | 2 | 0.052J |
| Ammonia as N (Unionized) | mg/L | 0.025 | Basin Plan | <0.0000046 | 0.0052 | <0.0000046 |
| Nitrate as N | mg/L | 10 (d) | Basin Plan | 0.4 | 0.37 | 0.35 |
| Nitrite as N | mg/L | 1 (d) | Basin Plan | 0.011 | 0.02 | 0.02 |
| Total Kjeldahl Nitrogen | mg/L | NA | | 1.1 | 2.5 | 0.79 |
| Total Nitrogen[1] | mg/L | 1 | Basin Plan | 1.5 | 2.9 | 1.2 |
| Dissolved Phosphorus | mg/L | NA | | 0.28 | 0.39 | 0.27 |
| Orthophosphate | mg/L | NA | | 0.18 | 0.27 | 0.2 |
| Total Phosphate | mg/L | NA | | 1.2 | 3.5 | 1.3 |
| Total Phosphorus[1] | mg/L | 0.1 | Basin Plan | 0.38 | 1.2 | 0.44 |
| **General Chemistry** | | | | | | |
| Dissolved Organic Carbon | mg/L | NA | | 8.2H | 7.4H | 6.9H |
| Total Organic Carbon | mg/L | NA | | 10 | 7.9 | 7.2 |
| Sulfate | mg/L | 250 (a) | Basin Plan | 90 | 37 | 32 |
| Surfactants (MBAS) | mg/L | 0.5 | Basin Plan | 0.08J | <0.03 | 0.03J |
| Total Dissolved Solids[2] | mg/L | 750 (a) | Basin Plan | 450 | 210 | 210 |
| Total Suspended Solids | mg/L | NA | | 32 | 150 | 1200 |
| Total Hardness | mg/L | NA | | 190 | 86 | 81 |
| **Total Metals** | | | | | | |
| Arsenic | µg/L | 10 (d) | Basin Plan | 2.4 | 1.8 | 2.4 |
| Cadmium | µg/L | 5 (d) | Basin Plan | <0.12 | 0.15J | 0.16J |
| Chromium | µg/L | 50 (d) | Basin Plan | 3.5 | 11 | 30 |
| Copper | µg/L | 1,000 (d) | Basin Plan | 6.9 | 10 | 11 |
| Iron[2] | µg/L | 300 (d) | Basin Plan | 1,600 | 8,500 | 4,700 |
| Lead | µg/L | NA | 40 CFR 131.38 | 0.9 | 2 | 1.7 |

**Table A4-6. 2019-2020 Wet Weather Receiving Water Monitoring Results for Middle SMR Subwatershed Long-Term Receiving Water Station 902USM828**

| Analyte | Units | Water Quality Objective (WQO) | Objective Reference | 902USM828 | | |
|---|---|---|---|---|---|---|
| | | | | W1 | W2 | W3 |
| | | | | 11/20/2019-11/21/2020 | 12/04/2019-12/05/2019 | 03/10/2020-03/11/2020 |
| Manganese[2] | µg/L | 50 (d) | Basin Plan | 320 | 180 | 100 |
| Mercury | µg/L | 2 (d) | Basin Plan | <0.099 | <0.099 | <0.099 |
| Nickel | µg/L | 100 (d) | Basin Plan | 3.3 | 4.9 | 28 |
| Selenium | µg/L | 5 | 40 CFR 131.38 | 1.3 | 0.6 | 0.8 |
| Silver | µg/L | 100 (d) | Basin Plan | <0.12 | <0.12 | <0.12 |
| Thallium | µg/L | 2 (d) | Basin Plan | <0.5 | <0.5 | <0.5 |
| Zinc | µg/L | 5,000 (d) | Basin Plan | 18 | 34 | 29 |
| **Dissolved Metals** | | | | | | |
| Arsenic | µg/L | 340 | 40 CFR 131.38 | 1.8 | 1.1 | 1.3 |
| Cadmium | µg/L | (e) | 40 CFR 131.38 | <0.12 | <0.12 | <0.12 |
| Chromium | µg/L | (e) | | 0.5 | 0.6 | 1.5 |
| Copper | µg/L | (e) | 40 CFR 131.38 | 3.2 | 3.3 | 3.3 |
| Iron[2] | µg/L | NA | | 31 | 29 | 20 |
| Lead | µg/L | (e) | 40 CFR 131.38 | <0.2 | <0.2 | <0.2 |
| Manganese[2] | µg/L | NA | | 11 | <5 | <5 |
| Mercury | µg/L | NA | | <0.099 | <0.099 | <0.099 |
| Nickel | µg/L | (e) | 40 CFR 131.38 | 2.3 | 1.2 | 16 |
| Selenium | µg/L | NA | | 1.1 | 0.5 | 0.6 |
| Silver | µg/L | (e) | 40 CFR 131.38 | <0.12 | <0.12 | <0.12 |
| Thallium | µg/L | NA | | <0.5 | <0.5 | <0.5 |
| Zinc | µg/L | (e) | 40 CFR 131.38 | 4.4 | 2.9 | 2.4 |
| **Organophosphorus Pesticides** | | | | | | |
| Aspon | µg/L | | | <0.05 | <0.05 | <0.05 |
| Atrazine | µg/L | | | <0.05 | <0.05 | <0.05 |
| Azinphos-ethyl | µg/L | | | <0.05 | <0.05 | <0.05 |
| Azinphos-methyl | µg/L | | | <0.05 | <0.05 | <0.05 |
| Bolstar | µg/L | | | <0.05 | <0.05 | <0.05 |
| Carbophenothion | µg/L | | | <0.05 | <0.05 | <0.05 |
| Chlorfenvinphos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Chlorpyrifos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Chlorpyrifos Methyl | µg/L | | | <0.05 | <0.05 | <0.05 |
| Coumaphos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Crotoxyphos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Demeton-s | µg/L | | | <0.05 | <0.05 | <0.05 |
| Diazinon | µg/L | | | <0.05 | <0.05 | <0.05 |
| Dichlofenthion | µg/L | | | <0.05 | <0.05 | <0.05 |
| Dichlorvos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Dichrotophos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Dimethoate | µg/L | | | <0.05 | <0.05 | <0.05 |

**Table A4-6. 2019-2020 Wet Weather Receiving Water Monitoring Results for Middle SMR Subwatershed Long-Term Receiving Water Station 902USM828**

| Analyte | Units | Water Quality Objective (WQO) | Objective Reference | 902USM828 | | |
|---|---|---|---|---|---|---|
| | | | | W1 | W2 | W3 |
| | | | | 11/20/2019-11/21/2020 | 12/04/2019-12/05/2019 | 03/10/2020-03/11/2020 |
| Dioxathion | µg/L | | | <0.05 | <0.05 | <0.05 |
| Disulfoton | µg/L | | | <0.05 | <0.05 | <0.05 |
| EPN | µg/L | | | <0.05 | <0.05 | <0.05 |
| Ethion | µg/L | | | <0.05 | <0.05 | <0.05 |
| Ethoprop | µg/L | | | <0.05 | <0.05 | <0.05 |
| Ethyl Parathion | µg/L | | | <0.05 | <0.05 | <0.05 |
| Famphur | µg/L | | | <0.05 | <0.05 | <0.05 |
| Fenitrothion | µg/L | | | <0.05 | <0.05 | <0.05 |
| Fensulfothion | µg/L | | | <0.05 | <0.05 | <0.05 |
| Fenthion | µg/L | | | <0.05 | <0.05 | <0.05 |
| Fonophos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Leptophos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Malathion | µg/L | | | <0.05 | <0.05 | <0.05 |
| Merphos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Methyl Parathion | µg/L | | | <0.05 | <0.05 | <0.05 |
| Mevinphos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Monocrotophos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Naled | µg/L | | | <0.05 | <0.05 | <0.05 |
| Phorate | µg/L | | | <0.05 | <0.05 | <0.05 |
| Phosmet | µg/L | | | <0.05 | <0.05 | <0.05 |
| Phosphamidon | µg/L | | | <0.05 | <0.05 | <0.05 |
| Ronnel | µg/L | | | <0.05 | <0.05 | <0.05 |
| Simazine | µg/L | | | <0.05 | <0.05 | <0.05 |
| Stirofos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Sulfotepp | µg/L | | | <0.05 | <0.05 | <0.05 |
| TEPP | µg/L | | | <0.05 | <0.05 | <0.05 |
| Terbufos | µg/L | | | <0.05 | <0.05 | <0.05 |
| Thionazin | µg/L | | | <0.05 | <0.05 | <0.05 |
| Tokuthion | µg/L | | | <0.05 | <0.05 | <0.05 |
| Trichlorfon | µg/L | | | <0.05 | <0.05 | <0.05 |
| Trichloronate | µg/L | | | <0.05 | <0.05 | <0.05 |
| **Pyrethroids** | | | | | | |
| Bifenthrin | µg/L | | | <0.0079 | AE | 0.0100 |
| Cyfluthrin | µg/L | | | <0.0083 | AE | <0.0042 |
| Cypermethrin | µg/L | | | <0.0066 | AE | <0.0033 |
| Deltamethrin/Tralomethrin | µg/L | | | <0.019 | AE | <0.0096 |
| Fenpropathrin (Danitol) | µg/L | | | <0.020 | AE | <0.010 |
| Fenvalerate/Esfenvalerate | µg/L | | | <0.0098 | AE | <0.0049 |
| L-Cyhalothrin | µg/L | | | <0.012 | AE | <0.006 |
| Permethrin | µg/L | | | <0.050 | AE | <0.025 |

**Table A4-6. 2019-2020 Wet Weather Receiving Water Monitoring Results for Middle SMR Subwatershed Long-Term Receiving Water Station 902USM828**

| Analyte | Units | Water Quality Objective (WQO) | Objective Reference | 902USM828 | | |
|---|---|---|---|---|---|---|
| | | | | W1 | W2 | W3 |
| | | | | 11/20/2019-11/21/2020 | 12/04/2019-12/05/2019 | 03/10/2020-03/11/2020 |
| **Toxicity** | | | | | | |
| *Ceriodaphnia* 7-day survival[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Ceriodaphnia* 7-day reproduction[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Selenastrum* 96-hr[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Pimephales* 7-day survival[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Pimephales* 7-day biomass[2] | TST | Pass/Fail | | Pass | Pass | Pass |

< – Results are less than the method detection limit.
[1] Constituent is a HPWQC for dry weather.
[2] Constituent is a PWQC for dry weather. Note that all PWQCs do not apply to all subareas in the WMA; constituents noted here are PWQCs in at least one subarea in the WMA.
(a) Water quality objective are based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective on or before May 17, 2016) and may vary by hydrologic area.
(b) Water quality objective for E. coli is based on Part 3 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California - Bacteria Provisions and Water Quality Standards Variance Policy (February 4, 2019).
(c) Water quality objective is the criterion maximum concentration (CMC) and criterion continuous concentration (CCC) based on pH and water temperature when applicable as described in the U.S. EPA, 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater, EPA-822-R-13-001, April 2013.
(d) Water quality objective is based on the MUN beneficial use as described in the Basin Plan, 1994 (with amendments effective on or before May 17, 2016).
(e) Water quality objective for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The Criterion Maximum Concentration (CMC) was used.
H – Sample received and or/analyzed past the recommended holding time.
J – Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
AE – Analysis error. Analysis not completed by contracted laboratory due to procedural or technical issue.
Shaded results did not meet water quality objectives.

## LTRW Station Wet Weather Trend Results

Wet weather trends at SMR-MLS-2 were assessed using the seven monitoring years of available long-term monitoring data. Statistically significant ($p < 0.05$) trends are summarized in **Table A4-7** for SMR-MLS-2. The 2019-2020 monitoring year was the first year of wet weather monitoring at 902USM828; therefore, trends cannot be evaluated until additional data are collected during future permit terms.

As shown in **Table A4-7**, statistically significant decreasing trends for nutrients (a HPWQC) were identified, and no statistically significant trends were identified for PWQCs. Trend plots for nutrients (ammonia as N and total nitrogen) are shown in **Figure A4-3**, where the x-axis shows the sample date (year) and the y-axis shows measured values. Sen's Slope estimates, as well as a trend line (green line), are shown on the scatterplots for consituents with less than 15 percent (%) non-detect results. A negative Sen's Slope indicates a decreasing trend and a positive Sen's Slope indicates an increasing trend. Scatterplots for all of the statistically significant dry weather trends listed in **Table A4-7** are provided in **Appendix 4A-4**.

**Table A4-7. Wet Weather Receiving Water Trend Results for SMR-MLS-2**

| Station | Increasing | Decreasing |
|---|---|---|
| SMR-MLS-2 (902.21) | None | Ammonia as N, Total Nitrogen, Total Cadmium |

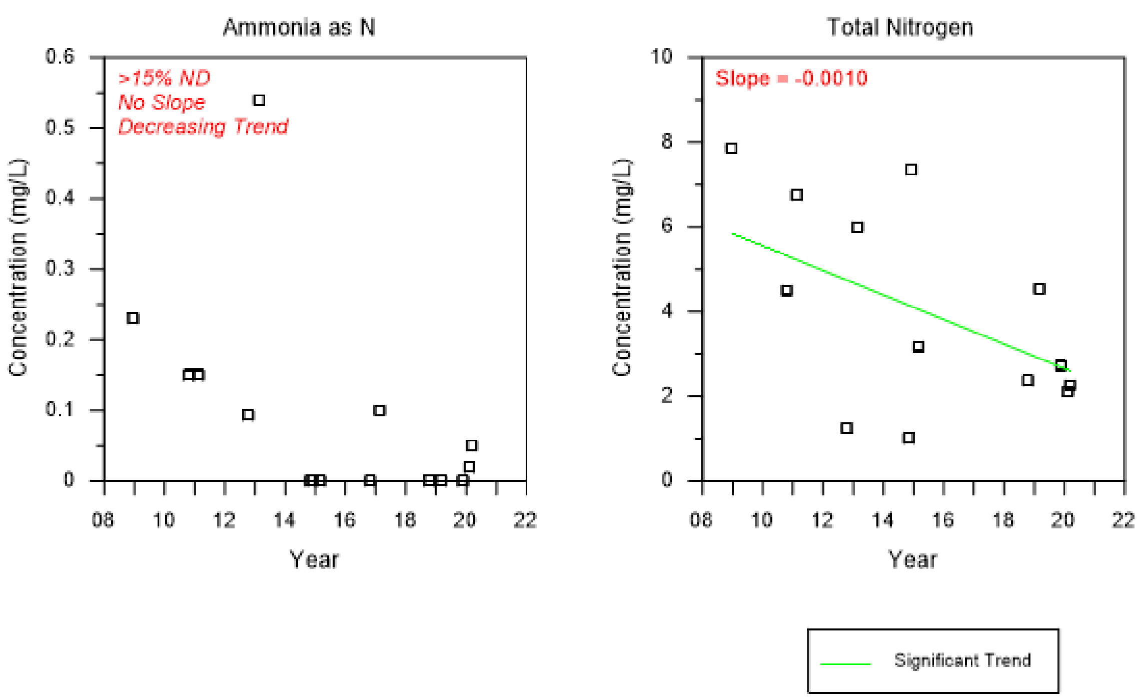



**Figure A4-3. Trend Plot for Nutrients for Wet Weather Results at SMR-MLS-2**

**<u>LTRW Station Wet Weather Trash Assessment Results</u>**

Field observations of trash (a PWQC for portions of the WMA) were conducted at sampled stations. At 908USM828, field records indicated that no trash was present during the three monitored events. At SMR-MLS, a trash assessment was conducted using the following categorization:

1. Optimal (no visible trash at first glance, or less than 10 pieces),
2. Suboptimal (10-50 pieces after close inspection),
3. Marginal (51-100 pieces at first glance and evidence of infrequent use),
4. Submarginal (101-400 pieces and evidence of frequent use), and
5. Poor (significantly impacted site with more than 400 pieces of trash observed due to constriction point or dumping).

Three site assessments were conducted, and all three assessments were rated as Optimal. No potential human or aquatic health threats were documented.

#### 4.4.1.2 *LTRW Station Dry Weather Results*

In accordance with the schedule outlined in the WQIP, the County of San Diego conducted monitoring during dry weather at their LTRW station, SMR-MLS-2, on September 24-25, 2019; February 5-6, 2020; and June 9-10, 2020. Riverside County will conduct dry weather monitoring at their LTRW stations, 902USM828 (Middle SMR Subwatershed) and 902WLC650 (Upper SMR Subwatershed), during the 2020-2021 monitoring year.

The constituent list for long-term monitoring is tailored towards issues in the watershed and includes the following in accordance with Provision D.1.c.(3)(f):

- constituents contributing to the HPWQC,
- constituents on the 2014/2016 Clean Water Act Section 303(d) List,
- constituents for implementation plans or load reduction plans where the Copermittees are listed as responsible parties under a TMDL,
- applicable non-stormwater action level (NAL) constituents, and
- constituents listed in Table D-3 of the Permit.

As shown in **Table A4-8**, concentrations of total nitrogen (a HPWQC) during all events and total dissolved solid (TDS) (a PWQC) during one event were above WQOs. All other constituent concentrations, including those for other PWQCs, were below WQOs, where available, except turbidity for one event. Results for organophosphorus pesticides and synthetic pyrethroids were below detection limits or estimated at a concentration above the detection limit but below the reporting limit. No toxicity was observed.

**Table A4-8. 2019-2020 Long-Term Dry Weather Receiving Water Monitoring Results for Lower SMR Subwatershed Station SMR-MLS-2**

| Analyte | Units | Water Quality Objective (WQO) | Objective Reference | SMR-MLS-2 | | |
|---|---|---|---|---|---|---|
| | | | | D1 | D2 | D3 |
| | | | | 9/24/2019-9/25/2019 | 2/5/2020-2/6/2020 | 6/9/2020-6/10/2020 |
| **Physical Chemistry** | | | | | | |
| Dissolved Oxygen | mg/L | <6.0 (a) | Basin Plan | 9.31 | 11.68 | 10.17 |
| pH | pH Units | 6.5-8.5 | Basin Plan | 7.82 | 7.81 | 8.10 |
| Specific Conductivity | µS/cm | NA | | 1,012 | 1,034 | 1,384 |
| Temperature | Celsius | NA | | 22.4 | 8.93 | 18.04 |
| Turbidity | NTU/FNU | 20 | Basin Plan | 107.9 | 1.8 | 3.9 |
| **Fecal Indicator Bacteria** | | | | | | |
| *E. coli*[2] | MPN/100 mL | 320 (b) | Bacteria Provisions | 20 | 75 | 75 |
| Enterococcus[2] | MPN/100 mL | NA | | 170 | <2 | 20 |
| Fecal Coliform[2] | MPN/100 mL | NA | | 110 | 70 | 70 |
| Total Coliform[2] | MPN/100 mL | NA | | 800 | 110 | 500 |
| **Nutrients** | | | | | | |
| Ammonia as N | mg/L | (c) | USEPA Water Quality Criteria (Freshwater) | <0.048 | 0.035J | 0.12 |
| Nitrate as N | mg/L | 10 (d) | Basin Plan | 0.67 | 2.0 | 2.1 |
| Nitrite as N | mg/L | 1 (d) | Basin Plan | <0.010 | 0.017J | <0.042 |
| Total Kjeldahl Nitrogen | mg/L | NA | | 0.37 | 0.2 | 0.32 |
| Total Nitrogen (calc) [1] | mg/L | 1 | Basin Plan | 1.04 | 2.217 | 2.42 |
| Orthophosphate as P | mg/L | NA | | 0.01 | 0.0082 | 0.011 |
| Total Phosphorus[1] | mg/L | 0.1 | Basin Plan | <0.012 | 0.013J | <0.012 |
| **General Chemistry** | | | | | | |
| Dissolved Organic Carbon | mg/L | NA | | 12 | 2.7 | 4.2 |
| Total Organic Carbon | mg/L | NA | | 13 | 2.6 | 3.6 |
| Sulfate | mg/L | 250 (a) | Basin Plan | 190 | 210 | 240 |
| Surfactants (MBAS) | mg/L | 0.5 | Basin Plan | <0.019 | 0.045J | 0.037J |
| Total Dissolved Solids[2] | mg/L | 750 (a) | Basin Plan | 640 | 750 | 890 |
| Total Suspended Solids | mg/L | NA | | 3 | 1 | 4 |
| Total Hardness | mg/L | NA | | 329 | 378 | 448 |
| **Total Metals** | | | | | | |
| Aluminum | µg/L | 1,000 (d) | Basin Plan | 80 | 8.9 | 19 |
| Arsenic | µg/L | 10 (d) | Basin Plan | 1.2 | 1.5 | 1.6 |
| Cadmium | µg/L | 5 (d) | Basin Plan | <0.041 | <0.041 | <0.041 |
| Chromium | µg/L | 50 (d) | Basin Plan | 0.16J | 0.29 | 0.11J |
| Chromium III | µg/L | NA | | 0.15 | 0.13 | <0.035 |
| Chromium VI | µg/L | NA | | 0.019J | 0.16 | 0.023 |
| Copper | µg/L | 1,000 (d) | Basin Plan | 1.2 | 0.87 | 1.1 |
| Iron[2] | µg/L | 300 (d) | Basin Plan | 190 | 58 | 35 |
| Lead | µg/L | NA | | 0.19J | <0.031 | <0.031 |
| Manganese[2] | µg/L | 50 (d) | Basin Plan | 32 | 24 | 11 |
| Mercury | µg/L | 2 (d) | Basin Plan | <0.017 | <0.017 | 0.017J |
| Nickel | µg/L | 100 (d) | Basin Plan | 0.67J | 0.57J | 0.85 |

**Table A4-8. 2019-2020 Long-Term Dry Weather Receiving Water Monitoring Results for Lower SMR Subwatershed Station SMR-MLS-2**

| Analyte | Units | Water Quality Objective (WQO) | Objective Reference | SMR-MLS-2 | | |
|---|---|---|---|---|---|---|
| | | | | D1 | D2 | D3 |
| | | | | 9/24/2019-9/25/2019 | 2/5/2020-2/6/2020 | 6/9/2020-6/10/2020 |
| Selenium | µg/L | 5 | 40 CFR 131.38 | 0.64 | 1.2 | 0.99 |
| Silver | µg/L | 100 (d) | Basin Plan | <0.062 | <0.062 | <0.062 |
| Thallium | µg/L | 2 (d) | Basin Plan | <0.014 | <0.014 | <0.014 |
| Zinc | µg/L | 5,000 (d) | Basin Plan | 3.2J | 1.1J | <0.94 |
| **Dissolved Metals** | | | | | | |
| Aluminum | µg/L | NA | | 4.2J | 3.1J | 10 |
| Arsenic | µg/L | 150 | 40 CFR 131.38 | 1.2 | 1.4 | 1.6 |
| Cadmium | µg/L | (e) | 40 CFR 131.38 | 0.05J | 0.07J | <0.041 |
| Chromium | µg/L | (e) | 40 CFR 131.38 | 0.14J | 0.25 | 0.09J |
| Chromium III | µg/L | (e) | 40 CFR 131.38 | <0.040 | AE | <0.043 |
| Chromium VI | µg/L | 11 | 40 CFR 131.38 | 0.01J | AE | 0.02 |
| Copper | µg/L | (e) | 40 CFR 131.38 | 1.0 | 0.83 | 0.99 |
| Iron[2] | µg/L | NA | | 18 | 24 | 15 |
| Lead | µg/L | (e) | 40 CFR 131.38 | 0.06J | <0.031 | <0.031 |
| Manganese[2] | µg/L | NA | | 2.4 | 15 | 7.8 |
| Mercury | µg/L | NA | | <0.017 | <0.017 | 0.019J |
| Nickel | µg/L | (e) | 40 CFR 131.38 | 0.72J | 0.62J | 0.8 |
| Selenium | µg/L | NA | | 0.61 | 1.1 | 0.94 |
| Silver | µg/L | (e) | 40 CFR 131.38 | <0.062 | <0.062 | <0.062 |
| Thallium | µg/L | NA | | 0.02J | <0.014 | <0.014 |
| Zinc | µg/L | (e) | 40 CFR 131.38 | 1.6J | 2.2J | 0.96J |
| **Organophosphorus Pesticides** | | | | | | |
| Azinphos Methyl | µg/L | NA | | <0.0055 | <0.0055 | <0.0055 |
| Bolstar | µg/L | NA | | <0.0046 | <0.0046 | <0.0046 |
| Chlorpyrifos | µg/L | NA | | <0.0069 | <0.0069 | <0.0069 |
| Coumaphos | µg/L | NA | | <0.0051 | <0.0051 | <0.0051 |
| Demeton-o | µg/L | NA | | <0.010 | <0.010 | <0.010 |
| Demeton-s | µg/L | NA | | <0.010 | <0.010 | <0.010 |
| Diazinon | µg/L | NA | | <0.0052 | <0.0052 | <0.0052 |
| Dichlorvos | µg/L | NA | | <0.0029 | <0.0029 | <0.0029 |
| Dimethoate | µg/L | NA | | 0.0080J | <0.0062 | <0.0062 |
| Disulfoton | µg/L | NA | | <0.010 | <0.010 | <0.010 |
| Ethoprop | µg/L | NA | | <0.0067 | <0.0067 | <0.0067 |
| Ethyl Parathion | µg/L | NA | | <0.0054 | <0.0054 | <0.0054 |
| Fensulfothion | µg/L | NA | | <0.0029 | <0.0029 | <0.0029 |
| Fenthion | µg/L | NA | | <0.0038 | <0.0038 | <0.0038 |
| Malathion | µg/L | NA | | <0.0076 | <0.0076 | <0.0076 |
| Merphos | µg/L | NA | | <0.0058 | <0.0058 | <0.0058 |
| Methyl Parathion | µg/L | NA | | <0.0063 | <0.0063 | <0.0063 |
| Mevinphos | µg/L | NA | | <0.0042 | <0.0042 | <0.0042 |

**Table A4-8. 2019-2020 Long-Term Dry Weather Receiving Water Monitoring Results for Lower SMR Subwatershed Station SMR-MLS-2**

| Analyte | Units | Water Quality Objective (WQO) | Objective Reference | SMR-MLS-2 | | |
|---|---|---|---|---|---|---|
| | | | | D1 | D2 | D3 |
| | | | | 9/24/2019-9/25/2019 | 2/5/2020-2/6/2020 | 6/9/2020-6/10/2020 |
| Naled | µg/L | NA | | <0.0076 | <0.0076 | <0.0076 |
| Phorate | µg/L | NA | | <0.0030 | <0.0030 | <0.0030 |
| Ronnel (Fenchlorphos) | µg/L | NA | | <0.0041 | <0.0041 | <0.0041 |
| Stirophos (Tetrachlorvinphos) | µg/L | NA | | <0.0031 | <0.0031 | <0.0031 |
| Tokuthion (Prothiofos) | µg/L | NA | | <0.0078 | <0.0078 | <0.0078 |
| Trichloronate | µg/L | NA | | <0.0067 | <0.0067 | <0.0067 |
| **Synthetic Pyrethroids** | | | | | | |
| Allethrin | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Bifenthrin | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Cyfluthrin | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Cyhalothrin, Total Lambda | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Cypermethrin | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Danitol (Fenpropathrin) | µg/L | NA | | <0.0003 | <0.0003 | <0.0003 |
| Deltamethrin/Tralomethrin | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Esfenvalerate | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Fenvalerate | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Fluvalinate | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Permethrin | µg/L | NA | | <0.002 | <0.002 | <0.002 |
| Prallethrin | µg/L | NA | | <0.0005 | <0.0005 | <0.0005 |
| Resmethrin | µg/L | NA | | <0.005 | <0.005 | <0.005 |
| **Toxicity** | | | | | | |
| *Ceriodaphnia* 7-day survival[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Ceriodaphnia* 7-day reproduction[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Selenastrum* 96-hr[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Pimephales* 7-day survival[2] | TST | Pass/Fail | | Pass | Pass | Pass |
| *Pimephales* 7-day biomass[2] | TST | Pass/Fail | | Pass | Pass | Pass |

< - Results are less than the method detection limit.

[1] Constituent is a HPWQC for dry weather.
[2] Constituent is a PWQC for dry weather. Note that all PWQCs do not apply to all subareas in the WMA; constituents noted here are PWQCs in at least one subarea in the WMA.
(a) Water quality objective are based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective on or before May 17, 2016) and may vary by hydrologic area.
(b) Water quality objective for *E. coli* is based on Part 3 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California - Bacteria Provisions and Water Quality Standards Variance Policy (February 4, 2019).
(c) Water quality objective for Ammonia as N is the criterion maximum concentration (CMC) and criterion continuous concentration (CCC) based on pH and water temperature when applicable as described in the U.S. EPA, 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater, EPA-822-R-13-001, April 2013.
(d) Water quality objective is based on the MUN beneficial use as described in the Basin Plan, 1994 (with amendments effective on or before May 17, 2016).
(e) Water quality objective for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The Criterion Continuous Concentration (CCC) was applied to dry weather results with the exception of Silver for which the Criterion Maximum Concentration (CMC) was applied as there is no CCC.
AE – Analysis error. Analysis not completed by contracted laboratory due to procedural or technical issue.
J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
NA - No criterion or published value was available or applicable to the matrix or program.
Shaded results did not meet water quality objectives.

**LTRW Station Dry Weather Trend Results**

Dry weather trends at SMR-MLS-2 were assessed using the six monitoring years of available long-term monitoring data. Significant ($p < 0.05$) dry weather trends are summarized in **Table A4-9**. The only increasing trend was pH; however, pH values were within the range specified by the Basin Plan. No statistically significant dry weather trends were observed for HPWQCs, and the only trend related to a PWQC was a decreasing trend for total coliform. A trend plot for total coliform in dry weather at SMR-MLS-2 is shown in **Figure A4-4**, where the x-axis shows the sample date (year) and the y-axis shows measured values. A negative Sen's Slope indicates a decreasing trend and a positive Sen's Slope indicates an increasing trend. Scatterplots for all the statistically significant dry weather trends listed in **Table A4-9** are provided in **Appendix 4A-4**. Dry weather trends were evaluated using the methodology summarized in **Section 4.4.1.1**.

**Table A4-9. Long-Term Dry Weather Receiving Water Trend Results for SMR-MLS-2**

| Station | Increasing | Decreasing |
|---|---|---|
| SMR-MLS-2 (902.21) | pH | Total Coliform, Dissolved Nickel, Total Nickel |

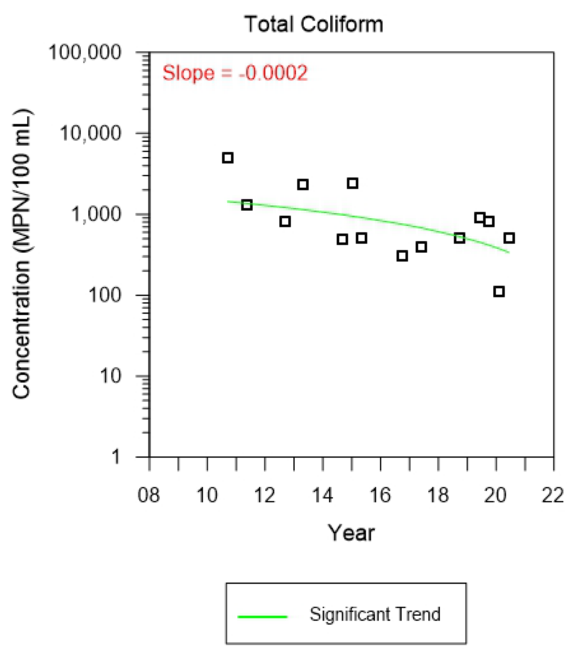



**Figure A4-4. Trend Plot for Total Coliform for Dry Weather Results at SMR-MLS-2**

**LTRW Station Dry Weather Trash Assessment Results**

Field observations of trash (a PWQC for portions of the WMA) were conducted at SMR-MLS-2. Two of the three assessments were rated as Optimal and one assessment was rated as Suboptimal. No potential human health threats were documented. One potential aquatic health threat was documented due to the presence of more than 50 pieces of litter, dominated by plastics.

### 4.4.2 Stream Bioassessment Monitoring

Stream bioassessment was conducted in the Lower SMR Subwatershed[8] during one dry weather event at the LTRW station (**Table A4-10**) and at four SMC Regional Monitoring Program bioassessment stations (**Table A4-11)**. Monitoring included water quality, benthic macroinvertebrates (BMI), benthic algae, and physical habitat data collection following the Surface Water Ambient Monitoring Program (SWAMP) *Standard Operating Procedures for the Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat* (Ode et al., 2016). Physical habitat quality of the monitoring sites was quantified using the California Rapid Assessment Method (CRAM) for riverine wetlands (Collins et al., 2012). Reach-wide algal cover was quantified as part of the SWAMP physical habitat assessment. Laboratory analyses included BMI taxonomy, benthic algae taxonomy, periphyton (ash-free dry mass [AFDM] and chlorophyll-a), and water chemistry analysis. Sediment chemistry and toxicity testing could be performed only for the Sandia Creek condition site due to insufficient availability of fine-grained depositional material at the other three 2020 SMC sites. Bioassessment monitoring at LTRW station SMR-MLS-2 was conducted in accordance with the long-term monitoring requirements of the Permit. In addition to the methods listed above, SMC Regional Monitoring Program bioassessment data were collected in accordance with the SMC Workplan (SCCWRP, 2015).

Stream bioassessment surveys were conducted from May to June 2020 in accordance with the sample index period of the 2015 SMC Program, given as March through July. Water quality parameters (i.e., water temperature, specific conductivity, pH, turbidity, and DO) were measured in situ as part of the physical habitat quality assessment at each station. Stream flow velocity was also measured with a portable flow meter or was visually estimated when the water was too shallow for use of the flow meter. Grab samples were collected and analyzed for conventional constituents, nutrients, and algal biomass. Survey generated data include all BMI and algal taxonomic (upon completion of algal taxonomy) results and calculated metrics. Two summary indices were also used to assess the overall biotic integrity of each monitoring reach, including the California Stream Condition Index (CSCI) and algal Index of Biotic Integrity (IBI).

The CSCI (Mazor et al., 2016) uses BMI taxonomic data to calculate a single index score related to the biological health of a given sample reach. The CSCI combines a predictive multi-metric index (pMMI) with a predictive observed to expected (O/E) ratio index, which incorporates local watershed geology and climate factors. This index is the primary BMI community quality index used throughout California. CSCI scores indicate benthic communities that are very likely altered (scores of 0.00 to 0.62), likely altered (0.63 to 0.78), possibly altered (0.79 to 0.91), or likely intact (at least 0.92). A CSCI value of 0.79 can be used as a threshold for detection of degradation, because 90% of reference sites score higher than this value (Mazor et al., 2016). Achieving a value greater than or equal to (≥) 90% of reference site scores (≥ 0.79) is the proposed biological objective for the San Diego Region.

[8] Bioassessment monitoring at the Middle and Upper SMR Subwatershed LTRW stations will be conducted during the 2020-2021 monitoring year.

The IBI (Fetscher et al., 2014) is an algal community assessment that includes the calculation of three separate IBIs based on different aspects of the algae community. These include the S2 IBI for soft algae, the D18 for diatoms, and the H20 which is a combination of diatoms and soft algae. The algal IBIs have a scoring range of 0-100, with a score above 57 representing a higher quality, less disturbed algal community which is closer to reference conditions.

CRAM assessments provide a numerical summary score of the physical habitat quality for each station. Scores range from 25 to 100 (none of the attributes can score a "0"), with higher scores generally indicating a higher quality physical habitat. The CRAM assessment has yet to be calibrated region-wide; thresholds for CRAM ratings were established for purposes of assessment within this report: scores of less than 50 are considered low (poor quality physical habitat), scores of 50-75 are considered moderate (fair condition) and scores of greater than 75 are considered high (good condition).

Benthic algae were collected at each site in accordance with Ode et al. (2016) for taxonomic identification, and biomass samples were collected for benthic AFDM and chlorophyll-a analysis.

**Table A4-10. 2020 NPDES Bioassessment Monitoring Location**

| Site Location, Program | Site Type | Date Sampled | Latitude | Longitude |
|---|---|---|---|---|
| **San Diego County, LTRW Station** | | | | |
| SMR-MLS-2 – Santa Margarita River (902.21) | Condition | 6/11/2020 | 33.398142 | -117.26273 |

**Table A4-11. 2020 SMC Bioassessment Monitoring Locations**

| Site Location, Program | Site Type | Date Sampled | Latitude | Longitude |
|---|---|---|---|---|
| **San Diego County, SMC** | | | | |
| 902M20301 – Santa Margarita River at Gavilan (902.21) | Condition | 6/24/2020 | 33.42523 | -117.20386 |
| 902WE0888 – De Luz Creek (902.21) | Trend | 6/3/2020 | 33.45432 | -117.30237 |
| **Riverside County, SMC** | | | | |
| 902M18917 – Sandia Creek Condition (902.22) | Condition | 5/29/2020 | 33.49208 | -117.24535 |
| SMC01097 – Sandia Creek Trend (902.22) | Trend | 5/29/2020 | 33.48724 | -117.25558 |

#### 4.4.2.1 *Long-Term Receiving Water Station Bioassessment*

At the SMR-MLS-2 LTRW station (**Figure A4-5**), the CSCI score indicated that the BMI community is *Likely Intact* (**Table A4-12**). The BMI community did not have a dominant taxon, but the most abundant taxa were the mayflies *Fallceon* sp., *Baetis adonis* and *Tricorythodes* sp. (24%, 17%, and 9% of the community, respectively). Several species present indicated good water quality, including the mayflies *Drunella doddsii* and *Ephemerella* sp., and the caddisflies *Micrasema* sp. and *Glossosoma* sp. (**Attachment 4B-2**). Physical habitat quality as measured by the CRAM score was in the high category (81). Clinger and intolerant taxa are an indicator of community completeness because their abundance tends to decrease in impaired waterbodies. The observed percentage of clinger taxa was above the predicted percentage, while the observed percentage of intolerant taxa was far below the predicted percentage. The algae community had IBI scores of 20 (soft algae), 46 (diatoms), and 38 (combined overall) (**Table A4-12**). All three scores were below the statistical boundary between reference and non-reference conditions.

**Table A4-12. 2020 CSCI, CRAM, and Algal IBI Scores for Bioassessment Monitoring at SMR-MLS-2**

| Station Code | Stream Name | Habitat | BMI | Algae |
|---|---|---|---|---|
| | | CRAM Score | CSCI Score | Algal IBI |
| SMR-MLS-2 | Santa Margarita River | 81<br>High | 0.98<br>Likely Intact | S2: 20<br>D18: 46<br>H20: 38 |

BMI – benthic macroinvertebrate; CRAM – California Rapid Assessment Method; CSCI – California Stream Condition Index; IBI – Index of Biotic Integrity

CSCI scores indicate benthic communities that are very likely altered (scores of 0.00 to 0.62), likely altered (0.63 to 0.78), possibly altered (0.79 to 0.91), or likely intact (at least 0.92).

CRAM score is 25-100; <50 = low, 50-75 = moderate, >75 = high.

S2 = soft algae and cyanobacteria; D18 = diatoms; H20 = combined. IBI Score of 57 is the statistical boundary between reference and non-reference condition.

