TMDL Technical Report: Proposed Revisions to the Middle Santa Ana River Watershed Bacterial Indicator TMDLs

Prepared for

Santa Ana Watershed Project Authority *in collaboration with* the Middle Santa Ana River Watershed TMDL Task Force

Prepared by

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Reviewed and Revised by

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January 27, 2026

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Acronyms

Acronym	Definition
AgSEP	Agricultural Source Evaluation Plan
Basin Plan	Water Quality Control Plan for the Santa Ana River Basin
BASMP	Bacterial Indicator Agricultural Source Management Plan
BAT	Best Available Treatment technology
BCT	Best Conventional Treatment technology
BDL	Below Detection Limit
BMP	Best Management Practice
BPJ	Best Professional Judgement
CAFO	Concentrated Animal Feeding Operation
Caltrans	California Transportation Department
CBRP	Comprehensive Bacteria Reduction Plan
CBW	Chino Basin Watermaster
cfs	Cubic feet per second
cfu	Colony Forming Units
CIP	Capital Improvement Project
CSPP	Control Strategy and Prioritization Plan
CWA	Clean Water Act
DAMP	Drainage Area Management Plan
DWF	Dry Weather Flow
E. coli	*Escherichia coli*
FBRP	Facility Bacteria Reduction Plan
fps	Feet per second
gc	Gene Copies
Grant Project	Middle Santa Ana River Pathogen TMDL BMP Implementation Project
HFS	High Flow Suspension
IEUA	Inland Empire Utilities Agency
ISWEBE	Inland Surface Waters, Enclosed Bays, and Estuaries
LA	Load Allocation
LIP	Local Implementation Plan
Los Angeles Water Board	Los Angeles Regional Water Quality Control Board
mL	milliliter
MPN	Most Probable Number
MS4	Municipal Separate Storm Sewer System
MSAR	Middle Santa Ana River
MSAR Task Force	MSAR Watershed TMDL Task Force
MST	Microbial Source Tracking
MSWMP	Municipal Storm Water Management Plan

Acronym	Definition
n	Number
NA	Not Available
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly-owned Treatment Works
ppt	Part per thousand
QAPP	Quality Assurance Project Plan
QMRA	Quantitative Microbial Risk Assessment
qPCR	Quantitative Polymerase Chain Reaction
RBMP	Regional Bacteria Monitoring Program
RBT	Risk-based Threshold
RCFC&WCD	Riverside County Flood Control & Water Conservation District
REC-1	Water Contact Recreation
REC-2	Non-contact Water Recreation
RIX	Rapid Infiltration and Extraction Facility
RMP	Regional Monitoring Program
RP-1	Regional Water Recycling Plant No. 1
RWQMTF	Regional Water Quality Monitoring Task Force
Santa Ana Water Board	Santa Ana Regional Water Quality Control Board
SAWPA	Santa Ana Watershed Project Authority
SBCFCD	San Bernardino County Flood Control District
SCAG	Southern California Association of Government
SSO	Site-specific Objective
Staff Report	Staff Report on Bacterial Indicator Total Maximum Daily Loads in the Middle Santa Ana River Watershed
State Water Board	State Water Resources Control Board
SWQSTF	Stormwater Quality Standards Task Force
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UAA	Use Attainability Analysis
UC Riverside	University of California Riverside
USACE	U.S. Army Corps of Engineers
USEP	Urban Source Evaluation Plan
USEPA	United States Environmental Protection Agency
WDR	Waste Discharge Requirements
WLA	Wasteload Allocation
WQ	Water Quality
WQBEL	Water Quality Based Effluent Limitation
WQMP	Water Quality Management Plan
WW	Wet Weather

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1. Introduction

1.1 Purpose

This report provides the technical basis for the preparation of a Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) amendment to support revisions to extend the Wet Winter Conditions[1] compliance deadline for bacterial indicator Total Maximum Daily Loads (TMDL) adopted by the Santa Ana Regional Water Quality Control Board (Santa Ana Water Board) in the Middle Santa Ana River (MSAR) watershed in 2005. The scope of the revision will be limited to extending the Wet Winter Conditions compliance deadline and establishing a Phase 2 Implementation Plan (limited revision). This section provides an overview of the basis for adoption of the 2005 TMDLs, a summary of activities completed under the adopted TMDLs' Phase 1 Implementation Plan and the scope of the proposed limited revision to the existing TMDLs. Subsequent sections of this report provide more detailed information regarding activities completed to date to facilitate compliance with the TMDLs' wasteload allocations (WLAs) and load allocations (LAs), proposed limited revision to the TMDLs including establishment of a Phase 2 Implementation Plan, and technical justification for the requested limited revision.

1.2 Adoption of Total Maximum Daily Loads

TMDLs are developed for waterbodies that are on California's List of Water Quality Limited Segments (Category 5 or 303(d) List) in California's Integrated Report prepared to comply with Clean Water Act Section 303(d) and 305(b) requirements. The Santa Ana Water Board adopted bacterial indicator TMDLs for six waterbodies in the MSAR watershed on August 26, 2005 (MSAR TMDLs) (**Figure 1-1**). These TMDLs were adopted to address impairment of the water contact designated recreation beneficial use (REC-1). The six waterbodies and original impairment findings included the following (**Figure 1-2**):

- *Santa Ana River Reach 3* – In 1988, the lower portion of Reach 3 (Santa Ana River from Prado Dam upstream to the Mission Boulevard Bridge) was placed on the 303(d) list. Based on monitoring data, during development of the TMDLs the extent of impairment was expanded to include all of Santa Ana River Reach 3 (Mission Boulevard to Prado Dam) (Santa Ana Water Board, 2019b).