Water chemistry results for the most recent dry weather monitoring event prior to bioassessment at SMR-MLS-2 indicated that concentrations of total nitrogen (a HPWQC) and TDS (a PWQC) were above WQOs (**Table A4-11**). All other constituent concentrations were below WQOs, where available, although conductivity (specific conductance) was elevated. High specific conductance may have an effect on BMI. Specific conductance is a measurement of the ability of water to conduct electricity via dissolved ions (i.e., Na+, Ca+2, SO4-2, etc.) (State Water Board Fact Sheet-3.1.3.0(EC)V2e) (2004). As such, specific conductance is related to TDS content. Although the effect of elevated TDS on BMI is variable among different taxa and not well understood, a number of studies have demonstrated a correlation between changes in conductivity/TDS with both altered BMI (Minshall and Minshall, 1978) and algal communities (Leland and Porter, 2000). Results from the first SMC five-year report suggest that elevated TDS is the most common stressor to biological condition in the entire region, affecting 76% of stream miles in Southern California (Mazor, 2015). The same study found phosphorus and nitrogen were the 2nd and 3rd-most common stressors identified in our region to be associated with poor biological condition.

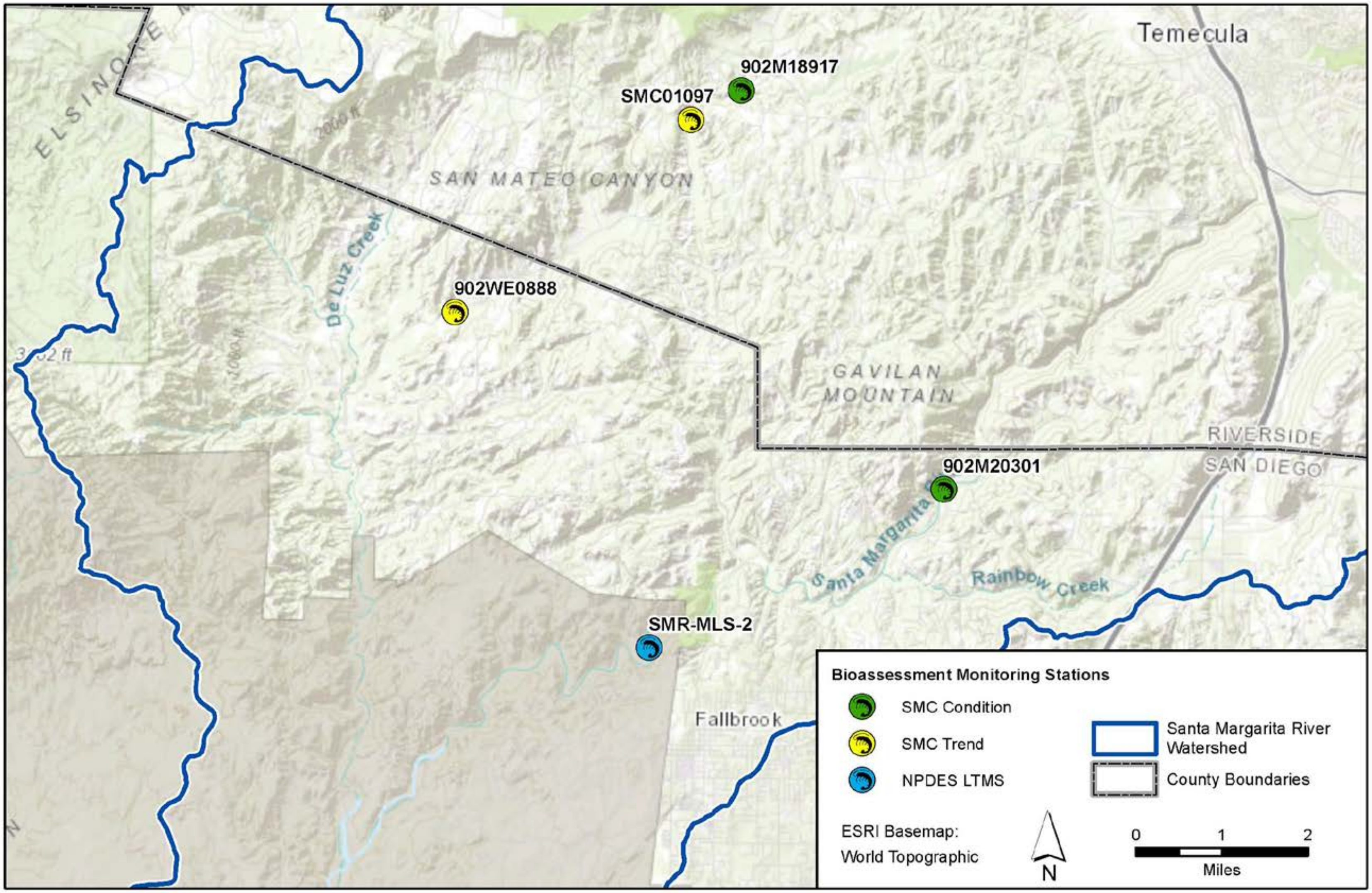



**Figure A4-5. 2020 SMC Regional Monitoring Program Bioassessment Monitoring Locations**

### 4.4.2.2 *SMC Regional Monitoring Program Participation*

SMC monitoring activities for the 2019-2020 monitoring year were conducted based on an extension of the 2015-2019 SMC Workplan. The 2015-2019 SMC Regional Monitoring Program was designed to answer key management questions about the impacts of stressors of interest on stream conditions. The study design includes both probabilistic (randomly-selected) and trend sites. Methodology is detailed in the SMC Workplan (SCCWRP, 2015). The next five-year study design was still under development in 2020; therefore, as an interim measure the Copermittees continued to participate in the regional monitoring under the existing study design.

The SMR WMA is grouped with the San Luis Rey River WMA in the Northern San Diego stratum of the SMC Program study area. The four SMC sites within the SMR WMA included two condition and two trend sites (**Figure A4-5**). All sites were located within the Lower SMR Subwatershed; two in the County of San Diego and two in Riverside County. The bioassessment report for the Riverside Copermittees is provided as **Attachment 4B-1**, and bioassessment data for the County of San Diego are provided as **Attachment 4B-2**.[9] Results are summarized below, and detailed results for the entire program will be available in the final report developed by the SMC Workgroup. The final report produced under the 2015-2019 Workplan is anticipated in the spring of 2021 (SCCWRP, 2015).

SMC bioassessment monitoring data are presented in **Table A4-13** for the CSCI, CRAM physical habitat scores, and algal IBI scores. Chemistry data collected for physical and general chemistry, periphyton (AFDM and chlorophyll-a), and nutrients are presented in **Table A4-14**. Chemistry results are compared to WQOs from the Basin Plan. However, for nutrients, these objectives are problematic because they do not consider site specific factors (i.e., the assimilative capacity of the waterbody). A Nutrient Numeric Endpoint framework is currently in development as an alternative regulatory approach advocated by State Water Board staff and USEPA Region 9. The purpose of the framework is to address the cause of potential impairments rather than focusing on controlling nutrient concentrations in and of themselves, in order to protect beneficial uses from biostimulatory substances.

#### *4.4.2.2.1 Santa Margarita River at Gavilan*

At the Santa Margarita River at Gavilan condition site (902M20301), the CSCI score indicated that the BMI community is *Possibly Altered* (**Table A4-13**). The BMI community did not have a dominant taxon, but the most abundant taxa were the mayflies *Fallceon* sp. and *Baetis* sp. (15% and 10% of the community, respectively), the caddisflies *Hydropsyche* sp. and *Hydroptila* sp. (12% and 9% of the community, respectively), and the true flu *Rheotanytarsus* sp. (8% of the community). An indicator of good water quality included the caddisfly *Tinodes* sp. (**Attachment 4B-2**). Clinger and intolerant taxa are an indicator of community completeness because their abundance tends to decrease in impaired waterbodies. The observed percentage of clinger taxa was above the predicted percentage, which may imply a somewhat healthy BMI community, although the observed percentage of intolerant taxa was far below the predicted percentage. Physical habitat quality as measured by the CRAM score was in the high category (84). The algae community had IBI scores of 22 (soft algae), 58 (diatoms), and 45 (combined overall) (**Table A4-13**). The diatom score was above the statistical boundary between

[9] Includes the Taxonomic Listing of Benthic Macroinvertebrates, Ranked Abundance of Benthic Macroinvertebrates, CSCI Metrics, CSCI Scores, Physical Habitat Quality Data, Water Chemistry Data, and Taxonomic Listing of Soft Algae and Algal IBIs.

reference and non-reference conditions and the soft algae and combined scores were below the threshold.

Water chemistry results indicated that all analyte concentrations were below WQOs, where applicable **(Table A4-14**). Due to insufficient availability of fine-grained depositional material, sediment chemistry and toxicity were not analyzed.

*4.4.2.2.2 De Luz Creek*

At the De Luz Creek trend site (902WE0888), the CSCI score indicated that the benthic community is *Likely Intact* (**Table A4-13**). The BMI community did not have a dominant taxon, but the most abundant taxa were the true fly *Simulium* sp. (17% of the community), the snail *Physa* sp. (14% of the community), the mayflies *Baetis* sp. and *Baetis adonis* (13% and 11% of the community, respectively), and the caddisfly *Ochrotrichia* sp. (11% of the community). Indicators of good water quality included the presence of the fishfly *Neohermes* sp., caddisfly *Micrasema* sp., and the stone fly family Perlodidae (**Attachment 4B-2**). Clinger and intolerant taxa are an indicator of community completeness because their abundance tends to decrease in impaired waterbodies. The observed percentage of clinger taxa was above the predicted percentage, which may imply a somewhat healthy BMI community, although the observed percentage of intolerant taxa was far below the predicted percentage. Physical habitat quality as measured by the CRAM score was moderate (63). The algae community had IBI scores of 13 (soft algae), 74 (diatoms), and 51 (combined overall) (**Table A4-13**). The diatom score was above the statistical boundary between reference and non-reference conditions and the soft algae and combined scores were below the threshold.

Water chemistry results indicated that concentrations of sulfate and total nitrogen (a HPWQC) were above their respective numeric WQOs. All other parameters met WQOs, where applicable (**Table A4-14**). Due to insufficient availability of fine-grained depositional material, sediment chemistry and toxicity were not analyzed.

Using the six monitoring years of available dry weather monitoring data at 902WE0888, a trend analysis was conducted to determine if conditions are improving or declining in terms of the monitored constituents. Data were tested for normality in order to determine the appropriate trend methodology. Data with normal distribution were assessed using linear regression and data with lognormal distribution were log-transformed and assessed with linear regression. The nonparametric Mann-Kendall test for linear trends was used to evaluate data that did not follow normal or lognormal distributions. Statistical significance was based on a 95% confidence level (e.g., a 5% probability of obtaining a test statistic, or a p-value of less than 0.05). The only statistically significant trend identified was a decreasing trend for total suspended solids (TSS).

*4.4.2.2.3 Sandia Creek Condition Site*

At the Sandia Creek condition site (902M18917), the CSCI score indicated that the BMI community is *Likely Intact* (**Table A4-13**). The BMI community was dominated by the mayfly *Baetis* sp. (55% of the community), followed by the true fly *Simulium* sp. (17%), the mayfly *Fallceon* sp. (4%), and the true fly *Eukiefferiella* sp. (4%). Several highly sensitive BMI taxa were collected, including the alderfly *Neohermes* sp., caddisfly *Micrasema* sp. and the stonefly *Isoperla denningi*. CRAM results indicated high physical habitat quality (89) (**Table A4-13**). Clinger and intolerant taxa are an indicator of community completeness because their abundance tends to decrease in impaired waterbodies. The observed percentage of clinger taxa was above the predicted percentage (1.0), while the observed percentage of intolerant taxa was far below the predicted percentage (0.27). The diversity of taxa observed exceeded the taxa expected with an O/E score of 1.30. The algae community had IBI scores of 30 (soft algae), 60 (diatoms), and 56 (combined overall) (**Table A4-13**). The diatom score was above the statistical boundary between reference and non-reference conditions and the soft algae and combined scores were below the threshold.

Water chemistry results indicated chloride, sulfate, and total nitrogen were above numeric WQOs. The remaining analyte concentrations were below WQOs, where applicable, although specific conductivity was elevated at 1,925 micro Siemens per centimeter (µS/cm) (**Table A4-14**).

At the Sandia Creek condition site, fine grained depositional material was encountered in sufficient volume for sediment chemistry and toxicity analysis. Analysis for sediment samples included grain size, % solids, total organic carbon (TOC), and pyrethroids. Grain size results indicated that the sample was composed predominately of silt (74%), with 17% clay, and 9% sand, and with TOC percentage of 0.56. None of the nine pyrethroids were detected. The toxicity assay results demonstrated no significant effect to *Hyalella azteca* survival or growth.

##### *4.4.2.2.4 Sandia Creek Trend Site*

At the Sandia Creek trend site (SMC01097), the CSCI score indicated that the BMI community is *Likely Intact* (**Table A4-13**). The BMI community was distributed among several dominant species, the largest of which was the mayfly *Baetis* sp. (23% of the community), followed by the mayfly *Fallceon* sp. (10%), the true fly *Simulium* sp. (9%), and the mite *Atractides* sp. (9%). Low representation of non-insect taxa and a high diversity of predators and beetle taxa were signals of a high-quality BMI community. Highly sensitive BMI taxa collected included the stonefly *Malenka* sp. and the caddisfly *Agapetos* sp., as well as the sensitive species present at the condition site. CRAM results indicated moderate physical habitat quality (78) (**Table A4-13**). Clinger and intolerant taxa are an indicator of community completeness because their abundance tends to decrease in impaired waterbodies. The observed percentage of clinger taxa was near the predicted percentage (0.81), while the observed percentage of intolerant taxa was far below the predicted percentage (0.24). The diversity of taxa observed exceeded the taxa expected with an O/E score of 1.16. The algae community had IBI scores of 40 (soft algae), 46 (diatoms), and 49 (combined overall) (**Table A4-13**). All three scores were below the statistical boundary between reference and non-reference conditions.

Water chemistry results indicated that chloride, sulfate, and total nitrogen concentrations were above numeric WQOs. The remaining analyte concentrations were below WQOs, where applicable, although specific conductivity was elevated at 1,834 µS/cm (**Table A4-14**). Due to insufficient availability of fine-grained depositional material, sediment chemistry and toxicity were not analyzed.

Using the six monitoring years of available dry weather monitoring data at SMC01097, BMI metrics were compared to determine whether conditions are improving or declining in terms of the monitored constituents. CSCI scores were consistently high, representative of reference conditions, ranging from a minimum of 0.90 in 2017 to a maximum of 1.07 in the current year. The Shannon-Weiner Diversity Index ranged from a minimum of 2.22 in 2019, to 3.10 in 2015; the current year score of 2.90 is the median value. Total nitrogen was highest during the current monitoring year with a value of 6.6 milligrams per Liter (mg/L), compared to the minimum value of 3.6 mg/L in 2015. Total phosphorous was not detected in 2016 and 2017, and was observed at a maximum of 0.11 mg/L in 2018; the current year is a median value for the monitoring period (0.05 mg/L). The Algae IBI score ranged from a minimum of 24 (H20) in 2019 to a maximum of 64 (H20) in 2018; the current year is a median value for the monitoring period (49 Combined H20).

**Table A4-13. 2020 CSCI, CRAM, and Algal IBI Scores for SMC Bioassessment Monitoring**

| Station Code | Stream Name | Habitat | BMI | Algae |
|---|---|---|---|---|
| | | CRAM Score | CSCI Score | Algal IBI |
| 902M20301 | Santa Margarita River at Gavilan - Condition | 84<br>High | 0.83<br>Possibly Altered | S2: 22<br>D18: 58<br>H20: 45 |
| 902WE0888 | De Luz Creek - Trend | 63<br>Moderate | 0.92<br>Likely Intact | S2: 13<br>D18: 74<br>H20: 51 |
| 902M18917 | Sandia Creek - Condition | 89<br>High | 1.08<br>Likely Intact | S2: 30<br>D18: 60<br>H20: 56 |
| SMC01097 | Sandia Creek - Trend | 78<br>Moderate | 1.07<br>Likely Intact | S2: 40<br>D18: 46<br>H20: 49 |

BMI – benthic macroinvertebrate; CRAM – California Rapid Assessment Method; CSCI – California Stream Condition Index; IBI – Index of Biotic Integrity

CSCI scores indicate benthic communities that are very likely altered (scores of 0.00 to 0.62), likely altered (0.63 to 0.78), possibly altered (0.79 to 0.91), or likely intact (at least 0.92).

CRAM score is 25-100; <50 = low, 50-75 = moderate, >75 = high.

S2 = soft algae and cyanobacteria; D18 = diatoms; H20 = combined. IBI Score of 57 is the statistical boundary between reference and non-reference condition.

**Table A4-14. 2020 SMC Regional Monitoring Program Chemistry Results**

| Analyte | Units | Water Quality Objective | Objective Reference | Santa Margarita River at Gavilan - Condition | De Luz Creek - Trend | Sandia Creek - Condition | Sandia Creek - Trend |
|---|---|---|---|---|---|---|---|
| | | | | 902.22 | 902.21 | 902.22 | 902.22 |
| | | | | 902M20301 | 902WE0888 | 902M18917 | SMC01097 |
| | | | | 6/24/2020 | 6/3/2020 | 5/29/2020 | 5/29/2020 |
| **Physical Chemistry** | | | | | | | |
| Alkalinity (Field) | mg/L | NA | | 144 | 216 | NR | NR |
| Alkalinity (Lab) | mg/L | NA | | 150 | 220 | 230 | 210 |
| Dissolved Oxygen | mg/L | 6.0 (a) | Basin Plan | 9.34 | 9.73 | 9.01 | 9.10 |
| pH | pH units | 6.5-9.0 | Basin Plan | 8.03 | 7.57 | 8.39 | 8.14 |
| Salinity | ppt | NA | | 0.48 | 0.84 | 0.98 | 0.90 |
| Specific Conductivity | µS/cm | NA | | 974 | 1,494 | 1,925 | 1,834 |
| Turbidity | NTU | 20 | Basin Plan | 2.01 | 0.25 | 2.0 | 1.7 |
| Water Temperature | Celsius | NA | | 24.8 | 19.6 | 17.6 | 18.5 |
| **Periphyton** | | | | | | | |
| Ash-Free Dry Weight | g/m2 | NA | | 28.5 | 44 | 22 | 27.9 |
| Chlorophyll a | mg/m2 | NA | | 129 | 29.2 | 101 | 85.2 |
| **General Chemistry** | | | | | | | |
| Chloride | mg/L | 250 (a) | Basin Plan | 120 | 210 | 290 | 270 |
| Sulfate | mg/L | 250 (a) | Basin Plan | 170 | 280 | 360 | 350 |
| Total Hardness as CaCO3 | mg/L | NA | | 296 | 631 | 730 | 670 |
| Total Suspended Solids | mg/L | NA | | 5 | <1 | 3 | 3 |

**Table A4-14. 2020 SMC Regional Monitoring Program Chemistry Results**

| Analyte | Units | Water Quality Objective | Objective Reference | Santa Margarita River at Gavilan - Condition | De Luz Creek - Trend | Sandia Creek - Condition | Sandia Creek - Trend |
|---|---|---|---|---|---|---|---|
| | | | | 902.22 | 902.21 | 902.22 | 902.22 |
| | | | | 902M20301 | 902WE0888 | 902M18917 | SMC01097 |
| | | | | 6/24/2020 | 6/3/2020 | 5/29/2020 | 5/29/2020 |
| **Nutrients** | | | | | | | |
| Ammonia as N | mg/L | (b) | USEPA Freshwater Criteria | 0.013J | <0.012 | <0.044 | <0.044 |
| Nitrate + Nitrite as N | mg/L | 10 (c) | Basin Plan | 0.65 | 5.8 | 5.8 | 6.6 |
| Nitrate as N | mg/L | 10 (c) | Basin Plan | 0.65 | 5.8 | 5.8 | 6.6 |
| Nitrite as N | mg/L | 1 (c) | Basin Plan | <0.042 | <0.042 | 0.0095J | 0.014 |
| Orthophosphate as P | mg/L | NA | | 0.0064 | 0.0067 | <0.05 | <0.05 |
| Total Kjeldahl Nitrogen | mg/L | NA | | 0.34 | <0.018 | 0.18 | <0.093 |
| Total Nitrogen | mg/L | 1 | Basin Plan | 0.99 | 5.8 | 6.0 | 6.6 |
| Total Phosphorus | mg/L | 0.1 | Basin Plan | 0.027 | <0.012 | 0.05 | 0.05 |

< - Results less than the method detection limit.
NA indicates no criteria or published value was available or applicable to the matrix or program.
NR - Not required
(a) Water Quality Objective is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective on or before May 17, 2016) and may vary by hydrologic area.
(b) Water Quality Objective is based on the criterion continuous concentration (CCC) using water temperature and pH as described in the U.S. EPA, 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater, EPA-822-R-13-001, April 2013.
(c) Water Quality Objective is based on the MUN beneficial as described in the Basin Plan, 1994 (with amendments effective on or before May 17, 2016).
J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
Shaded results did not meet water quality objectives.

### 4.4.3 Total Maximum Daily Load Monitoring

The Rainbow Creek Nutrient TMDL (San Diego Water Board, 2005) became effective in February 2006. Compliance with the TMDL may be demonstrated via one of five compliance pathways identified in Attachment E.3 of the Permit, including meeting final receiving water limitations (RWLs). During 2019-2020, monitoring in compliance with the Rainbow Creek Nutrient TMDL was conducted at the locations shown in **Figure A4-6**. Eleven locations are in the receiving water, while HST01 is an MS4 outfall and HST02 is a location that flows to the HST01 outfall. Methodology is described in the *Sampling and Analysis Plan for Rainbow Creek Nutrient Reduction TMDL Implementation Water Quality Monitoring* (County of San Diego Department of Public Works Watershed Protection Program, 2010) and the *Quality Assurance Project Plan, Rainbow Creek Watershed TMDL and MS4 Water Quality Monitoring Program* (WESTON, 2020a). Detailed results are provided in the 2019-2020 Rainbow Creek Nutrient TMDL Monitoring Report (WESTON, 2020b) provided as **Attachment 4C**.

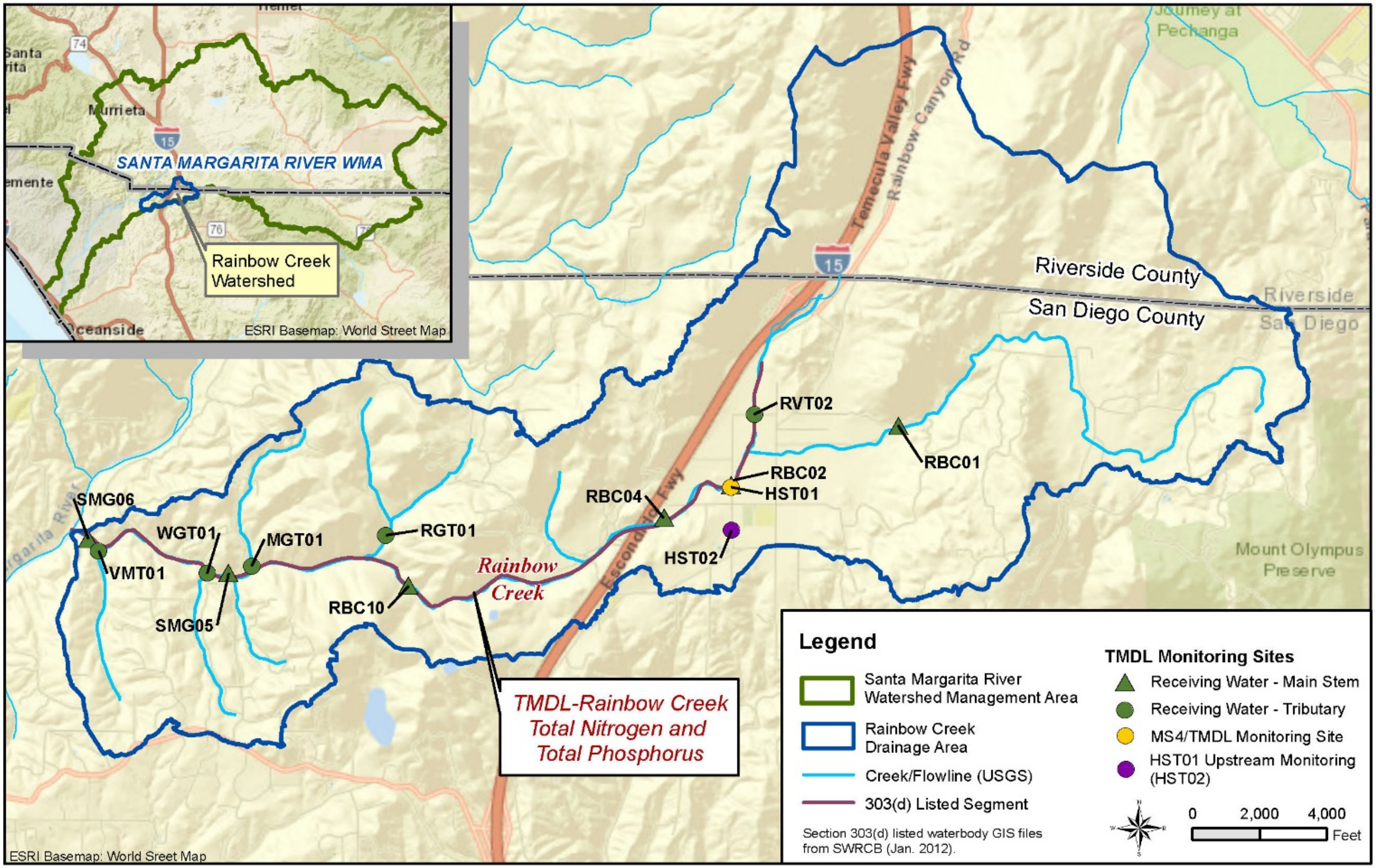



**Figure A4-6. Rainbow Creek Nutrient TMDL Compliance Monitoring Locations**

Concentrations of total nitrogen were above the RWL of 1 mg/L in all but two of the 107 samples collected as part of the Rainbow Creek TMDL Monitoring Program in the 2019-2020 monitoring year. Ninety-three of the 107 samples collected during 2019-2020 were above the total phosphorus RWL of 0.1 mg/L. The highest mean concentration of total nitrogen on the main stem of Rainbow Creek was measured at RBC02 (at Huffstatler Road), followed by RBC04 (at Old Highway 395). The highest total phosphorus mean concentrations on the main stem were found at RBC10 (at MWD Crossing), followed by RBC04 (at Old Highway 395). The lowest mean concentrations for total nitrogen and total phosphorus on the main stem were measured at RBC01 (Jubilee Way) and SMG06 (at Stage Coach Lane). These results may indicate that nutrients were added to the system downstream of RBC01 (Jubilee Way) and upstream of RBC02 (at Huffstatler Road).

In tributaries to Rainbow Creek, the highest mean concentrations of total nitrogen and total phosphorus were observed at RVT02 (Chica Tributary). This tributary enters Rainbow Creek downstream of RBC01 (Jubilee Way) and just upstream of RBC02 (at Huffstatler Road).

Statistically significant increasing trends in total nitrogen concentrations were evident at four of the six monitoring locations along the main stem of Rainbow Creek as shown in **Table A4-15**. A significant trend was not detected for total nitrogen at RBC01 (Jubilee Way) or SMG06 (at Stage Coach Lane). Of the five tributary monitoring locations, four of the sites were determined to have significant decreasing trends for total nitrogen and one site, RVT02 (Chica Tributary) was found to have a significant increasing trend in total nitrogen. Data collected at other TMDL stations, HST01 (outfall) and HST02 (location upstream of HST01 outfall) indicated increasing trends for total nitrogen.

For total phosphorus concentrations, four of the main stem locations had statistically significant decreasing trends. A significant trend was not identified for RBC01 (Jubilee Way) nor RBC10 (at MWD Crossing). Among the tributary locations, only one significant trend for total phosphorus concentrations was identified, a decreasing trend at Chica Tributary (RVT02). Significant increasing trends in total phosphorus were identified at stations HST01 and HST02.

**Table A4-15. Rainbow Creek Nutrient TMDL Monitoring Trend Analysis Results**

| Site ID | Description | Statistically Significant Trends | |
|---|---|---|---|
| | | Total Nitrogen | Total Phosphorus |
| **Main Stem** | | | |
| RBC01 | Rainbow Creek at Jubilee Way | No Trend Identified | |
| RBC02 | Rainbow Creek at Huffstatler Road | ▲ | ▼ |
| RBC04 | Rainbow Creek at Old Highway 395 | ▲ | ▼ |
| RBC10 | Rainbow Creek at MWD Crossing | ▲ | No Trend Identified |
| SMG05 | Rainbow Creek at Willow Glen Road | ▲ | ▼ |
| SMG06 | Rainbow Creek at Stage Coach Lane | No Trend Identified | ▼ |
| **Tributary** | | | |
| RVT02 | Chica Tributary at 1st Street | ▲ | ▼ |
| RGT01 | Rainbow Glen Tributary to Rainbow Creek | ▼ | No Trend Identified |
| MGT01 | Margarita Glen Tributary to Rainbow Creek | ▼ | No Trend Identified |
| WGT01 | Willow Glen Tributary at Willow Glen Road | ▼ | No Trend Identified |
| VMT01 | Via Milpas Tributary to Rainbow Creek | ▼ | No Trend Identified |
| **Other TMDL Compliance Monitoring Locations** | | | |
| HST01 | Brow Ditch to Rainbow Creek at Huffstatler Road | ▲ | ▲ |
| HST02 | Brow Ditch to Rainbow Creek at Huffstatler Road | ▲ | ▲ |

▲ indicates an increasing trend (potential declining water quality)
▼ indicates a decreasing trend (potential improving water quality)

### 4.4.4 Hydromodification Monitoring at the Long-Term Receiving Water Station

During the 2019-2020 monitoring year, hydromodification monitoring was conducted at SMR-MLS-2 in accordance with the WQIP MAP schedule and Provision D.1.c.(6) of the Permit.[10] The LTRW station is shown in **Figure A4-2** in **Section 4.4.1**. The hydromodification assessment Reach locations are shown in **Figure A4-7**. There are no major storm drain outfalls located near the hydromodification assessment domain of analysis. Reach 1 was located in proximity to the SMR-MLS-2 station and Reach 2 was approximately 600 feet (ft) upstream of Reach 1. Reach 3 was approximately 1,150 ft downstream of Reach 1 and coincided with the dry weather receiving water bioassessment monitoring site. Channel accessibility and safety concerns were factors in the placement of the monitored reaches.

[10] Hydromodification monitoring at the Middle and Upper SMR Subwatershed LTRW stations will be conducted during the 2020-2021 monitoring year.

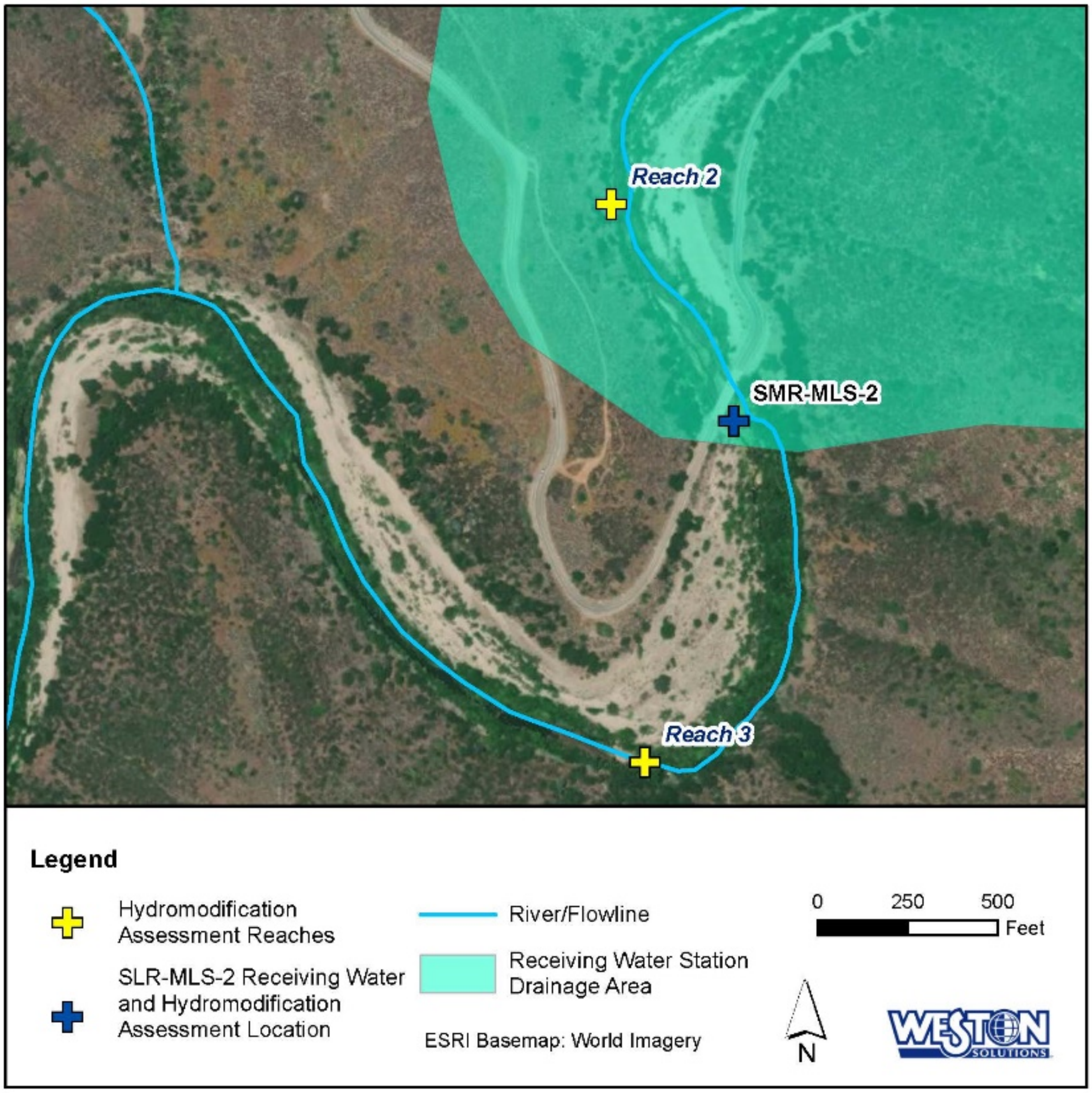



**Figure A4-7. Hydromodification Monitoring Reach Locations at SMR-MLS-2**

The SCCWRP channel assessment tool was employed to perform a rapid assessment of the relative susceptibility of the monitored reaches to effects of hydromodification. The field screening tool uses a series of decision trees, checklists, and tables with calculations to arrive at determinations of vertical and lateral susceptibility. The results of this process for SMR-MLS-2 are presented in **Table A4-16**. The screening tool data and photographs are provided in **Attachment 4A-5**. The geomorphic assessment results indicated that these reaches were all were in labile bed states and had very high vertical susceptibilities (i.e., susceptibility of channel to deepening). The very high vertical susceptibility results from the SCCWRP channel assessment tool were driven by a combination of sand dominated bed material, which has little resistant substrate, and by lack of effective grade control. All reaches were determined to have a labile bed with no grade control, causing the highest vertical susceptibility scores of Very High to be assigned. Reach 1 was located downstream of the De Luz Road overpass and is experiencing active formation of a chute cutoff; the channel bifurcates and has split a significant portion of flow onto a historical floodplain. The Valley Width Index (VWI) causes a lateral susceptibility rating of High to be assigned to Reach 1. Reach 2 was bound on the right bank by a protrusion of bedrock and directly attached to the hillslope, and the left bank was confined by a moderately well-consolidated bank with an armoring vegetative layer. The resistant bedrock bank and moderately resistant left bank caused Reach 2 to be assessed as having a medium lateral susceptibility. Reach 3 was bound on the left bank by a protrusion of bedrock but had greater lateral susceptibility on the right bank with the ability to migrate laterally onto the current floodplain which indicates High lateral susceptibility. The geomorphic results indicate a moderate to high potential for changes to the lateral form or bank composition of the channel. Physical habitat quality results were assessed using CRAM (Collins et al, 2012) and are presented in **Section 4.4.2.1**.

The SCCWRP channel assessment tool does not evaluate current conditions in terms of attribution to historic land-use practices. It should be noted that this tool assesses proximity to geomorphic thresholds delineated using field data from small watersheds in Southern California. The tool focuses on small watersheds because the majority of larger streams in the region have been substantially altered in form and/or flow (Bledsoe et al., 2010). The receiving water channel near SMR-MLS-2 is a high gradient reach that receives almost all of the flow from the Santa Margarita River Watershed, with a drainage area of more than 163,200 acres to SMR-MLS-2. The SCCWRP channel assessment tool may need to be revised or a new tool may need to be developed to better assess large developed watersheds in order to make management decisions.

Based on the WQIP MAP schedule, the District, on behalf of the Riverside Copermittees, will complete long-term receiving water hydromodification monitoring during the 2020-2021 monitoring year.

**Table A4-16. Hydromodification Monitoring Summary**

| Location | Description | Latitude | Longitude | d50 (mm) | % Sand | Incision/ Braiding Risk | Vertical Suscepti -bility | Lateral Suscepti -bility |
|---|---|---|---|---|---|---|---|---|
| SMR-MLS-2 Reach 1 | SMR-MLS-2 receiving water monitoring station | 33.39782 | -117.26267 | 2 | 64 | >50 | Very High | High |
| SMR-MLS-2 Reach 2 | Approximately 600 feet upstream of SMR-MLS-2 | 33.39948 | -117.26377 | 2 | 92 | >50 | Very High | Medium |
| SMR-MLS-2 Reach 3 | Approximately 1150 feet downstream of SMR-MLS-2 | 33.39522 | -117.26350 | 2 | 82 | >50 | Very High | High |

### 4.4.5 Receiving Water Monitoring Assessments

Receiving water monitoring was conducted in the SMR WMA during 2018-2019. Long-term receiving water monitoring requirements for wet weather were completed at two of the three LTRW stations, providing long-term receiving water data for the Lower SMR Subwatershed and Middle SMR Subwatershed during three events. Five mobilizations were conducted for wet weather monitoring at the LTRW station in the Upper SMR Subwatershed, but there was no surface flows observed and water quality samples could not be collected. Dry weather monitoring requirements were completed for the Lower SMR Subwatershed LTRW station. Dry weather monitoring for the Middle and Upper SMR Subwatersheds is to be performed during the 2020-2021 monitoring year in accordance with the schedule in the WQIP. Other programs providing receiving water data include participation in the SMC Regional Monitoring Program and TMDL monitoring in compliance with the Rainbow Creek Nutrient TMDL. Receiving water results collected under these programs were summarized in **Sections 4.4.1** through **4.4.4** and in the documents attached to this Appendix.

The receiving water assessments required by Permit Provision D.4.a were addressed in the Regional Monitoring and Assessment Report (RMAR), which was submitted to the San Diego Water Board in December 2017 with the Report of Waste Discharge (ROWD) in accordance with Provision D.4.a.(1)(b). However, assessments that are reliant on receiving water data collected under an accepted WQIP and MAP were not addressed in the RMAR because the WQIP was in development at the time, and long-term receiving water monitoring data had not yet been collected under the accepted WQIP MAP. Collection of long-term receiving water monitoring data is now underway, with a portion completed during the 2019-2020 monitoring year. The required assessments will be conducted once the complete set of long-term receiving water data have been collected at the LTRW stations pursuant to the schedule of the WQIP MAP. The Riverside County Copermittees are proactively addressing a data gap for the Upper SMR Subwatershed. The Wilson Creek LTRW station is intended to provide receiving water data for this subwatershed. Five attempts were made during the 2019-2020 monitoring year to monitor this station during wet weather, and none of these storms produced surface flows. As a result, the District initiated a modeling study to identify mobilization criteria specific to this LTRW station. A technical memorandum has been prepared and is provided in **Attachment 4I**. The Riverside County Copermittees will make additional attempts to monitor the Wilson Creek LTRW station in the 2020-2021 monitoring year.

## 4.5 MS4 Outfall Monitoring

As part of the WQIP process, the Copermittees have developed a program to monitor discharges from MS4 outfalls during dry and wet weather that meets the requirements of Provisions D.2.b and D.2.c of the Permit. The purpose of MS4 outfall monitoring is to evaluate the potential impacts from MS4 outfall discharges on the beneficial uses of a waterbody during dry and wet weather conditions. Under dry conditions, the program is also used to assess the ability of jurisdictional and watershed programs to effectively eliminate non-stormwater discharges to receiving waters. The data generated are used to identify persistently flowing outfalls, pollutants in discharges, guide pollutant source identification and non-stormwater discharge elimination efforts, and track progress toward achieving numeric goals set forth in the WQIP.

During the 2013-2014 monitoring year, an inventory of major MS4 outfalls discharging directly to a receiving water was developed by the County of San Diego in accordance with Provision D.2.a.(1) of the Permit, and refinements have been made since that time. The Riverside County Copermittees began developing their major MS4 outfall inventory specific to the Permit requirements during the 2016-2017 monitoring year, following their enrollment under the Permit. Therefore, the 2019-2020 monitoring year was the fourth year of MS4 outfall monitoring for the Riverside County Copermittees and the seventh for the County of San Diego.

During 2019-2020, one outfall was added to the inventories for the City of Murrieta, County of Riverside, County of San Diego and eight outfalls were added to the District's inventory. No major outfalls have been identified in the Upper SMR Subwatershed within either Riverside or San Diego County.

The number of major outfalls monitored by monitoring program element and Copermittee is provided in **Table A4-17**. In accordance with Provision D.2.b.(1) of the Permit, Copermittees with fewer than 125 major MS4 outfalls in their inventory, which includes each of the Copermittees in the SMR WMA, must conduct field screening at 80% of these major outfalls twice per monitoring year (October 1st through September 30th). The number of major outfalls monitored per year is subject to change based on new information, updates to outfall inventories, changes in transient or persistent flow classifications, and/or changes or updates to the PWQCs.

**Table A4-17. Number of Major MS4 Outfalls for Monitoring per Copermittee**

| Copermittee | Field Screening (Provision D.2.b(1))* | Dry Weather Monitoring (Provision D.2.b(2)) | Wet Weather Monitoring (Provision D.2.c) |
|---|---|---|---|
| City of Murrieta | 32 | 5 | 1 |
| City of Temecula | 119 | 5 | 1 |
| City of Wildomar | 13 | 5 | 1 |
| County of Riverside | 8 | 5 | 1 |
| County of San Diego | 14 | 5 | 1 |
| District | 90 | 5 | 1 |

*Includes all major outfalls in inventory. Some may be inaccessible.

Program descriptions, monitoring results, and assessments for MS4 outfall monitoring conducted during 2019-2020 are presented in the following subsections. Methodology is described in greater detail in the WQIP MAP.

### 4.5.1 Dry Weather Field Screening and Outfall Prioritization

Dry weather field screening is visual monitoring of major MS4 outfalls as outlined in Table D-5 of the Permit. Field screening is conducted to identify non-stormwater and illicit discharges, determine which discharges are transient and which are persistent, and prioritize those discharges that will be investigated and eliminated. This program is designed to assess the effectiveness of jurisdictional programs to effectively prohibit non-stormwater discharges. Each Copermittee performs field screening of a certain number of major MS4 outfalls on an annual basis (e.g., typically an effort equivalent to visiting at least 80% of their outfall inventory twice per year) to maintain an up-to-date inventory of persistently flowing outfalls and to initiate follow-up investigations that identify and mitigate the source(s). The data collected during field screening are one of the sources of information for the Copermittees' Illicit Discharge Detection and Elimination (IDDE) Program (see **Section 4.5.4**). Highest priority persistent flow monitoring in Riverside County was conducted during separate visits to outfalls providing additional field screening results at the highest priority outfalls. The County of San Diego conducts additional visits to outfalls for other projects, which provides supplemental flow observations and are shown in a separate column (**Table A4-18**). Dry weather field screening records are provided as **Attachment 4D**. California Environmental Data Exchange Network (CEDEN) data submittals can be found in **Attachment 4J**.

The number of major MS4 outfall stations included in dry weather field screening and the total number of visual observations conducted by each Copermittee in the WMA during 2019-2020 are shown in **Table A4-18**. Some source investigations were conducted as separate follow-up visits and are included in the source investigations column. Other investigations were performed during routine visits and are included in the routine visits column and the source investigations column will list "NA."

**Table A4-18. Number of Visual Observations Conducted During the 2019-2020 Monitoring Year at Major MS4 Outfalls**

| Copermittee | Number of Major MS4 Outfalls or Proxy Locations Visited | Number of Routine Visits[1] | Number of Source Investigations[2] | Number of Additional Visits for Other Projects |
|---|---|---|---|---|
| City of Murrieta | 32 | 71 | 0[3] | - |
| City of Temecula | 102 | 204 | 0[3] | - |
| City of Wildomar | 11 | 25 | 10 | - |
| County of Riverside | 8 | 25 | 0 | - |
| County of San Diego | 14 | 28 | 4[4] (24 locations) | 175 |
| District | 90 | 174 | 113[5] | - |

1 - Copermittees with < 125 major outfalls in WMA; at least 80% of major outfalls must be screened twice per year. Includes additional field screening (visual observations) recorded during separate high priority persistent flow monitoring visits.
2 – Visual Observations of sources are also recorded during routine visits and persistent flow monitoring events, which are not included in these counts. These counts do not include visits for other IDDE program activities.
3 – In lieu of upstream investigations at high priority outfalls, the City of Murrieta and City of Temecula sent notification letters with public education pamphlets to residential HOAs and commercial POAs to compel these HOAs and POAs to take the lead with eliminating dry weather flows throughout the communities they serve.
4 – 5 upstream source investigations were initiated. HST01 was dry during IDDE visit, so no further upstream activities were conducted. Therefore, 4 source investigations were completed.
5 – Additional Visits to District Outfalls 1025, 1032, 1037, 1060, 1061 in response to NAL exceedances on May 12-14, 2020.

Copermittees recorded numerous visual observations regarding outfall and flow characteristics including the following:

- Flow conditions (flowing [including trickle flow, where applicable], ponded, or dry);
- Whether or not the flow reached the receiving water;
- Whether or not there was a non-stormwater flow source;

- Potential non-stormwater sources;
- Whether the flow source was eliminated;
- Evidence of obvious illegal connection and illicit discharge (IC/ID);
- Whether trash was present and relative amount;
- Whether there was evidence of illegal dumping.

The complete set of visual observations recorded during dry weather field screening visits is provided in **Attachment 4D**. CEDEN data submittals can be found in **Attachment 4J**. The field screening trash assessment results are summarized in **Table A4-21**. There was no trash (a PWQC in portions of the WMA) present during 46% of the visits.

**Table A4-19. Dry Weather Field Screening Trash Assessments**

| Copermittee | HSA No. | No Trash Present | Trash Present |
|---|---|---|---|
| **Upper SMR Subwatershed** | | | |
| *No major outfalls identified* | | | |
| **Middle SMR Subwatershed** | | | |
| City of Murrieta | 902.31 | 0 | 8 |
| | 902.32 | 6 | 19 |
| | 902.33 | 4 | 24 |
| **Subtotal** | | **10** | **51** |
| City of Temecula | 902.32 | 50 | 25 |
| | 902.42 | 32 | 13 |
| | 902.51 | 26 | 14 |
| | 902.52 | 9 | 3 |
| **Subtotal** | | **117** | **55** |
| City of Wildomar | 902.31 | 1 | 2 |
| | 902.32 | 12 | 6 |
| **Subtotal** | | **13** | **8** |
| County of Riverside | 902.33 | 4 | 9 |
| | 902.41 | 0 | 4 |
| | 902.51 | 1 | 4 |
| **Subtotal** | | **5** | **17** |
| District | 902.31 | 25 | 13 |
| | 902.32 | 14 | 12 |
| | 902.33 | 11 | 10 |
| | 902.41 | 2 | 8 |
| | 902.42 | 10 | 17 |
| | 902.51 | 8 | 28 |
| | 902.52 | 1 | 4 |

**Table A4-19. Dry Weather Field Screening Trash Assessments**

| Copermittee | HSA No. | No Trash Present | Trash Present |
|---|---|---|---|
| **Subtotal** | | **71** | **92** |
| **Lower SMR Subwatershed** | | | |
| County of San Diego | 902.13 | 4 | 27 |
| | 902.22 | 2 | 0 |
| | 902.23 | 7 | 18 |
| **Subtotal** | | **13** | **45** |
| **Grand Total** | | **229** | **268** |

A summary of the flow conditions (i.e., flowing, trickle flow, ponded, or dry) at the major MS4 outfall stations during the 2019-2020 field visits is shown in **Figure A4-8**, where the stacked bars represent the number of observations in each flow category by Copermittee. The category of trickle flow used by the Riverside Copermittees identifies low flow that cannot be directly measured and is estimated to be < 0.01 cfs or < 0.001 cfs depending on field conditions. Given that outfalls are visited more than once, the number of observations is greater than the number of MS4 outfalls monitored.

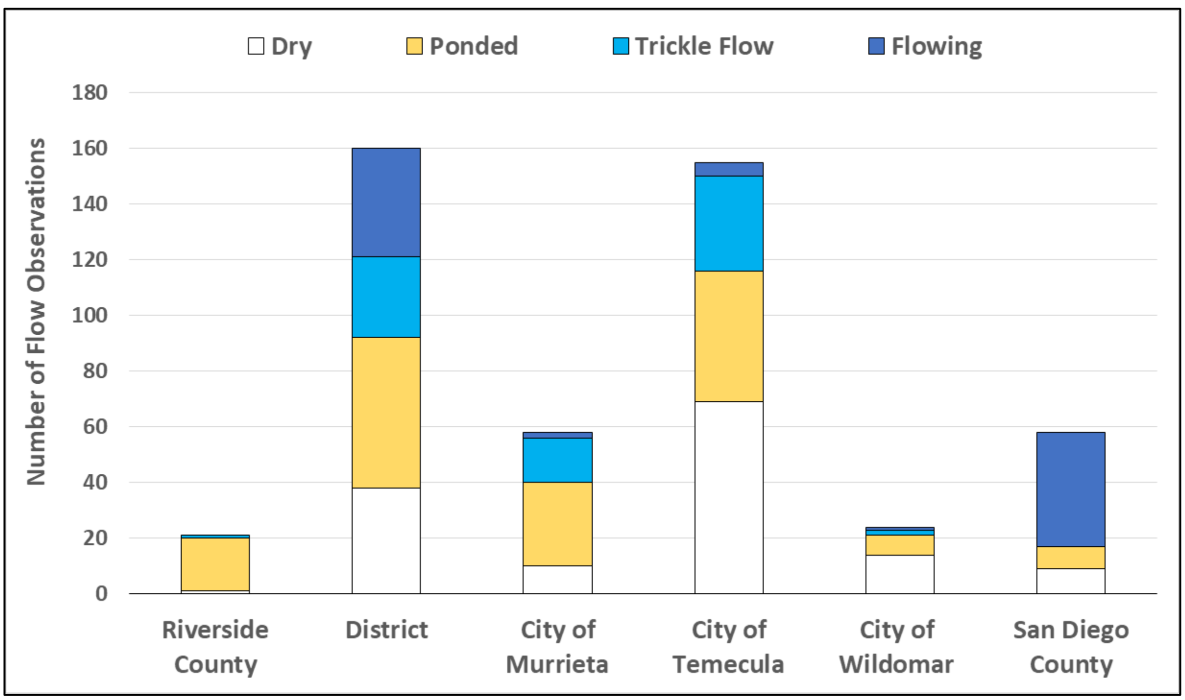



**Figure A4-8. Dry Weather Field Screening Flow Observations at Major MS4 Outfall Stations**

During dry weather field screening, Copermittees measured or estimated flow rates at stations where flow was present, as required by Table D.5 of the Permit. Sixty-four % of observations (306 of 476) indicated no flow (dry or pooled/ponded conditions). Some flow observations were noted as a trickle, and not all of these flows were measurable. Of the observations where flows could be estimated, 58% (95 observations) had estimated flows less than one gallon per minute (gpm[11]). A summary of flow estimations is presented in **Figure A4-9**.

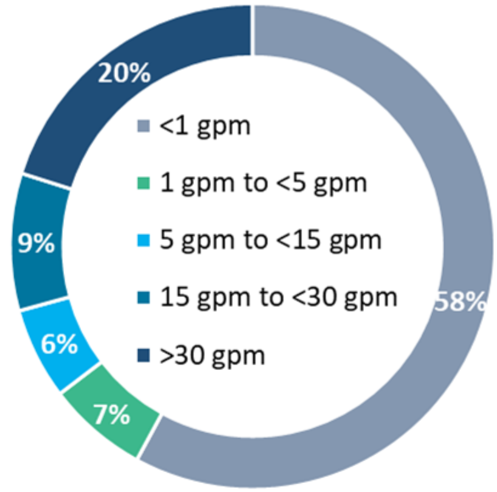



**Figure A4-9. Flow Rate Estimations Based on Visual Observations at Major MS4 Outfalls**

Where an illicit discharge is observed during dry weather field screening, follow-up investigations are performed to locate the source and eliminate the discharge. When flow sources are known based on historical data, this information is listed on the field sheet and the upstream area is briefly checked for additional sources. In cases where discharges are observed, but no obvious illicit discharge was identified as the source, appropriate documentation is recorded, and the locations are prioritized for follow-up.

Based on these field screening visits and available historical data, the Copermittees determined the flow status of each major MS4 outfall as persistent, transient, dry, or undetermined at the completion of the monitoring year. As defined in the Permit, flow status for a given outfall is dry if no flowing or standing water is observed at the outfall over the three most recent visits, and persistent flow is defined as presence of flowing or standing water for the three most recent visits. Otherwise, the outfall status is classified as transient. Outfalls with unknown flow status are inaccessible. The number of MS4 outfalls in each category is shown in **Table A4-20**. Flow determinations are shown in **Figure A4-10**.

[11] In the field, flow is generally measured in cubic feet per second (cfs). One cfs = 449 gallons per minute (gpm).

**Table A4-20. 2019-2020 Dry Weather Flow Determinations for Major MS4 Outfalls**

| Copermittee | HSA | Persistent | Transient | Dry/ No-Flow | Undetermined | Grand Total |
|---|---|---|---|---|---|---|
| **Upper SMR Subwatershed** | | | | | | |
| *No major outfalls identified* | | | | | | |
| **Middle SMR Subwatershed** | | | | | | |
| City of Murrieta | 902.31 | 2 | 0 | 0 | 0 | 2 |
| | 902.32 | 6 | 5 | 3 | 0 | 14 |
| | 902.33 | 6 | 8 | 2 | 0 | 16 |
| **SUB-TOTAL** | | **14** | **13** | **5** | **0** | **32** |
| City of Temecula | 902.32 | 27 | 18 | 19 | 2 | 66 |
| | 902.42 | 16 | 2 | 6 | 0 | 24 |
| | 902.51 | 10 | 9 | 2 | 0 | 21 |
| | 902.52 | 1 | 3 | 4 | 0 | 8 |
| **SUB-TOTAL** | | **54** | **32** | **31** | **2** | **119** |
| City of Wildomar | 902.31 | 0 | 1 | 3 | 1 | 5 |
| | 902.32 | 3 | 3 | 2 | 0 | 8 |
| **SUB-TOTAL** | | **3** | **4** | **5** | **1** | **13** |
| County of Riverside | 902.33 | 3 | 1 | 0 | 0 | 4 |
| | 902.41 | 2 | 0 | 0 | 0 | 2 |
| | 902.51 | 1 | 0 | 1 | 0 | 2 |
| **SUB-TOTAL** | | **6** | **1** | **1** | **0** | **8** |
| District | 902.31 | 6 | 6 | 8 | 0 | 20 |
| | 902.32 | 9 | 4 | 1 | 0 | 14 |
| | 902.33 | 8 | 6 | 0 | 0 | 14 |
| | 902.34 | 1 | 0 | 0 | 0 | 1 |
| | 902.41 | 2 | 1 | 1 | 0 | 4 |
| | 902.42 | 11 | 3 | 1 | 0 | 15 |
| | 902.51 | 16 | 2 | 1 | 0 | 19 |
| | 902.52 | 3 | 0 | 0 | 0 | 3 |
| **SUB-TOTAL** | | **56** | **22** | **12** | **0** | **90** |
| **Lower SMR Subwatershed** | | | | | | |
| County of San Diego | 902.13 | 1 | 5 | 2 | 0 | 8 |
| | 902.22 | 4 | 1 | 0 | 0 | 5 |
| | 902.23 | 0 | 0 | 1 | 0 | 1 |
| **SUB-TOTAL** | | **5** | **6** | **3** | **0** | **14** |
| **GRAND TOTAL** | | **138** | **78** | **57** | **3** | **276** |

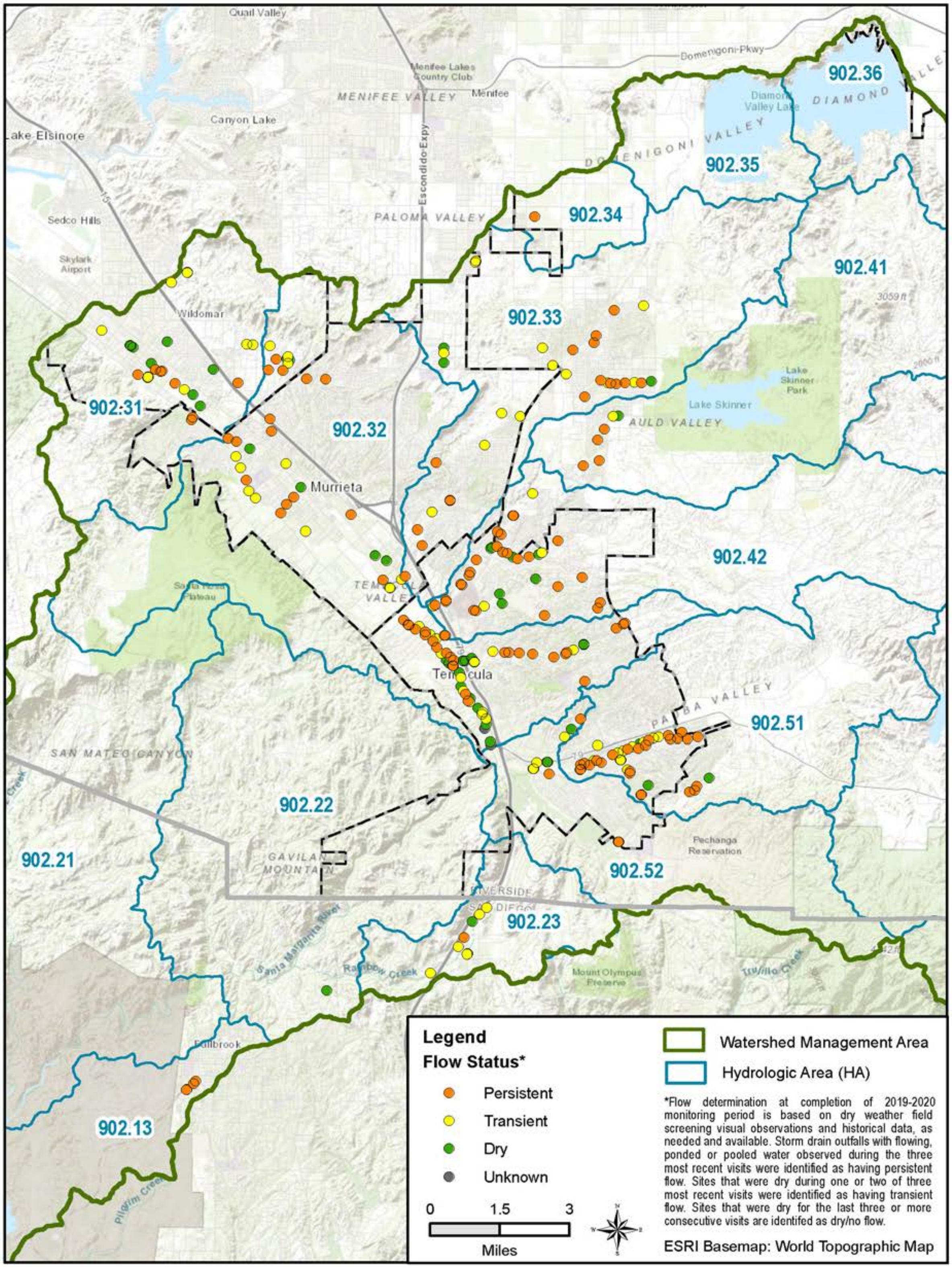



**Figure A4-10. Dry Weather Flow Determinations for Major MS4 Outfalls**

Copermittees prioritize persistently flowing MS4 outfalls based on their potential to contribute to the HPWQC (i.e., nutrients), and other pertinent factors such as safety conditions and site accessibility. In cases where less than five persistently flowing outfalls were identified, the next highest priority transient outfall was selected. Thirty highest priority MS4 outfall discharge monitoring stations (five for each Copermittee) were identified in the WQIP. Since the submittal of the WQIP, the Riverside Copermittees and the County of San Diego have adjusted their selection of highest priority outfalls, and changes are documented in **Appendix 5** of the 2018-2019 WQIP Annual Report and in this 2019-2020 WQIP Annual Report. The list of prioritized outfalls is maintained and updated as program implementation develops and additional monitoring occurs.

### 4.5.2 Highest Priority Dry Weather MS4 Outfall Discharge Monitoring

The purpose of the highest priority dry weather MS4 outfall discharge monitoring is to evaluate the potential contribution from MS4 outfall discharges to receiving water quality during dry weather conditions and to assess the ability of programs to effectively eliminate non-stormwater discharges to waterbodies or waterways. The 2019-2020 monitoring year was the second year of this sampling under the WQIP MAP, although the County of San Diego began conducting analytical monitoring during the 2017-2018 monitoring year. Sampling was conducted at the highest priority outfalls identified for each jurisdiction in the WMA (**Table A4-21, Figure A4-11**) between May 7 and August 31, 2020. Of the 30 outfalls visited for highest priority persistent flow discharge monitoring, 23 were dry, ponded, or there was insufficient flow to sample during one or both monitoring events. Of the 60 outfall events (30 outfalls monitored twice), 41 resulted in a VNS result due to lack of measurable flow,[12] as follows: 29 outfall events were ponded, 7 had trickle flow too low to sample, and 5 were dry. **Table A4-21** provides the sampling event dates for each outfall, the number of events that were VNS, and the number of events where a sample was collected. In-situ measurements were taken for pH, temperature, conductivity, dissolved oxygen, and turbidity. Grab samples were collected and analyzed for constituents contributing to the HPWQC, 2014/2016 303(d) List impairments, TMDLs, NALs, and those listed in Table D-7 of the Permit. Grab samples were also collected from receiving waters to which the sampled outfalls were discharging (County of San Diego) or a historical dry weather average from the LTRW station was used (Riverside Copermittees). These samples were analyzed for total hardness, a measurement needed to compare concentrations of metals to hardness-dependent NALs. Visual observations were also recorded.

Analytical results are provided in **Table A4-22** for the Riverside County Copermittees and **Table A4-23** for the County of San Diego. Results are compared to NALs as provided in the Permit. In accordance with Table C-4 of the Permit, indicator bacteria concentrations are compared to instantaneous maximum value (IM) NALs. The remaining constituent concentrations, including general and physical chemical constituents, nutrients, and total and dissolved metals, are compared to Maximum Daily Action Level (MDAL) NALs. NALs for total nitrogen (1.0 mg/L) and total phosphorus (0.1 mg/L) are the same concentrations as the numeric targets given in the Rainbow Creek Nutrient TMDL. Result summaries note where exceedances involve HPWQC or PWQC constituents identified in the WMA. However, the outfall may not discharge to the particular geographic area for which the HPWQC or PWQC has been identified. Laboratory and field data will be uploaded to CEDEN, and data submittals are provided in **Attachment 4J**.

[12] Per Provision D.2.b.(2)(e), samples are collected when there is measurable flow.

Highest priority outfalls were a specific focus for IDDE investigations during the 2019-2020 monitoring year. The results from these investigations are presented in **Section 4.5.4.2**.

**Table A4-21. Highest Priority Outfalls during the 2019-2020 Monitoring Year**

| Copermittee | HSA | Outfall | Latitude (NAD83) | Longitude (NAD83) | Dates Monitored | | Events VNS[1] | Events Sampled |
|---|---|---|---|---|---|---|---|---|
| City of Murrieta | 902.33 | 902MS44030 | 33.533058 | -117.176415 | 5/14/2020 | 8/27/2020 | 2 Ponded | 0 |
| | 902.33 | 902MS44038 | 33.556767 | -117.159943 | 5/12/2020 | 8/27/2020 | 2 Ponded | 0 |
| | 902.33 | 902MS44039 | 33.556694 | -117.159965 | 5/12/2020 | 8/27/2020 | 2 Ponded | 0 |
| | 902.32 | 902MS44062 | 33.552029 | -117.196884 | 5/12/2020 | 8/26/2020 | 2 Ponded | 0 |
| | 902.32 | 902MS44063 | 33.552029 | -117.196884 | 5/12/2020 | 8/26/2020 | 1 Trickle | 1 |
| | | | | | | | | |
| District | 902.32 | 902MS41060 | 33.59446 | -117.21375 | 5/12/2020 | 8/26/2020 | 0 | 2 |
| | 902.42 | 902MS41025 | 33.5241 | -117.1651 | 5/13/2020 | 8/27/2020 | 0 | 2 |
| | 902.42 | 902MS41032 | 33.5521 | -117.1361 | 5/12/2020 | 8/27/2020 | 0 | 2 |
| | 902.41 | 902MS41037 | 33.568 | -117.1104 | 5/14/2020 | 8/27/2020 | 0 | 2 |
| | 902.32 | 902MS41061 | 33.5943 | -117.2066 | 5/12/2020 | 8/26/2020 | 0 | 2 |
| | | | | | | | | |
| Riverside County | 902.41 | 902MS42207 | 33.576133 | -117.105133 | 5/14/2020 | 8/31/2020 | 2 Ponded | 0 |
| | 902.33 | 902MS42211 | 33.593917 | -117.100483 | 5/14/2020 | 8/31/2020 | 2 Ponded | 0 |
| | 902.33 | 902MS42235 | 33.606533 | -117.10695 | 5/12/2020 | 8/31/2020 | 2 Ponded | 0 |
| | 902.33 | 902MS42236 | 33.606533 | -117.10695 | 5/12/2020 | 8/31/2020 | 2 Ponded | 0 |
| | 902.51 | 902MS42245 | 33.466433 | -117.069717 | 5/13/2020 | 8/27/2020 | 2 Ponded | 0 |
| | | | | | | | | |
| City of Temecula | 902.32 | 902MS43038 | 33.509566 | -117.115947 | 5/13/2020 | 8/27/2020 | 1 Trickle | 1 |
| | 902.42 | 902MS43120 | 33.530492 | -117.155168 | 5/13/2020 | 8/27/2020 | 2 Trickle | 0 |
| | 902.52 | 902MS43082 | 33.471773 | -117.122115 | 5/13/2020 | 8/27/2020 | 1 Ponded, 1 Trickle | 0 |
| | 902.42 | 902MS43119 | 33.525695 | -117.161120 | 5/13/2020 | 8/27/2020 | 2 Trickle | 0 |
| | 902.42 | 902MS43123 | 33.533461 | -117.152525 | 5/13/2020 | 8/27/2020 | 2 Ponded | 0 |
| | | | | | | | | |

**Table A4-21. Highest Priority Outfalls during the 2019-2020 Monitoring Year**

| Copermittee | HSA | Outfall | Latitude (NAD83) | Longitude (NAD83) | Dates Monitored | | Events VNS[1] | Events Sampled |
|---|---|---|---|---|---|---|---|---|
| **City of Wildomar** | 902.32 | 902MS45012 | 33.597012 | -117.228161 | 5/12/2020 | 8/26/2020 | 1 Ponded, 1 Dry | 0 |
| | 902.32 | 902MS45015 | 33.600562 | -117.225093 | 5/13/2020 | 8/26/2020 | 2 Ponded | 0 |
| | 902.32 | 902MS45019 | 33.601411 | -117.22081 | 5/13/2020 | 8/26/2020 | 1 Ponded, 1 Dry | 0 |
| | 902.31 | 902MS45024 | 33.605061 | -117.233763 | 5/12/2020 | 8/26/2020 | 2 Dry | 0 |
| | 902.32 | 902MS45026 | 33.597109 | -117.222806 | 5/12/2020 | 8/26/2020 | 2 Ponded | 0 |
| | | | | | | | | |
| **County of San Diego** | 902.23 | HST01 | 33.41506 | -117.15202 | 5/7/2020 | 7/13/2020 | 0[2] | 2 |
| | 902.13 | MS4-SMG-015 | 33.37476 | -117.25261 | 5/7/2020 | 7/13/2020 | 0 | 2 |
| | 902.13 | MS4-SMG-021 | 33.37477 | -117.25259 | 5/7/2020 | 7/13/2020 | 0 | 2 |
| | 902.23 | MS4-SMG-063 | 33.40928 | -117.16562 | 5/7/2020 | 7/13/2020 | 0[2] | 2 |
| | 902.13 | MS4-SMG-062 | 33.3738439 | -117.253496 | 5/7/2020 | 7/13/2020 | 0[2] | 2 |

[1] Ponded and trickle flow conditions are not required to be sampled per Permit Provision D.2.b.(2)(e), which specifies that sampling is required when measurable flow is present.

[2] One event each at these outfalls was ponded but sampling was conducted.

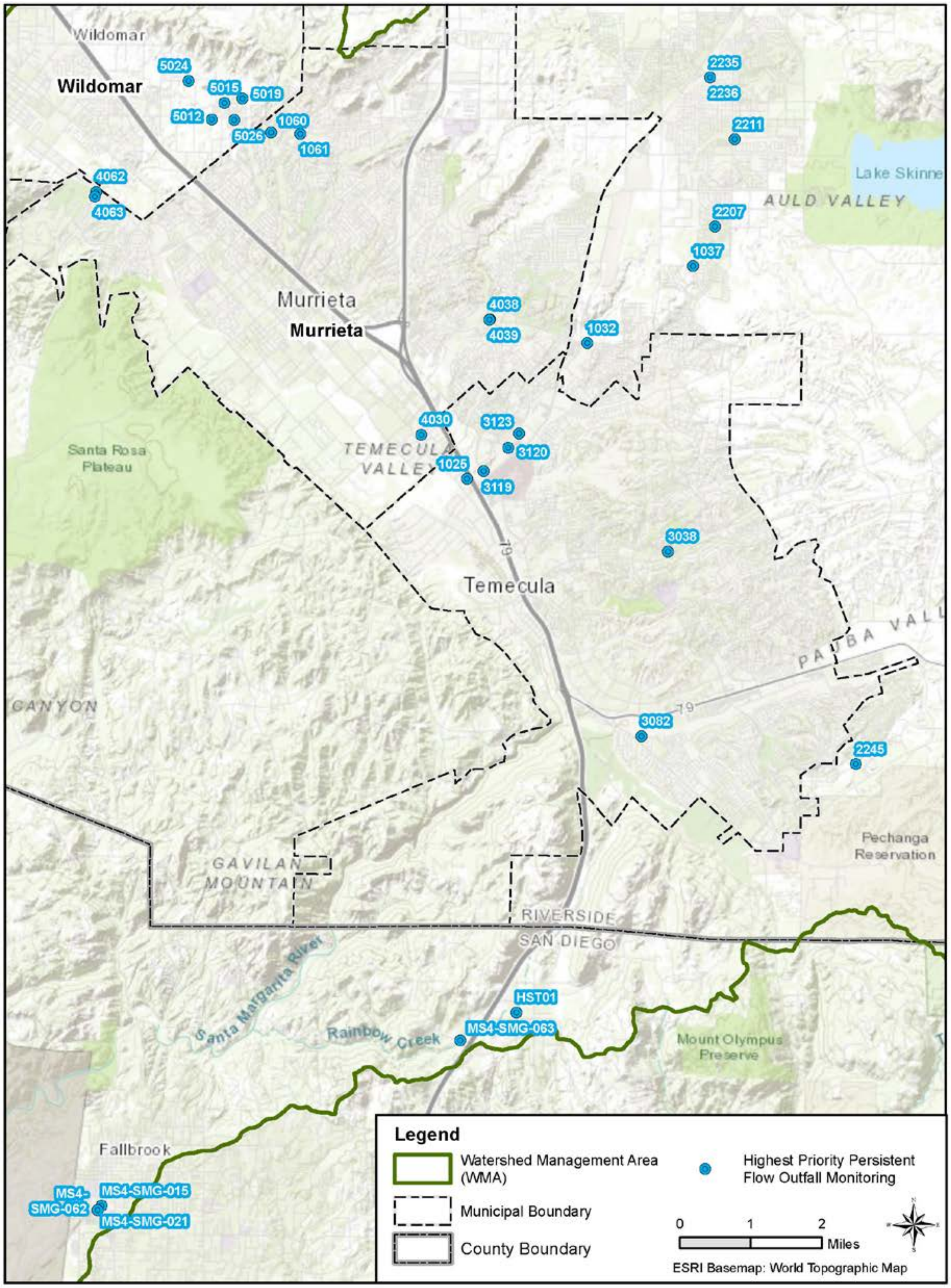



**Figure A4-11. 2019-2020 Highest Priority Outfall Discharge Monitoring Locations**

#### 4.5.2.1 *City of Murrieta*

Of the five highest priority outfalls monitored by the City of Murrieta, four were ponded and one had trickle flow during the first event and four were ponded and one was flowing during the second event. Ponded and trickle flow conditions were not sampled per Permit Provision D.2.b.(2)(e). Site 902MS44063 was sampled only once due to trickle flow conditions that were not measurable during the first event (**Table A4-21**).

Existing NALs related to HPWQCs include total nitrogen and total phosphorus. The total phosphorous concentration (0.68 mg/L) was measured above the NAL (0.1 mg/L) during the single event at 902MS44063.

NALs related to PWQCs include fecal indicator bacteria (*Enterococcus* and fecal coliform), total iron, and total manganese. Bacteriological results indicated that the concentration of *Enterococcus* (1,100 most probable number per 100 milliliters [MPN/100 mL]) was above the IM (61 MPN/100 mL). Total manganese (120 micrograms per Liter [µg/L]) was also above the NAL (50 µg/L) for the single event at 902MS44063 (**Table A4-22**).

The remaining constituents that were analyzed were below NALs, where available.

#### 4.5.2.2 *Riverside County Flood Control District*

The highest priority outfalls monitored by the District had flowing water which permitted sampling during all events (**Table A4-21**).

Existing NALs related to HPWQCs include total nitrogen and total phosphorus. All concentrations of total nitrogen (1.6 to 21 mg/L) and total phosphorus (0.11 to 0.65 mg/L) were measured above the NALs (1 and 0.1 mg/L, respectively).

NALs related to PWQCs include fecal indicator bacteria (*Enterococcus* and fecal coliform), total iron, and total manganese. Bacteriological results indicated that concentrations of *Enterococcus* (200 to 17,000 MPN/100 mL) were above IM (61 MPN/100 mL) during both events at all sites. Fecal coliform concentrations (450 to 24,000 MPN/100 mL) were also above the IM (400 MPN/100 mL) during all events except the second event at 902MS41060. Total iron (3,000 µg/L) was measured above the NAL (300 µg/L) during one event at 902MS41025. Total manganese (58 to 1,200 µg/L) was above the NAL (50 µg/L) during both events at 902MS41032, the first event at 902MS41025, and the second event at 902MS41037 and 902MS41060 (**Table A4-22**).

The only other constituent in exceedance of NALs was turbidity (Lab) during one event at 902MS41025 (result of 28 Nephelometric Turbidity Units [NTUs]).

#### 4.5.2.3 *County of Riverside*

None of the five sites for the County of Riverside were sampled due to ponded conditions (per Permit Provision D.2.b.(2)(e)) during both events (**Table A4-21**).

#### 4.5.2.4 *City of Temecula*

Only one of the five sites for the City of Temecula was sampled due to dry or ponded conditions (per Permit Provision D.2.b.(2)(e)) during most visits (**Table A4-21**). Most sites had trickle flows which were not measurable, whereas 902MS43123 had ponded conditions for both events and 902MS43082 was ponded for one event. 902MS43038 was sampled during one event.

Existing NALs related to HPWQCs include total nitrogen and total phosphorus. The total nitrogen (2.7 mg/L) and total phosphorus concentrations (0.36 mg/L) were measured above the NAL (1.0 mg/L and 0.1 mg/L, respectively) for the single event at 902MS43038.

NALs related to PWQCs include fecal indicator bacteria (*Enterococcus* and fecal coliform), total iron, and total manganese. Bacteriological results indicated that *Enterococcus* (9,400 MPN/100 mL) and fecal coliform (35,000 MPN/100 mL) were above the IMs (61 and 400 MPN/100 mL, respectively) during the single event at 902MS43038. The total iron concentration (780 µg/L) was also measured above the NAL (300 µg/L). The other constituents related to PWQCs were measured below the NALs (**Table A4-22**).

The only other constituent in exceedance of NALs was turbidity (Field) (43.3 NTU), which was measured above the NAL (20 NTU) for the single event at 902MS43038. The laboratory-measured turbidity for 902MS43038 was below the NAL (8.4 NTU).

#### 4.5.2.5 *City of Wildomar*

None of the five sites for the City of Wildomar was sampled due to dry or ponded conditions (per Permit Provision D.2.b.(2)(e)) during both events (**Table A4-21**).

#### 4.5.2.6 *County of San Diego*

All sites were sampled by the County of San Diego during both events. One event each at outfalls HST01, MS4-SMG-063, and MS4-SMG-062 was ponded but sampling was conducted (**Table A4-21**).

Existing NALs related to HPWQCs include total nitrogen and total phosphorus. Concentrations of total nitrogen (1.24 to 35.7 mg/L) and total phosphorus (0.12 to 0.55 mg/L) were measured above the NALs (1 and 0.1 mg/L, respectively) during both events at all five locations, except total phosphorus during the first event at MS4-SMG-063.

NALs related to PWQCs include fecal indicator bacteria (*Enterococcus* and fecal coliform), total iron, and total manganese. Bacteriological results indicated that concentrations of *Enterococcus* (130 to 23,000 MPN/100 mL) were above the IM (61 MPN/100 mL) during both events at all sites. Fecal coliform concentrations (500 to 1,700 MPN/100 mL) were measured above the IM (400 MPN/100 mL) during both events at MS4-SMG-015, and the first event at both MS4-SMG-021 and MS4-SMG-062. Total iron (630 to 1,500 µg/L) was measured above the NAL (300 µg/L) during the second event at MS4-SMG-062 and MS4-SMG-063. Total manganese (52 to 230 µg/L) was measured above the NAL (50 µg/L) during all events except the first at MS4-SMG-062 and MS4-SMG-063, and the second at MS4-SMG-021 (**Table A4-23**).