- *Chino Creek, Reach 1*– This waterbody extends from the Chino Creek's confluence with the Santa Ana River upstream to the beginning of the concrete-lined channel south of Los Serranos Road. Chino Creek Reach 1[2] was placed on the 303(d) list in

1 "Wet Winter Conditions", as described in Resolution No. R8-2005-0001, reflects November 1 through March 31.
2 Since being placed on the 303(d) list, Chino Creek Reach 1 was divided into Reaches 1A and 1B under a Basin Plan amendment adopted January 24, 2004. At the time of the development of the MSAR TMDLs this Basin Plan amendment had not yet been approved by the USEPA (Santa Ana Water Board 2005a).

1994.

- *Chino Creek, Reach 2* – Placed on the 303(d) list in 1998, this waterbody extends from the concrete-lined channel south of Los Serranos Road upstream to the confluence of Chino Creek and San Antonio Creek.

- *Mill Creek, Prado Area* – Waterbody extends from Mill Creek's confluence with Chino Creek Reach 1 in the lower part of Prado Basin to a location just upstream of Chino- Corona Road (where it becomes Cucamonga Creek Reach 1). Mill Creek was placed on the 303(d) list in 1994.

- *Cucamonga Creek, Reach 1* – Placed on the 303(d) list in 1998, this waterbody extends from a location just above Chino-Corona Road upstream to 23rd Street in the City of Upland, California.

- *Prado Park Lake* – This small 60-acre, constructed lake is located within Prado Regional Park near the junction of Highway 83 (Euclid Avenue) and State Highway 71. The waterbody was placed on the 303(d) list in 1998.

On May 16, 2007, the MSAR TMDLs became effective when the United States Environmental Protection Agency (USEPA) gave its final approval. The technical justification for the adoption and approval of the TMDLs was the technical support document, which was prepared by the Santa Ana Water Board (Santa Ana Water Board, 2005b). The Santa Ana Water Board staff worked with a stakeholder workgroup during the development of that technical support document. The TMDLs specified numeric targets for fecal coliform and *Escherichia coli* (*E. coli*) for all six waterbodies. It also established the Dry Summer Conditions[3] and Wet Winter Conditions waste load allocations (WLAs) and load allocations (LAs) applicable to point and nonpoint sources, respectively. The MSAR TMDLs included a Phase 1 Implementation Plan, which established a variety of activities to be undertaken by entities responsible for compliance with the WLAs/LAs as well as the Santa Ana Water Board.

[3] "Dry Summer Conditions", as described in Resolution No. R8-2005-0001, reflects April 1 through October 31.