Other constituents not meeting a NAL were DO during one event at MS4-SMG-062 (a result of 3.83 mg/L, which is below the NAL of 5.0 mg/L, indicating impairment) and pH (8.83 – 8.88 pH units, above the NAL of 6.5-8.5 pH units) during the first event at MS4-SMG-062 and MS4-SMG-063. The remaining analyzed constituents were below NALs, where available.

**Table A4-22. 2019-2020 Dry Weather MS4 Outfall Discharge Monitoring Analytical Results for Highest Priority Outfalls – Riverside County Copermittees**

| Analyte | Unit | Maximum Daily Action Level (MDAL) | 902MS41025 (902.42) | | 902MS41032 (902.42) | | 902MS41037 (902.41) | | 902MS41060 (902.32) | | 902MS41061 (902.32) | | 902MS43038 (902.31) | 902MS44063 (902.32) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5/13/2020 | 8/27/2020 | 5/12/2020 | 8/27/2020 | 5/14/2020 | 8/27/2020 | 5/14/2020 | 8/26/2020 | 5/12/2020 | 8/26/2020 | 8/27/2020 | 8/26/2020 |
| **Physical Chemistry** | | | | | | | | | | | | | | |
| Dissolved Oxygen (Field)[1] | mg/L | 5 | 8.10 | 7.63 | 8.36 | 7.30 | 7.10 | 6.60 | 7.23 | 7.02 | 7.64 | 6.64 | 7.06 | 6.86 |
| Specific Conductance (Field) | µS/cm | | 3,850 | 1,159 | 1,320 | 1,460 | 1,570 | 1,580 | 1,510 | 1,590 | 1,385 | 1,760 | 996 | 1,640 |
| Specific Conductance (Lab) | umhos/cm | | 3,700 | 1,100 | 1,300 | 1,400 | 1,600 | 1,500 | 1,500 | 1,500 | 1,300 | 1,700 | 950 | 1,600 |
| Water Temperature (Field) | Deg C | | 18.46 | 22.88 | 19.17 | 23.58 | 17.5 | 22.59 | 17.49 | 25.12 | 19.17 | 24.25 | 24.33 | 22.99 |
| Turbidity (Field) | NTU | 20 | 7.12 | 2.9 | 2.8 | 2.5 | 0.0 | 4.8 | 0.3 | 4.0 | 2.3 | 1.1 | 43.3 | 3.6 |
| Turbidity (Lab) | NTU | 20 | 28 | 0.9 | 0.74 | 1.3 | 0.93 | 1.5 | 0.34 | 3.5 | 1.4 | 0.47 | 8.4 | 1.4 |
| pH (Field) | Units | 6.5-8.5 | 7.32 | 8.06 | 7.91 | 8.13 | 6.97 | 7.16 | 7.65 | 8.12 | 7.14 | 7.85 | 6.67 | 7.44 |
| **General Chemistry** | | | | | | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | | 10H | 6.1H | 4.2H | 4.3H | 5.9H | 8.3H | 3.3H | 5.7H | 3.7H | 4.9H | 6.9H | 8.7H |
| MBAS | mg/L | 0.5 | 0.04J | 0.04J | 0.04J | 0.03J | 0.03J | 0.04J | 0.03J | 0.09 | <0.03 | 0.06J | 0.03J | 0.06J |
| Sulfate | mg/L | | 270 | 210 | 160 | 170 | 230 | 260 | 220 | 250 | 240 | 290 | 190 | 210 |
| Total Dissolved Solids[2] | mg/L | | 2,400 | 670 | 840 | 910 | 990 | 980 | 950 | 1,000 | 890 | 1,100 | 580 | 970 |
| Total Hardness | mg/L | | 570 | 290 | 440 | 510 | 490 | 450 | 510 | 500 | 450 | 560 | 240 | 350 |
| Total Suspended Solids | mg/L | | 130 | 2 | 3 | 2 | 3 | 2 | <2 | 19 | 6 | 2 | 22 | 9 |
| **Nutrients** | | | | | | | | | | | | | | |
| Ammonia as N | mg/L | | 0.14 | <0.04 | 0.27 | 0.04J | <0.044 | 0.06J | <0.044 | 0.09J | <0.044 | 0.10 | 0.20 | 0.07J |
| Ammonia as N (Unionized) | mg/L | | 0.0052 | <0.0000046 | 0.0032 | <0.0000046 | <0.0000046 | <0.0000046 | <0.0000046 | <0.0000046 | <0.0000046 | 0.0051 | 0.00032 | <0.0000046 |
| Nitrate as N | mg/L | | 9.1 | 0.8 | 0.89 | 0.87 | 3.6 | 2.3 | 1.3 | 0.94 | 1.4 | 1.6 | 0.67 | 0.18J |
| Nitrite as N | mg/L | | 0.037 | 0.022 | 0.07 | 0.0028J | 0.013 | 0.012 | 0.0037J | 0.012 | 0.033 | 0.011 | 0.031 | 0.0025J |
| Total Kjeldahl Nitrogen | mg/L | | 12 | 0.8 | 1.3 | 1.2 | 1.3 | 1.5 | 0.37 | 0.8 | 0.68 | 0.5 | 2.0 | 0.6 |
| Total Nitrogen[1] | mg/L | 1.0 | 21 | 1.6 | 2.3 | 2.1 | 4.9 | 3.8 | 1.7 | 1.8 | 2.1 | 2.1 | 2.7 | 0.6 |
| Total Phosphorus[1] | mg/L | 0.1 | 0.65 | 0.40 | 0.19 | 0.23 | 0.32 | 0.52 | 0.11 | 0.14 | 0.16 | 0.23 | 0.36 | 0.68 |
| Total Phosphate | mg/L | | 2.0 | 1.2 | 0.57 | 0.70 | 0.97 | 1.6 | 0.32 | 0.42 | 0.47 | 0.68 | 1.1 | 2.0 |
| Dissolved Phosphorus | mg/L | | 0.28 | 0.38 | 0.16 | 0.22 | 0.32 | 0.44 | 0.11 | 0.08 | 0.14 | 0.098 | 0.25 | 0.61 |
| Orthophosphate as P | mg/L | | 0.19 | 0.33 | 0.13 | 0.17 | 0.11 | 0.38 | <0.05 | 0.051 | 0.09 | 0.19 | 0.22 | 0.58 |
| **Total Metals** | | | | | | | | | | | | | | |
| Aluminum | µg/L | | 1,900 | 32J | <33 | 37J | <33 | 110 | <33 | 58J | <33 | <16 | 640 | 130 |
| Cadmium | µg/L | | 0.12J | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 |
| Chromium | µg/L | | 8.3 | 0.5 | 0.6 | 0.6 | 0.8 | 1 | <0.4 | 1 | 0.5 | 0.4J | 1.8 | 0.9 |
| Chromium III | µg/L | | 5 | <1 | <1 | 0.6J | <1 | 0.85J | <1 | <0.4 | <1 | <1 | 1.8 | 0.9J |
| Chromium VI | µg/L | | 3.3 | 0.130J | 0.160J | 0.092J | 0.420J | 0.150J | 0.082J | 1.2 | <0.021 | 0.058J | 0.260J | 0.045J |
| Copper | µg/L | | 80 | 12 | 6.9 | 7.8 | 9.2 | 17 | 7.3 | 9.1 | 9.2 | 8.6 | 10 | 7.7 |
| Iron[2] | µg/L | 300 | 3,000 | 39J | 80 | 64 | 46J | 170 | 48J | 94 | 52 | 35J | 780 | 200 |
| Lead | µg/L | | 1.5 | <0.2 | <0.2 | <0.2 | <0.2 | 0.2J | <0.2 | <0.2 | <0.2 | <0.2 | 0.4J | <0.2 |
| Manganese[2] | µg/L | 50 | 1,200 | 12 | 250 | 60 | 40 | 58 | 31 | 59 | 18 | <25 | 31 | 120 |
| Nickel | µg/L | | 7.0 | 3.3 | 3.4 | 4.3 | 4.3 | 4.6 | 3.1 | 3.8 | 3.3 | 4.3 | 3.2 | 4.1 |
| Selenium | µg/L | | 4.7 | 2.2 | 3.0 | 3.7 | 3.1 | 3.8 | 2.2 | 2.6 | 2.9 | 3.6 | 2.2 | 2.9 |
| Silver | µg/L | | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 |
| Zinc | µg/L | | 86 | 8.1 | 3.2 | 2.6 | 5.4 | 10 | 2.3 | 3.7 | 5.3 | 6.9 | 18 | 13 |
| **Dissolved Metals** | | | | | | | | | | | | | | |
| Aluminum | µg/L | | <16 | <34 | <16 | <34 | <16 | <34 | <16 | <34 | <16 | <34 | <34 | <34 |
| Cadmium | µg/L | (a)(b) | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 |

**Table A4-22. 2019-2020 Dry Weather MS4 Outfall Discharge Monitoring Analytical Results for Highest Priority Outfalls – Riverside County Copermittees**

| Analyte | Unit | Maximum Daily Action Level (MDAL) | 902MS41025 (902.42) | | 902MS41032 (902.42) | | 902MS41037 (902.41) | | 902MS41060 (902.32) | | 902MS41061 (902.32) | | 902MS43038 (902.31) | 902MS44063 (902.32) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5/13/2020 | 8/27/2020 | 5/12/2020 | 8/27/2020 | 5/14/2020 | 8/27/2020 | 5/14/2020 | 8/26/2020 | 5/12/2020 | 8/26/2020 | 8/27/2020 | 8/26/2020 |
| Chromium | µg/L | | 4.4 | 0.7 | 0.4J | 0.5 | 0.9 | 0.9 | <0.4 | 1.9 | <0.4 | 0.7 | 1.1 | 0.8 |
| Trivalent Chromium | µg/L | | 1.3 | 0.7J | <1 | 0.5J | <1 | 0.9J | <1 | 0.4J | <1 | 0.7 | 1.1 | 0.8 |
| Chromium VI | µg/L | 16 | 3.1 | 0.14J | 0.12J | 0.068J | 0.42J | 0.14J | 0.069J | 1.5 | <0.021 | 0.056J | 0.29J | 0.042J |
| Copper | µg/L | (a) | 26 | 9.7 | 5.7 | 6.3 | 8.4 | 11 | 7.4 | 10 | 7.6 | 9.0 | 6.2 | 8.4 |
| Iron[2] | µg/L | | <3.1 | 14J | <3.1 | <6.4 | 12J | 27J | 6.3J | <6.4 | <3.1 | 8.3J | 12J | 21J |
| Lead | µg/L | (a) | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Manganese[2] | µg/L | | <5 | <5 | <5 | <5 | 19 | 20 | 21 | <5 | <5 | 8J | <5 | 63 |
| Nickel | µg/L | (a)(b) | 4.6 | 3.5 | 3.2 | 4.5 | 4.1 | 4.9 | 3.3 | 4.4 | 3.3 | 5.5 | 2.7 | 4.7 |
| Selenium | µg/L | | 3.1 | 1.9 | 2.8 | 3.3 | 3.2 | 3.2 | 2.6 | 3.0 | 2.9 | 3.7 | 2.0 | 3.2 |
| Silver | µg/L | (a) | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 |
| Zinc | µg/L | (a) | 4.8 | 6.0 | 1.7 | 1.4 | 4.1 | 4.7 | 2.0 | 1.2 | 4.6 | 4.5 | 2.7 | 4.1 |
| **Organophosphorus Pesticides** | | | | | | | | | | | | | | |
| Chlorpyrifos | µg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Diazinon | µg/L | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| **Fecal Indicator Bacteria** | | | | | | | | | | | | | | |
| *E. coli*[2] | MPN/100 mL | | 3,300 | 24,000 | 1,700 | 1,700 | 4,900 | 2,700 | 3,300 | <180 | 7,000 | 450 | 35,000 | 200 |
| Enterococcus[2] | MPN/100 mL | 61 (c) | 4,900 | 4,900 | 2,300 | 680 | 7,000 | 7,900 | 1,300 | 780 | 17,000 | 200 | 9,400 | 1,100 |
| Fecal Coliform[2] | MPN/100 mL | 400 (c) | 3,300 | 24,000 | 1,700 | 1,700 | 4,900 | 2,700 | 3,300 | <180 | 7,000 | 450 | 35,000 | 200 |
| Total Coliform[2] | MPN/100 mL | | 92,000 | 35,000 | 24,000 | 13,000 | 160,000 | 22,000 | 17,000 | 930 | ≥160,000 | 1,700 | 92,000 | 4,900 |

< - Results are less than the reporting limit.
[1] Constituent is a HPWQC for dry weather.
[2] Constituent is a PWQC for dry weather. Note that all PWQCs do not apply to all subareas in the WMA; constituents noted here are PWQCs in at least one subarea in the WMA.
H - Sample filtered/preserved or analyzed outside of holding time.
J - Results are greater than the method detection limit but below the reporting limit. Reported result is estimated.

(a) Water quality objective for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The Criterion Continuous Concentration (CCC) was applied to dry weather results with the exception of Silver for which the Criterion Maximum Concentration (CMC) was applied as there is no CCC.

(b) If calculated CCC values exceeded the Maximum Contaminant Levels (MCLs) as given in the basin plan, concentrations were compared to the MCLs. No MCLs were exceeded for these constituents.

(c) Instantaneous Maximum for storm drain outfall discharges to inland surface waters with REC-1 beneficial use (Table C-4 of Permit).

Shaded results greater than Maximum Daily Action Level or the Instantaneous Maximum.

**Table A4-23. 2019-2020 Dry Weather MS4 Outfall Discharge Monitoring Analytical Results for Highest Priority Outfalls – County of San Diego**

| Analyte | Unit | Maximum Daily Action Level (MDAL) | HST01 (902.23) | | MS4-SMG-015 (902.21) | | MS4-SMG-021 (902.21) | | MS4-SMG-062 (902.21) | | MS4-SMG-063 (902.21) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5/7/2020 | 7/13/2020 | 5/7/2020 | 7/13/2020 | 5/7/2020 | 7/13/2020 | 5/7/2020 | 7/13/2020 | 5/7/2020 | 7/13/2020 |
| **Physical Chemistry** | | | | | | | | | | | | |
| Dissolved Oxygen[1] | mg/L | 5 | 7.39 | 6.09 | 8.57 | 7.4 | 8.47 | 7.41 | 8.27 | 3.83 | 9.05 | 6.07 |
| Specific Conductivity | µS/cm | | 2,179 | 1,458 | 1,827 | 1,856 | 1,826 | 1,891 | 1,481 | 1,293 | 1,044 | 1,312 |
| Temperature | Celsius | | 20.5 | 21.8 | 22.4 | 24.7 | 21.9 | 25.6 | 22.0 | 24.8 | 19.8 | 22.5 |
| Turbidity | NTU | 20 | 1.53 | 0.56 | 0.18 | 1.41 | 11.5 | 0.73 | 0.43 | 9.84 | 0.08 | 6.05 |
| pH | pH unit | 6.5-8.5 | 7.7 | 7.83 | 8.38 | 7.89 | 8.31 | 8.02 | 8.88 | 7.90 | 8.83 | 7.67 |
| **General Chemistry** | | | | | | | | | | | | |
| MBAS | mg/L | 0.5 | 0.063 | 0.078 | 0.044J | 0.20 | 0.05 | 0.14 | 0.049J | 0.11 | 0.081 | 0.21 |
| Sulfate | mg/L | | 490 | 290 | 380 | 400 | 370 | 390 | 270 | 230 | 190 | 290 |
| Total Dissolved Solids[2] | mg/L | | 1,100 | 930 | 1,300 | 1,300 | 1,300 | 1,300 | 1,000 | 800 | 730 | 920 |
| Total Hardness | mg/L | | 807 | 413 | 657 | 636 | 671 | 643 | 453 | 357 | 293 | 391 |
| Total Suspended Solids | mg/L | | 22 | 9 | 1 | 3 | 4 | 1 | 2 | 45 | <1 | 200 |
| **Nutrients** | | | | | | | | | | | | |
| Ammonia as N | mg/L | | <0.10 | 0.07J | 0.06J | 0.04J | 0.07J | 0.03J | 0.02J | 0.13 | 0.04J | 0.10 |
| Nitrate as N | mg/L | | 35.4 | 0.10 | 6.20 | 4.47 | 6.34 | 6.11 | 6.34 | 0.23 | 18.9 | 10.40 |
| Nitrite as N | mg/L | | 0.3 | 0.04J | 0.06 | 0.05 | 0.04J | 0.03J | 0.02J | <0.05 | <0.05 | 0.11 |
| Total Kjeldahl Nitrogen | mg/L | | <0.5 | 1.1 | <0.5 | 0.4J | 0.4J | <0.5 | 0.6 | 1.1 | <0.5 | 2.5 |
| Total Nitrogen[1] | mg/L | 1.0 | 35.7 | 1.24 | 6.26 | 4.92 | 6.78 | 6.14 | 6.96 | 1.33 | 18.9 | 13.0 |
| Total Phosphorus[1] | mg/L | 0.1 | 0.31 | 0.50 | 0.13 | 0.12 | 0.14 | 0.22 | 0.28 | 0.55 | 0.08 | 0.34 |
| Orthophosphate as P | mg/L | | 0.29 | 0.42 | 0.08 | 0.12 | 0.07 | 0.2 | 0.23 | 0.36 | 0.07 | 0.2 |
| **Total Metals** | | | | | | | | | | | | |
| Aluminum | µg/L | | 210 | 150 | 14 | 22 | 22 | 17 | 62 | 240 | 31 | 920 |
| Cadmium | µg/L | | 0.044J | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.06J | 0.35 | 0.63 |
| Chromium | µg/L | | 0.29 | 0.26 | 0.15J | 0.12J | 0.17J | 0.2 | 0.26 | 0.49 | 0.2 | 1.4 |
| Chromium III | µg/L | | 0.26 | 0.26 | 0.092 | <0.20 | 0.087 | <0.20 | 0.12 | 0.48 | 0.11 | 1.2 |
| Chromium VI | µg/L | | 0.028 | <0.02 | 0.055 | 0.015J | 0.087 | 0.066 | 0.13 | 0.0096J | 0.092 | 0.18 |
| Copper | µg/L | | 2.6 | 5.0 | 1.9 | 1.5 | 2.8 | 2.2 | 3.9 | 11 | 3.1 | 27 |
| Iron[2] | µg/L | 300 | 260 | 180 | 71 | 46 | 82 | 35 | 120 | 630 | 54 | 1,500 |
| Lead | µg/L | | 0.18J | 0.14J | 0.12J | 0.09J | 0.13J | 0.09J | 0.15J | 0.8 | 0.2 | 3.4 |
| Manganese[2] | µg/L | 50 | 71 | 120 | 58 | 52 | 56 | 33 | 5.9 | 230 | 3 | 110 |
| Nickel | µg/L | | 1.4 | 1.9 | 0.77J | 0.82 | 1.2 | 1.2 | 1.0 | 2.7 | 0.85 | 5.3 |
| Selenium | µg/L | | 0.35J | 0.53 | 0.65 | 0.58 | 0.55 | 0.55 | 0.68 | 1.0 | 1.0 | 1.5 |
| Silver | µg/L | | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Zinc | µg/L | | 12 | 8.8 | 12 | 5.8 | 69 | 6.5 | 38 | 32 | 31 | 260 |
| **Dissolved Metals** | | | | | | | | | | | | |
| Aluminum | µg/L | | 3.5J | 9.7 | 4.1J | 4.3J | 5.6 | 4.3J | 7.8 | 14 | 6.5 | 5.5 |
| Cadmium | µg/L | (a)(b) | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.042J | <0.1 | 0.39 | 0.33 |
| Chromium | µg/L | | 0.075J | 0.1J | 0.078J | 0.09J | 0.12J | 0.13J | 0.2 | 0.26 | 0.11J | 0.34 |
| Chromium III | µg/L | (a)(b) | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | 0.25 | <0.22 | <0.22 |
| Chromium VI | µg/L | 16 | 0.032 | <0.02 | 0.058 | 0.019J | 0.14 | 0.069 | 0.22 | 0.0099J | 0.089 | 0.19 |
| Copper | µg/L | (a) | 2.1 | 4.7 | 1.6 | 1.3 | 2.3 | 1.8 | 3.4 | 11 | 2.6 | 21 |
| Iron[2] | µg/L | | 5.3J | 14J | 27 | 11J | 27 | 9.5J | 14J | 80 | 14J | 47 |

**Table A4-23. 2019-2020 Dry Weather MS4 Outfall Discharge Monitoring Analytical Results for Highest Priority Outfalls – County of San Diego**

| Analyte | Unit | Maximum Daily Action Level (MDAL) | HST01 (902.23) | | MS4-SMG-015 (902.21) | | MS4-SMG-021 (902.21) | | MS4-SMG-062 (902.21) | | MS4-SMG-063 (902.21) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5/7/2020 | 7/13/2020 | 5/7/2020 | 7/13/2020 | 5/7/2020 | 7/13/2020 | 5/7/2020 | 7/13/2020 | 5/7/2020 | 7/13/2020 |
| Lead | µg/L | (a) | 0.034J | <0.2 | 0.052J | <0.2 | 0.051J | 0.04J | 0.06J | 0.14J | 0.097J | 0.10J |
| Manganese[2] | µg/L | | 16 | 84 | 46 | 34 | 45 | 12 | 1.8 | 170 | 1.8 | 7.1 |
| Nickel | µg/L | (a)(b) | 1.3 | 1.8 | 0.71J | 0.82 | 1.2 | 1.1 | 0.94 | 3.2 | 0.68J | 4.4 |
| Selenium | µg/L | | 0.37J | 0.5 | 0.62 | 0.55 | 0.55 | 0.55 | 0.64 | 0.9 | 1 | 1.5 |
| Silver | µg/L | (a) | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Zinc | µg/L | (a) | 7.9 | 7.8 | 11 | 5 | 70 | 5.3 | 33 | 18 | 27 | 160 |
| **Organophosphorus Pesticides** | | | | | | | | | | | | |
| Chlorpyrifos | µg/L | | <0.010 | <0.010 | <0.010 | <0.010 | <0.020 | <0.010 | <0.010 | <0.050 | <0.010 | <0.050 |
| **Fecal Indicator Bacteria** | | | | | | | | | | | | |
| *E. coli*[2] | MPN/100 mL | | 63 | 100 | 420 | 100 | 373 | 200 | 512 | 410 | 565 | 2,990 |
| Enterococcus[2] | MPN/100 mL | 61 (c) | 500 | 400 | 210 | 130 | 500 | 17,000 | 500 | 2,400 | 500 | 23,000 |
| Fecal Coliform[2] | MPN/100 mL | 400 (c) | 220 | 300 | 500 | 1,700 | 800 | 270 | 1,700 | 260 | 300 | 330 |
| Total Coliform[2] | MPN/100 mL | | 2,300 | 2,200 | 1,700 | 23,000 | 5,000 | 50,000 | 3,000 | 1,700 | 2,300 | 8,000 |

< - Results are less than the reporting limit.
[1] Constituent is a HPWQC for dry weather.
[2] Constituent is a PWQC for dry weather. Note that all PWQCs do not apply to all subareas in the WMA; constituents noted here are PWQCs in at least one subarea in the WMA.
J - Results are greater than the method detection limit but below the reporting limit. Reported result is estimated.
NR - Not required.
(a) Water quality objective for dissolved metal fractions is based on total hardness and is calculated as described by 40 CFR Part 131.38 (May 18, 2000). The Criterion Continuous Concentration (CCC) was applied to dry weather results with the exception of Silver for which the Criterion Maximum Concentration (CMC) was applied as there is no CCC.
(b) If calculated CCC values exceeded the Maximum Contaminant Levels (MCLs) as given in the basin plan, concentrations were compared to the MCLs. No MCLs were exceeded for these constituents.
(c) Instantaneous Maximum for storm drain outfall discharges to inland surface waters with REC-1 beneficial use (Table C-4 of Permit).
Shaded results greater than Maximum Daily Action Level or the Instantaneous Maximum.

### 4.5.3 Dry Weather MS4 Outfall Monitoring Data Assessments

**Table A4-24** summarizes the dry weather MS4 outfall monitoring data assessments required by Permit provision D.4.b.(1)(c)(i-vi). The information necessary to demonstrate compliance with each Provision is outlined in the following discussion. In instances where compliance has been demonstrated in previous sections of this Annual Report, those sections are referenced.

As stated in **Section 4.2**, the Copermittees in the region requested regulatory relief from performing some of the Permit-required assessments for the 2019-2020 monitoring year. In an email dated August 19, 2020, the San Diego Water Board provided approval for the Copermittees to "assess the data as required pursuant to provision D.4.b.(1)(c)(iv) and D.4.b.(2)(c) by evaluating the pollutant loads from each outfall, i.e., only calculating the pollutant loads at the outfall level and not using the outfall data to extend the load calculation at the watershed scale." Therefore, the dry weather assessment requirements of D.4.b.(1)(c)(iv) are fulfilled in this Annual Report through estimation of volumes and loads for the highest priority outfalls. In addition, the Copermittees are providing Microsoft (MS) Excel tables and pivot charts of the pollutant loads over time for their current set of highest priority outfalls (monitored during the 2019-2020 year) with two or more years of monitoring data (**Attachment 4E**).

**Table A4-24. Dry Weather MS4 Outfall Monitoring Assessments**

| Assessment | Components | Provision(s) | Section |
|---|---|---|---|
| **WQIP Annual Report** | | | |
| Identify known and suspected controllable sources. | Identify known and suspected controllable sources (e.g., facilities, areas, land uses, pollutant generating activities) of transient and persistent flows. | D.4.b.(1)(b)(i) | 4.5.4.1 |
| Identify sources that have been reduced or eliminated. | Identify sources of transient and persistent flows that have been reduced or eliminated. | D.4.b.(1)(b)(ii) | 4.5.4.3 |
| Identify necessary modifications to monitoring locations and frequencies. | Identify necessary modifications to monitoring locations and frequencies necessary to identify and eliminate sources of persistent flows. | D.4.b.(1)(b)(iii) | 4.5.3.1 |
| Rank and prioritize non-stormwater discharges. | Rank persistently flowing outfalls according to potential threat to receiving water quality. | D.4.b.(1)(c)(ii) | Appendix 5<br>4.5.3.1 |
| | Produce/update prioritized list of outfalls. | | |
| Identify sources contributing to NAL exceedances. | Identify known and suspected sources that may cause or contribute to exceedances. | D.4.b.(1)(c)(iii) | 4.5.4.1<br>Table A4-28 |

**Table A4-24. Dry Weather MS4 Outfall Monitoring Assessments**

| Assessment | Components | Provision(s) | Section |
|---|---|---|---|
| Estimate volumes and loads of non-stormwater discharges.* | Analyze data collected as part of the Permit-required dry weather outfall monitoring. Use a model or other method to calculate and estimate collective persistent non-stormwater discharge volumes and pollutant loads. Specific calculations/estimates include:<br>▪ Annual non-stormwater volumes and loads discharged from the Copermittee's major MS4 outfalls to receiving waters within its jurisdiction, with an estimate of the percent contribution from each known source for each MS4 outfall.<br>▪ Annual identification and quantification (by volume and pollutant load) of sources of discharged non-stormwater not subject to the Copermittee's legal authority. | D.4.b.(1)(c)(iv) | 4.5.3.4.2<br>Attachment 4E |
| Identify data gaps. | Identify data gaps in the monitoring data necessary to fulfill assessment requirements. | D.4.b.(1)(c)(vi) | 4.5.3.6 |
| **Once during Permit Term** | | | |
| Evaluate progress in achieving non-stormwater volume and load reductions. | Identify reductions and progress in achieving reductions. | D.4.b.(1)(c)(v) | N/A |
| | Assess the effectiveness of WQIP improvement strategies, with estimates of volume and load reductions attributed to specific strategies when possible. | | N/A |
| | Identify modifications necessary to increase the effectiveness of WQIP strategies. | | N/A |

* An email from the San Diego Water Board dated August 19, 2020 granted the Copermittees regulatory relief related to this assessment. See **Section 4.2** for additional detail.

### 4.5.3.1 *Provision D.4.b.(1)(b) – Identify Known and Suspected Controllable Sources, Sources that have been Reduced or Eliminated, and Necessary Modifications to Monitoring Locations and Frequencies*

The dry weather field screening monitoring assessments that were first required by Provision D.4.b.(1)(b)(i-iii) during the long-term monitoring period are required to be continued by Provision D.4.b.(1)(c)(i). The assessments related to (i) and (ii) are described in **Section 4.5.4** below. To comply with (iii), the data collected under the dry weather field screening monitoring program (**Section 4.5.1**) were assessed.

The Copermittees are conducting field screening at a frequency greater than that required by the Permit and will continue adapting their frequencies and locations for 2020-2021. The County of San Diego conducts additional visits to their outfalls to record flow observations. The District incorporated a targeted approach which comprised of screening 100% of its major outfall inventory in spring, 82% of outfalls known to be "accessible" and "not dry" (i.e., flowing, trickle flow, or ponded) in early summer, and then conducting 10 additional screenings at highest priority persistent flow (HPPF) stations in early to late summer. For District outfalls that are observed to have excessive vegetation or other conditions that impede access, that require maintenance, or have conditions of structural concern, the conditions are photographed and documented in a tracking spreadsheet, and the information is provided to the

District's Operations and Maintenance Division. The field screening and IDDE investigation process is shown in **Figure A4-12**.

As needed, the outfall concerns are discussed during meetings regarding the District's Maintenance Environmental Authorization Requests where maintenance activities and requests for maintenance are reviewed for consideration of environmental regulatory requirements, restrictions, and/or permitting. These meetings are also used to prioritize maintenance activities and schedules based on needs such as routine clean-ups, increased flood protection, and facility structural repairs. Schedules are typically aligned by service area, as well as immediate needs vs. long-term needs. Outfalls or other conditions requiring maintenance are logged by the District's Operations and Maintenance Division and placed in the maintenance queue and prioritized along with all the other maintenance requests. Response time to address outfall maintenance may vary based on pre-scheduled District maintenance activities, emergency activities, environmental restrictions or permissions, development project priorities, and available resources. The Copermittees have similar processes within their jurisdictions for identifying, documenting, and addressing maintenance needs.

Accessible major outfalls with persistent flows will continue to be a key component of field screening efforts to identify sources in dry weather. The Copermittees will continue adapting their field screening frequencies and locations for 2020-2021, as needed, and utilize the data as part of the prioritization process for selection of highest priority outfalls with persistent flows to be sampled in dry weather pursuant to the provisions discussed below.

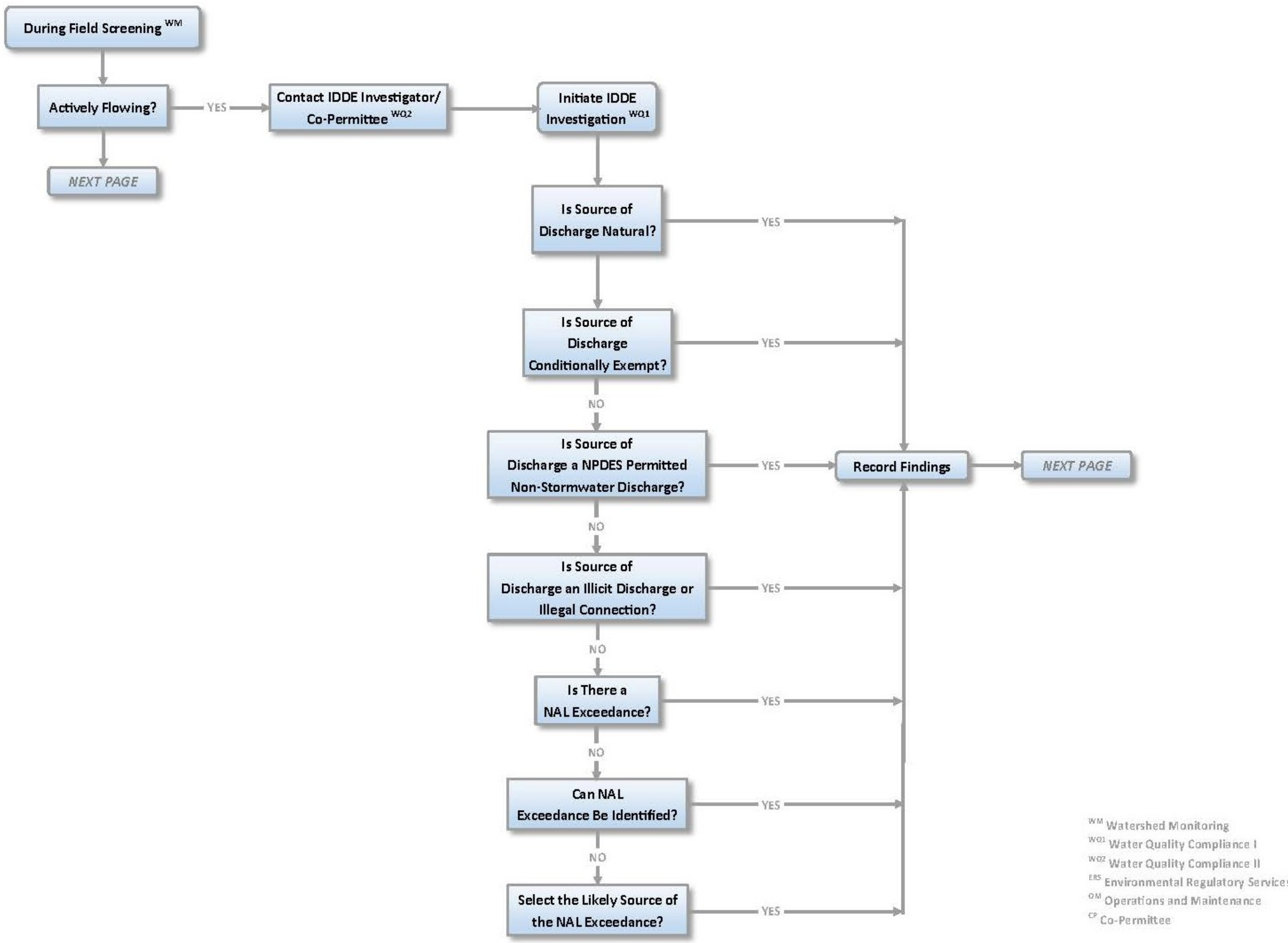



**Figure A4-12. Field Screening and IDDE Investigation Flow Chart (Page 1)**

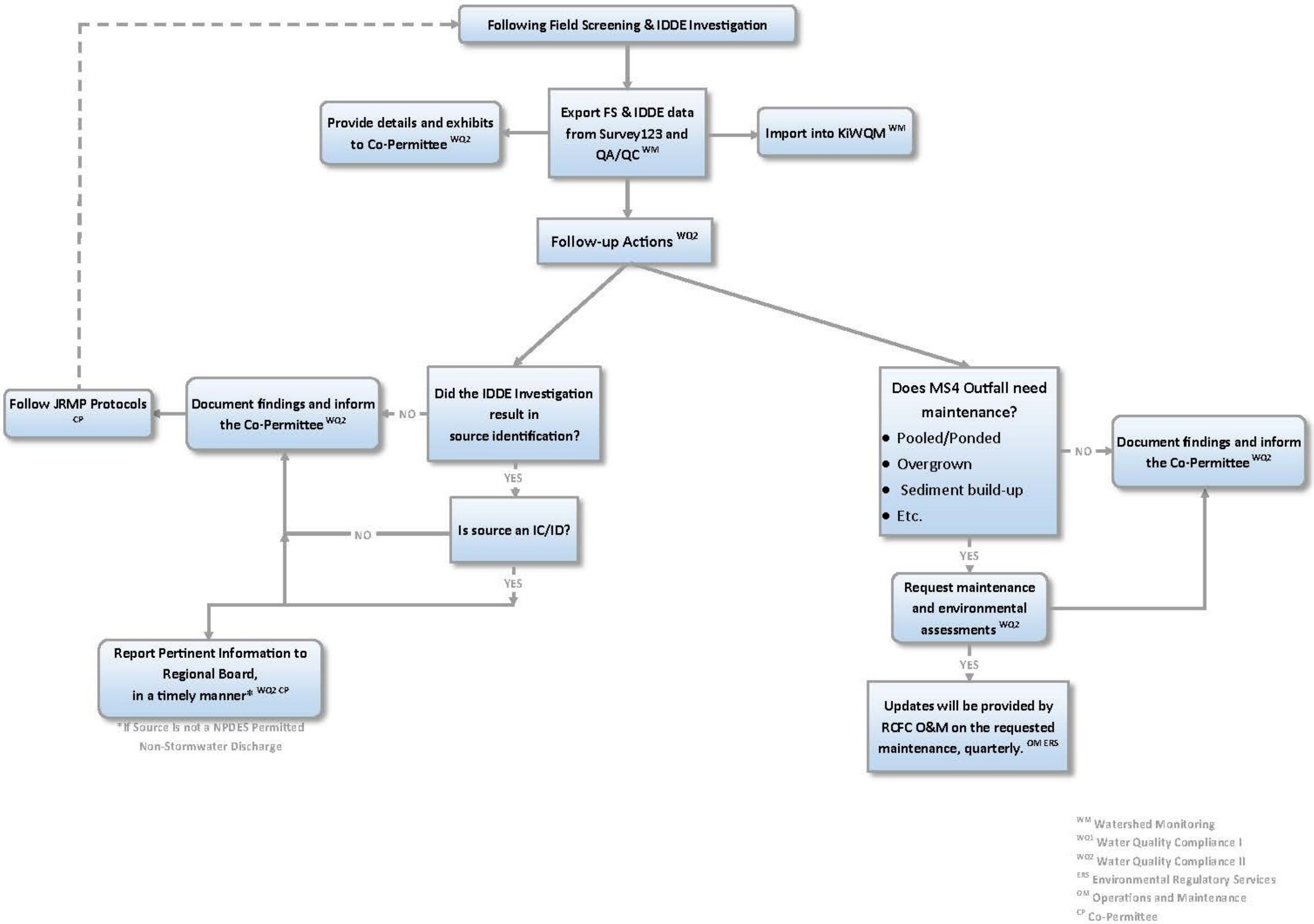



**Figure A4-12. Field Screening and IDDE Investigation Flow Chart (Page 2)**

#### 4.5.3.2 *Provision D.4.b.(1)(c)(ii) – Rank and Prioritize Non-stormwater Discharges*

In addition to continuing the assessments required by Provision D.4.b.(1)(b)(i-iii), analytical monitoring of dry weather MS4 outfall discharge samples and the associated assessments outlined in Provision D.4.b.(1)(c)(ii-v) are required.

Provision D.4.b.(1)(c)(ii) requires the prioritization of major MS4 outfalls within each Copermittee's jurisdiction based on the dry weather MS4 outfall monitoring data. These data were presented in **Section 4.5.1**, and the analytical data collected at the highest priority dry weather MS4 outfalls for each jurisdiction during the 2019-2020 monitoring year are presented in **Table A4-22** and **Table A4-23** in **Section 4.5.2**. Highest priority outfalls will continue to be monitored until one of the following conditions outlined in Provision D.2.b.(2)(b)(ii) have been met:

- No flowing or standing water observed over the three most recent consecutive visits.
- Source has been identified as category of non-stormwater discharge that does not require a National Pollutant Discharge Elimination System (NPDES) Permit and does not have to be addressed as an illicit discharge.
- No exceedances of NALs
- Identified as a non-stormwater discharge authorized by a separate NPDES permit.

When an outfall fulfills one of these criteria or the threat to water quality has been reduced (per Provision D.2.b.(2)(b)(iii)), it will be replaced with the next highest priority outfall based on the Copermittee's list for the WMA.

The Riverside Copermittees evaluated their 2018-2019 Dry Weather Outfall Monitoring Station data using finalized outfall field screening observations and criteria (i.e., persistence, NAL exceedances, flow rate, changes in flow determination, outfall accessibility, land use type and upstream drainage area) during the outfall reprioritization process. This process was outlined in Section 5.1.2.1.6 of Appendix 5 of the 2018-2019 WQIP Annual Report. Once all data were analyzed, the District presented its findings to each respective Copermittee and provided station change recommendations, as needed. When station changes were confirmed, they were added to the 2019-2020 Dry Weather Outfall Monitoring station lists, sampling schedules, and added to all the 2019-2020 software programs and applications that the District uses under the Compliance Monitoring Program.

During repeated outfall inspections, District outfall 1010 was observed to have ponded or trickle flow conditions, which are not sampleable and therefore do not provide data for comparability to the NALs. District staff discussed several monitoring station options and determined based on the criteria mentioned above that 1010 would be replaced by 1060 due to measurable flow documented during the last nine field screening events. On December 3, 2019, District staff confirmed the necessary station change.

Temecula outfall 3062, which District staff determined to be unsafe to access for dry weather monitoring, would be replaced with outfall 3119. Additionally, Temecula outfall 3082, which had recently changed its flow pattern from persistent to transient, would be replaced with 3120, the next highest priority outfall. On December 10, 2019, City of Temecula staff confirmed the station changes.

Murrieta outfall 4033 was determined to be unsafe for staff to access and was be replaced with outfall 4038, a persistently flowing outfall that is fully accessible. On December 19, 2019, City of Murrieta staff confirmed the station change.

Riverside County and Wildomar stations remained unchanged for the 2019-2020 monitoring year. Monitored outfalls with updated flow determinations are shown in **Table A4-20** and **Figure A4-10** in **Section 4.5.1**.

The County of San Diego also reviews and reprioritizes major MS4 outfalls on an annual basis using field screening, IDDE follow-up, and analytical data from previous years. The County of San Diego's detailed process for prioritization is outlined in Section 5.1.2.1.6 of Appendix 5 of the 2018-2019 WQIP Annual Report. During the prioritization process of the 2019-2020 monitoring year, the County deprioritized site MS4-SMG-024 since it was determined that the site conveyed a blue line stream (see **Section 4.5.4.4** for details). MS4-SMG-024 was replaced with MS4-SMG-063 for the 2019-2020 monitoring year. The County has made some minor updates to their prioritization process (see **Section 5.2.4.1** in **Appendix 5**).

#### 4.5.3.3 *Provision D.4.b.(2)(c)(iii) – Identify Sources Contributing to NAL Exceedances*

This Provision requires further investigation into sources causing persistent flows and NAL exceedances at the highest priority outfalls. The highest priority outfalls are listed for each jurisdiction in **Table A4-21**, and the analytical results collected during this reporting period at these outfalls are presented in **Table A4-22** and **Table A4-23**.

These highest priority outfalls were a specific focus for IDDE investigations during the 2019-2020 monitoring year. The results from these investigations are presented in **Section 4.5.4**.

#### 4.5.3.4 *Provision D.4.b.(2)(c)(iv) – Estimate Volumes and Loads of Non-stormwater Discharges - as revised for 2019-2020 and 2020-2021 Monitoring Years*

The Copermittees are required to calculate or estimate the non-stormwater volumes and pollutant loads discharged from their highest priority outfalls monitored during the 2019-2020 monitoring year. In addition, the Copermittees have provided an attachment with compiled historical loads and the 2019-2020 data in tables and graphs (**Attachment 4E**) in response to the San Diego Water Board's request from their email dated August 19, 2020: "for outfalls that have been monitored for two or more years, tables and figures showing changes in pollutant loads over time from the outfall should also be prepared and reported."

##### *4.5.3.4.1 Discharge Volumes from Persistently Flowing Major MS4 Outfalls*

For each highest priority outfall monitored during the 2019-2020 monitoring year, the non-stormwater discharge was modeled by multiplying the total number of dry weather days for the month by an instantaneous flow rate for the outfall for that month. The number of dry weather days (i.e., greater than 72 hours since rain event of 0.1 inches or more) for each calendar month was determined using rainfall data from both County of San Diego and County of Riverside rainfall gauges near the jurisdictions. Flow measurements were determined as follows:

- For months with field visits, the instantaneous flow measurement recorded for that visit was applied to the month.

- If there were multiple field visits within a given month, flow measurements were averaged and applied to the month (averages included instantaneous flow measurements and zero flow for dry/tidal/ponded conditions).
- For months where no outfall-specific data was available, the average of all instantaneous flow measurements for the outfall was applied to that month.
- Where available, continuous flow monitoring data were used instead of instantaneous flow measurements.

The annual non-stormwater discharge for each highest priority outfall represents the sum of cumulative monthly flows. These non-stormwater discharge volumes should be considered rough estimates that are based on limited field observations and measurements. When feasible, instantaneous flow measurements are based on the area-velocity method, which applies measured flow depth, width, and velocity. Velocity is often measured using a float. Although multiple velocity measurements may be collected to overcome inherent variability and a roughness factor may be applied to address friction, the float method represents a rough estimation tool for velocity. Where site conditions limit accurate collection of area-velocity field measurements, non-stormwater discharge may be estimated either using a volumetric flow rate method (e.g., filling a container of known volume in a measured interval of time), or best professional judgement based on field observations.

The County of San Diego collected continuous flow monitoring data from May to mid-September 2020 at four highest priority MS4 outfalls. At these outfalls, available continuous flow data were substituted for instantaneous flow measurements for the months when these data were available. The continuous flow datasets were adjusted to exclude wet weather days and the following 72-hours, then cumulative monthly discharges were calculated for the months of May to September 2020 using the average daily flow rate for the month multiplied by the dry weather days for that month. For months with no outfall-specific flow data, an average of the daily discharge values using the continuous flow dataset was applied to the days of that month.

**Table A4-25** presents the estimated annual non-stormwater volume for major MS4 outfalls with persistent flow and highest priority outfalls with transient flow, by Copermittee.

**Table A4-25. 2018-2019 Annual Non-stormwater Flow Estimates for Highest Priority Outfalls**

| Copermittee | Outfall ID* | 2019-2020 Dry Weather Determination | Number of Samples | Number of Samples with Measurable Flow | Total Non-stormwater Discharge (gallons) |
|---|---|---|---|---|---|
| County of San Diego | HST01 | Transient | 2 | 1 | 4,258,312 |
| | MS4-SMG-015 | Persistent | 2 | 2 | 15,250,839 |
| | MS4-SMG-021 | Persistent | 2 | 2 | 6,528,571 |
| | MS4-SMG-062 | Persistent | 2 | 1 | 534,554 |
| | MS4-SMG-063 | Transient | 2 | 1 | 260,267 |
| Riverside County Flood Control District | 1025 | Persistent | 2 | 2 | 51,698,812 |
| | 1032 | Persistent | 2 | 2 | 50,143,654 |
| | 1037 | Persistent | 2 | 2 | 36,338,349 |
| | 1060 | Persistent | 2 | 2 | 12,682,968 |
| | 1061 | Persistent | 2 | 2 | 3,986,278 |
| City of Murrieta | 4063 | Persistent | 1 | 1 | 10,688,502 |
| City of Temecula | 3038 | Persistent | 1 | 1 | 7,800,378 |

MG = million gallons.
* Highest priority outfalls not shown in table were VNS and therefore have no volumes to report. County of Riverside and City of Wildomar's highest priority outfalls did not have measurable flow and therefore were not sampled.

#### *4.5.3.4.2 Pollutant Loads for Highest Priority Outfalls*

Pollutant loads were calculated for each monitored highest priority outfall as the product of the outfall-specific annual discharge volume and the concentration of the sample for each monitored constituent. When both monitored events yielded samples, the mean concentration of the two results was used. Pollutant loads are not calculated for stations that were ponded and not sampled during both field screening events. The volume would be considered zero, and there is no concentration data. The pollutant load estimates are presented in **Attachment 4E**.

### 4.5.3.5 *Provision D.4.b.(2)(c)(v) – Evaluate Progress Achieving Non-stormwater Volume and Load Reductions*

This Provision requires the Copermittees to review the data collected under the MS4 outfall dry weather monitoring program. The purpose of this review is to identify pollutant reduction progress, assess water quality improvement strategy effectiveness, and identify modifications necessary to increase effectiveness. This assessment is required once during the Permit term and was provided in the RMAR for most of the watersheds in the San Diego Region, which had accepted WQIPs in place several years before the SMR WMA. Strategies have been implemented in the SMR WMA for less than two years under the accepted WQIP, and additional implementation and data collection are anticipated during upcoming reporting periods for a comprehensive and meaningful effectiveness assessment. Assessments required once during the Permit term will be conducted again after MS4 outfall discharge monitoring data is collected under the next Permit.

#### 4.5.3.6 *Provision D.4.b.(2)(c)(vi) – Identify Data Gaps*

This provision requires the Copermittees to identify gaps in the monitoring data necessary to assess the previous provisions. No gaps were identified in the highest priority outfall monitoring data during the reporting year. Many of the highest priority outfalls sites visited were dry, ponded, or otherwise lacked measurable flow which prevented sampling. These results are representative of the dry conditions at the outfalls listed in the inventory.

### 4.5.4 Illicit Discharge Detection and Elimination Program Data and Assessment

Highest priority outfalls are typically a specific focus of IDDE investigations related to the monitoring program. Since March 2020, COVID significantly impacted the Riverside Copermittees' usual procedures for field follow-up investigations, education, and enforcement in response to persistent flows at high priority outfalls. Prior to the COVID pandemic, the typical procedure for upstream investigations based on outfall monitoring consisted of having District staff track flows upstream to the District's jurisdictional boundary with the neighboring Copermittee's jurisdictional boundary. The District would then hand off the investigation to the Copermittee, who would complete the investigation within its jurisdiction, along with any follow-up action as needed to address the identification and elimination of sources of flow and pollutants.

Beginning with the start of the COVID pandemic in March 2020, however, Riverside Copermittees' ability to do these field investigations was severely limited. Nonetheless, the District and Riverside Copermittees pulled together their limited resources to identify high-priority sources of dry-weather flows or NAL exceedances. District staff began tracking the path of these flows not only within the District's jurisdiction but very often into Copermittee jurisdictions. When possible, the District began identifying locations of potential sources (residential neighborhoods for the most part) and in many cases was able to leave educational material for property owners or talk directly to responsible parties in the field. The District also provided source location information (e.g., Google maps, latitude and longitude coordinates, addresses, photographs, etc.) to the appropriate Copermittee, which in turn, at that point, could follow up with responsible parties about the prohibited discharges, usually by mail. In cases where discharges were not linked to a specific residence but were traced to a particular development or community, Copermittees typically reached out to the applicable POA or HOA, respectively, to educate them on discharge prevention and work with them to address the discharges, which typically ended up consisting of irrigation runoff.

The County of San Diego also adjusted some of its standard IDDE investigation and follow-up procedures to protect the health and safety of people who live and work in the County and of County employees. County staff generally limited in person interactions with responsible parties and adhered to the San Diego County Public Health Order requirements when in person interaction was necessary. While the approaches used were somewhat different than those used before the COVID-19 pandemic, the County of San Diego was still able to identify and respond to illicit discharges in compliance with the MS4 Permit, as discussed in more detail in the County's letter to the Regional Board dated March 27, 2020.

In addition to field screenings, outfall monitoring source tracking, and investigations, the IDDE programs also included the following components, to the extent that COVID-related restrictions and associated safety precautions allowed, to prevent, identify, and eliminate IC/IDs:

- Educating commercial retail businesses such as hardware/home improvement stores, garden centers, and nurseries about outdoor water conservation and over-irrigation runoff, and Best Management Practices (BMP) for proper disposal of common household hazardous wastes.
- Operating a public complaint phone hotline and website and addressing each complaint by investigating those that pose immediate threats to the beneficial uses of the area's receiving waters, or by entering lower priority complaints into a database to identify and prioritize areas of repeated but minor violations that can be addressed as staff become available.
- Prior to COVID, the Copermittees had the means to conduct inspections at industrial and commercial sites, municipal facilities, construction projects, and residential areas in a timely manner. With the onset of COVID, the Riverside Copermittees had to limit their inspections and submitted letters to the Regional Board requesting a temporary suspension to these inspection components until local and state authorities withdrew COVID-related restrictions. The County of San Diego continued inspections but adapted its existing development inspection approach to limit in person interaction and follow social distancing and other public health protection procedures, as described in the County of San Diego's letter to the Regional Board regarding COVID impacts on its program.
- Maintaining the MS4 and sewer system, which provide opportunities to identify unpermitted connections to the MS4, cross connections, and other potential sources of IC/IDs.
- Enhanced source investigation studies, such as continuous flow monitoring and isotope studies (County of San Diego).

The IDDE components listed above are described in more detail in **Section 2** of the Annual Report and in the jurisdictional strategy tables in **Appendix 2**. The Copermittees' Jurisdictional Runoff Management Program (JRMP) Annual Report forms, also included in **Appendix 2**, list the total numbers of IC/IDs identified and eliminated through all IDDE program activities during the monitoring year. More detail about source investigation and elimination specifically related to the dry weather MS4 outfall monitoring component of the IDDE program is presented below.

#### 4.5.4.1 *Dry Weather MS4 Outfall Source Identification Results*

Known and suspected sources identified during monitoring are presented in **Table A4-26**. In cases where flow was observed at the outfall, but the source was not directly observed or otherwise definitively identified, Copermittees may have identified the sources as "suspected" rather than "known." Suspected sources may require additional investigation to identify them more specifically before they can be reduced or eliminated. The counts shown in these tables are for investigations associated with dry weather monitoring activities and do not include identification of sources during inspections and audits.

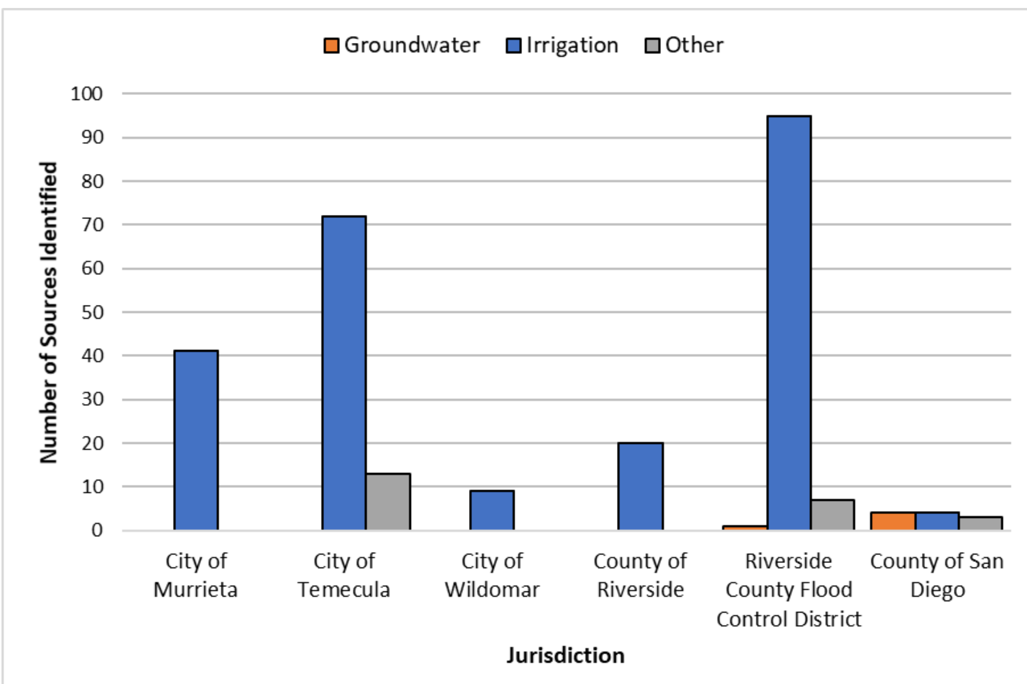
Irrigation runoff was the most commonly identified known or suspected source within the SMR WMA. Copermittees worked with residents, Home Owners Associations (HOAs) and water districts to address irrigation runoff through water conservation programs, consisting of outreach and enforcement, typically through drought ordinances or other prohibitions of wasting water, where necessary. The Copermittees also identified known or suspected sources that typically are not within their ability to control, usually groundwater infiltration into the MS4 or a permitted discharge, which are also included in **Table A4-26** and **Figure A4-13.**

Suspected groundwater infiltration into the MS4 was identified at multiple outfalls within the SMR WMA. Some Copermittees have begun to perform additional testing to help determine whether groundwater is a source of flow at certain outfalls. The additional tests typically included ion and/or isotope analyses, where results were plotted against known sources such as groundwater and potable water.

**Table A4-26. Known and Suspected Sources of Persistent and Transient Flows in the SMR WMA**

| Copermittee | Known Sources | | | Suspected Sources | | | |
|---|---|---|---|---|---|---|---|
| | Irrigation Runoff | Ground-water | Other | Irrigation Runoff | Ground-water | Water District | Other |
| **Middle SMR Subwatershed** | | | | | | | |
| City of Murrieta | - | - | - | 41 | - | - | - |
| City of Temecula | - | - | - | 72 | - | 1 | 13 |
| City of Wildomar | 9 | - | - | - | - | - | - |
| County of Riverside | - | - | - | 20 | - | - | - |
| District | 95 | 1 | 7 | - | - | - | - |
| **Lower SMR Subwatershed** | | | | | | | |
| County of San Diego | - | - | - | 4 | 4 | - | 3 |

Results limited to major MS4 outfalls and may represent a combination of controllable and uncontrollable sources. More than one source may be identified at a site.




Other sources include residential car wash water and maintenance power washing.

**Figure A4-13. Known and Suspected Flow Sources Recorded During Field Screening and Follow-up Source Investigations**

#### 4.5.4.2 *Source Identification for Highest Priority Outfalls*

The highest priority outfalls identified by each Copermittee through their outfall prioritization process were a focus for IDDE investigations during 2019-2020. More than one source may contribute flow to a single outfall. Details about source investigations and associated source elimination activities at the highest priority outfalls are provided in **Table A4-27.**

#### 4.5.4.3 *Additional Source Investigation Activities*

The County of San Diego has installed flow meters at four outfalls and two upstream locations in the SMR WMA to assist in source identification. The flow meters measure continuous flow at these locations, which allows the County of San Diego to target source investigation and elimination activities at particular times when flow rates tend to be higher. For example, irrigation systems are typically turned on at night or in the early morning and can be identified by recurring higher flow rates during this time.

The County of San Diego is also investigating potential sources of human bacteria since human sources of bacteria are the highest priority to address from a public health perspective. The County of San Diego is conducting long-term monitoring as well as a wastewater collection system assessment to identify areas of concern and prioritize areas for preventative maintenance.

**Table A4-27. Highest Priority Persistent Outfall Source Elimination**

| Jurisdiction | Highest Priority Site ID | Source Investigation Performed? | Type | Runoff Source(s) | Actions Taken or Planned |
|---|---|---|---|---|---|
| **City of Murrieta** | 4030 | No (ponded) | N/A | N/A | N/A |
| **City of Murrieta** | 4038 | No (ponded) | N/A | N/A | N/A |
| **City of Murrieta** | 4039 | No (ponded) | N/A | N/A | N/A |
| **City of Murrieta** | 4062 | No (ponded) | N/A | N/A | N/A |
| **City of Murrieta** | 4063 | No, located within private community | Unknown | Unidentified | City will send notification letter to the HOA located within the area tributary to the outfall and provide public education materials on landscape and gardening, over-irrigation and pet waste. The City will also be reaching out to Rancho California Water District to inquire about any sanitary sewer lines and potential water main flushings in the area. |
| **City of Temecula** | 3038 | No | Unknown | Unidentified | In lieu of upstream investigations at high priority outfalls, the City of Temecula sent notification letters with public education pamphlets to residential HOAs and commercial POAs to compel these HOAs and POAs to take the lead with eliminating dry weather flows throughout the communities they serve. |
| **City of Temecula** | 3082 | No | Unknown | Unidentified | In lieu of upstream investigations at high priority outfalls, the City of Temecula sent notification letters with public education pamphlets to residential HOAs and commercial POAs to compel these HOAs and POAs to take the lead with eliminating dry weather flows throughout the communities they serve. |
| **City of Temecula** | 3119 | No | Unknown | Unidentified | In lieu of upstream investigations at high priority outfalls, the City of Temecula sent notification letters with public education pamphlets to residential HOAs and commercial POAs to compel these HOAs and POAs to take the lead with eliminating dry weather flows throughout the communities they serve. |
| **City of Temecula** | 3120 | No | Unknown | Unidentified | In lieu of upstream investigations at high priority outfalls, the City of Temecula sent notification letters with public education pamphlets to residential HOAs and commercial POAs to compel these HOAs and POAs to take the lead with eliminating dry weather flows throughout the communities they serve. |
| **City of Temecula** | 3123 | No (ponded) | N/A | N/A | N/A |
| **City of Wildomar** | 5012 | Yes | Unknown | Unidentified | N/A |
| **City of Wildomar** | 5015 | Yes | Unpermitted Discharge | Irrigation | Outreach and educational materials were given. |
| **City of Wildomar** | 5019 | Yes | Unpermitted Discharge | Irrigation | Outreach and educational materials were given. |
| **City of Wildomar** | 5024 | No (dry) | N/A | N/A | N/A |
| **City of Wildomar** | 5026 | Yes | Unpermitted Discharge | Irrigation | Outreach and educational materials were given. |
| **County of Riverside** | 2207 | No (dry or ponded) | N/A | N/A | N/A |
| **County of Riverside** | 2211 | No (dry or ponded) | N/A | N/A | N/A |
| **County of Riverside** | 2235 | No (dry or ponded) | N/A | N/A | N/A |
| **County of Riverside** | 2236 | No (dry or ponded) | N/A | N/A | N/A |
| **County of Riverside** | 2245 | No (dry or ponded) | N/A | N/A | N/A |

**Table A4-27. Highest Priority Persistent Outfall Source Elimination**

| Jurisdiction | Highest Priority Site ID | Source Investigation Performed? | Type | Runoff Source(s) | Actions Taken or Planned |
|---|---|---|---|---|---|
| **Riverside County Flood Control District** | 1060 | Yes | Unpermitted Discharge | Suspected Irrigation Runoff (Possibly Multiple Property Owners) | The District's IC/ID Officer conducted follow-up field investigation at the outfall station and the proximate tributary area in accordance with the District's JRMP IC/ID protocol. Per the investigation there was evidence of backyard drainage of water coming from residential homes. Public education door hangers and pamphlets with reference to dry weather discharge prohibition were left on the front door of the multiple residential homes. |
| **Riverside County Flood Control District** | 1025 | Yes | Unpermitted Discharge | Suspected Irrigation Runoff (Possibly Multiple Property Owners) | The District's IC/ID Officer conducted follow-up field investigation at the outfall station and the proximate tributary area in accordance with the District's JRMP IC/ID protocol. Per the investigation there was evidence of backyard drainage of water coming from a residential home, as well as overwatering of grass along a business park. Public education door hangers and pamphlets with reference to dry weather discharge prohibition were left for communication to the property owners. |
| **Riverside County Flood Control District** | 1032 | Yes | Unpermitted Discharge | Suspected Irrigation Runoff (Possibly Multiple Property Owners) | The District's IC/ID Officer conducted follow-up field investigation at the outfall station and the proximate tributary area in accordance with the District's JRMP IC/ID protocol. Per the investigation there was evidence of backyard drainage of water coming from residential homes. Public education door hangers and pamphlets with reference to dry weather discharge prohibition were left on the front door of the multiple residential homes. The IC/ID officer then referred the complaint addresses to the Copermittee with jurisdiction over these discharges for possible future enforcement. |
| **Riverside County Flood Control District** | 1037 | Yes | Unpermitted Discharge | Suspected Irrigation Runoff | The District's IC/ID Officer conducted follow-up field investigation at the outfall station and the proximate tributary area in accordance with the District's JRMP IC/ID protocol. Per the investigation there was evidence of overwatering of front lawns from residential homes. Public education door hangers and pamphlets with reference to dry weather discharge prohibition were left on the front door of the multiple residential homes. The IC/ID officer then referred the complaint addresses to the Copermittee with jurisdiction over these discharges for possible future enforcement. |
| **Riverside County Flood Control District** | 1061 | Yes | Unpermitted Discharge | Suspected Irrigation Runoff | The District's IC/ID Officer conducted follow-up field investigation at the outfall station and the proximate tributary area in accordance with the District's JRMP IC/ID protocol. Based on field observations it was determined to be caused by overwatering of front lawn and backyard drainage of water from residential homes, and the connectivity to the proximate storm drain was verified. For this reason the IC/ID Officer approached the property and placed a public education door hanger and pamphlet, with reference to dry weather discharge prohibition, on the front door of the residence. The IC/ID officer then referred the complaint address to the Copermittee with jurisdiction over this discharge for possible future enforcement. |
| **County of San Diego** | HST01 | No (dry or ponded) | N/A | | N/A |
| **County of San Diego** | MS4-SMG-015 | Yes | Unpermitted Discharge | Suspected Irrigation Runoff, Rising Groundwater | No dry weather discharges observed during the IDDE investigation, flow appears to be mostly groundwater infiltration into the MS4. Source investigation efforts are ongoing |
| **County of San Diego** | MS4-SMG-021 | Yes | Unpermitted Discharge | Suspected Irrigation Runoff, , Rising Groundwater | No dry weather discharges observed during the IDDE investigation, flow appears to be mostly groundwater infiltration into the MS4. Source investigation efforts are ongoing |
| **County of San Diego** | MS4-SMG-062 | Yes | Unpermitted Discharge | Suspected Irrigation Runoff, Rising Groundwater | Increased inspections during early morning hours to identify sources. |
| **County of San Diego** | MS4-SMG-063 | Yes | Unpermitted Discharge | Rising Groundwater | Flow source appears to be from a French drain designed to redirect groundwater from the roadway. Source investigation efforts are ongoing. |

#### 4.5.4.4 *Continuous Flow Monitoring Conducted by County of San Diego*

According to Provision D.2.b of the San Diego Region NPDES Permit, each Copermittee must perform dry weather MS4 outfall monitoring to identify non-storm water and illicit discharges within its jurisdiction pursuant to Provision E.2.c, and prioritize the dry weather MS4 discharges that will be investigated and eliminated pursuant to Provision E.2.d. In an effort to identify, measure, and reduce sources of non-stormwater flows in the SMR WMA, as required in Provision D.2.b and Provision E.2.c of the Permit, the County of San Diego (County) has implemented a continuous flow monitoring program at select highest priority persistently flowing MS4 outfalls.

During the dry season (May through September) in 2015, 2016, 2017, and 2018, continuous flow monitoring was conducted at one County MS4 outfall, HST01. In 2019, due to minimal dry weather flows observed during the previous four years at HST01, flow monitoring was discontinued at this site. However, four new MS4 outfall locations were added to the continuous flow monitoring program (MS4-SMG-062, MS4-SMG-015, MS4-SMG-021, and MS4-SMG-024) in the SMR WMA for the 2019 dry season. It was determined through a GIS analysis and field investigations that site MS4-SMG-024 conveyed a blue line creek, along with flows from the three sites upstream (062, 015, and 021). In 2020, site MS4-SMG-024 was given a lower priority status and replaced with MS4-SMG-063 on the County's list of highest priority dry weather outfalls. In order to measure continuous dry weather flow rates at these select outfalls, water level loggers were installed at each outfall to record flow, conductivity, and temperature at five-minute intervals. Since the loggers need to be completely submerged in water to function properly, monitoring the low flow levels at these outfalls required installation of custom v-notch weirs. The weirs hold back the flows and direct flow through the v-notch. Flow rates are then calculated from the measurement of water level in the v-notch using equations specific for the individual control structure.

In 2019, four sites were monitored for continuous flow during the dry season: MS4-SMG-062, MS4-SMG-015, MS4-SMG-021, and MS4-SMG-024. All four of these MS4 outfalls belong to the same MS4 system, with MS4-SMG-024 being the most downstream location that conveys flows from the other three sites, along with a few other sections of MS4 not captured by the other outfalls (**Figure A4-14**). At the most downstream location (MS4-SMG-024), the MS4 outfall discharges directly to Fallbrook Creek, which eventually discharges to O'Neill Lake. Further upstream of MS4-SMG-024, the drainage area splits into two large MS4 segments that discharge to sites MS4-SMG-015 and MS4-SMG-021. There is a blue line creek (Fallbrook Creek) that is conveyed by the MS4 system between these two segments and the downstream discharge point at MS4-SMG-024, so it is possible that some portion of the flow at these three locations are natural in origin. Site MS4-SMG-062 drains a smaller segment on the west side of the larger MS4-SMG-024 drainage and discharges directly to this same blue line creek (**Figure A4-14).**

With the exception of MS4-SMG-024, these sites were monitored for a second consecutive dry season in 2020. All three of the MS4 outfalls monitored in both 2019 and 2020 experienced an increase in mean dry weather flow rates (**Table A4-28**). MS4-SMG-015 had a mean daily flow rate of 50,892 GPD in 2019 and 54,019 GPD in 2020 (6% increase). MS4-SMG-021 had a mean daily flow rate of 20,708 in 2019 and 22,097 in 2020 (7% increase). An upstream MS4 pipe was monitored at this site in 2020 (MS4-SMG-021A) in order to assess the contribution of dry weather flows from the upper portion of the drainage area. This upstream site had a mean daily flow rate of 16,111 GPD, which is 73% of the total flow at the downstream outfall. MS4-SMG-021A monitors flow in the main stem of the MS4 that drains to the downstream outfall and there are no known inputs from County storm drains between the two sites, which indicates potential flow sources (27% of total flow) are either private pipes, illegal connections, or groundwater infiltration between these two sites. The source of this flow will continue to be investigated. MS4-SMG-062 had a mean daily flow rate of 284 GPD in 2019 and 810 GPD in 2020 (185% increase). An upstream MS4 pipe was also monitored at this site in 2020 (MS4-SMG-062D) in order to quantify the dry weather flows from a portion of drainage area that was identified as a main source of flow during Illicit Discharge Detection and Elimination (IDDE) investigations. This upstream pipe conveys flows from a residential neighborhood and a private MS4 pipe. The mean daily flow rate at this upstream pipe was 887 GPD in 2020, which is slightly more than the total flow at the downstream outfall MS4-SMG-062, indicating that this portion of the drainage area contributes most of the flow at the outfall. The source of flow at the upstream site and the private connection is still under investigation and will be the focus of future inspections.

In 2020, one new site was added to the County's list of monitored sites (MS4-SMG-063). Prior to the dry season, MS4-SMG-063 was identified as a potential candidate site to assess progress towards reducing and eliminating anthropogenic dry weather flows for compliance with the County's dry weather goals in the SMR WQIP. However, since the outfall drains to Rainbow Creek and is subject to other regulatory requirements under the Rainbow Creek Nutrient TMDL, this site will not be used to evaluate progress towards dry weather flow reductions. The County has identified at least one outfall (MS4-SMG-093) that has the potential to discharge to the Santa Margarita River during dry weather and can be used to assess progress toward dry weather flow reductions. This outfall will be monitored during the 2021 dry season to establish a baseline flow rate. The final dry weather goal is to eliminate anthropogenic dry weather flows from MS4 outfalls (by 100%) by the end of FY 2038, and the first interim goal is to reduce dry weather flows from MS4 outfalls by 25% by the end of FY 2023 from the baseline year. Baseline dry weather flow rates will be established in 2021.

In order to further address the origins of non-stormwater flows from the MS4, during the 2018 dry season, the County initiated a source ID water quality sampling program focused on the hydrogen and oxygen stable isotope composition, along with geochemistry and analysis. Four major MS4 outfalls in the SMR WMA were added to this sampling program in 2019, three of which are currently HPPF outfalls (MS4-SMG-015, MS4-SMG-021, and MS4-SMG-062), while one was deprioritized from the continuous flow program and the HPPF list (MS4-SMG-024). Samples of the discharge were collected at the outfalls and, for comparison, water samples were also collected at potential source locations including tap water, groundwater, reclaimed water, and other accessible potential source waters. The goal of the stable isotope analysis is to quantify the percentage of imported water (tap water) in the non-stormwater MS4 discharge samples. According to the results from the stable isotope analysis, MS4-SMG-015, MS4-SMG-021, and MS4-SMG-024 are all between 58-62% tap water, while MS4-SMG-062 is 78% tap water; the results of the geochemistry and indicator analyses suggest that the remainder of flow at these sites is attributable to groundwater. The results of this study allow the County to focus efforts on addressing sources of anthropogenic dry weather flow through IDDE investigations, and residential, commercial, and industrial inspections. The results of the Dry Weather Flow Source Investigation 2018 – 2019 Monitoring Years Final Report (Wood Environment and Infrastructure, 2020) are included in **Attachment 4I** of this appendix.

**Table A4-28. Mean Flow Rates (gallons/day) at Priority Outfalls in the Santa Margarita WMA (2020)**

| Site ID | Mean Flow (gallons/day) | | % Difference | Notes/Comments |
|---|---|---|---|---|
| | 2019 | 2020 | 2019-2020 | |
| MS4-SMG-015 | 50,892 | 54,019 | 6% | |
| MS4-SMG-021 | 20,708 | 22,097 | 7% | |
| MS4-SMG-021A | - | 16,111 | - | 73% of total flow at downstream location |
| MS4-SMG-062 | 284 | 810 | 185% | |
| MS4-SMG-062D | - | 887 | - | 109% of total flow at downstream location |
| MS4-SMG-024 | 93,808 | - | - | |
| MS4-SMG-063 | - | 909 | - | |

## Santa Margarita River Watershed - Major Outfalls - Fallbrook

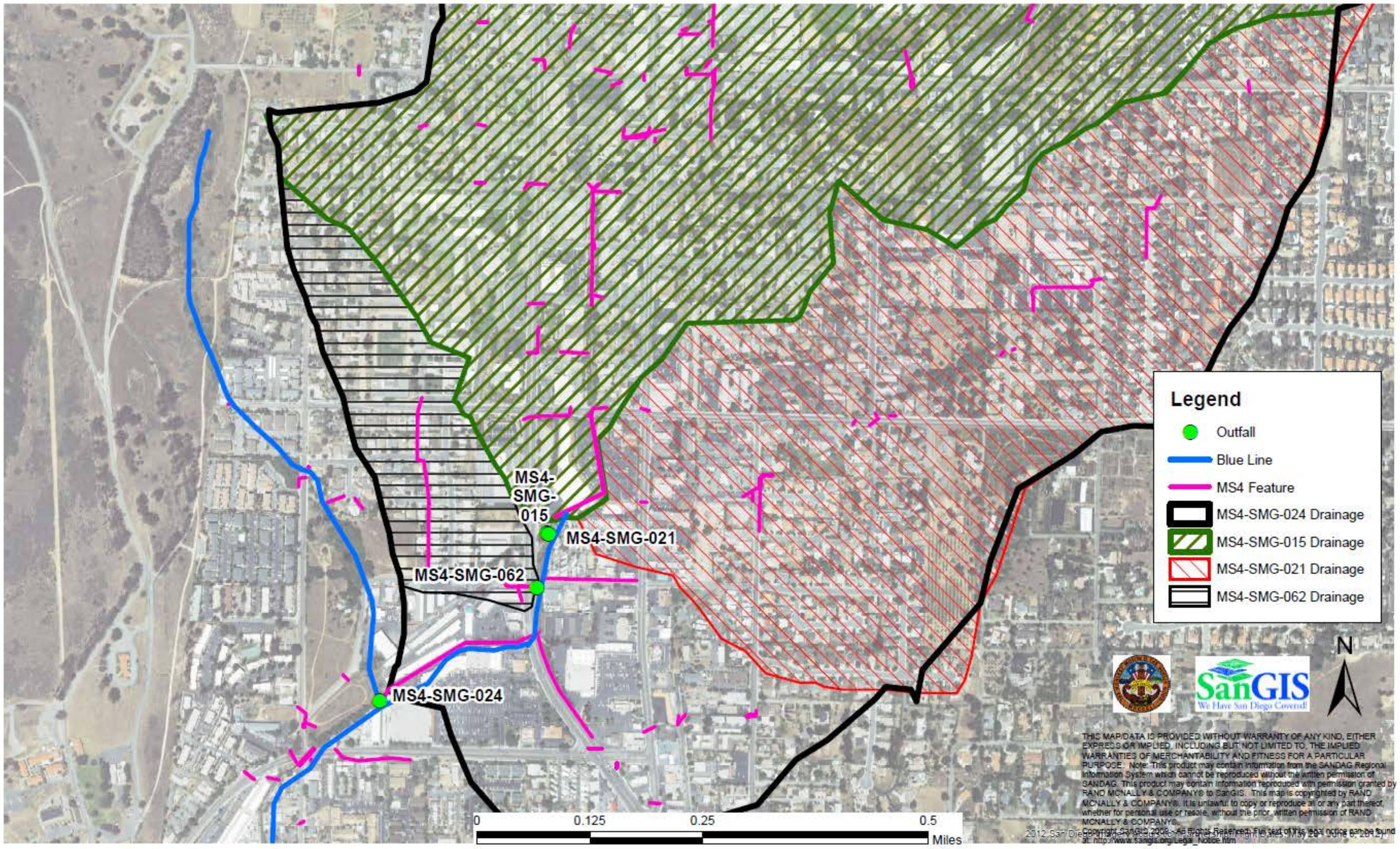



**Figure A4-14. Priority Major MS4 Outfalls and Drainage Areas within the SMR WMA (Fallbrook)**

### 4.5.5 Wet Weather MS4 Outfall Monitoring

Wet weather MS4 outfall monitoring was conducted at six outfalls in the WMA. Stations representative of stormwater discharges from Residential, Commercial, Industrial, and typical Mixed-use land uses were selected from the inventory of major MS4 outfalls, and at least one station was selected for each Copermittee within the WMA. The wet weather MS4 outfall monitoring stations for the WMA are presented in **Table A4-29** and are shown with corresponding drainage areas in **Figure A4-15**. The drainage area for HST01 was updated in the 2018-2019 reporting year based on refined drainage area delineations for the Rainbow Creek Watershed. This outfall includes agricultural land use.

This was the second year of wet weather MS4 outfall monitoring under the accepted WQIP, and the fourth year of monitoring at these six locations. The Copermittees began long-term wet weather monitoring at these locations during the 2016-2017 monitoring year. While the County of San Diego began long-term monitoring in the 2013-2014 monitoring year, they adjusted the monitoring locations to be in the Rainbow Creek Watershed during the 2016-2017 monitoring year. This was done in part to provide additional wet weather nutrient concentrations and loading data to engineers developing structural best management practice (BMP) designs for the Rainbow Creek Watershed.

**Table A4-29. Wet Weather MS4 Outfall Monitoring Stations**

| MS4 Outfall Name | Site Description | Jurisdiction | HSA Name/No. | Latitude | Longitude |
|---|---|---|---|---|---|
| **Lower SMR Subwatershed** | | | | | |
| HST01[1] | Brow Ditch to Rainbow Creek @ Huffstatler Road | County of San Diego | Vallecitos/902.23 | 33.41422 | -117.15197 |
| **Middle SMR Subwatershed** | | | | | |
| 902MS45031 | Outlet to NW side of Wildomar Channel @ Gruwell Street | City of Wildomar | Wildomar/902.31 | 33.6037 | -117.2787 |
| 902MS44034[2] | RCP Outlet to Warm Springs Creek d/s of M.H.S. Road | City of Murrieta | French/902.33 | 33.5475 | -117.1719 |
| 902MS41033 | Outlet to W side of Tucalota Creek south of M.H.S. Road | District | Gertrudis/902.42 | 33.5521 | -117.1364 |
| 902MS43015 | Outlet to Murrieta Creek @ Diaz Road behind Rancho California Water District pump station | City of Temecula | Murrieta/902.32 | 33.5165 | -117.1723 |
| 902MS42240 | Outlet to Temecula Creek @ South of Breeze Way Place and Summit View | County of Riverside | Pauba/902.51 | 33.4866 | -117.0636 |
| **Upper SMR Subwatershed** | | | | | |
| *There are no major outfalls identified in the Upper SMR Subwatershed.* | | | | | |

[1] Previously also identified as SMR-MS4-091. HST01 station name is used for consistency with TMDL and MS4 outfall monitoring in the Rainbow Creek Watershed.
[2] Previously 902MS4034.