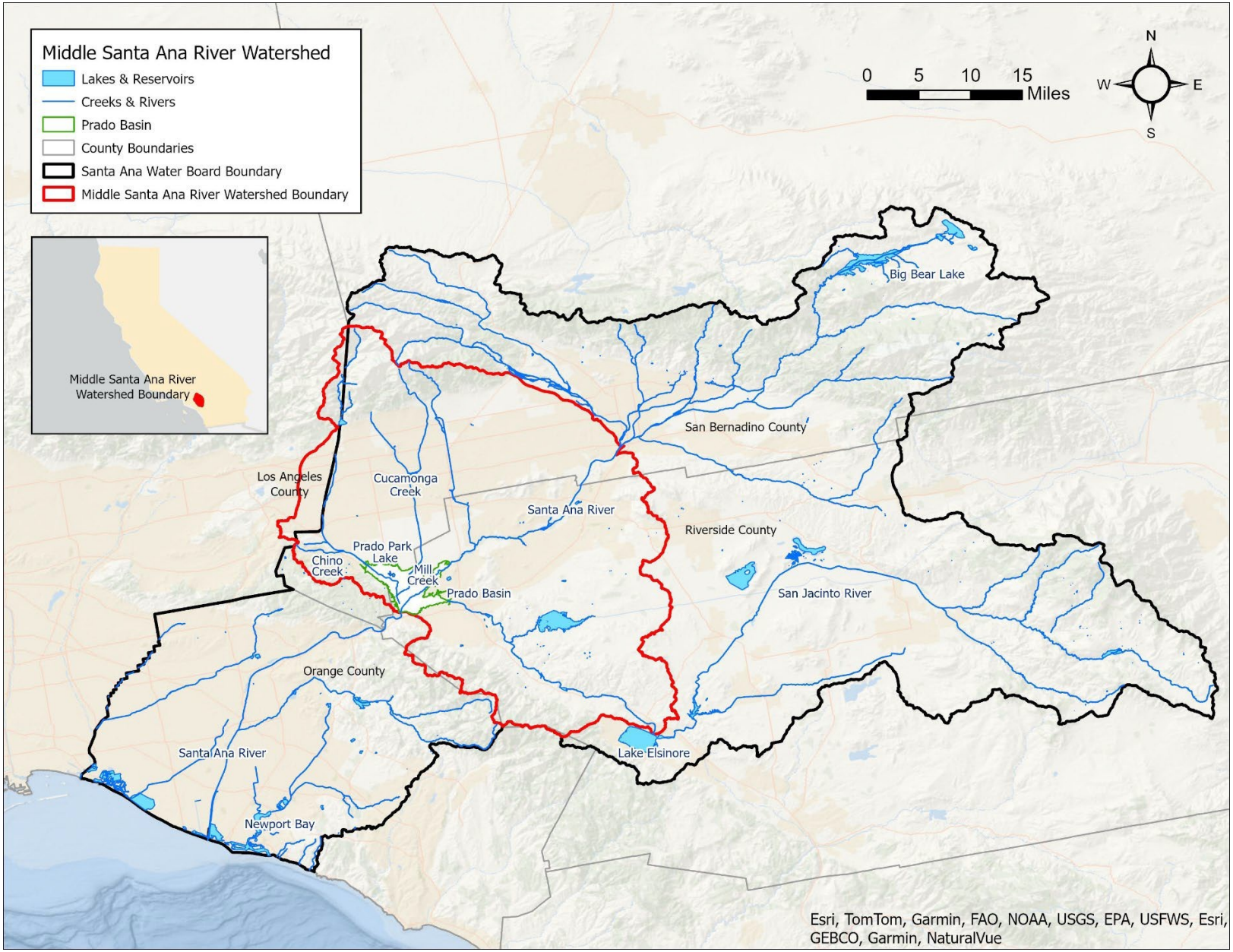


Figure 1-1. MSAR Portion of the Overall Santa Ana River Watershed. (Santa Ana Water Board, 2005e)

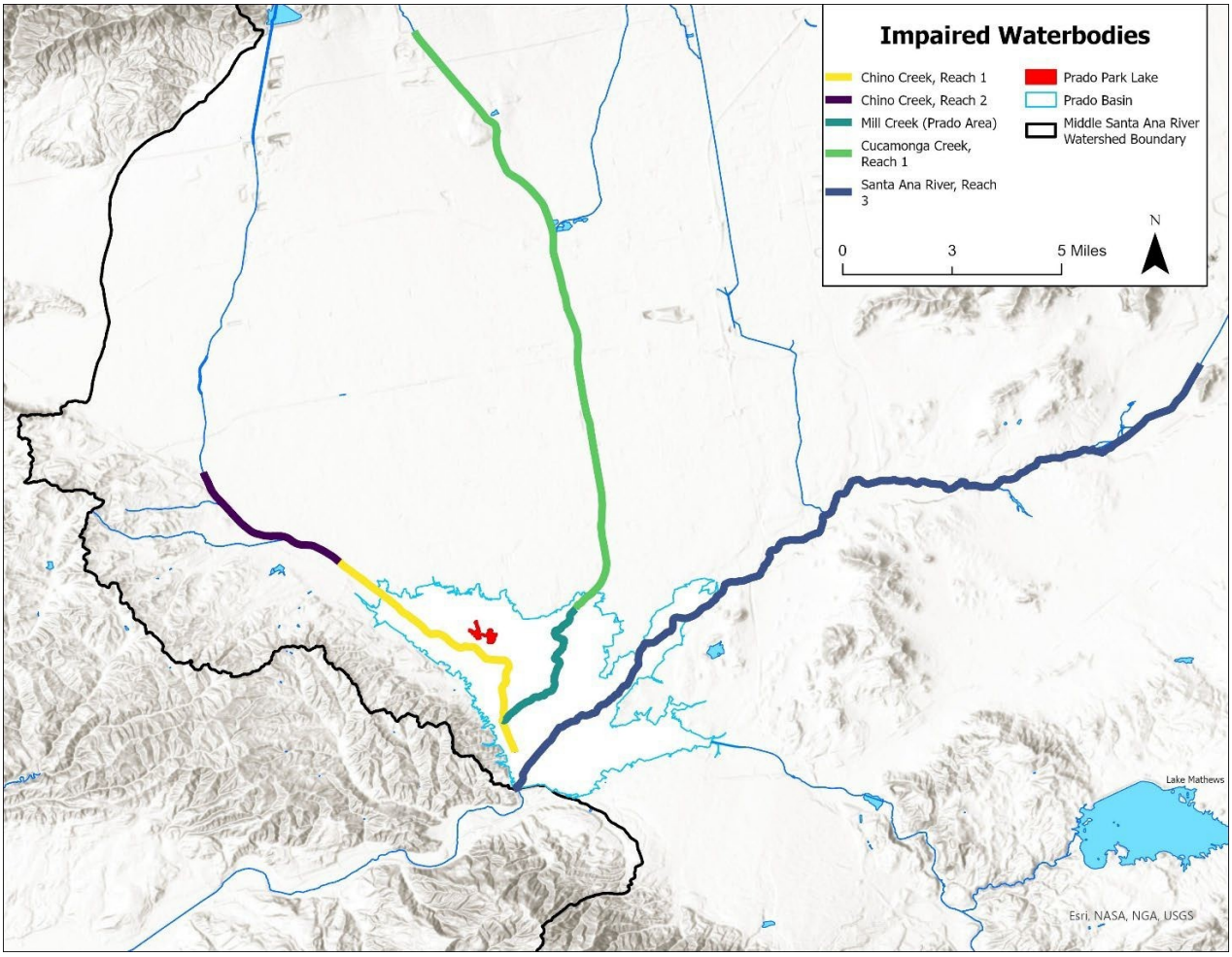


Figure 1-2. Locations of Waterbodies Listed as Impaired in the MSAR Watershed. For physical description of impaired waters refer to text in the Santa Ana Water Board letter from May 30, 2019 (Santa Ana Water Board, 2019b).

1.3 Implementation of the MSAR TMDLs

The MSAR Watershed TMDL Task Force (MSAR Task Force), which is administered by the Santa Ana Watershed Project Authority (SAWPA) and includes most of the members from the original stakeholder workgroup, was formed in 2006 to support stakeholder efforts to comply with TMDL-related requirements. Since the adoption and approval of the MSAR TMDLs, stakeholders, working collectively through the MSAR Task Force, as part of a Municipal Separate Stormwater Sewer System (MS4) program, or as individual permittees, have implemented numerous programs and projects to comply with the requirements set forth in the 2005 MSAR TMDL Phase 1 Implementation Plan, including the following:

- The MSAR Task Force initiated a TMDL-required Watershed-wide Compliance Monitoring Program in the MSAR watershed in 2007 based on a Santa Ana Water Board-approved Monitoring Plan and Quality Assurance Project Plan (QAPP) (SAWPA, 2008c, 2008d). This monitoring program continues to be implemented as part of the Santa Ana Water Board-approved Regional Bacteria Monitoring Program (RBMP) which was initiated in 2016.

- Stakeholders secured State Proposition 40 grant funding in 2006 to implement the "Middle Santa Ana River Pathogen TMDL Best Management Practice (BMP) Implementation Project" ("Grant Project"). Completed in 2010, this Grant Project supported the implementation of several early TMDL implementation tasks, including preparation of an Urban Source Evaluation Plan (USEP) for urban dischargers and an Agricultural Source Evaluation Plan (AgSEP) for agricultural operators to guide the identification of sources of bacterial indicators in the MSAR watershed. The outcome from this effort provided an initial assessment of bacterial indicator sources in the watershed, and supported implementation of a risk-based approach to prioritize resources dedicated to addressing identified sources, especially during dry weather flow conditions when recreational use activity most likely occurs.

- Through the reauthorization of National Pollutant Discharge Elimination System (NPDES) permits governing the stormwater discharges from MS4s, urban dischargers in the watershed were required to prepare a Comprehensive Bacteria Reduction Plan (CBRP) to meet the Dry Summer Conditions TMDLs WLAs. In 2012, the CBRP was approved by the Santa Ana Water Board for the Riverside and San Bernardino County MS4s (Santa Ana Water Board, 2012b, 2012c). In 2014, the Cities of Claremont and Pomona were added (Santa Ana Water Board, 2014a). Upon approval, the CBRP replaced the USEP and became the final Water Quality-based Effluent Limit (WQBEL) for bacterial indicators for WLAs applicable to the Dry Summer and Wet Winter Conditions TMDLs.

- In 2005, the Santa Ana Water Board approved a Bacterial Indicator Total Maximum Daily Load for the Middle Santa Ana River Watershed (Heretofore "2005 MSAR Bacterial Indicator TMDL) which required agricultural operators a Bacterial Indicator Agricultural Source Management Plan (BASMP) (See Task 5.2, Page 14, R8-2005-0001). In December of 2014, the Chino Basin Watermaster Agricultural Pool, in partnership with identified agricultural operators (defined in Task, 2, Page 11 of the 2005 MSAR Bacterial Indicator TMDL), developed a single BASMP to the Santa Ana Water Board on behalf of the agricultural community (CDM Smith, 2014). Implementation of the BASMP is ongoing and a more inclusive list of the "agricultural community" is being considered (Santa Ana Water Board, 2018c).

- MS4 permittees have been actively implementing their respective CBRP since their approval. The program implemented prioritizes MS4s for subsequent source investigation of dry weather flows for bacterial indicators. Based on findings from these investigations, dischargers implement projects to reduce or eliminate sources of bacterial indicators of impaired receiving waters downstream, including construction of regional treatment facilities. In addition to these CBRP-related activities, the University of California Riverside (UC Riverside) is implementing its own Facility Bacteria Reduction Plan (FBRP). The FBRP was submitted to the Santa Ana Water Board in 2022 to satisfy its Phase 2 Small MS4 permit requirement to ensure urban runoff from the UC Riverside does not contribute bacterial indicators to impaired waters in the watershed.

- In 2018, the Santa Ana Water Board conducted its own review of both the Riverside and San Bernardino County MS4 CBRP through a formal compliance audit process. The final audit report revealed that urban dischargers in these counties were in compliance with their respective CBRP (Santa Ana Water Board, 2018a, 2018b). Accordingly, the BMP-based compliance programs in each CBRP continue to be implemented. As per audit recommendations and directed by the Santa Ana Water Board, urban dischargers plan to update their CBRP to incorporate the latest information available from the watershed.

- As of 2022, a number of projects have been completed in the MSAR watershed, including the Box Springs Channel sewer cross-connection repair and the construction of the Mill Creek Wetlands, Phoenix Storm Drain Diversion to Sewer project and Chris Basin Retrofit.

- Both the Riverside and San Bernardino County MS4 CBRP included targets for reduction of dry weather flows[4] for MS4s draining to Santa Ana River Reach 3, Chino Creek and Cucamonga Creek. These targets have not only been met, but substantially exceeded, especially in the Santa Ana River Reach 3 subwatershed (SAWPA, 2023a). While bacterial indicator loads in urban runoff during dry weather[5] has been substantially reduced, the impaired receiving waterbodies still have not attained the water quality objectives for bacterial indicators established to protect recreational uses.