Monitoring at the wet weather MS4 outfall monitoring locations was conducted between November 19, 2019 and March 11, 2020. The rainfall statistics for the monitored event at each outfall, based on nearby County station rain gauges, are presented in **Table A4-30**. Wet weather MS4 outfall flow data are presented in **Attachment 4F-1**, and a QA/QC report is provided as **Attachment 4F-2**.

Monitoring was conducted in accordance with the WQIP MAP. Grab samples were collected and analyzed for pH, temperature, conductivity, dissolved oxygen, turbidity, hardness, and indicator bacteria. Composite samples were collected and analyzed for constituents contributing to the HPWQC, 2014/2016 303(d) List impairments, and constituents with SALs. A receiving water sample was collected and analyzed for hardness, where feasible. Observational and hydrologic data were also recorded.

**Table A4-30. 2019-2020 Rainfall Statistics for Wet Weather MS4 Outfall Monitoring Events**

| Date | Outfall Name | Total Rain (inches) | Duration (hours) | Intensity (inches/ hour) | Antecedent Dry Days | Event Volume (cf) | Peak Flow (cfs) |
|---|---|---|---|---|---|---|---|
| **Middle SMR Subwatershed** | | | | | | | |
| 3/9-10/2020 | 902MS45031 | 1.41 | 27.3 | 0.05 | 16 | 19,205 | 2.94 |
| 12/4/2019 | 902MS41033 | 1.27 | 15.5 | 0.08 | 5 | 128,027 | 4.58 |
| 3/9-10/2020 | 902MS44034 | 1.39 | 25.0 | 0.06 | 16 | 75,508 | 8.29 |
| 11/19-20/2019 | 902MS43015 | 0.86 | 20.5 | 0.04 | 178 | 77,222 | 5.75 |
| 12/4/2019 | 902MS42240 | 1.27 | 15.5 | 0.08 | 5 | 6,292 | 0.42 |
| **Lower SMR Subwatershed** | | | | | | | |
| 2/9-10/2020 | HST01 | 0.12 | 7 | 0.02 | 19 | 45,994 | 8.19 |

cf – cubic feet; cfs – cubic feet per second

Analytical results for samples collected at the six wet weather MS4 outfall monitoring locations are summarized in **Table A4-31**. Nutrient concentrations at HST01 are compared to final effluent limitations from the Rainbow Creek Nutrient TMDL. Results for the remaining required constituents, including general and physical chemical constituents, nutrients, and total and dissolved metals, are compared to SALs as provided in the Permit.

Nutrient results were below the applicable SALs except at HST01, where nitrate as N, nitrite + nitrite as N, and total phosphorus results exceeded the SALs and/or the final effluent limitations from the Rainbow Creek Nutrient TMDL. There are no existing SALs (Table C-5 of the Permit) that relate to PWQCs. No other constituent concentrations were above the corresponding SALs. Laboratory and field data collected for wet weather MS4 outfall monitoring will be uploaded to CEDEN, and data submittals are provided in **Attachment 4K**.

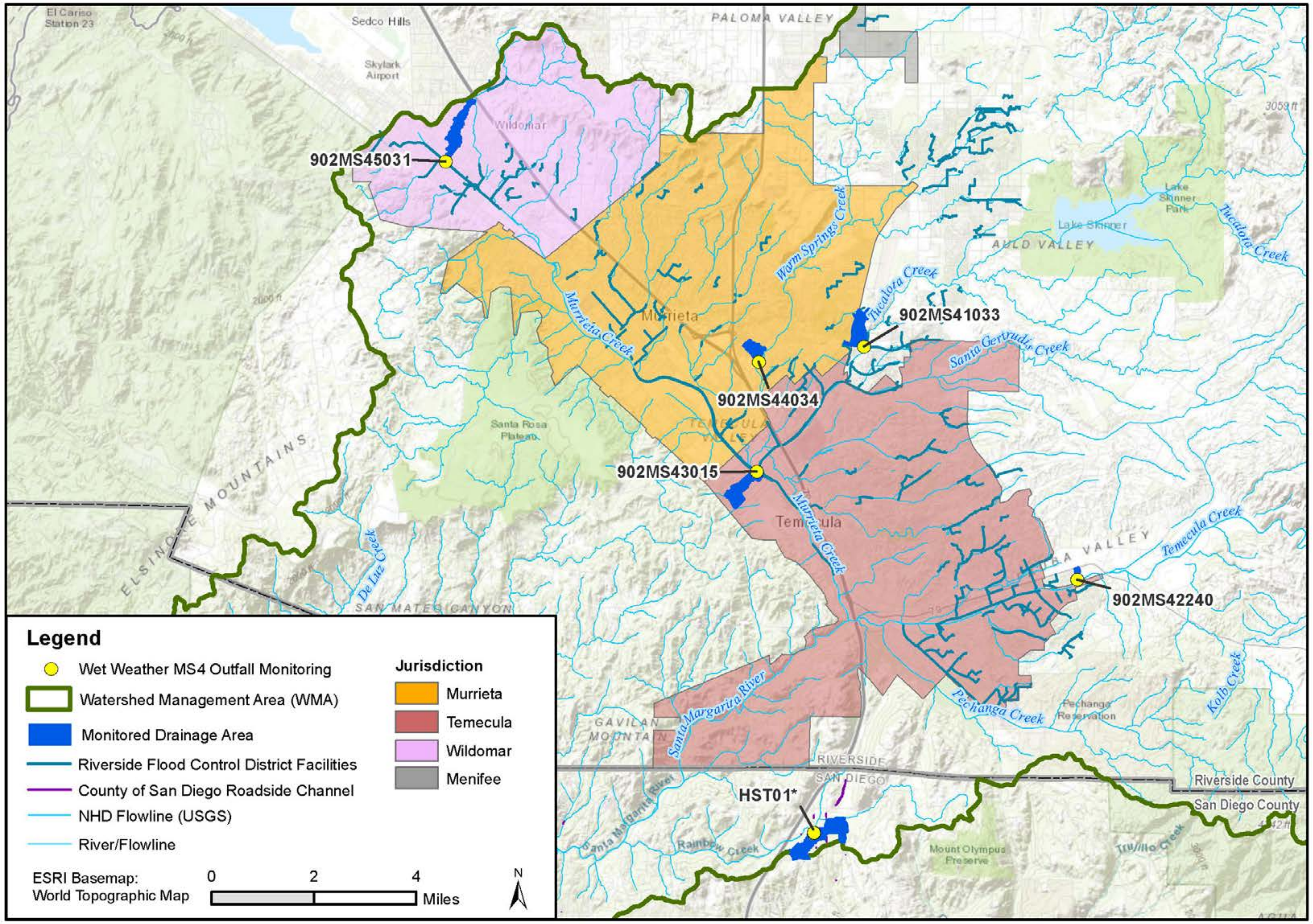



**Figure A4-15. 2019-2020 Wet Weather MS4 Outfall Monitoring Locations and Drainage Areas**

**Table A4-31. 2019-2020 Wet Weather MS4 Outfall Monitoring Analytical Results**

| Analyte | Units | Final Effluent Limitations[1] | SAL[2] | 902MS45031 (902.31) | 902MS41033 (902.42) | 902MS44034 (902.33) | 902MS43015 (902.32) | 902MS42240 (902.51) | HST01* (902.23) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 03/10/2020-03/11/2020 | 12/4/2019 | 03/10/2020-03/11/2020 | 11/20/2019 | 12/4/2019 | 2/9/2020 |
| **Physical Chemistry** | | | | | | | | | |
| Dissolved Oxygen (Field) | mg/L | | | 9.68 | 10.33 | 9.84 | 9.81 | 10.34 | 8.66 |
| pH (Field) | pH units | | | 7.49 | 7.37 | 7.37 | 7.78 | 8.1 | 8.18 |
| Specific Conductance (Field) | µS/cm | | | 33 | 907 | 126 | 939 | 175 | 1071 |
| Specific Conductance (Lab) | µmhos/cm | | | 47 | 330 | 200 | 180 | 400 | NR |
| Water Temperature (Field) | Celsius | | | 13.9 | 12.9 | 14 | 13.1 | 12.4 | 14.12 |
| Turbidity (Field) | NTU | | 126 | 23.51 | 17.89 | 19.93 | 122.9 | 13.2 | 53.6 |
| Turbidity (Lab) | NTU | | 126 | 67 | 19 | 8.9 | 72 | 18 | NS |
| **Fecal Indicator Bacteria** | | | | | | | | | |
| *E. coli*[4] | MPN/100 mL | | | 780 | 5,400 | 7,900 | 35,000 | 14,000 | 5,200 |
| *Enterococcus*[4] | MPN/100 mL | | | 680 | 1,700 | 35,000 | 4,900 | 17,000 | 5,400 |
| Fecal Coliform[4] | MPN/100 mL | | | 780 | 5,400 | 7,900 | 35,000 | 14,000 | 3,500 |
| Total Coliform[4] | MPN/100 mL | | | 24,000 | ≥16,000 | 92,000 | 54,000 | 54,000 | 160,000 |
| **General Chemistry** | | | | | | | | | |
| Dissolved Organic Carbon | mg/L | | | 5.4H | 8.3H | 7.1H | 16H | 8.9H | 24 |
| Total Organic Carbon | mg/L | | | NR | NR | NR | NR | NR | 27 |
| Surfactants (MBAS) | mg/L | | | NR | NR | NR | NR | NR | 0.17 |
| Sulfate | mg/L | | | 1.7 | 37 | 23 | 16 | 47 | 240 |
| Total Dissolved Solids[4] | mg/L | | | 50 | 200 | 120 | 140 | 240 | 780 |
| Total Suspended Solids | mg/L | | | NS | NS | NS | NS | NS | 100 |
| Total Hardness | mg/L | | | 18 | 86 | 51 | 48 | 91 | 301 |
| **Nutrients** | | | | | | | | | |
| Ammonia as N | mg/L | | | 0.27 | 0.29 | 0.12 | 0.63 | 0.55 | 0.66 |
| Ammonia as N (Unionized) | mg/L | | | 0.0022 | 0.0024 | 0.00031 | 0.016 | 0.014 | NS |
| Nitrate as N[3] | mg/L | 10 | | 0.49 | 0.4 | 0.55 | 0.62 | 1.2 | 22 |
| Nitrate + Nitrite as N | mg/L | | 2.6 | 0.52 | 0.429 | 0.584 | 0.642 | 1.271 | 22.35 |
| Nitrite as N | mg/L | | | 0.03 | 0.029 | 0.034 | 0.022 | 0.071 | 0.35 |
| Total Kjeldahl Nitrogen | mg/L | | | 0.83 | 1.2 | 0.98 | 2.4 | 2.1 | 3.8 |
| Total Nitrogen[3] | mg/L | 1 | | 1.4 | 1.6 | 1.6 | 3 | 3.4 | 26.15 |
| Total Phosphorus[3] | mg/L | 0.1 | 1.46 | 0.34 | 0.41 | 0.38 | 0.55 | 0.85 | 1.3 |
| Dissolved Phosphorus | mg/L | | | 0.18 | 0.37 | 0.27 | 0.38 | 0.82 | NS |
| Orthophosphate as P | mg/L | | | 0.12 | 0.26 | 0.19 | 0.23 | 0.26 | 0.99 |
| Total Phosphate | mg/L | | | 1 | 1.2 | 1.2 | 1.7 | 2.5 | NS |
| **Total Metals** | | | | | | | | | |
| Aluminum | µg/L | | | 3,000 | 1,200 | 710 | 4,000 | 830 | 1,800 |
| Cadmium | µg/L | | 3 | 0.13J | <0.12 | <0.12 | 0.18J | <0.12 | 0.19 |
| Copper | µg/L | | 127 | 9.6 | 12 | 5.7 | 19 | 8 | 24 |
| Iron[4] | µg/L | | | 3,100 | 1,600 | 980 | 5,400 | 1,100 | 2,000 |
| Lead | µg/L | | 250 | 2.7 | 1 | 0.5 | 3.7 | 0.6 | 1.8 |
| Manganese[4] | µg/L | | | 71 | 34 | 55 | 77 | 26 | 150 |
| Selenium | µg/L | | | <0.3 | 0.4J | 0.3J | 0.4J | 0.8 | 0.43 |
| Silver | µg/L | | | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.2 |
| Zinc | µg/L | | 976 | 40 | 61 | 18 | 120 | 15 | 91 |

**Table A4-31. 2019-2020 Wet Weather MS4 Outfall Monitoring Analytical Results**

| Analyte | Units | Final Effluent Limitations[1] | SAL[2] | 902MS45031 (902.31) | 902MS41033 (902.42) | 902MS44034 (902.33) | 902MS43015 (902.32) | 902MS42240 (902.51) | HST01* (902.23) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 03/10/2020-03/11/2020 | 12/4/2019 | 03/10/2020-03/11/2020 | 11/20/2019 | 12/4/2019 | 2/9/2020 |
| **Dissolved Metals** | | | | | | | | | |
| Aluminum | µg/L | | | 37J | <33 | 16J | <33 | <33 | 46 |
| Cadmium | µg/L | | | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | 0.18 |
| Copper | µg/L | | | 3.6 | 7.1 | 3.7 | 5.4 | 5 | 18 |
| Iron | µg/L | | | 28 | 22 | 67 | 67 | 19J | 78 |
| Lead | µg/L | | | <0.2 | <0.2 | <0.2 | 0.3J | <0.2 | 0.14J |
| Manganese | µg/L | | | <5 | <5 | 19 | 10 | <5 | 88 |
| Selenium | µg/L | | | <0.3 | 0.4J | 0.3J | 0.3J | 0.7 | 0.38J |
| Silver | µg/L | | | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.2 |
| Zinc | µg/L | | | 6.6 | 27 | 7 | 40 | 4.4 | 58 |
| **Organophosphorus Pesticides** | | | | | | | | | |
| Chlorpyrifos | µg/L | | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.10 |
| Diazinon | µg/L | | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.10 |

< - Results are less than the method detection limit.

* Previously SMR-MS4-091. Renamed for consistency with TMDL and MS4 outfall monitoring in the Rainbow Creek Watershed.

H – Sample received and/or analyzed after recommended holding time.

J – Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

NR – Not required

Hydrologic subarea is shown in parenthesis following monitoring station name.

[1] Final Effluent Limitations from Table 3.2. San Diego Regional Water Quality Control Board Order No. R9-2013-0001, Attachment E. Only applies to HST01.

[2] Storm Water Action Levels for Discharges from MS4s to Receiving Waters, Table C-5. San Diego Regional Water Quality Control Board Order No. R9-2013-0001.

[3] Constituent is a HPWQC for wet weather in the Rainbow Creek subarea.

[4] Constituent is a PWQC for wet weather. Note that all PWQCs do not apply to all subareas in the WMA; constituents noted here are PWQCs in at least one subarea in the WMA.

Shaded results did not meet the Final Effluent Limitation (nutrients at HST01) or Stormwater Action Level.

### 4.5.6 Wet Weather MS4 Outfall Monitoring Data Assessments

Provision D.4.b.(2)(c) of the Permit requires the wet weather MS4 outfall monitoring data assessments summarized in **Table A4-32**. The information necessary to demonstrate compliance with each Provision is outlined below. In instances where compliance has been demonstrated in previous sections of this Annual Report, those sections are referenced.

As stated in **Section 4.2**, the Copermittees in the region requested regulatory relief from performing some of the Permit-required assessments for the 2019-2020 monitoring year, which includes the stormwater assessments required by Provision D.4.b.(2)(c), including Provision D.4.b.(2)(b) which is incorporated by reference. In an email dated August 19, 2020, the San Diego Water Board provided approval for the Copermittees to "assess the data as required pursuant to provision D.4.b.(1)(c)(iv) and D.4.b(2)(c) by evaluating the pollutant loads from each outfall, i.e., only calculating the pollutant loads at the outfall level and not using the outfall data to extend the load calculation at the watershed scale." Therefore, the wet weather assessment requirements of D.4.b.(2)(c) are fulfilled in this Annual Report through estimation of volumes and loads for the wet weather monitored outfalls only. In addition, the Copermittees are providing Microsoft (MS) Excel tables and pivot charts of the pollutant loads over time for the six outfalls monitored during the 2019-2020 year that have two or more years of monitoring data (**Attachment 4G**).

**Table A4-32. Wet Weather MS4 Outfall Monitoring Assessments**

| Assessment | Components | Provision(s) | Section |
|---|---|---|---|
| **WQIP Annual Report** | | | |
| Estimate loads and volumes.* | Calculate or estimate the average stormwater runoff coefficient for each land use type. | D.4.b.(2).(b)(i)(a) | Attachment 4G |
| | Calculate or estimate the volume of stormwater and pollutant loads discharged from each monitored MS4 outfall for each qualifying storm event. | D.4.b.(2).(b)(i)(b) | 4.5.6.1 |
| | Calculate or estimate the total volume and pollutant load discharged from the Copermittee's jurisdiction over the course of the wet season. | D.4.b.(2).(b)(i)(c) | 4.5.6.1 |
| | Calculate or estimate the percent contribution of stormwater volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major MS4 outfall or each major MS4 outfall for each qualifying storm event. | D.4.b.(2).(b)(i)(d) | 4.5.6.1 Attachment 4G |
| | Identify necessary modifications to monitoring locations and frequencies necessary to identify pollutants in stormwater discharges. | D.4.b.(2).(b)(ii) | 4.5.6.1 |
| Evaluate WQIP analysis. | Using data and applicable SALs, evaluate and compare data collected to the analyses and assumptions used to develop the WQIP. | D.4.b.(2).(c)(ii) | 4.5.6.2 |
| | Evaluate whether analyses and assumptions should be updated as a component of the adaptive management efforts. | D.4.b.(2).(c)(ii) | 4.5.6.2 |
| Identify data gaps. | Identify data gaps in the monitoring data necessary to fulfill assessment requirements. | D.4.b.(2).(c)(iv) | 4.5.6.4 |

**Table A4-32. Wet Weather MS4 Outfall Monitoring Assessments**

| Assessment | Components | Provision(s) | Section |
|---|---|---|---|
| Evaluate trends. | Evaluate data collected pursuant to D.2.c, incorporate new data into time-series plots for each long-term monitoring constituent and perform statistical trends analysis on cumulative long-term wet weather data set. | D.4.b.(2)(d) | 4.5.6.5 |
| **Once during Permit Term** | | | |
| Evaluate progress in achieving stormwater pollutant reductions. | Identify reductions and progress in achieving reductions from different land uses and/or drainage areas. | D.4.b.(2).(c)(iii) | N/A |
| | Assess the effectiveness of WQIP improvement strategies, with estimates of volume and load reductions attributed to specific strategies when possible. | | N/A |
| | Identify modifications necessary to increase the effectiveness of WQIP strategies. | | N/A |

* An email from the San Diego Water Board dated August 19, 2020 granted the Copermittees regulatory relief related to this assessment. See **Section 4.2** for additional detail.
N/A – Not Applicable. Evaluation will be conducted in a future report.

#### 4.5.6.1 *Provision D.4.b.(2)(b) – Estimate Loads and Volumes – requirements as revised for 2019-2020 and 2020-2021 Reporting Years*

Based on the regulatory relief provided, the Copermittees were required to calculate stormwater volumes and pollutant loads at the outfall level only for outfalls monitored during the 2019-2020 year. Event and annual loads are provided for the six monitored outfalls in **Table A4-33** and **Table A4-34**, respectively. Event loads were calculated using measured concentrations and flow rates (used to calculate the stormwater volume) during the monitored storm event for each outfall. Annual loads were calculated based on estimated annual volume (using rainfall for all wet weather days and the average runoff coefficient calculated from the monitored events at the outfall) multiplied by the concentration measured during the monitored event. In addition, the Copermittees have provided an attachment with compiled historical loads and the 2019-2020 data in tables and graphs (**Attachment 4G**) in response to the San Diego Water Board's request "for outfalls that have been monitored for two or more years, tables and figures showing changes in pollutant loads over time from the outfall should also be prepared and reported."

The evaluation of monitoring frequency included a review of the monitoring data to determine how well the data from the single storm event monitored at each outfall represented the wet weather conditions on an annual basis. The total qualifying rainfall characterizing storms greater than 0.1 inch for July 2019 to June 2020 was 14.31 inches, 17.35 inches, and 16.69 inches at the Murrieta, Wildomar, and Temecula rain gauges, respectively. The County of San Diego Alert station rain gauge had a total qualifying rainfall of 20.37 inches. These rainfall totals are similar to the previous monitoring year but more than triple the rainfall that occurred in the 2017-2018 transitional monitoring year.

Rainfall intensity as well as storm size is considered when evaluating forecasted storm events for monitoring, if possible. It has been found that a target rainfall intensity of at least 0.05 inch/hour shows a good precipitation response and higher measured Runoff "C" compared to lower intensity storm events. In general, capturing larger events has been less feasible in recent years due to the patterns of rainfall in the region; however, the 2019-2020 monitoring year produced several large rainfall events and five of the six outfalls were monitored during events greater than 0.5 inches.

**Table A4-33. 2019-2020 Wet Weather MS4 Outfall Discharge Pollutant Loads for Monitored Event**

| Analyte | Units | 902MS45031 | 902MS41033 | 902MS44034 | 902MS43015 | 902MS442240 | HST01 |
|---|---|---|---|---|---|---|---|
| | | Wildomar Outfall | District Outfall | Murrieta Outfall | Temecula Outfall | Riverside County Outfall | San Diego County Outfall |
| | | 902.31 | 902.42 | 902.33 | 902.32 | 902.51 | 902.23 |
| **Tributary Drainage Area** | **acres** | 106.1 | 107.4 | 54.3 | 106.2 | 5.5 | 215.3 |
| **Event Date** | **-** | 03/10/2020-03/11/2020 | 12/4/2019 | 03/10/2020-03/11/2020 | 11/20/2019 | 12/4/2019 | 2/9/2020 |
| **Event Measured Rainfall** | **inches** | 1.41 | 1.27 | 1.39 | 0.86 | 1.27 | 0.12* |
| **Measured Outfall Runoff "C"** | **-** | 0.035 | 0.258 | 0.276 | 0.234 | 0.245 | 0.490 |
| **Event Volume** | **cf** | 19,205 | 128,027 | 75,508 | 77,222 | 6,292 | 45,994 |
| **Bacteriological** | | | | | | | |
| *E. coli* [2] | MPN | 4.24E+09 | 1.96E+11 | 1.69E+11 | 7.65E+11 | 2.49E+10 | 6.77E+10 |
| *Enterococcus* [2] | MPN | 3.70E+09 | 6.16E+10 | 7.48E+11 | 1.07E+11 | 3.03E+10 | 7.03E+10 |
| Fecal Coliform[2] | MPN | 4.24E+09 | 1.96E+11 | 1.69E+11 | 7.65E+11 | 2.49E+10 | 4.56E+10 |
| Total Coliform[2] | MPN | 1.31E+11 | 5.80E+11 | 1.97E+12 | 1.18E+12 | 9.62E+10 | 2.08E+12 |
| **General Chemistry** | | | | | | | |
| Total Organic Carbon | lbs | NR | NR | NR | NR | NR | 77.53 |
| Dissolved Organic Carbon | lbs | 6.47 | 66.34 | 33.47 | 77.13 | 3.50 | 68.91 |
| Sulfate | lbs | 2.04 | 295.72 | 108.42 | 77.13 | 18.46 | 689.11 |
| Surfactants (MBAS) | lbs | NR | NR | NR | NR | NR | 0.49 |
| Total Hardness | lbs | 21.58 | 687.34 | 240.40 | 231.40 | 35.74 | 864.26 |
| Total Dissolved Solids[2] | lbs | 59.95 | 1,598.47 | 565.65 | 674.91 | 94.26 | 2,239.61 |
| Total Suspended Solids | lbs | NR | NR | NR | NR | NR | 287.13 |
| **Nutrients** | | | | | | | |
| Total Nitrogen[1] | lbs | 1.68 | 12.79 | 7.54 | 14.46 | 1.34 | 75.08 |
| Ammonia as N | lbs | 0.32 | 2.32 | 0.57 | 3.04 | 0.22 | 1.90 |
| Ammonia as N (Unionized) | lbs | 0.003 | 0.019 | 0.001 | 0.08 | 0.005 | NR |
| Nitrate as N[1] | lbs | 0.59 | 3.20 | 2.59 | 2.99 | 0.47 | 63.17 |
| Nitrite as N | lbs | 0.036 | 0.23 | 0.16 | 0.11 | 0.03 | 1.00 |

**Table A4-33. 2019-2020 Wet Weather MS4 Outfall Discharge Pollutant Loads for Monitored Event**

| Analyte | Units | 902MS45031 | 902MS41033 | 902MS44034 | 902MS43015 | 902MS442240 | HST01 |
|---|---|---|---|---|---|---|---|
| | | Wildomar Outfall | District Outfall | Murrieta Outfall | Temecula Outfall | Riverside County Outfall | San Diego County Outfall |
| | | 902.31 | 902.42 | 902.33 | 902.32 | 902.51 | 902.23 |
| Nitrate/Nitrite as N | lbs | 0.62 | 3.43 | 2.75 | 3.09 | 0.50 | 64.17 |
| Total Kjeldahl Nitrogen | lbs | 1.00 | 9.59 | 4.62 | 11.57 | 0.82 | 10.91 |
| Total Phosphate | lbs | 1.20 | 9.59 | 5.66 | 8.20 | 0.98 | NR |
| Total Phosphorus[1] | lbs | 0.41 | 3.28 | 1.79 | 2.65 | 0.33 | 3.73 |
| Dissolved Phosphorus | lbs | 0.22 | 2.96 | 1.27 | 1.83 | 0.32 | NR |
| Orthophosphate | lbs | 0.14 | 2.08 | 0.90 | 1.11 | 0.10 | 2.84 |
| **Total Metals** | | | | | | | |
| Aluminum | lbs | 3.5968 | 9.5908 | 3.3468 | 19.2830 | 0.3260 | 5.16834 |
| Cadmium | lbs | 0.000156 | 0.0005 | 0.0003 | 0.0009 | 0.00002 | 0.00055 |
| Copper | lbs | 0.0115 | 0.0959 | 0.0269 | 0.0916 | 0.0031 | 0.06891 |
| Iron[2] | lbs | 3.7167 | 12.7878 | 4.6195 | 26.0321 | 0.4320 | 5.74260 |
| Lead | lbs | 0.0032 | 0.0080 | 0.0024 | 0.0178 | 0.0002 | 0.00517 |
| Manganese[2] | lbs | 0.0851 | 0.2717 | 0.2593 | 0.3712 | 0.0102 | 0.43069 |
| Selenium | lbs | 0.0002 | 0.0032 | 0.0014 | 0.0019 | 0.0003 | 0.00123 |
| Silver | lbs | 0.000072 | 0.0005 | 0.0003 | 0.0003 | 0.00002 | 0.00029 |
| Zinc | lbs | 0.0480 | 0.4875 | 0.0848 | 0.5785 | 0.0059 | 0.26129 |
| **Dissolved Metals** | | | | | | | |
| Aluminum | lbs | 0.0444 | 0.1319 | 0.0754 | 0.0795 | 0.0065 | 0.13208 |
| Cadmium | lbs | 0.000072 | 0.0005 | 0.0003 | 0.0003 | 0.0000 | 0.00052 |
| Copper | lbs | 0.0043 | 0.0567 | 0.0174 | 0.0260 | 0.0020 | 0.05168 |
| Iron[2] | lbs | 0.0336 | 0.1758 | 0.3158 | 0.3230 | 0.0075 | 0.22396 |
| Lead | lbs | 0.000120 | 0.0008 | 0.0005 | 0.0014 | 0.0000 | 0.00040 |
| Manganese[2] | lbs | 0.0030 | 0.0200 | 0.0896 | 0.0482 | 0.0010 | 0.25267 |
| Selenium | lbs | 0.000180 | 0.0032 | 0.0014 | 0.0014 | 0.0003 | 0.00109 |

**Table A4-33. 2019-2020 Wet Weather MS4 Outfall Discharge Pollutant Loads for Monitored Event**

| Analyte | Units | 902MS45031 | 902MS41033 | 902MS44034 | 902MS43015 | 902MS442240 | HST01 |
|---|---|---|---|---|---|---|---|
| | | Wildomar Outfall | District Outfall | Murrieta Outfall | Temecula Outfall | Riverside County Outfall | San Diego County Outfall |
| | | 902.31 | 902.42 | 902.33 | 902.32 | 902.51 | 902.23 |
| Silver | lbs | 0.000072 | 0.0005 | 0.0003 | 0.0003 | 0.00002 | 0.00029 |
| Zinc | lbs | 0.0079 | 0.2158 | 0.0330 | 0.1928 | 0.0017 | 0.16654 |
| **Pesticides** | | | | | | | |
| Chlorpyrifos | lbs | 0.000030 | 0.00020 | 0.0001 | 0.0001 | 0.0000 | 0.00014 |
| Diazinon | lbs | 0.000030 | 0.00020 | 0.0001 | 0.0001 | 0.0000 | 0.00014 |

NR – not required; these constituents are not required for WQIP monitoring.

Where chemistry results were less than the reporting limit (RL), for load calculations purposes half the RL value was used for this constituent,

[1] Constituent is a HPWQC for wet weather in the Rainbow Creek subarea.

[2] Constituent is a PWQC for wet weather. Note that all PWQCs do not apply to all subareas in the WMA; constituents noted here are PWQCs in at least one subarea in the WMA.

*At HST01, rainfall data from an on-site gauge was available. Monitoring of the 0.12 inch rainfall event on 2/9/20 began at approximately 13:00 and flow rose and fell after a period of rain. At approximately 16:50, more than 1.5 hours after any significant rainfall, flow unexpectedly surged and filled the channel. Field scientists monitoring the site investigated the source of the unexpected flow and determined that a nursery upstream had opened a berm and released ponded stormwater.

**Table A4-34. 2019-2020 Annual Wet Weather MS4 Outfall Discharge Pollutant Loads**

| Analyte | Units | 902MS45031 | 902MS41033 | 902MS44034 | 902MS43015 | 902MS442240 | HST01 |
|---|---|---|---|---|---|---|---|
| | | Wildomar Outfall | District Outfall | Murrieta Outfall | Temecula Outfall | Riverside County Outfall | San Diego County Outfall |
| | | 902.31 | 902.42 | 902.33 | 902.32 | 902.51 | 902.23 |
| **Area** | **acres** | 106.1 | 107.4 | 54.3 | 106.2 | 5.5 | 215.3 |
| **Precipitation Station (Rain Gage)** | **-** | 246 Wildomar | 217 Temecula | 128 Murrieta | 217 Temecula | 217 Temecula | 27092 Rainbow County Park |
| **2019-2020 Qualifying Measured Rainfall (≥0.1")** | **inches** | 17.35 | 16.69 | 14.31 | 16.69 | 16.69 | 20.37 |
| **Measured Outfall Runoff "C"** | **-** | 0.035 | 0.258 | 0.276 | 0.234 | 0.245 | 0.490 |
| ***Runoff "C" (2016-2020)** | **-** | 0.024 | 0.215 | 0.316 | 0.461* | 0.711 | 0.399 |
| **2019-2020 Annual Volume** | **cf** | 161,347 | 1,401,361 | 891,549 | 2,995,810 | 238,737 | 6,350,327 |
| **Bacteriological** | | | | | | | |
| *E. coli* [2] | MPN | 3.56E+10 | 2.14E+12 | 1.99E+12 | 2.97E+13 | 9.46E+11 | 9.35E+12 |
| *Enterococcus* [2] | MPN | 3.11E+10 | 6.75E+11 | 8.84E+12 | 4.16E+12 | 1.15E+12 | 9.71E+12 |
| Fecal Coliform[2] | MPN | 3.56E+10 | 2.14E+12 | 1.99E+12 | 2.97E+13 | 9.46E+11 | 6.29E+12 |
| Total Coliform[2] | MPN | 1.10E+12 | 6.35E+12 | 2.32E+13 | 4.58E+13 | 3.65E+12 | 2.88E+14 |
| **General Chemistry** | | | | | | | |
| Total Organic Carbon | lbs | NR | NR | NR | NR | NR | 10,703.70 |
| Dissolved Organic Carbon | lbs | 54.39 | 726.11 | 395.16 | 2,992.32 | 132.64 | 9,514.40 |
| Sulfate | lbs | 17.12 | 3,236.87 | 1,280.11 | 2,992.32 | 700.47 | 95,144.03 |
| Surfactants (MBAS) | lbs | NR | NR | NR | NR | NR | 67.39 |
| Total Hardness | lbs | 181.30 | 7,523.55 | 2,838.51 | 8,976.97 | 1,356.23 | 119,326.47 |
| Total Dissolved Solids[2] | lbs | 503.62 | 17,496.62 | 6,678.84 | 26,182.82 | 3,576.88 | 309,218.09 |
| Total Suspended Solids | lbs | NR | NR | NR | NR | NR | 39,643.34 |
| **Nutrients** | | | | | | | |
| Total Nitrogen[1] | lbs | lbs | 14.10 | 139.97 | 89.05 | 561.06 | 50.67 |
| Ammonia as N | lbs | lbs | 2.72 | 25.37 | 6.68 | 117.82 | 8.20 |

**Table A4-34. 2019-2020 Annual Wet Weather MS4 Outfall Discharge Pollutant Loads**

| Analyte | Units | 902MS45031 | 902MS41033 | 902MS44034 | 902MS43015 | 902MS442240 | HST01 |
|---|---|---|---|---|---|---|---|
| | | Wildomar Outfall | District Outfall | Murrieta Outfall | Temecula Outfall | Riverside County Outfall | San Diego County Outfall |
| | | 902.31 | 902.42 | 902.33 | 902.32 | 902.51 | 902.23 |
| Ammonia as N (Unionized) | lbs | 0.02 | 0.21 | 0.02 | 2.99 | 0.21 | NR |
| Nitrate as N[1] | lbs | 4.94 | 34.99 | 30.61 | 115.95 | 17.88 | 8,721.54 |
| Nitrite as N[1] | lbs | 0.30 | 2.54 | 1.89 | 4.11 | 1.06 | 138.75 |
| Nitrate/Nitrite as N | lbs | 5.24 | 37.53 | 32.50 | 120.07 | 18.94 | 8,860.29 |
| Total Kjeldahl Nitrogen | lbs | 8.36 | 104.98 | 54.54 | 448.85 | 31.30 | 1,506.45 |
| Total Phosphate | lbs | 10.07 | 104.98 | 66.79 | 317.93 | 37.26 | NR |
| Total Phosphorus[1] | lbs | 3.42 | 35.87 | 21.15 | 102.86 | 12.67 | 515.36 |
| Dissolved Phosphorus | lbs | 1.81 | 32.37 | 15.03 | 71.07 | 12.22 | NR |
| Orthophosphate | lbs | 1.21 | 22.75 | 10.57 | 43.01 | 3.87 | 392.47 |
| **Total Metals** | | | | | | | |
| Aluminum | lbs | 68.8023 | 123.8832 | 20.8317 | 152.1466 | 15.4485 | 4644.04651 |
| Cadmium | lbs | 0.0028 | 0.0057 | 0.0031 | 0.0408 | 0.0013 | 0.18576 |
| Copper | lbs | 0.1474 | 2.3824 | 0.5729 | 2.0920 | 0.2328 | 15.62088 |
| Iron[2] | lbs | 76.1739 | 133.4127 | 17.1862 | 171.1649 | 18.4112 | 6754.97675 |
| Lead | lbs | 0.0590 | 0.1429 | 0.0208 | 0.2174 | 0.0127 | 5.48842 |
| Manganese[2] | lbs | 1.7201 | 4.8600 | 3.3331 | 4.6187 | 0.5714 | 232.20233 |
| Selenium | lbs | 0.0012 | 0.0572 | 0.0417 | 0.1087 | 0.0254 | 0.34619 |
| Silver | lbs | 0.0005 | 0.0057 | 0.0031 | 0.0163 | 0.0013 | NA |
| Zinc | lbs | 1.7201 | 15.2472 | 0.9895 | 10.3242 | 0.3809 | 88.65907 |
| **Dissolved Metals** | | | | | | | |
| Aluminum | lbs | 0.3727 | 1.4435 | 0.8905 | 3.0858 | 0.2459 | 18.23594 |
| Cadmium | lbs | 0.0006 | 0.0052 | 0.0033 | 0.0112 | 0.0009 | 0.07136 |
| Copper | lbs | 0.0363 | 0.6211 | 0.2059 | 1.0099 | 0.0745 | 7.13580 |
| Iron[2] | lbs | 0.2820 | 1.9246 | 3.7290 | 12.5303 | 0.2832 | 30.92181 |

**Table A4-34. 2019-2020 Annual Wet Weather MS4 Outfall Discharge Pollutant Loads**

| Analyte | Units | 902MS45031 | 902MS41033 | 902MS44034 | 902MS43015 | 902MS442240 | HST01 |
|---|---|---|---|---|---|---|---|
| | | Wildomar Outfall | District Outfall | Murrieta Outfall | Temecula Outfall | Riverside County Outfall | San Diego County Outfall |
| | | 902.31 | 902.42 | 902.33 | 902.32 | 902.51 | 902.23 |
| Lead | lbs | 0.0010 | 0.0087 | 0.0056 | 0.0561 | 0.0015 | 0.05550 |
| Manganese[2] | lbs | 0.0252 | 0.2187 | 1.0575 | 1.8702 | 0.0373 | 34.88614 |
| Selenium | lbs | 0.0015 | 0.0350 | 0.0167 | 0.0561 | 0.0104 | 0.15064 |
| Silver | lbs | 0.0006 | 0.0052 | 0.0033 | 0.0112 | 0.0009 | 0.03964 |
| Zinc | lbs | 0.0665 | 2.3620 | 0.3896 | 7.4808 | 0.0656 | 22.99314 |
| **Pesticides** | | | | | | | |
| Chlorpyrifos | lbs | 0.0003 | 0.0022 | 0.0014 | 0.0047 | 0.0004 | 0.01982 |
| Diazinon | lbs | 0.0003 | 0.0022 | 0.0014 | 0.0047 | 0.0004 | 0.01982 |

NR – not required; these constituents are not required for WQIP monitoring.
Where chemistry results were less than the reporting limit (RL), for load calculations purposes half the RL value was used for this constituent,
[1] Constituent is a HPWQC for wet weather in the Rainbow Creek subarea.
[2] Constituent is a PWQC for wet weather. Note that all PWQCs do not apply to all subareas in the WMA; constituents noted here are PWQCs in at least one subarea in the WMA.
* At 902MS43015, the Runoff "C" value was excluded for the 2018-2019 dataset due to abnormal flow data; 2016-2020 value based on the average of 2016-2017, 2017-2018 and 2019-2020 years.