- Outcomes from bacteria reduction efforts by all urban dischargers are regularly reported in various submittals to the Santa Ana Water Board, including MSAR TMDLs Triennial Reports and MS4 Annual Reports. Triennial Reports, which periodically assess the status of compliance with the TMDLs' WLAs and LAs

[4] "Dry Weather Flow" refers to flow in MS4 drains or receiving waterbodies during dry weather in either the wet or dry season.
[5] "Dry weather" is a condition where daily rainfall does not exceed 0.1 inches.

are submitted about every three years since the MSAR TMDLs became effective (SAWPA, 2010a, 2013, 2017b, 2020 and 2023a). These reports provide regular updates on bacterial indicator concentrations and mass balance for the MSAR watershed.

- As of 2023, all the tasks originally set forth in the Phase 1 TMDL Implementation Plan have been implemented. Although impaired receiving waters are not attaining water quality objectives during dry weather flows, the entities responsible for compliance with the WLAs/LAs remain committed to the continued implementation of their respective BMP-based compliance plans, existing or as revised, to further reduce or eliminate sources of bacterial indicators during dry weather flows.

1.4 Proposed Limited Revision of the MSAR TMDLs

During the process of adopting the 2005 MSAR TMDLs, it was found that the protection of recreational uses during the dry season[6] was a higher priority than protection of recreational uses during the wet season[7], in recognition of the difficulties associated with the control of stormwater discharges. This was a key justification for establishing separate compliance schedules for dry and wet seasons in the approved TMDLs (Santa Ana Water Board, 2005e). Accordingly, the USEP initially, and later the CBRP, incorporated a risk-based approach that prioritized the investigation and mitigation of bacterial sources during dry weather flow. This prioritized approach to reduce or eliminate bacteria in dry weather flows has resulted in the use of stakeholder resources for the construction of infrastructure to reduce bacteria to safe levels when recreational activity most likely occurs, regardless of the season.

At the time of the adoption of the 2005 MSAR TMDLs, the Santa Ana Water Board was working collaboratively with stakeholders through the Stormwater Quality Standards Task Force (SWQSTF) on potential revisions to the water quality standards for inland waters to protect recreational beneficial uses. These revisions, which were adopted and incorporated in the Basin Plan in 2012, not only modified the water quality objectives to protect the REC-1 beneficial use, but also included language in the Basin Plan implementation chapter that (a) provides examples of sources of “controllable” and “uncontrollable” bacterial indicators; and (b) established provisions to temporarily suspend recreation standards under specified unsafe flow conditions that preclude water contact recreation (Santa Ana Water Board, 2012d). In addition, the State Water Resources Control Board (State Water Board) adopted new statewide bacteria provisions in 2018 (State Water Board, 2018).

[6] “Dry season,” as described in Order R8-2005-0001, reflects April 1 through October 31. and is functionally equivalent to "Dry Summer Conditions" as described in the revised TMDLs.
[7] “Wet season,” as described in Order R8-2005-0001, reflects November 1 through March 31 and is functionally equivalent to "Wet Winter Conditions" as described in the revised TMDLs.

Given that the outcome of the SWQSTF basin planning work could be relevant to the implementation of the MSAR TMDLs, the TMDLs' Implementation Plan included (Task 6) a TMDL "Re-opener" task. On page 14, Task 6 stated the following:

> "The basis for the TMDLs and implementation schedule will be re-evaluated at least once every three years to determine the need for modifying the load and wasteload allocations, numeric targets and TMDLs...Based on results generated through the monitoring programs, special studies, modeling analysis, efforts of the Storm Water Quality Standards Task Force...and/or special studies by one or more-responsible parties, changes to the TMDLs, including revisions to the numeric targets, WLAs and LAs, may be warranted. Such changes would be considered through the Basin Plan Amendment process." (Santa Ana Water Board, 2005e)

Revisions to the MSAR TMDLs to extend the Wet Winter Conditions deadline and establish a Phase 2 Implementation Plan are appropriate due to current regulatory changes. The focus to date is on bacterial indicator mitigation efforts on protecting recreational uses during dry weather, and the significant knowledge gained through the work of the MSAR Task Force and stakeholder implementation of bacteria reduction plans have occurred since the adoption of the MSAR TMDLs. This limited revision includes extending the compliance date for the Wet Winter Conditions TMDLs and adopting a Phase 2 TMDL Implementation Plan to establish specific wet weather milestones to be completed during the extended schedule. To support the proposed limited revision to the MSAR TMDLs, this technical report has been prepared with the following key sections:

- *Section 2 - Environmental Setting*: Describes the MSAR watershed as it was when the MSAR TMDLs were adopted in 2005 and key changes that have occurred since that TMDLs adoption.

- *Section 3 - Regulatory Background*: Provides a history of adoption of the MSAR TMDLs with Phase 1 Implementation Plan, establishment of the MSAR Task Force to facilitate implementation of the TMDLs, and changes in regulations that have occurred since the TMDLs became effective.

- *Section 4 – Status of TMDL Implementation*: Provides a detailed explanation of how each of the Phase 1 TMDL Implementation Plan tasks have been implemented by entities responsible for the WLAs/LAs since the TMDLs became effective in 2007.

- *Section 5 – Proposed Revisions to the MSAR TMDLs*: This section presents each of the proposed revisions to the MSAR TMDLs, including the relevant TMDL elements that needs to be addressed, proposed revisions, and the technical and regulatory rationale for the proposed revisions. In addition, this section provides recommendations for future revisions of the TMDLs

2. Environmental Setting

2.1 Middle Santa Ana River Watershed

The Santa Ana River watershed in southern California encompasses an area of approximately 2,650 square miles and includes portions of Orange, Riverside, and San Bernardino Counties, and a small portion of Los Angeles County (**Figure 2-1**). The Santa Ana River mainstem is the primary waterbody in the watershed. Surface water flows begin in the San Bernardino and San Gabriel Mountains (northeast and north parts of the watershed) and flow in a generally northeast to southwest direction to the Pacific Ocean.

Lying within an arid region, limited natural perennial surface water is present in the watershed. Flows derived from mountain areas (snowmelt or storm runoff) are mostly captured by dams or percolated in recharge basins. Where perennial flow does occur, the source of water is often tertiary treated effluent discharged from Publicly Owned Treatment Works (POTWs). However, there are several perennial waterbodies in the watershed that contribute surface water flows in the Santa Ana River as a result of rising groundwater or urban runoff.

The MSAR watershed encompasses an area of approximately 488 square miles and is located generally in the north central portion of the Santa Ana River watershed (see Figure 1-1). The MSAR watershed includes the southwestern part of San Bernardino County, the northwestern part of Riverside County, and a small portion of Los Angeles County.

The MSAR watershed can be divided into four major subwatersheds: Chino Creek, Mill-Cucamonga Creek, Santa Ana River Reach 3 and Temescal Creek. Prado Park Lake, which is listed as impaired and subject to the MSAR TMDLs, has relatively small watershed draining to the lake. The following sections provide a brief description of each of the subwatersheds included in the MSAR TMDLs (Santa Ana Water Board 2005a).

2.1.1 Chino Creek

Chino Creek is a tributary to Santa Ana River Reach 3 in the Prado Basin area (see red rectangle, Figure 2-2). Per the MSAR TMDLs, Chino Creek is divided into two

reaches:

- Reach 1[8] – Lower portion of Chino Creek that extends from the confluence with the Santa Ana River upstream to the beginning of the concrete-lined channel, south of Los Serranos Road. Except for a short segment in the upper portion of this reach which has been modified, Reach 1 has a natural bottom and banks.

- Reach 2 – Upper portion of Chino Creek extending from Los Serranos Road to the confluence of Chino Creek and San Antonio Channel. This entire reach is concrete-lined along the bottom and banks.

Flows in Chino Creek generally flow from northwest to southeast. Baseflow[9] historically was primarily tertiary treated effluent from Inland Empire Utility Agency's (IEUA) Carbon Canyon Water Reclamation Facility and Recycling Plant No. 5 (RP-5) facilities. However, today RP-5 no longer discharges treated effluent to Chino Creek and the Carbon Canyon Water Reclamation Facility discharges of treated effluent to Chino Creek are reduced.

2.1.2 Mill-Cucamonga Creek

Mill-Cucamonga Creek is tributary to Chino Creek Reach 1 in Prado Basin. This Creek has two parts: (a) the lower part - Mill Creek that extends from its confluence with Chino Creek upstream to upstream of Chino-Corona Road; (b) above Chino-Corona Road the waterbody is Cucamonga Creek (see white rectangle, Figure 2-2). Mill Creek has a natural bottom and banks. Cucamonga Creek is concrete-lined and is divided into two reaches:

- Reach 1 extends from transition from Mill Creek to Cucamonga Creek upstream to 23rd Street in the City of Upland; and

- Reach 2 is upstream of Reach 1.

Only Reach 1 is listed as impaired in the MSAR TMDLs. The MSAR TMDLs acknowledge that Reach 1 is designated with both REC-1 and Non-Contact Water Recreation (REC-2) beneficial uses. However, since adoption of the 2005 TMDLs, REC-1 was removed from Reach 1 through an approved Use Attainability Analysis (UAA) (Santa Ana Water Board, 2012d). Dry weather flow in Mill-Cucamonga Creek primarily receives tertiary treated effluent from the IEUA Regional Water Recycling Plant No. 1 (RP-1) facility. A berm in the center of Cucamonga Creek keeps treated

[8] The MSAR TMDLs noted that a pending Basin Plan amendment awaiting USEPA approval divided Reach 1 into Reaches 1A and 1B. While the description in this section is consistent with the adopted TMDLs, the Basin Plan does separately list both Reaches 1A (Santa Ana River confluence to downstream of confluence with Mill Creek, Prado Area) and 1B (confluence with Mill Creek, Prado Area, to beginning of concrete-lined channel south of Los Serranos Road) (Santa Ana Water Board, 2019b).

9 The portion of streamflow that is sustained between precipitation events, originating from the gradual release of groundwater that seeps into a stream or river.

effluent from RP-1 separate from dry weather flow arising from MS4 outfalls for a distance of about 1 mile.[10]