#### 4.5.6.2 *Provision D.4.b.(2)(c)[ii] – Evaluate WQIP Analysis*

Provision D.4.b.(2)(c)(ii) requires the Copermittees to evaluate and compare data collected during the monitoring year to the analyses and assumptions used to develop the WQIP and evaluate whether adaptive management is necessary for updates. The analytical results for samples collected at the six wet weather MS4 outfall monitoring locations are summarized in **Table A4-31** in **Section 4.5.5**. Nutrients are a wet weather HPWQC in the Rainbow Creek Watershed. Results indicated that total nitrogen was above the final effluent limitation given in the Rainbow Creek Nutrient TMDL (the Permit does not include a SAL for total nitrogen), and total phosphorus was above the SAL at HST01. HST01 is located in the Rainbow Creek Watershed, which is subject to the Nutrient TMDL. Because concentrations of nitrogen and phosphorus in wet weather discharge from this outfall were above the applicable numeric thresholds, continued monitoring of this outfall is consistent with the intention of the WQIP. Nutrient concentrations at other outfalls were below applicable numeric thresholds. An adaptive management update is not necessary at this time.

#### 4.5.6.3 *Provision D.4.b.(2)(c)[iii] – Evaluate Progress Achieving Stormwater Pollutant Reductions*

This Provision requires the Copermittees to review the data collected under the wet weather MS4 outfall monitoring program in order to identify pollutant reduction progress, assess water quality improvement strategy effectiveness, and identify modifications necessary to increase effectiveness. This assessment is required once during the Permit term and was provided in the RMAR for most of the watersheds in the San Diego Region, which had accepted WQIPs several years before the SMR Watershed. Because strategies have been implemented in this WMA for less than two years under the accepted WQIP, modifications that may increase effectiveness have not yet been identified. Assessments required once during the Permit term will be conducted again after MS4 outfall discharge monitoring data are collected under the next Permit, or earlier if sufficient data are available to conduct these assessments.

#### 4.5.6.4 *Provision D.4.b.(2)(c)[iv] – Identify Data Gaps*

This provision requires the Copermittees to identify data gaps in the monitoring data necessary to fulfill assessment requirements. No gaps have been identified in the wet weather MS4 outfall monitoring data.

#### 4.5.6.5 *Provision D.4.b.(2)(d) – Evaluate Trends*

This provision requires creation of time-series plots for long-term monitoring data collected under Provision D.2.c and a trend analysis of this cumulative long-term wet weather MS4 outfall discharge monitoring data set. Time-series plots for long-term monitoring constituents were prepared and a Mann-Kendall statistical trend analysis was performed on the cumulative dataset from the four years of monitoring. A summary of these trends is shown in **Table A4-35**. Trends do not indicate exceedances of SALs. Statistically significant trends related to nutrients include increasing trends for nitrate as N, nitrate+nitrite as N, and total nitrogen at HST01 (County of San Diego), and increasing trends for ammonia as N (unionized), and dissolved phosphorus at Wildomar Outfall 5031. All time series plots and trend data are provided in **Attachment 4H**.

**Table A4-35. Statistically Significant Trends for Wet Weather Storm Drain Outfall Discharges**

| Station | Increasing | Decreasing |
|---|---|---|
| HST01 (902.23) | Nitrate as N, Nitrate+Nitrite as N, Total Nitrogen, pH (Field), Specific Conductance (Field) | Dissolved Iron |
| 902MS45031 (902.31) | *E. coli*, Fecal Coliform, Dissolved Organic Carbon, Ammonia as N (Unionized), Dissolved Phosphorus, Total Copper, Total Iron, Turbidity (Field), Turbidity (Lab) | None |

## 4.6 Special Studies

Special studies conducted in the SMR WMA during the 2019-2020 monitoring year are summarized in the following sections, with details provided in **Attachment 4I**.

### 4.6.1 Dry Weather MS4 Monitoring – Rainbow Creek Nutrient TMDL

Progress toward compliance with the Rainbow Creek Nutrient TMDL may be demonstrated in several ways, as outlined in Attachment E.3 of the Permit. One of the pathways is to show that there is "no direct or indirect discharge from the Responsible Copermittee's MS4 to the receiving water". To this end, the County of San Diego conducts dry weather monitoring at MS4 outfalls in the Rainbow Creek Watershed to determine whether there are direct or indirect dry weather discharges from the County's MS4 to Rainbow Creek. If discharges are found and sampled for analysis of nutrients, the data collected also address the compliance pathway to determine if there are "no exceedances of the final effluent limitations at the Responsible Copermittee's MS4 outfalls." This monitoring is not required by the Permit or the TMDL.

Monitored outfalls are shown in **Figure A4-16**. Monitoring was conducted during dry weather (i.e., not within 72 hours of a rain event totaling 0.1 inch or greater). When flow was observed, flow rates were measured or estimated and a grab sample was collected and analyzed for ammonia, nitrate as N, nitrite as N, total Kjeldahl nitrogen (TKN), orthophosphate as P, and total phosphate as P. Total nitrogen concentrations were calculated by adding the concentrations of TKN, nitrate as N, and nitrite as N.

During 2019-2020, 16 of the 21 monitored outfalls were ponded or flowing during at least one site visit. Flow rates were generally low; 83% of sampled flowing sites were calculated as < 0.1 cfs. Nutrient concentrations were above TMDL effluent limitations for total nitrogen in 35 of 47 samples and for total phosphorus in 39 of 47 samples. **Table A4-36** provides the 2019-2020 sample results for total phosphorus and total nitrogen, as well as the flow rates associated with those samples.

The County will continue monthly monitoring at all MS4 outfalls with a potential to discharge into Rainbow Creek during dry weather and to observe and address potential sources of any flowing or standing water.

Additional information can be found in the associated report, *2019-2020 County of San Diego Storm Drain Outfall Monitoring at Rainbow Creek* (WESTON, 2020c) provided in **Attachment 4I**.

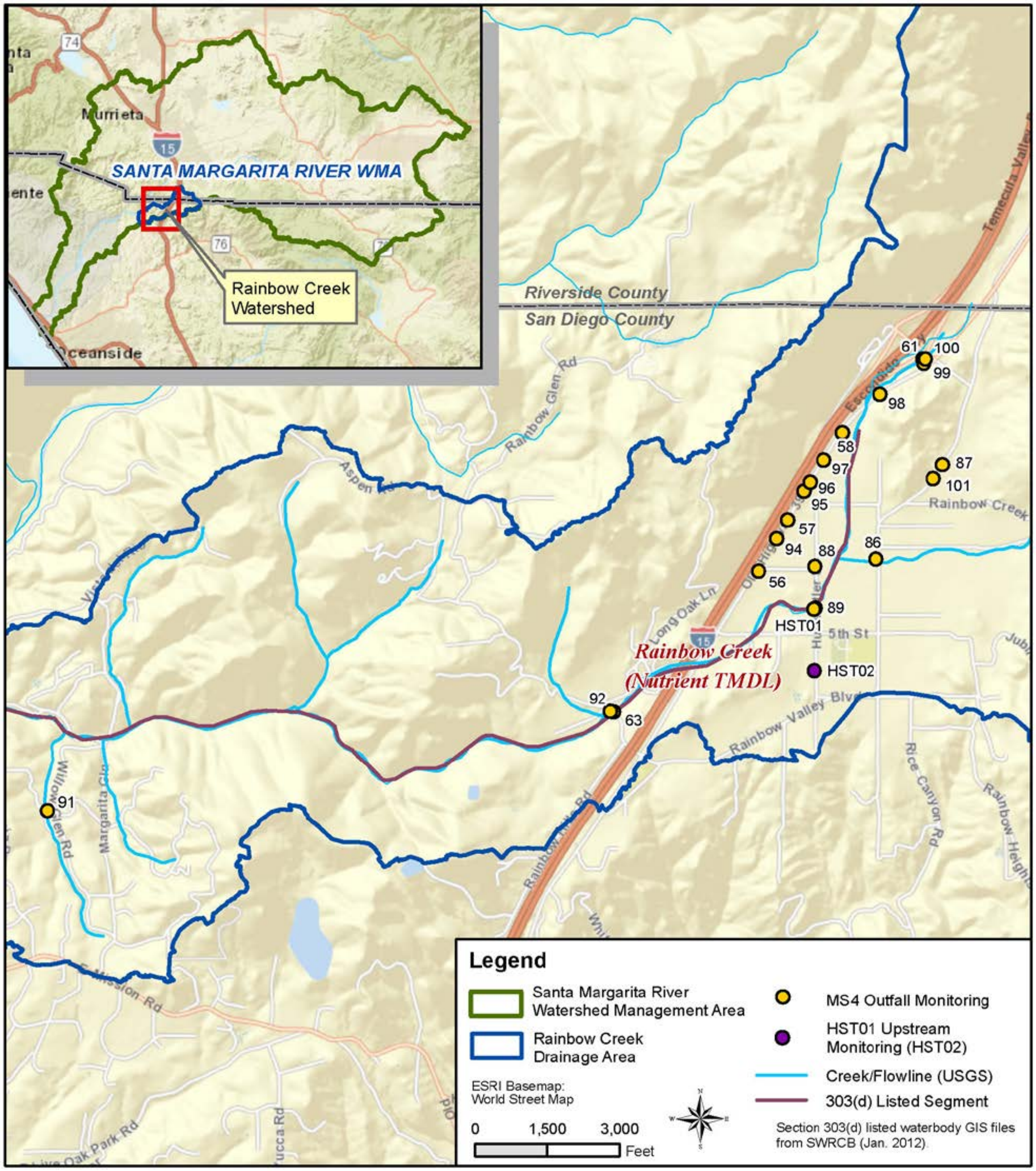



**Figure A4-16. Rainbow Creek Watershed Dry Weather MS4 Outfall Monitoring Locations**

**Table A4-36. Sample Results at Rainbow Creek MS4 Locations for Total Phosphorus and Total Nitrogen**

| Site ID | Sample Date | Flow (cfs) | Total Phosphorus (mg/L) | Total Nitrogen (mg/L) |
|---|---|---|---|---|
| HST01 | 12/3/2019 | 0.0021 | 0.83 | 27.2 |
| | 1/24/2020 | 0.01664 | 0.45 | 16.26 |
| | 3/30/2020 | 0.07885 | 0.48 | 22.96 |
| | 4/16/2020 | 1.00 | 0.56 | 25.63 |
| | 5/13/2020 | 0.0087 | 0.53 | 29.04 |
| | 6/9/2020 | 0.03 | 0.35 | 43.63 |
| HST02 | 12/3/2019 | 0.00294 | 2.89 | 20.27 |
| | 1/24/2020 | 0.004992 | 0.45 | 32.52 |
| | 3/30/2020 | 0.0495 | 0.43 | 28.51 |
| | 4/16/2020 | 1.5 | 0.46 | 29.84 |
| MS4-SMG-056 | 4/16/2020 | 0.0415 | 0.29 | 3.76 |
| MS4-SMG-057 | 1/24/2020 | 0.005205 | 0.13 | 0.32 |
| | 2/19/2020 | 0.00208 | 0.1 | 0.03 |
| | 3/30/2020 | 0.0466875 | 0.2 | 0.8 |
| | 4/16/2020 | 0.53333333 | 0.02 | 0.96 |
| | 5/13/2020 | 0.0537425 | 0.05 | 0.31 |
| | 6/9/2020 | 0.0049358 | 0.12 | 0.01 |
| | 7/15/2020 | 0.0013936 | 0.31 | 0.33 |
| | 8/11/2020 | 0.002278 | 0.07 | 0.02 |
| | 9/8/2020 | 0.000462 | 0.14 | 0.74 |
| MS4-SMG-058 | 3/30/2020 | 0.06993 | 0.19 | 0.5 |
| | 4/16/2020 | 0.576 | 0.04 | 1.45 |
| | 5/13/2020 | 0.012 | 0.14 | 0.93 |
| MS4-SMG-063 | 3/30/2020 | <0.001* | 0.2 | 14.909 |
| | 4/16/2020 | 0.016 | 0.28 | 19.6 |
| | 5/13/2020 | <0.001* | 0.14 | 18.2 |
| | 6/9/2020 | 0.00055454 | 0.14 | 20.109 |
| | 7/15/2020 | 0.00017573 | 0.12 | 21.14 |
| MS4-SMG-086 | 4/16/2020 | 0.166 | 0.66 | 19.08 |
| MS4-SMG-087 | 4/16/2020 | 0.625 | 0.34 | 9.197 |
| | 5/13/2020 | 0.0664 | 0.35 | 7.69 |
| MS4-SMG-089 | 12/3/2019 | 0.001575 | 0.84 | 123.21 |
| | 1/24/2020 | 0.00112802 | 0.18 | 82.84 |
| | 3/30/2020 | 0.0075 | 0.35 | 80.52 |
| | 4/16/2020 | 0.3 | 0.24 | 72.05 |

**Table A4-36. Sample Results at Rainbow Creek MS4 Locations for Total Phosphorus and Total Nitrogen**

| Site ID | Sample Date | Flow (cfs) | Total Phosphorus (mg/L) | Total Nitrogen (mg/L) |
|---|---|---|---|---|
| MS4-SMG-095 | 10/21/2019 | 0.00008201 | 0.72 | 21.25 |
| | 4/16/2020 | 0.05714286 | 0.04 | 2.88 |
| | 6/9/2020 | 0.0006 | 0.36 | 29.05 |
| | 7/15/2020 | 0.00011 | 0.18 | 29.66 |
| | 8/11/2020 | <0.001* | 0.11 | 30.04 |
| MS4-SMG-096 | 4/16/2020 | 0.02 | 0.05 | 0.74 |
| MS4-SMG-097 | 4/16/2020 | 0.13833333 | 0.38 | 2.25 |
| MS4-SMG-098 | 3/30/2020 | 0.0038 | 0.15 | 4.6 |
| | 4/16/2020 | 0.02 | 0.29 | 5.8 |
| MS4-SMG-099 | 3/30/2020 | 0.00603 | 0.16 | 19.9 |
| | 4/16/2020 | 0.02666667 | 0.05 | 16.11 |
| MS4-SMG-101 | 4/16/2020 | 0.016 | 0.45 | 6.76 |

Shaded results did not meet Nutrient TMDL effluent limitations.
*Trickle flow, too low to measure
cfs- cubic feet per second; mg/L- milligrams per liter

### 4.6.2 Rainbow Creek HF183 Monitoring

The County of San Diego conducted a study in the Rainbow Creek Watershed in support of the Nutrient TMDL to determine if human-associated fecal marker (HF183) was present in MS4 outfall non-stormwater discharge and/or receiving water dry weather flows. Additional study questions sought to understand spatial and temporal distribution of HF183, as well as relationships (if any) with parameters such as nutrient levels, flow, land uses, and fecal indicator bacteria.

Monthly sampling events were conducted over the course of the monitoring period (June 2019 through June 2020) at the same locations monitored under the Rainbow Creek TMDL and MS4 Monitoring Program (see **Figure A4-6** for TMDL locations and **Figure A4-16** for MS4 locations). Samples were collected during flowing and ponded conditions for analysis of HF183 and during flowing conditions for indicator bacteria. The study addressed the following questions:

1. *Is the human-associated fecal marker HF183 present in MS4 outfall and/or receiving water dry weather flows in the Rainbow Creek Watershed?*

Study results indicate that HF183 is present only intermittently in dry weather receiving water and MS4 outfall flows in the Rainbow Creek Watershed. Overall, HF183 results were above the detection level in only 9% of samples collected in the receiving waters and 9% percent of samples collected in the MS4 outfall features.

2. *If HF183 is present in the watershed, the following sub-questions will be addressed:*

    a. *What is the spatial pattern of HF183?*

All 10 of the HF183 detections at receiving water sites occurred in main stem locations. The furthest upstream receiving water detection occurred at RBC02 (one detection). Detections also occurred at RBC04 (five detections), RBC10 (one detection), SMG05 (one detection) and SMG06 (two detections). Detections of HF183 at MS4 sites did not follow a discernable spatial pattern. A total of seven samples were detected at seven different locations.

    b. *What is the magnitude and the rate of occurrence of HF183?*

The rate of occurrence of HF183 detections in analyzed samples was approximately 9% percent at both receiving water and MS4 locations. The highest percentage of detections of HF183 above the detection limit in receiving water samples was observed at RBC04 (38%). No MS4 monitoring location had more than one detection throughout the study.

In terms of the magnitude, the highest magnitude in receiving water samples was detected at RBC02 (1,633 copies/100 mL) in October 2019 followed by detections of 991 and 886 copies/100 mL at RBC04 in December 2019 and June 2019, respectively. For MS4 monitoring locations, the sample collected at HST01 in April 2020 was the highest concentration detected in the study (69,281 copies/100 mL) by an order of magnitude. This level of detection indicates the presence of a fresh source of HF183. There were no other detections at HST01. Other elevated HF183 detections in MS4 samples included those collected at MS4-SMG-095 in July 2019 (6,368 copies/100 mL), MS4-SMG-101 in April 2020 (2,757 copies/100 mL), and the samples collected in March 2020 at MS4-SMG-097 (1,626 copies/100 mL) and MS4-SMG-099 (1,942 copies/100 mL). None of the MS4 stations had more than one detection of HF183 during the monitoring period

    c. *Under what flow conditions is HF183 observed?*

Months with greater precipitation generally had higher flow conditions observed. The three months with the highest precipitation totals were December, March, and April. These were also the months with the most HF183 detections. In addition to having the highest number of detections, these months also had three of the four highest percentage of detections relative to the number of samples taken.

    d. *Is there a correlation between the HF183 marker and land use?*

There were no detections of HF183 upstream of Rainbow Valley at RBC01. The furthest upstream detection was at RBC02 (1 detection, detection rate of 8%), which is located downstream of intensive agricultural land uses. There were no detections of HF183 in the tributary monitoring locations that drain primarily open space, vacant/undeveloped land. and spaced rural residential areas.

The MS4 locations primarily drain areas with intensive agriculture or transportation and open space land uses. Each of the seven detections of HF183 at MS4 locations was at a different monitoring location, including those that drain open space and sections of I-15 and those that drain from agricultural land uses.

*e. Is there a correlation between HF183 spatial patterns and known septic tank locations?*

The County recently conducted a Rainbow Creek watershed parcel evaluation for MS4 drainage areas. The number of septic systems located within each of the MS4 drainage areas was estimated. The limited amount of data from this study does not provide enough evidence to determine a relationship between HF183 and the number of septic systems in each drainage area. HF183 detections were found in samples from locations from drainage areas with and without parcels assumed to have septic systems. Each detection was also identified at a different MS4 outfall location.

Additional information can be found in the associated report, *2019-2020 Rainbow Creek HF183 Monitoring Draft Report* (WESTON, 2020d) provided in **Attachment 4I**.

### 4.6.3 County of San Diego HF183 Follow-up Monitoring at MS4-SMG-095

MS4-SMG-095 is sampled monthly by the County of San Diego as part of the Rainbow Creek HF183 Monitoring Program (**Section 4.6.1**). The sample collected in July 2019 indicated the presence of HF183. The County initiated a follow-up study to conduct weekly sampling at the outfall in August and September 2019. Of the eight samples collected, only one contained quantifiable levels of HF183. Results for this study were reported in the 2018-2019 WQIP Annual Report (WESTON and D-Max Engineering, 2020).

As a result of a high HF183 result in July 2019, in October 2019, the County initiated an MS4-SMG-095 follow-up study that included source investigations, continuous dry weather flow monitoring, weekly sampling for four weeks at the outfall, analysis of samples for HF183 and minerals, and mineral analysis of municipal water supply samples from the nearby Rainbow County Park. Data from groundwater monitoring in the watershed were also evaluated to determine if the chemical composition of the dry weather flows at the outfall were similar to the groundwater or to the municipal water supply. The study addressed the following questions:

1. *Under what flow conditions is human-associated fecal marker HF183 observed at the MS4-SMG-095 outfall?*

There were no detections of HF183 in samples from the outfall during the study; however, detections during previous studies indicate that HF183 is intermittently detected at this outfall but is not persistently present. Site observations indicated a potential source of HF183 may be human defecation along the southbound side of the I-15 freeway. The County coordinated with Caltrans to address this potential source and reduce potential for recurrence.

2. *What are the patterns in the timing of flow at the outfall?*

The highest average flow (excluding a large flow event on October 14, 2019) was observed on Wednesday and Thursday mornings, and Tuesday evenings. The large discharge on October 14 indicates that intermittent discharges may be occurring and may be the transport mechanism for the intermittent detections of HF183.

3. *How does the chemical composition of dry weather flow at the outfall compare to possible sources including local treated water or groundwater?*

4. *How much does each water source influence the chemical composition of dry weather flows?*

Several approaches were used to answer these two study questions. Geochemical analysis of dry weather samples and comparison with the municipal water supply as well as nearby groundwater indicate that groundwater is likely contributing to dry weather flows in the outfall. However, influence from the municipal water supply could not be ruled out.

During source investigation efforts, County staff and consultants identified human feces in the channel across the I-15, within the drainage area of MS4-SMG-095. The County worked closely with Caltrans to abate the source and conduct maintenance to the surrounding area to prevent future human fecal contamination at the outfall. Following abatement activities, no further positive hits for HF183 have been identified.

Additional detail can be found in the associated report, *HF183 Follow-up Sampling at MS4-SMG-095* (WESTON, 2020e) provided in **Attachment 4I**.

### 4.6.4 Rainbow Creek Wet Weather Pre-BMP Monitoring

Several structural BMP retrofits are planned for the Rainbow Creek Watershed within the Lower SMR Subwatershed to facilitate progress toward compliance with the Rainbow Creek Nutrient TMDL. To collect water quality data prior to BMP installation, wet weather monitoring was conducted by the County of San Diego during two monitoring events in February and March 2020 at outfalls and upstream locations in the watershed. Monitoring locations are summarized in **Table A4-37**. Time-weighted composite samples were collected using autosamplers at MS4-SMG-088 and MS4-SMG-087 in February 2020. During the second event in March 2020, grab samples were collected at locations just upstream of six outfalls, the two previously monitored outfalls and HST01. HST01 was also monitored as part of the wet weather MS4 outfall monitoring program during February 2020 in accordance with the methods of the WQIP MAP, and those results are presented separately in **Section 4.5.5**.

**Table A4-37. Pre-BMP Monitoring Locations in the Rainbow Creek Watershed**

| MS4 Outfall | Site Description | Latitude | Longitude | Sample Type | Sample Date |
|---|---|---|---|---|---|
| MS4-SMG-087 | Channel @ 2826 Rainbow Valley Blvd. | 33.42356 | -117.14336 | Composite | 2/22/20 |
| MS4-SMG-088 | Channel @ Huffstatler St. & 2nd St. | 33.41563 | -117.15205 | Composite | 2/9/20 |
| HST01-US | Channel @ west side of Huffstatler St., just downstream of HST02 | 33.411832 | -117.151988 | Grab | 3/10/20 |
| MS4-SMG-089 - US | Channel @ North side of 5th St., just west of Rainbow Valley Blvd. | 33.414025 | -117.147834 | Grab | 3/10/20 |
| MS4-SMG-101-US | Channel @ west side of Rainbow Valley Blvd., across from intersection of Mt. Olympus Rd. | 33.427503 | -117.141880 | Grab | 3/12/20 |
| MS4-SMG-087-US | Channel @ east side of Rainbow Valley Blvd., @ intersection of Mt. Olympus Rd. | 33.427442 | -117.1417 | Grab | 3/10/20 |
| MS4-SMG-086-US | Channel @ west side of Rainbow Valley Blvd., 115' south of Chica Rd. intersection | 33.420021 | -117.147793 | Grab | 3/10/20 |
| MS4-SMG-088-US | Channel@ west side of Huffstatler St., 575' North of 2nd St. | 33.419258 | -117.15205 | Grab | 3/12/20 |

Composite and grab samples were analyzed for field measurements, total suspended solids, and nutrients. Results are summarized in **Table A4-38** for composite samples and **Table A4-39** for grab samples. Results are compared to SALs as provided in the Permit. Of the constituents monitored, there are applicable SALs for turbidity, nitrate + nitrite as N, and total phosphorus. Nitrate as N, total nitrogen, and total phosphorus concentrations are also compared to final effluent limitations from the Rainbow Creek Nutrient TMDL.

In the composite samples, total nitrogen and total phosphorus exceeded the TMDL final effluent limitations in samples from both outfalls and nitrate + nitrite as N exceeded the SAL in the sample from MS4-SMG-087.

In the grab samples, TMDL final effluent limitations were exceeded for nitrate as N at HST01-US; for total nitrogen at HST01-US, MS4-SMG-086-US, MS4-SMG-088-US, and MS4-SMG-089-US; and for total phosphorus at all five locations. SALs exceeded for grab samples included turbidity at HST01-US and MS4-SMG-065-US; nitrate + nitrite as N for HST01-US, MS4-SMG-065-US, and MS4-SMG-089-US; and total phosphorus for HST01-US and MS4-SMG-089-US.

Pollutant loads for the composite sampling event at MS4-SMG-087 on February 22, 2020 are provided in **Table A4-40**. Total rainfall measured on site during this monitored event was 0.49 inches during 5.08 hours (average intensity of 0.10 inches/hr). The hydrograph for MS4-SMG-087 is provided in **Attachment 4I**. MS4-SMG-088 composite sampling was conducted during the February 9, 2020 event of 0.12 inches of rain over 7 hours (0.02 inches/hr). The runoff produced during this smaller event was not of sufficient depth to submerge the area-velocity sensor used to monitor level and calculate flow at MS4-SMG-088. Therefore, flow data were not able to be collected. As a result, the sampling methodology was changed to a time-weighted composite sample, with an aliquot collected every five minutes.

Laboratory and field data will be uploaded to CEDEN, and data submittals and hydrographs are provided in **Attachment 4I**.

**Table A4-38. Rainbow Creek BMP Pre-Monitoring Results – Composite Samples**

| Analyte | Units | Final Effluent Limitation[1] | SAL[2] | MS4-SMG-087 | MS4-SMG-088 |
|---|---|---|---|---|---|
| | | | | 2/22/2020 | 2/9/2020 |
| **Physical Chemistry** | | | | | |
| Dissolved Oxygen | mg/L | | | 9.98 | 10.21 |
| Salinity | PPT | | | 0.22 | 0.06 |
| Specific Conductivity | µS/cm | | | 454 | 127 |
| Temperature | Celsius | | | 14.8 | 10.39 |
| Turbidity | NTU | | 126 | 51.8 | 39.4 |
| pH | None | | | 7.76 | 7.16 |
| **General Chemistry** | | | | | |
| Total Suspended Solids | mg/L | | | 95 | 37 |
| **Nutrients** | | | | | |
| Ammonia as N | mg/L | | | 0.17 | 0.12 |
| Nitrate + Nitrite as N | mg/L | | 2.6 | 8.035 | 0.934 |
| Nitrate as N | mg/L | 10 | | 8.0 | 0.88 |
| Nitrite as N | mg/L | | | 0.035J | 0.054J |
| Orthophosphate as P | mg/L | | | 1.1 | 0.41 |
| Total Kjeldahl Nitrogen | mg/L | | | 1.9 | 1.5 |
| Total Nitrogen | mg/L | 1 | | 9.94 | 2.43 |
| Total Phosphorus | mg/L | 0.1 | 1.46 | 1.4 | 0.47 |

J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

[1] Final Effluent Limitations from Table 3.2. San Diego Regional Water Quality Control Board Order No. R9-2013-0001, Attachment E.

[2] Storm Water Action Levels for Discharges from MS4s to Receiving Waters, Table C-5. San Diego Regional Water Quality Control Board Order No. R9-2013-0001.

Shaded results did not meet Final Effluent Limitations.

**Table A4-39. Rainbow Creek BMP Pre-Monitoring Locations – Grab Samples**

| Analyte | Units | Final Effluent Limitation[1] | SAL[2] | HST01-US 3/10/2020 | MS4-SMG-086-US 3/10/2020 | MS4-SMG-087-US 3/10/2020 | MS4-SMG-088-US 3/12/2020 | MS4-SMG-089-US 3/10/2020 | MS4-SMG-101-US 3/12/2020 |
|---|---|---|---|---|---|---|---|---|---|
| **Physical Chemistry** | | | | | | | | | |
| Dissolved Oxygen | mg/L | | | 9.22 | 8.33 | 8.81 | 9.12 | 8.65 | 9.28 |
| Salinity | PPT | | | 0.4 | 0.14 | 0.05 | 0.25 | 0.61 | 0.01 |
| Specific Conductivity | µS/cm | | | 806 | 304 | 108 | 405.6 | 1,210 | 22.1 |
| Temperature | Celsius | | | 15.4 | 19.56 | 19.38 | 14.6 | 17.4 | 14.7 |
| Turbidity | NTU | | 126 | 211.6 | 128.6 | 15.8 | 48.03 | 21 | 76.52 |
| pH | None | | | 7.62 | 8.03 | 10.35 | 6.93 | 7.71 | 7.65 |
| **General Chemistry** | | | | | | | | | |
| Total Suspended Solids | mg/L | | | 208 | 124 | 16.6 | 47.5 | 15.4 | 98.5 |
| **Nutrients** | | | | | | | | | |
| Ammonia as N | mg/L | | | <0.10 | <0.10 | 0.19 | 0.07J | 0.44 | <0.10 |
| Nitrate + Nitrite as N | mg/L | | 2.6 | 11.21 | 3.94 | 0.119 | 1.44 | 7.55 | 0.22 |
| Nitrate as N | mg/L | 10 | | 11.1 | 3.85 | 0.11 | 1.44 | 7.47 | 0.22 |
| Nitrite as N | mg/L | | | 0.11 | 0.09 | 0.009J | <0.05 | 0.08 | <0.05 |
| Orthophosphate as P | mg/L | | | 1.44 | 0.41 | 0.05 | 0.13 | 1.59 | 0.04J |
| Total Kjeldahl Nitrogen | mg/L | | | 3.5 | 2 | 0.6 | 1.3 | 4.1 | 0.7 |
| Total Nitrogen | mg/L | 1 | | 14.71 | 5.94 | 0.719 | 2.74 | 11.65 | 0.92 |
| Total Phosphorus | mg/L | 0.1 | 1.46 | 2.22 | 0.56 | 0.26 | 0.38 | 2.20 | 0.24 |

< - Results are less than the reporting limit.
[1] Final Effluent Limitations from Table 3.2. San Diego Regional Water Quality Control Board Order No. R9-2013-0001, Attachment E.
[2] Storm Water Action Levels for Discharges from MS4s to Receiving Waters, Table C-5. San Diego Regional Water Quality Control Board Order No. R9-2013-0001.
J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
Shaded results did not meet Final Effluent Limitations and/or Stormwater Action Levels.

**Table A4-40. Pollutant Loads for Monitored Event at MS4-SMG-087**

| Analyte | Units | MS4-SMG-087 |
|---|---|---|
| Rainfall | in | 0.49 |
| Event Volume | cf | 5,129 |
| Total Suspended Solids | lbs | 30.42 |
| Total Nitrogen | lbs | 3.18 |
| Ammonia as N | lbs | 0.05 |
| Nitrate as N | lbs | 2.56 |
| Nitrite as N | lbs | 0.01 |
| Nitrate/Nitrite as N | lbs | 2.57 |
| Total Kjeldahl Nitrogen | lbs | 0.61 |
| Total Phosphorus | lbs | 0.45 |
| Orthophosphate | lbs | 0.35 |

in – inches; cf – cubic feet; lbs - pounds

### 4.6.5 Dry Weather MS4 Outfall Flow Source Assessment Study

The County of San Diego Flow Source Assessment Study 2018-2019 Report describes the results of two years of non-stormwater MS4 outfall flow source investigations conducted by the County in the Santa Margarita, San Luis Rey, Carlsbad, San Dieguito, and San Diego River watersheds. The investigations were conducted during the dry seasons (May through September) focusing on MS4 outfall locations with persistent non-stormwater flows that were prioritized for dry weather flow and pollutant load reduction efforts. The Flow Source Assessment Study employed data collected at 89 outfall locations and selected upstream sites that included continuous flow measurements, geochemistry, analysis for stable isotopes of water, and a suite of source indicators including fluoride, nitrate, boron, methylene blue active substances and TDS. These data were then compiled and analyzed using a tiered multiple lines of evidence approach to evaluate potential flow sources such as residential irrigation runoff, agricultural runoff, groundwater infiltration, and others.

The findings showed dry weather flow sources ranging from nearly all imported water to all local groundwater, with flows at most sites comprised of a mixture of sources. Of the 48 main MS4 sites investigated (i.e., not including the upstream special study sites), 16 had flows of "mainly tap water," pointing to irrigation runoff; three sites had mainly local water indicating groundwater infiltration. However, at most sites, dry weather flows were composed of a mix of imported "tap" water and local "groundwater;" three sites showed strong to moderate influence of reclaimed water.

Of the 89 sites monitored during both years, 35 sites had some lines of evidence for both years allowing some comparison. Of those, the majority (20) did not change flow source designation, while seven showed an increased groundwater influence and six showed a shift toward imported (tap) water. Two sites that were influenced by reclaimed water in 2018 showed a decreased presence of reclaimed water in 2019.

In 2020, County of San Diego continued flow data collection at most outfall locations monitored in 2018 and 2019. However, due to the COVID-19 social distancing-related restrictions, isotope, geochemistry, and indicator analysis was not conducted.

Additional detail can be found in the reports (Wood Environment and Infrastructure, 2020) provided in **Attachment 4I**.

### 4.6.6 Dry Weather Low-Flow Monitoring Equipment Testing and Uncertainty Estimation

The purpose of this study was to assess the accuracy and reliability of water level sensors used during the County of San Diego Dry Weather Continuous Flow Monitoring Program by testing the sensors in the field and in laboratory. Several types of water level sensors used in the program since 2015 were set upstream of 90-degree v-notch weirs previously used by the County for continuous flow monitoring. The study was conducted at three County MS4 outfall sites and one controlled laboratory setting. Data accuracy was assessed by comparing sensor data with manual measurements of water level and flow and calculating the root mean square error (RMSE) and mean absolute error (MAE). Overall, average RMSE and MAE results from this study exceeded manufacturers' specified uncertainty for all tested sensors under field and laboratory conditions. This was with the exception of the Meter Hydros sensors. This is a good result considering that, in 2018, the County started using Meter water level sensors exclusively throughout the entire program to minimize uncertainty in comparing results across sites and monitoring seasons.

A copy of the report describing the methods in results of the study in greater detail is provided in **Attachment 4I.**

### 4.6.7 Post-Fire Stormwater Monitoring Study – 2019 Tenaja Fire

The Tenaja Fire burned approximately 2,001 acres in the SMR WMA during September 2019. The District undertook the implementation of a post-fire water quality monitoring study downstream of burned catchments of the Tenaja Fire. A sampling design was developed to assess the potential water quality impacts of the 2019 Tenaja Fire based on the guidance included in the SMC Post-Fire Water Quality Monitoring Plan[13] with a focus on the HPWQCs. The study is focused on characterizing the contaminant flux from post-fire runoff over the 2019-2020 and 2020-2021 wet weather seasons. The goal of this study is to assess contaminant concentration and flux by sampling stormwater runoff from the terminal end of burned catchments and comparing the data to reference sites, and to assess the effects of the Tenaja Fire on the hydrologic response, sediment loads, and contribution of pollutant loads (metals, nutrients, and organic contaminants) from post-fire runoff. The data are being used to assess the potential post-fire water quality impacts, with a focus on the HPWQCs identified by the WQIP, observed at the WQIP's most proximate long-term receiving water monitoring station. The preliminary results of this monitoring special study are summarized in the interim report provided in **Attachment 4I** and are summarized below. Following the additional sampling data planned to be

[13] Post-Fire Water Quality Monitoring Plan prepared by the Southern California Coastal Water Research Project (SCCWRP) and SMC titled "Effects of Post-fire Runoff on Surface Water Quality: Development of a Southern California Regional Monitoring Program with Management Questions and Implementation Recommendations" (SCCWRP, 2009). The Post-Fire Water Quality Monitoring Plan can be found at the following link:
http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/598_SoCalRegionalFireMonitoringPlan.pdf

collected during the 2020-2021 wet weather season, a final report will be provided in the subsequent 2020-2021 WQIP Annual Report.

The Tenaja Fire began on September 4, 2019, northeast from the intersection of Tenaja Road and Clinton Keith Road, in La Cresta. The Tenaja Fire burned approximately 2,001 acres (8.1 $km^2$) in the Santa Rosa Plateau, including parts of the Copper Canyon neighborhood in Murrieta. The main waterbody downstream of the burn area is Murrieta Creek. The post-fire monitoring study included two monitoring locations, one on Cole Creek at the terminal end of burned catchment before it discharges to Murrieta Creek and the second at the historical receiving water station at Lower Murrieta Creek (902LMC778) to assess the potential post-fire water quality impacts in the downstream receiving waters. The Cole Creek location was chosen to evaluate runoff potentially discharging downstream to Murrieta Creek and the Murrieta Creek location was chosen to evaluate runoff potentially discharging downstream to WQIP monitoring stations.

Wet weather monitoring was conducted during two storm events in the 2019-2020 monitoring season.

Based on the sampling design, the first monitoring event targeted the first storm event of the 2019-2020 monitoring season and the second monitoring event targeted the third storm event meeting the mobilization criteria. The mmobilization was based on the District's criteria described in the CMP and adapted to consider the USGS rainfall rate thresholds for post-burn areas.

The first wet weather monitoring event was conducted on November 29, 2019 and was the 'first flush' from the burned catchments of the 2019 Tenaja Fire, and the second wet weather monitoring event was conducted on March 11, 2020 (see **Figure A4-17**).

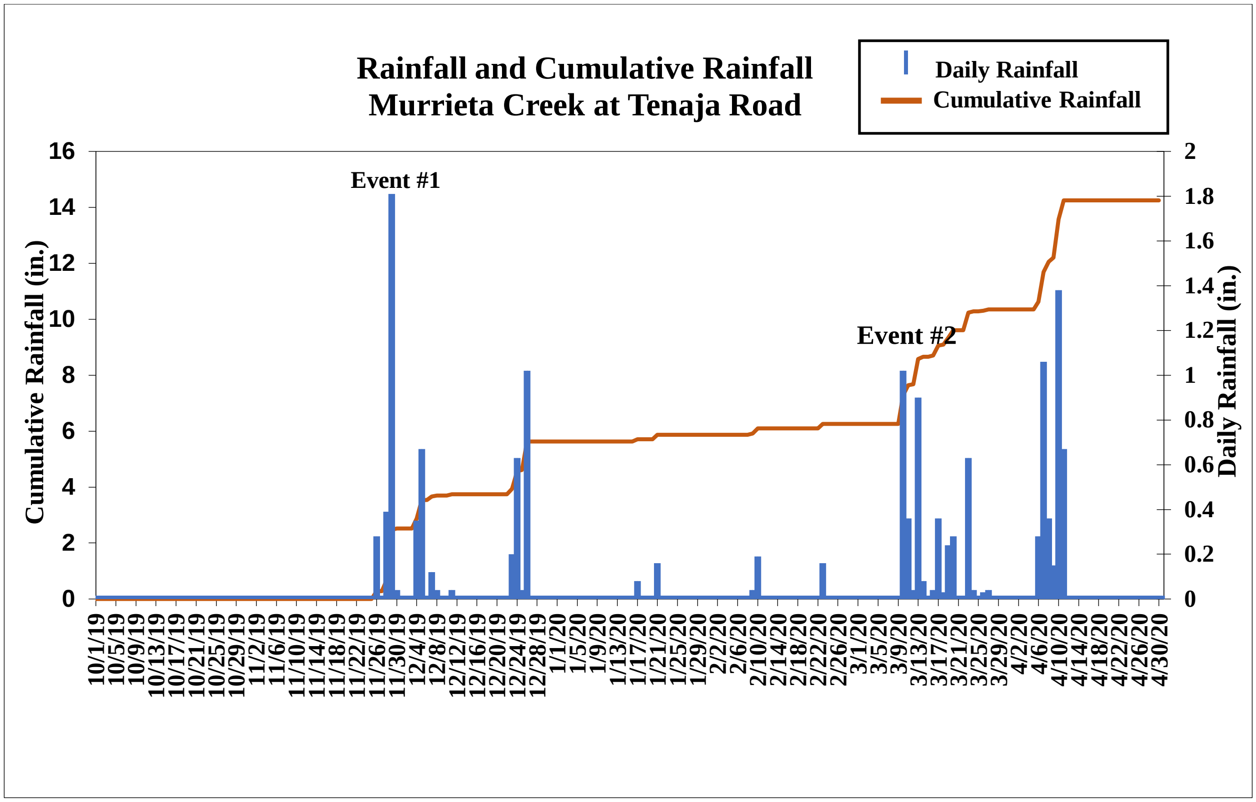



**Figure A4-17. Event Rainfall Murrieta Creek at Tenaja Road**

Flux estimates were calculated to compare the data from burned catchments and downstream sites of different sizes. Contaminant flux was calculated as the ratio of the mass loading in kilograms (kg) and the contributing catchment area in square kilometers ($km^2$) for each storm monitoring event. A summary of the preliminary results for total nitrogen and total phosphorus are provided below.

**Assessment of post-fire contaminant and flux**

- Mean total phosphorus and total nitrogen flux ($kg/km^2$) during the 'first flush' event in November 2019 were between 102- and 285-fold higher from the Cole Creek burned catchment compared to the downstream receiving waters.
- Mean total phosphorus and total nitrogen flux ($kg/km^2$) during the second wet weather event in March 2020 were between 3- and 5-fold higher from the Cole Creek burned catchment compared to the downstream receiving waters.
- The preliminary data indicate that the contaminant flux from the burned catchments were significantly lower during the second wet weather event in March 2020 compared to the 'first flush' event in November 2019, indicating the attenuation of contaminant concentrations and loads was observed as the 2019-2020 winter storm season progressed.

**Comparison of post-fire water quality results with reference data**

- Nutrient concentrations from the Cole Creek burned catchment were higher compared to unburned natural areas, based on the comparison to the historical data from the Cole Creek (902COL188) and Adobe Creek (902ADB848) reference stations (see **Table A4-41**).

**Table A4-41. Comparison of post-fire water quality results with reference data**

| Parameter | Units | Cole Creek Event #1 (11/28-29/2019) | Cole Creek Event #2 (3/11/2020) | Cole Creek Historical Average (2001-2011) | Adobe Creek Historical Average (2014-2017) |
|---|---|---|---|---|---|
| Total Nitrogen | mg/L | 77.0 | 2.30 | 1.98 | 0.90 |
| Total Phosphorus | mg/L | 9.2 | 0.67 | 0.30 | 0.27 |

mg/L – milligrams per Liter

- Nutrient concentrations from the Murrieta Creek station (902LMC778) during two storm events in the 2019-2020 monitoring season following the Tenaja Fire were similar to historical averages from the Murrieta Creek station (902LMC778) (see **Table A4-42**).

**Table A4-42. Comparison of post-fire water quality results with historical data**

| Parameter | Units | Murrieta Creek Event #1 (11/28-29/2019) | Murrieta Creek Event #2 (3/11/2020) | Murrieta Creek Historical Average (1996-2017) |
|---|---|---|---|---|
| Total Nitrogen | mg/L | 2.4 | 1.40 | 1.69 |
| Total Phosphorus | mg/L | 0.8 | 0.63 | 0.59 |

mg/L – milligrams per Liter

**Influence on the WQIP HPWQC**

- Mean total phosphorus and total nitrogen flux ($kg/km^2$) during the 'first flush' event in November 2019 were between 102- and 285-fold higher from the Cole Creek burned catchment compared to the downstream receiving waters.
- The preliminary data indicates that the contaminant flux from the 'first flush' event in November 2019 following the September 2019 Tenaja Fire was a source of nutrients discharging downstream to Murrieta Creek. However, the preliminary data indicates that the contaminant flux from the burned catchments were significantly lower during the second wet monitored weather event in March 2020, indicating the attenuation of contaminant concentrations and loads was observed as the 2019-2020 winter storm season progressed.

### 4.6.8 Santa Margarita River Nutrient Initiative Group

In addition to the special studies listed above, several ongoing projects are continuing to support the development of alternative approaches for establishing biostimulatory targets in the SMR Estuary and River. During the 2019-2020 year, no work was planned for this special study, rather monitoring is scheduled for WQIP year 3 (2020-2021) as described in the schedule of the WQIP MAP. Future monitoring is intended to coincide with a dry weather monitoring event at the long-term receiving water stations.

As described in the WQIP, the SMRNIG is piloting alternative approaches to establish biostimulatory targets based on recent science. This work includes developing targets in three phases: Phases I and II developed targets for the SMR Estuary and began work on the lower SMR Mainstem, and Phase III is developing targets for the Upper and Lower SMR Mainstem. In addition, Phase III includes evaluation of the impact of climate change scenarios on biological conditions in the SMR Estuary and River, an evaluation of possible restoration actions that could improve the level of biointegrity, and an estimation of nutrient load and wasteload allocations expected to achieve the biostimulatory targets in the river. As part of Phase III the stakeholders and the technical team are working to update the SMR watershed models and develop a receiving water model for the SMR Mainstem. Two Hydrologic Simulation Program-FORTRAN (HSPF)* models have been developed incrementally over a number of years and with a variety of project elements. These HSPF watershed loading models cover the areas upstream (currently being finalized) and downstream (completed in 2018) of the confluence of Murrieta and Temecula Creeks. The Upper SMR Watershed Loading model was updated during the reporting period with more recent and complete hydrology and land use data, improved data for releases from Diamond Valley Lake, Lake Skinner, and Vail Lake, and improved representation of groundwater/surface water interactions in the Middle SMR Subwatershed using results from a groundwater model. A Calibration report for the Upper Watershed Loading Model was released for review by stakeholders in October 2020. The Upper and Lower Watershed Loading models will provide hydrology and water quality inputs to a receiving water model being developed for the Upper and Lower SMR Mainstem using the USEPA's Water Quality Analysis Simulation Program (WASP). The results of the WASP model are expected to support development of response targets for reaches of the SMR Mainstem (analogous to the targets developed for the SMR Estuary), and the Watershed Loading Models will support development of nutrient loading limitations expected to be protective of the targets. The combined receiving water quality and watershed loading models will also be used to simulate conditions under selected climate change scenarios, for undeveloped watershed conditions, and possibly to evaluate effectiveness of various management/implementation scenarios, depending on availability of funds for model runs.

During WQIP implementation, Copermittees will continue to support the study effort under the SMRNIG by including in-kind monitoring of additional parameters at the long-term receiving water stations during a dry weather monitoring event as relevant to the Nutrient Numeric Endpoint framework, an alternative regulatory approach advocated by State Water Board staff and USEPA Region 9. This will consist of collection of additional samples from the long-term receiving water stations to be analyzed for ammonium, orthophosphate, total dissolved nitrogen, total dissolved phosphorus, particulate organic carbon, particulate organic nitrogen, particulate phosphorus, phytoplankton chlorophyll-a, algal carbon-nitrogen content, and algal phosphorus content. The Copermittees will continue to support future phases of the Nutrient Numeric Endpoint development efforts.

#### 4.6.9 Participation in SMC California LID Evaluation and Analysis Network (SMC CLEAN) Project

The SMC has taken a lead role in gathering and evaluating available Low Impact Development (LID) BMP data. The SMC's California LID Evaluation and Analysis Network (CLEAN) project is designed to develop an understanding of the effectiveness of LID BMPs in Southern California. The District, on behalf of the Copermittees, collaborates with the SMC CLEAN project and supports its mission by providing quantification of LID BMP performance and serving as a participating agency for LID monitoring information. The efforts of the SMC CLEAN Project are described in detail in **Section 4.7.1**. The District, on behalf of the Copermittees, has been collaborating with the SMC CLEAN project in support of its mission by providing quantification of LID BMP performance and serving as a participating agency for LID monitoring information. The efforts of the SMC CLEAN Project are described in detail in **Section 4.7.1**.

## 4.7 Additional Special Study Results and Assessments

Special studies are conducted to "address pollutant and/or stressor data gaps and/or develop information necessary to more effectively address the pollutants and/or stressors that cause or contribute to highest priority water quality conditions identified in the Water Quality Improvement Plan (San Diego Water Board, 2013)." Provision D.4.c of the Permit requires an annual evaluation of special studies results to assess their relevance to the Copermittees' characterization of receiving water conditions, understand sources of pollutants and/or stressors, and control and reduce the discharges of pollutants from MS4 outfalls to receiving waters. This Provision also requires the Copermittees to identify modifications and/or updates to the WQIP that are necessary based on special study results. As this was the first full WQIP monitoring year there are no modifications or updates to the WQIP that are necessary at this time based on special study results to date.

Special studies conducted during the 2019-2020 monitoring year are summarized in the sections above, and the results of these studies are being used to better understand potential sources contributing the HPWQCs. Assessment of special study results provides direction for additional investigation and is informing evaluation of progress to goals and adaptive management.

### 4.7.1 Participation in the Southern California Stormwater Monitoring Coalition's California LID Evaluation and Analysis Network (SMC CLEAN) Project

The District, on behalf of the Copermittees, collaborates with the SMC CLEAN project (**Section 4.6.9**) and support its mission by providing quantification of LID BMP performance and serving as a participating agency for LID monitoring information. The District coordinated with the Santa Ana Watershed Project Authority on a Proposition 84 grant to construct a LID Testing and Demonstration Facility at the District's 15-acre headquarters in Riverside, California. The LID Testing and Demonstration Facility (**Figure A4-18**) monitors and evaluates LID BMPs with respect to Southern California's semi-arid environment. In accordance with the District's LID Monitoring Plan and QAPP, the facility collects volume and pollutant data to gauge BMP performance and effectiveness. Findings from the District's LID BMP facility will support the development of technical guidance regarding LID BMP design, implementation, and maintenance for systems within semi-arid environments for the foreseeable future. As sufficient data become available, the results from the District's monitoring program and those of other partner agencies will be used to establish more effective water quality treatments that will help in crediting flow reductions to developments that implement BMPs.


**Figure A4-18. Photographs of the LID BMP Testing and Demonstration Facility**

In accordance with SMC CLEAN's short-term goal, the District collects flow data and influent and effluent samples from its monitored BMP sites. The 2019-2020 wet season saw a total of two sampled events. The date of the sampled event, stations monitored, and the total rainfall depth of the events are shown in **Table A4-43**.

**Table A4-43. LID Sampled Storm Events**

| Date | Stations Sampled | Rainfall Depth |
|---|---|---|
| 12/04/2019 | 606 & 608 | 0.83" |
| 03/10/2020 | 606 & 608 | 0.84" |

606 – Bioretention Basin Influent; 608 – Bioretention Basin Effluent

The District also monitored an additional nine storm events in an effort to focus on the hydraulic properties of its monitored BMPs. The date of the storm events, stations monitored, and the total rainfall depth of the storms are shown per **Table A4-44**. Flow data for both the sampled storm events and the monitored storm events are still in review and are not presented in this report. The District plans on continuing its efforts in the evaluation of flow data and the volume reduction potential of its monitored BMPs.

**Table A4-44. LID Monitored Storm Events**

| Date | Stations Monitored | Rainfall Depth |
|---|---|---|
| 12/23/2019 | 606 & 608 | 0.57" |
| 3/12/2020 | 606 & 608 | 1.42" |
| 3/13/2020 | 606 & 608 | 0.12" |
| 03/16–17/2020 | 606 & 608 | 0.16" |
| 03/18–19/2020 | 606 & 608 | 0.20" |
| 03/22–23/2020 | 606 & 608 | 0.87" |
| 04/06–07/2020 | 606 & 608 | 1.06" |
| 04/07–08/2020 | 606 & 608 | 0.51" |
| 04/09–10/2020 | 606 & 608 | 1.02" |

606 – Bioretention Basin Influent; 608 – Bioretention Basin Effluent

Influent and effluent samples are collected, composited, and processed to determine pollutant concentrations and results are assessed by the District. Analytes that were tested for in the 2019-2020 wet season are shown per **Table A4-45**. The District plans in continuing its efforts in the evaluation of its analyte concentrations and the pollutant removal effectiveness between the monitored BMPs.

**Table A4-45. Analytical Constituents (2019 – 2020 Wet Season)**

| Category | Analyte(s) |
|---|---|
| Cations | Hardness as CaCO3 |
| Cations | Calcium |
| Cations | Magnesium |
| Anions | Nitrate |
| Solids | Total Dissolved Solids |
| Solids | Total Suspended Solids |
| Aggregate Organic Compounds | Organic Carbon (Total) |
| Aggregate Organic Compounds | Organic Carbon (Dissolved) |
| Aggregate Organic Compounds | Oil & Grease |
| Nutrients | Nitrite |
| Nutrients | Ammonia |
| Nutrients | Total Kjeldahl Nitrogen |
| Nutrients | Total Nitrogen |
| Nutrients | Inorganic Nitrogen |
| Nutrients | Ortho Phosphorus |
| Nutrients | Phosphorus (Total) |
| Nutrients | Phosphorus (Dissolved) |
| Metals and Metalloids | Cadmium (Total) |
| Metals and Metalloids | Chromium (Total) |
| Metals and Metalloids | Copper (Total) |
| Metals and Metalloids | Iron (Total) |
| Metals and Metalloids | Lead (Total) |
| Metals and Metalloids | Manganese (Total) |
| Metals and Metalloids | Nickel (Total) |
| Metals and Metalloids | Zinc (Total) |
| Metals and Metalloids | Cadmium (Dissolved) |
| Metals and Metalloids | Chromium (Dissolved) |
| Metals and Metalloids | Copper (Dissolved) |
| Metals and Metalloids | Iron (Dissolved) |
| Metals and Metalloids | Lead (Dissolved) |
| Metals and Metalloids | Manganese (Dissolved) |
| Metals and Metalloids | Nickel (Dissolved) |
| Metals and Metalloids | Zinc (Dissolved) |
| Multiple Tube Fermentation - Multiple Dilution - SM 9221 B, E, F series | *E. coli* |
| Multiple Tube Fermentation - Multiple Dilution - SM 9221 B, E, F series | Total Coliform |
| Multiple Tube Fermentation - Multiple Dilution - SM 9221 B, E, F series | Fecal Coliform |

In 2017, after a total of five years since the implementation of the LID Testing and Demonstration Facility, the District reviewed the data collected to determine if conclusions can be made regarding performance and design. Based on the trends in the data and in line with SMC CLEAN's long-term goal of LID design, construction, and maintenance, the District revitalized several of its systems to improve volume reduction and pollutant removal performance. Improvements were based on scientific studies and guidance from leading authorities on Green Infrastructure.

Starting in the 2017-2018 wet season, the District equipped its planter box with a raised outlet aiming to improve the system's pollutant removal effectiveness. Recommendation for this improvement was based on a scientific report[14] describing nitrogen removal in a saturated anaerobic zone. As detailed in the report, the saturated anaerobic zone, created by the raised outlet, allows for denitrification processes to happen more efficiently. The denitrification process converts nitrate to gaseous forms of nitrogen, which removes it from the water completely. Both the original configuration and the raised outlet configuration are shown per **Figure A4-19**. The District plans a possible upgrade to this BMP in the near future; planned improvements may consist of an upgraded impermeable barrier and/or improved vegetation and soil mix. The District also expects to continue its review of the BMP's performance and evaluating the resulting data.


**Figure A4-19. Planter Box – Before and After**

In addition, the District rebuilt its Bioretention Basin before the start of the 2018-2019 wet season. The District developed a new soil mix comprised of silica sand, coconut pith, topsoil, and biochar, based on a report prepared for Kitsap County Public Works[15] that showed high pollutant removal. With guidance from technical memoranda[16] and the Central Coast Water Board[17], the District replaced the old vegetation with new plant species designed to achieve LID goals. The plants: *Carex pansa*, *Carex praegracilis*, and *Juncus patens*; were selected for denitrifying bacteria contained within their roots and their ability to withstand long periods of inundation. Moreover, a new grade design to the soil media was also implemented. The original design, a shallow valley, developed short-circuiting problems, which drastically reduced travel distance and contact time for treatment within the soil media. The soil media was graded with an inverted V layout allowing water to pond along the sides of

[14] Zinger, Yaron, Godecke-Tobias Blecken, Tim D. Fletcher, Maria Viklander, and Ana Deletić. 2013. "Optimising Nitrogen Removal in Existing Stormwater Biofilters: Benefits and Tradeoffs of a Retrofitted Saturated Zone." *Ecological Engineering* 51: 75–82.
[15] Herrera Environmental Consultants, Inc. (2015). Analysis of Bioretention Soil Media for Improved Nitrogen, Phosphorous and Copper Retention.
[16] Monash University. (2015). Adoption Guidelines for Stormwater Biofiltration Systems (Version 2).
[17] Central California Coast. (n.d.). LID Plant Guidance for Bioretention.

the Bioretention Basin. This design forces the water to follow a longer path to the center subdrains thus allowing for more time for treatment by the newly engineered soil mix and its associated plant roots. These changes, as well as the rest of the LID Testing and Demonstration Facility, will continue being monitored to learn how these systems perform over time.

Data gathered from the SMC CLEAN project will also aid in the management of the HPWQCs of the SMR WMA. The District's LID Facility currently monitors the following nutrients: ammonia, inorganic nitrogen, nitrite, ortho phosphorus, phosphorus (Dissolved) (dissolved phosphorus), phosphorus (Total) (TP), total Kjeldahl nitrogen (TKN), and total nitrogen (TN). Understanding how these nutrients and other pollutants react with the different types of media and BMP designs can assist in the appropriate selection of BMPs during the development of Water Quality Management Plans. District LID Demonstration Facility Nutrient Monitoring Data are provided in **Attachment 4I**.

The District's LID Facility has monitored and sampled a total of 17 storm events from 2012 to 2020. Nutrient data from 2012 to 2019 were consolidated in an effort to gauge the BMPs' performance in nutrient reduction. Nutrient reduction is given as the average percent difference in concentration from influent (either measured at a representative control site, or as actual influent to the BMP) to effluent. Thus, a positive value is associated with a decrease in concentration whereas a negative value indicates the system is introducing additional nutrients into the effluent. An overview of the performance of the District's BMPs in reducing nutrient concentrations is given below per **Figure A4-20**.

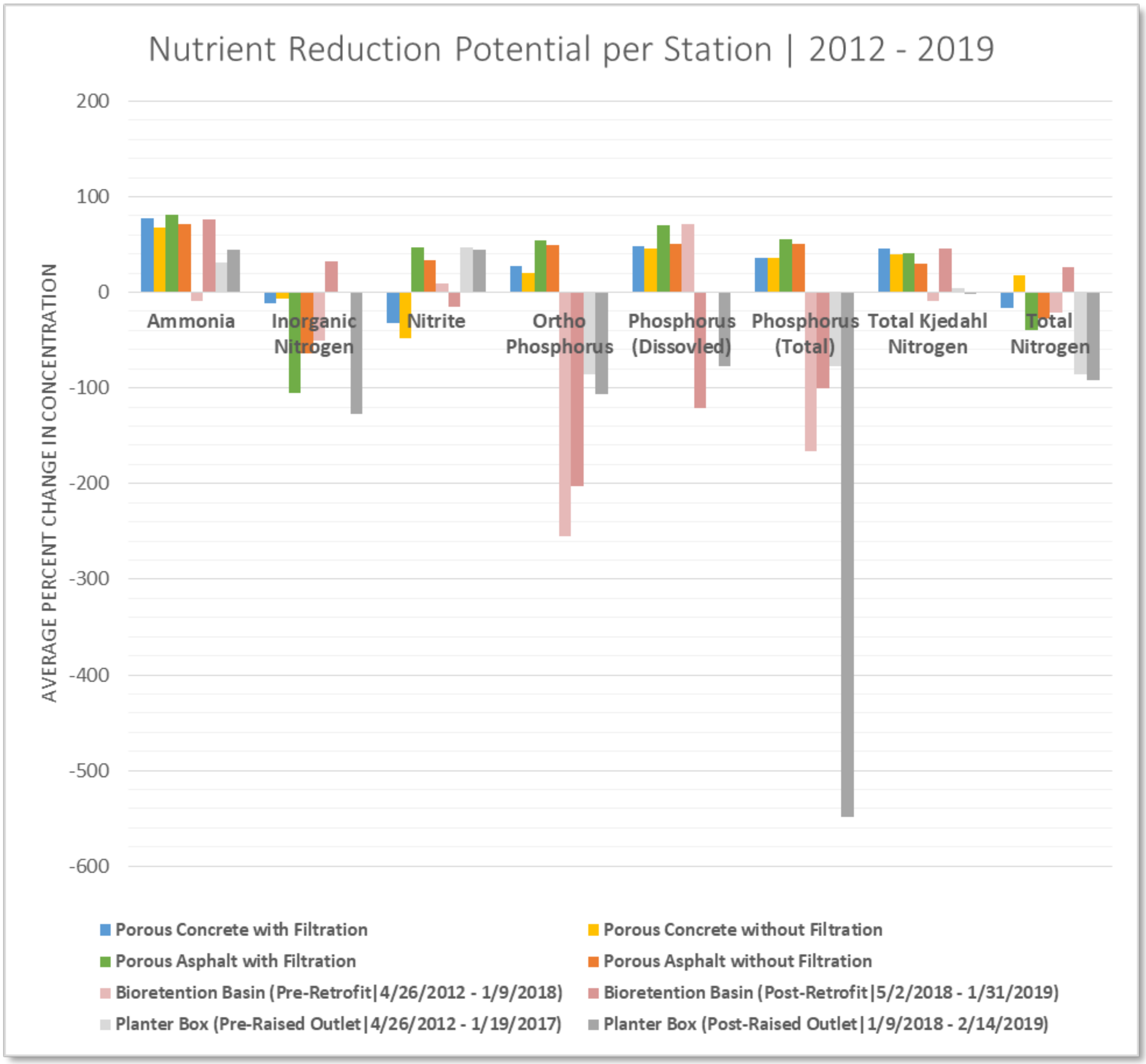



**Figure A4-20. Nutrient Reduction Potential**

Per the data shown, ammonia was reduced across all monitored BMPs with the exception of Bioretention Basin's original configuration. Moreover, Porous Concrete with Filtration was shown to have the greatest potential at removing ammonia with an average 77% reduction in concentration. The Bioretention Basin's original configuration was found to be the least effective at reducing ammonia with an average 9% increase in concentration. Except for the retrofitted Bioretention Basin, all the other BMP systems increased inorganic nitrogen concentrations in the effluent. As the data indicate, the retrofitted Bioretention Basin saw an average 32% reduction in concentration of inorganic nitrogen. The Planter Box post-raised outlet may have the potential to add the largest amount of inorganic nitrogen with an average 127% increase in concentration.

The Porous Asphalt systems (with and without filtration), pre-retrofitted Bioretention Basin, and both Planter Box configurations reduced nitrite concentrations. Porous Asphalt with Filtration reduced nitrite concentration an average 47%, while the Porous Concrete with and without filtration, and the retrofit to the Bioretention Basin, had increased concentrations of nitrite in their effluent. The retrofitted Bioretention Basin increased nitrite concentrations the least, with an average 9% increase, whereas the Porous Concrete without Filtration system increased nitrite concentrations the most, as indicated by its average 48% increase. On the other hand, all porous pavements reduced concentrations of ortho phosphorus in the effluent, with the greatest reduction found for Porous Asphalt with Filtration, with an average 54% reduction. However, both retrofitted and pre-retrofitted configurations for the Bioretention Basin and the Planter Box increased concentrations of ortho phosphorus in their effluent. The long-term data suggest that the original Bioretention Basin configuration may potentially introduce the most ortho phosphorus into the system with an average 255% increase in concentration.

As with ortho phosphorus, the data suggests that all porous pavements have the potential to remove dissolved phosphorus. Both the Porous Asphalt with Filtration and pre-retrofitted Bioretention Basin appear to have the most potential to reduce dissolved phosphorus with an average 71% reduction, while both retrofitted designs for the Bioretention Basin and the Planter Box were both found to increase dissolved phosphorus concentrations. Similar results are shown for TP, all porous pavements showed reductions, however both pre-and post-retrofitted designs for the Bioretention Basin and the Planter Box showed increased effluent concentrations of TP. Trends in the data suggest Porous Asphalt with Filtration may have the greatest potential to reduce TP concentrations with an average 55% reduction. Conversely, the Planter Box with raised outlet may have the greatest potential to increase TP concentrations.

All porous pavements, along with the retrofitted Bioretention Basin, were able to reduce TKN concentrations. As the data indicate, Porous Concrete with Filtration may have the greatest potential at decreasing TKN concentrations by an average 46% reduction. While the pre-retrofitted Bioretention Basin may be the least effective for TKN reduction, with an average 10% increase in concentration. As for Total Nitrogen, the Porous Concrete without Filtration and the retrofitted Bioretention Basin were the most effective at removing TN. The Bioretention retrofit showed the most potential for removing TN, exhibiting an average 26% reduction in concentration. Both Planter Box configurations showed the most increase in TN concentrations.

On November 28$^{th}$, 2017, the District equipped its Planter Box with a raised outlet to study its effects on pollutant removal potential. The Planter Box with raised outlet was monitored and sampled during five storm events from January 9$^{th}$, 2018 to February 14$^{th}$, 2019. The District's previous configuration, Planter Box without a raised outlet, was monitored and sampled during six storm events from April 26$^{th}$, 2012 to January 19$^{th}$, 2017. **Figure A4-21** details the comparative results related to the Planter Box system before and after the installed the raised outlet.

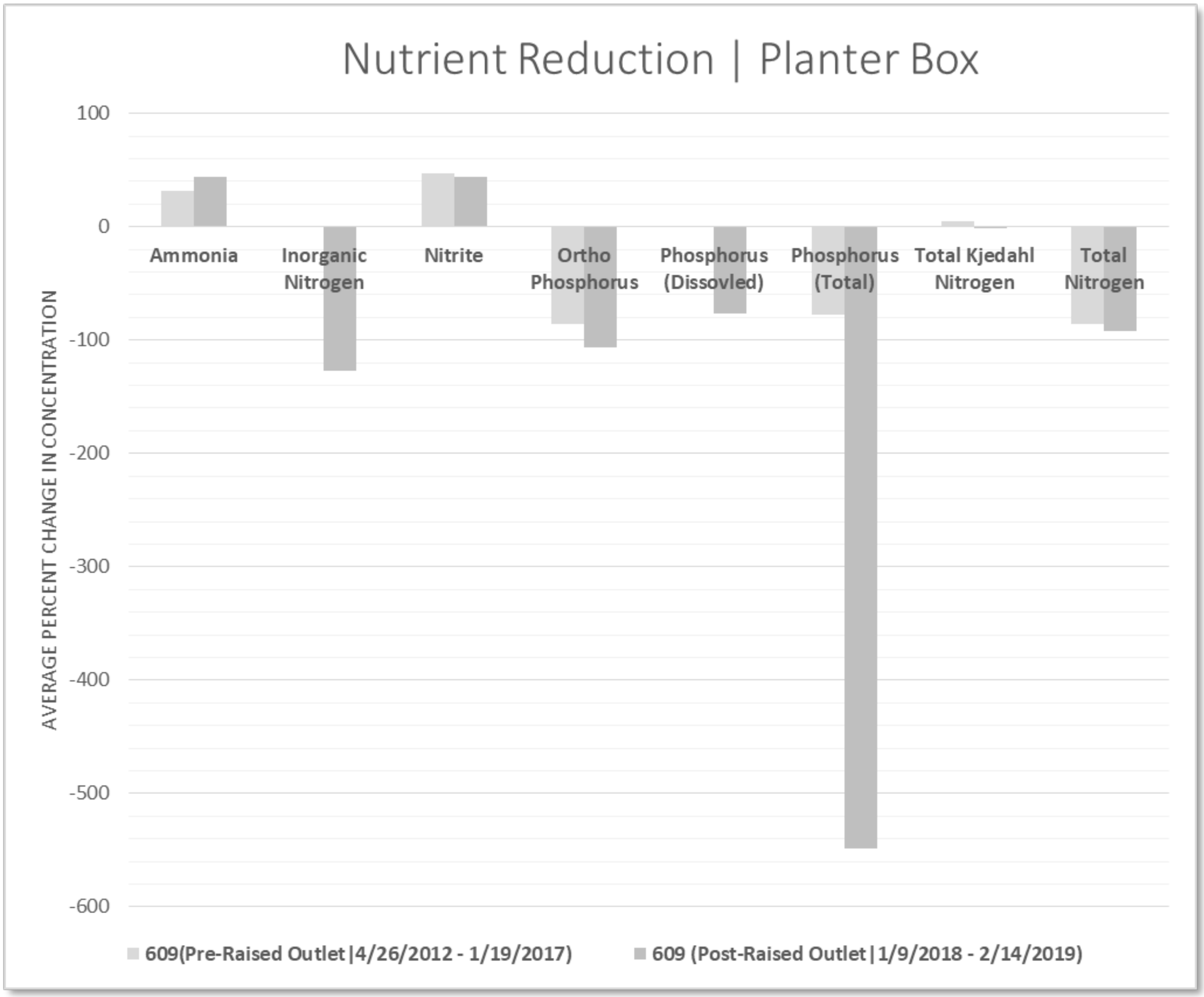



**Figure A4-21. Nutrient Reduction – Planter Box Pre-and-Post Raised Outlet**

Results suggest that, with the exception of ammonia, the raised outlet did not improve nutrient removal. Ammonia concentrations in the effluent for the Planter Box with a raised outlet were reduced by 44%, compared to a 31% reduction with the previous configuration. For nitrite removal, the reconfigured BMP showed similar results to the previous configuration (44% reduction vs. 42% reduction). While the majority of the results show the raised outlet was less effective for nutrients overall, the District is conducting further review of the data and relevant literature. Different vegetation in combination with different soil types may lead to different results under saturated - anaerobic conditions, as such, the District plans to continue studying its Planter Box BMP as to effectively determine its pollutant reduction potential.

On March 26th, 2018, the District completed a retrofit of the Bioretention Basin to improve volume reduction and pollutant removal. The retrofitted Bioretention Basin was monitored and sampled during five storm events from May 2nd, 2018 to February 14th, 2019. The District's original Bioretention Basin was monitored and sampled a total of 7 storm events from April 26th, 2012 to January 9th, 2018. **Figure A4-22** details the comparative results related to the District's Bioretention Basin pre- and post-retrofit.

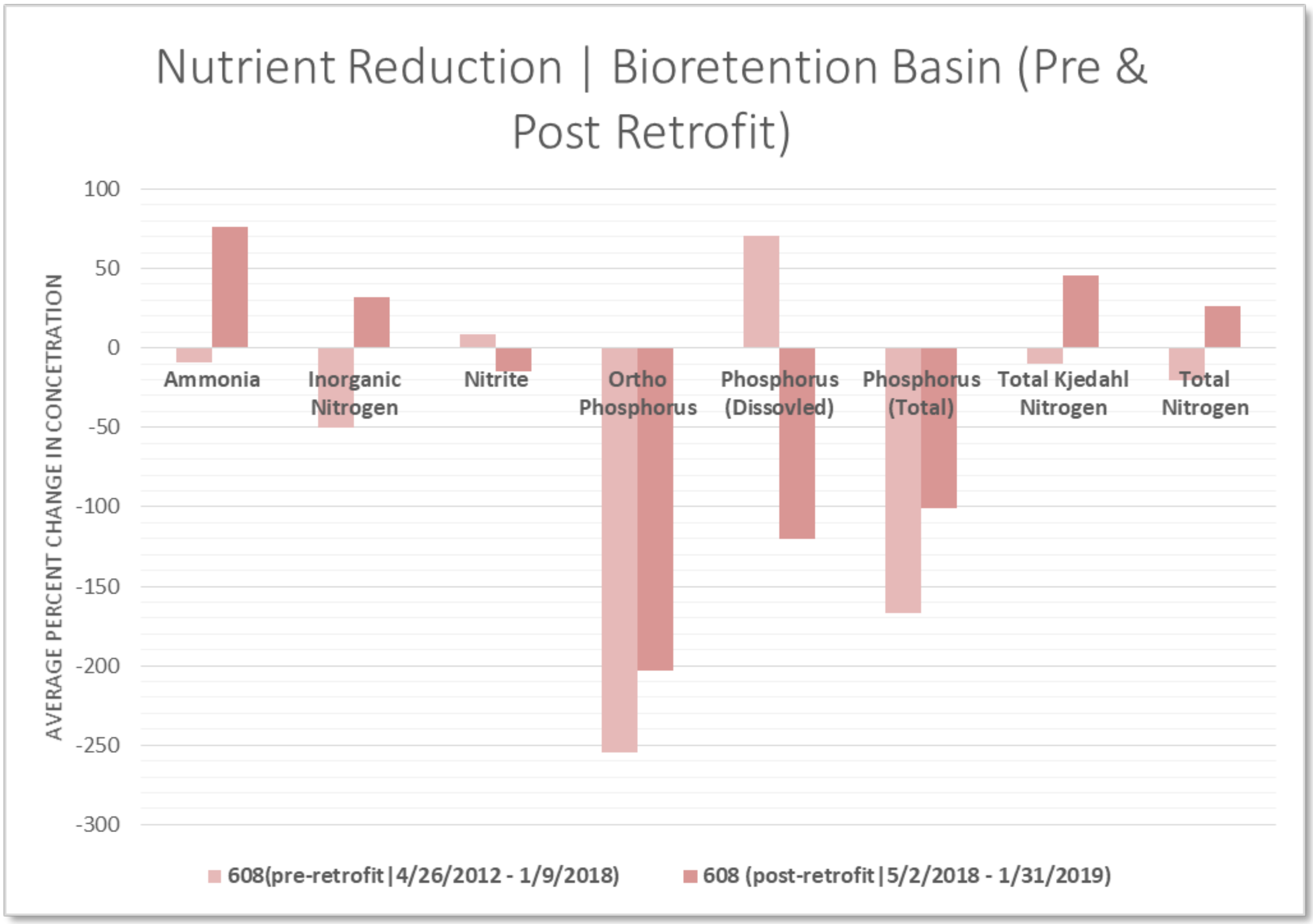



**Figure A4-22. Nutrient Reduction – Bioretention Basin Pre-and-post Retrofit**

Results indicate that, except for nitrite and dissolved phosphorus, the nutrient reduction potential of the Bioretention Basin was greatly improved following its retrofit. Ammonia was reduced by an average 76% change in concentration, a significant improvement from its previous design which increased ammonia an average 8%. Inorganic nitrogen was also greatly reduced; the Bioretention Basin post-retrofit saw an average 32% reduction in inorganic nitrogen concentration compared to its average pre-retrofit 50% increase. TKN and TN were also substantially reduced. The retrofit showed a reduction in TKN concentrations by an average of 45% compared to its pre-retrofit increase of 10%. Likewise, the retrofit showed a reduction in TN concentrations by an average of 26% compared to its pre-retrofit increase of 21%. However, post-retrofit nitrite concentrations were increased by an average of 14%.

Data for phosphorus show mixed results. For dissolved phosphorus, the retrofit basin effluent showed a substantial 120% increase in average concentration, while the original design reduced effluent concentration by an average 71%. The retrofit basin substantially increased the concentrations of both ortho phosphorus and TP in the effluent (203% and 101%, respectively), although the concentration increases were smaller compared to data for the original design (255% and 167%, respectively). As with the Planter Box, the District will continue studying the Bioretention Basin as to effectively determine its pollutant reduction potential.

Due in part to the results described and the efforts to make various improvements such as the change in drainage design, improved soil type, and the implementation of specialized vegetation, the Bioretention Basin's retrofit won the California Stormwater Quality Association 2019 Award for Outstanding Stormwater BMP Implementation Project as shown in **Figure A4-23.** The District's retrofitted Bioretention Basin was evaluated on several criteria such as: how well the BMP effectively integrates into the target site or program, the BMP's targeting of priority pollutants or pollutants of concern, the BMP's achievement of objectives and producing of valuable results, the inclusion of outstanding elements which distinguish it from other BMPs, and whether the project has been promoted via professional publications. A before and after of the District's retrofit is given below in **Figure A4-24.** The District will continue to monitor and sample the Bioretention Basin as well as its other BMPs to further study nutrient and pollutant behavior in relation to SMC CLEAN's short-term and long-term goals for Green Infrastructure.

**Figure A4-23. CASQA 2019 Award – Outstanding Stormwater BMP Implementation Project**


**Figure A4-24. Bioretention Basin – Before and After**

## 4.8 California Environmental Data Exchange Network Data Upload and Retrieval

Provision F.4.a.(6) of the Permit requires that monitoring data collected pursuant to Provision D (Monitoring and Assessment Program Requirements) must be uploaded to the CEDEN, a central location for finding and sharing information about California's waterbodies. CEDEN aggregates water quality, aquatic habitat, and wildlife health data and makes them accessible in downloadable forms at www.ceden.org.

Data in CEDEN are searchable by date, location, project, station, or parameter using the "Find Data" functionality of the CEDEN website. The data from the San Diego Region Copermittee Program can be retrieved by identifying the Program as "NPDES Program" and Project as "San Diego Region NPDES", which is the parent Project name. The data from the Riverside County Copermittee Program can be retrieved by identifying the Program as "Riverside County NPDES MS4 Monitoring Program" and Project as "San Diego Region", which is the parent Project name. Within this overall retrieval, the specific datasets described in this Annual Report can be identified using the project names listed in **Table A4-46**. Data are limited to those parameters that are currently storable in CEDEN. SMC data are submitted to the SMC Program.

In accordance with the Permit, data collected during the 2019-2020 monitoring year have been submitted to CEDEN and will become available from CEDEN once loaded by the State into the system. CEDEN data submittals and receipts are provided as **Attachment 4L**. GIS files of the monitoring locations are provided in **Attachment 4M**.

**Table A4-46. Project Names for CEDEN Data Retrieval**

| Program Code | Project Code | Project Name |
|---|---|---|
| **San Diego County Program** | | |
| NPDES | MS4_DW_OFS_T | Dry Weather MS4 Outfall Field Screening |
| NPDES | MS4_WW_OFM_T | Wet Weather MS4 Outfall Monitoring |
| NPDES | RCN_TMDL_COSD | Nutrient TMDL for Santa Margarita Watershed |
| NPDES | RCN_MS4_COSD | MS4 Outfall Monitoring Rainbow Creek Watershed |
| NPDES | NPDES_RWM | NPDES Receiving Water Monitoring |
| NPDES | RBC_MS4_BMP_COSD | Rainbow Creek MS4 BMP |
| SDCWPP | RBN_MST_COSD | Rainbow Creek HF183 |
| **Riverside County Program** | | |
| RC_NPDES_MS4_MP | SMR_GM | Dry Weather MS4 Outfall Field Screening,<br>Dry Weather MS4 Outfall Monitoring,<br>Wet Weather MS4 Outfall Monitoring, and<br>NPDES Receiving Water Monitoring |
| RC_NPDES_SSP | SMR_PF | SMR Post-fire Monitoring |