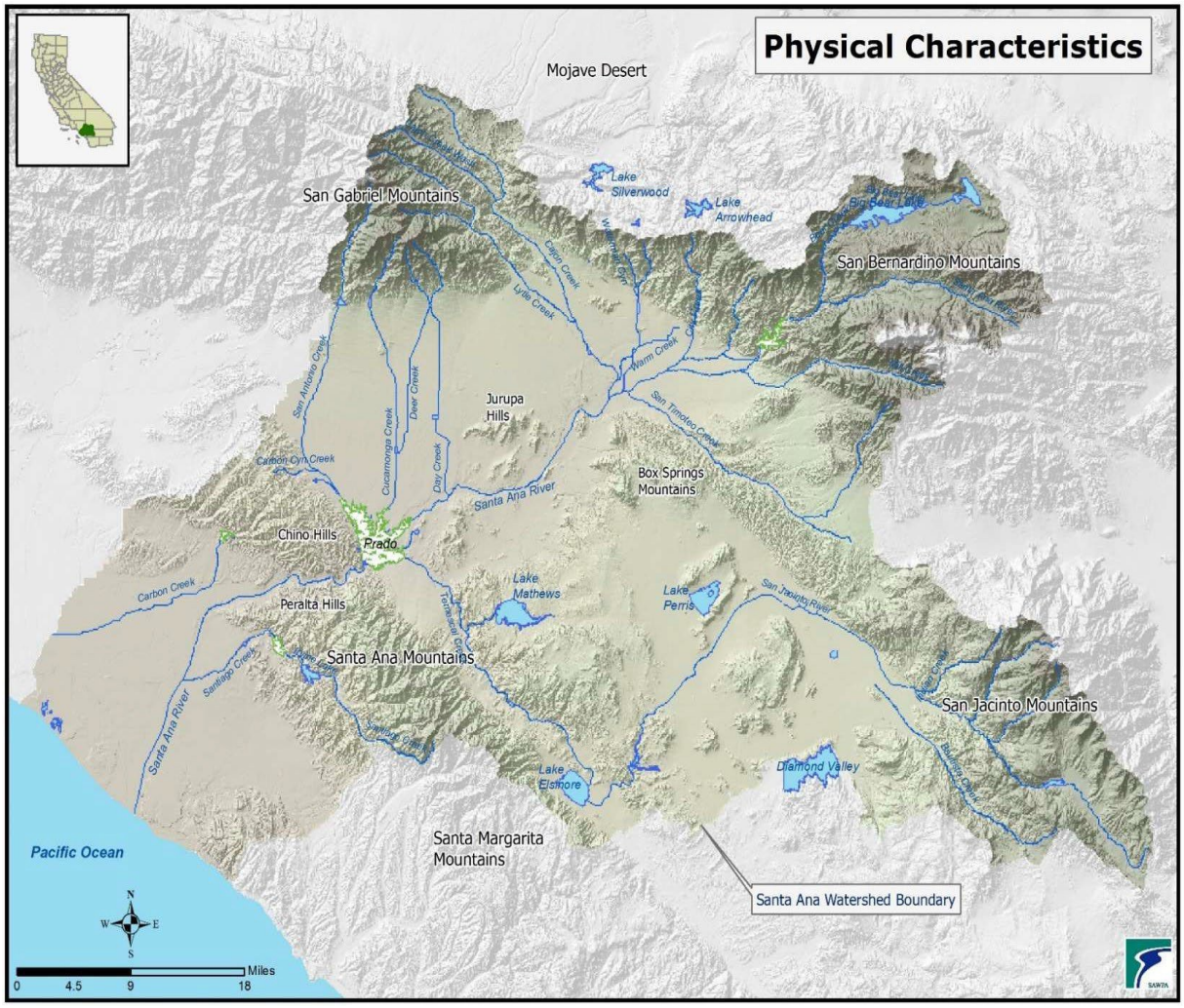


Figure 2-1. Physical Characteristics of the Santa Ana River Watershed in Southern California. (SAWPA https://sawpa.org/gis-tools/)

10 The 2023 MSAR Triennial Report provides information regarding bacterial indicator concentrations in this portion of Cucamonga Creek above and below where the dividing berm ends (SAWPA,2023a).

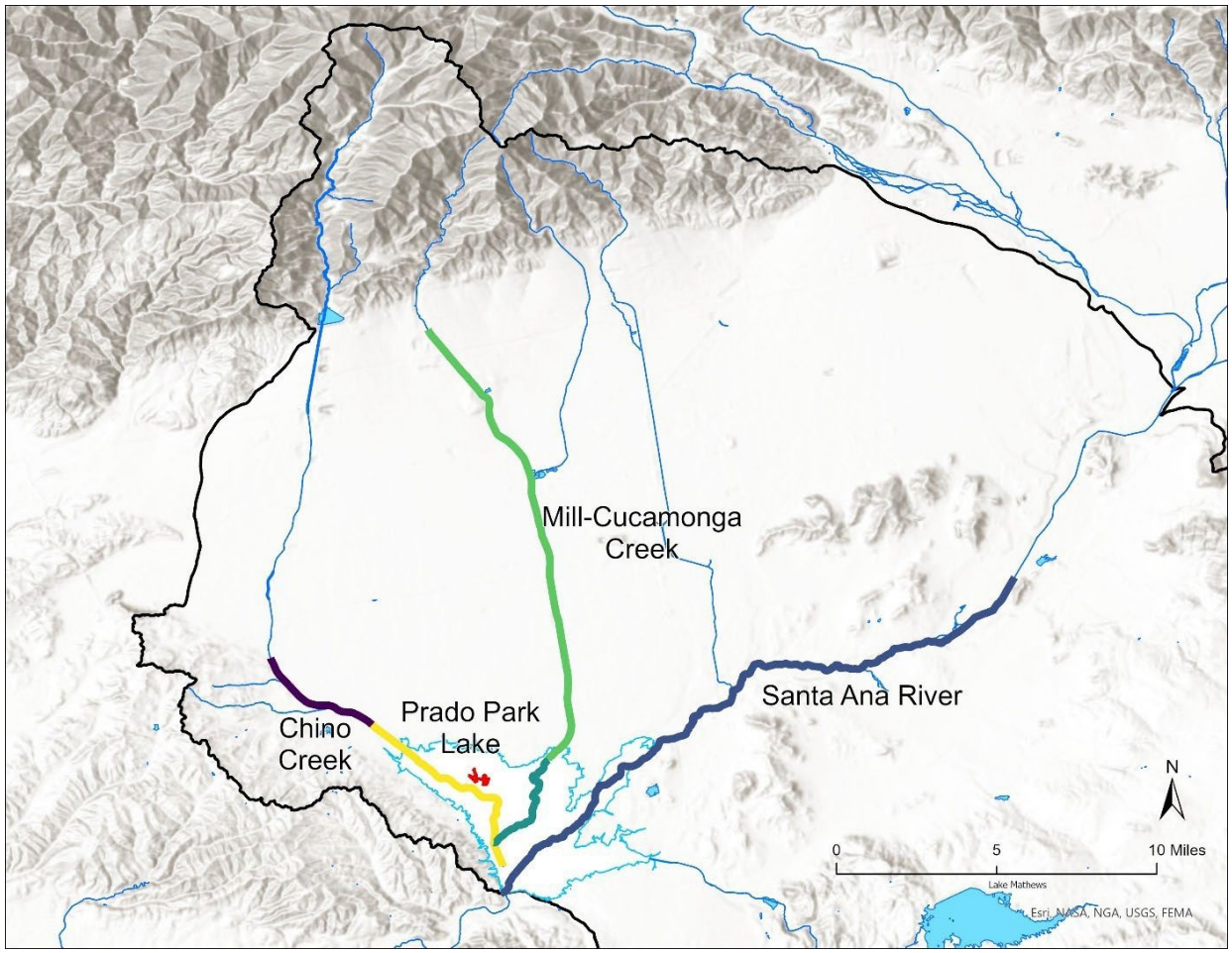


Figure 2-2. Subwatersheds with Waters Impaired for Bacteria in the MSAR Watershed. General Locations of Impaired Waters in the MSAR Watershed in the Santa Ana Region: (Chino Creek [yellow-purple]; Mill-Cucamonga Creek [green]; Santa Ana River Reach 3 [dark blue]; and Prado Park Lake [red])

2.1.3 Santa Ana River Reach 3

Santa Ana River Reach 3 extends from Prado Dam to Mission Boulevard Bridge (see yellow rectangle, Figure 2-2). This entire river reach has a natural, unlined bottom. Portions of Reach 3 have been straightened and had banks rip-rapped.[11] Baseflow in Reach 3 is mostly supplied from tertiary treated effluent from three POTWs: (a) City of Rialto Wastewater Treatment Plant; (b) Rapid Infiltration and Extraction Facility (RIX) that serves the Cities of Colton and San Bernardino, and (c) Riverside Water Quality Control Plant. Additional baseflow is contributed by a number of tributaries that drain directly to Reach 3 (see discussion in Section 2.3.2 below).

2.1.4 Prado Park Lake

Prado Park Lake is located in Prado Regional Park in San Bernardino County where Chino Creek enters Prado Basin (see black circle, Figure 2-2). On page 20 of the TMDL Staff Report described this lake as follows:

> "at the confluence of two drainage channels – Euclid Avenue storm channel and the Grove Avenue storm channel. During low-flow conditions, urban runoff from these two channels flows under the lake through pipes and discharges into the lake's outlet structure. However, these pipes are undersized, and during large storm events, they cannot handle the storm flows. Consequently, stormwater is discharged directly into the lake." (Santa Ana Water Board, 2005a)

The referenced pipeline under the lake was replaced in 2017 to restore the original MS4 conveyance that ensured stormwater bypassed the lake. During the construction project, the lake was drained and kept dry during most of the year in 2017.

2.2 Hydrology

Surface water flows occur in many waterbodies in the MSAR watershed during dry weather. Potential sources of these flows include the following (Riverside County Flood Control & Water Conservation District [RCFC&WCD], 2011):

- Tertiary treated effluent from POTWs (**Figure 2-3**);
- Authorized non-stormwater discharges (as defined by Waste Discharge Requirements [WDR] issued by the Santa Ana Water Board);

[11] U.S. Army Corps of Engineers (USACE) maintains the federally-constructed levees that control the Santa Ana River channel. These levees, which range from 15 to 22 feet in height above the elevation of the riverbed, were constructed in the 1950s to reduce the potential for Santa Ana River flows to break out of the channel and flood adjacent properties. In 2022, USACE began implementation of the Santa Ana River Basin-Riverside Levees Rehabilitation Project which will rehabilitate damaged portions of the levees. This project is ongoing and will continue in phases as weather and site conditions allow. The project is planned for completion in summer of 2026.

- Groundwater inputs from areas of rising groundwater;

- Turnouts of imported water by the Metropolitan Water District purchased for groundwater recharge by water agencies in the Santa Ana River watershed;

- Temporary de minimis discharges, e.g., as may be generated by well blow-offs, but authorized under General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (De Minimis) Threat to Water Quality (R8-2020-0006) (Santa Ana Water Board, 2020);

- Water transfers between water agencies for conjunctive use programs; and

- Non-permitted discharges.

While each of these sources of dry weather flows have a different pathway and potential to contribute and transport sources of bacteria within the watershed. The two key sources of dry weather flows are the discharge of tertiary treated effluent from POTWs and urban runoff.

2.2.1 Treated POTW Effluent

The largest contributor of dry weather flow in the MSAR watershed is the discharge of tertiary treated effluent from POTWs (see Figure 2-4 for locations in the watershed). However, since TMDL adoption in 2005 the volume of treated effluent discharged in the MSAR watershed has been steadily declining at all POTWs, as a result of increasing reuse and increased water conservation (**Figure 2-4**). In the future, both IEUA and the City of Rialto plan to further increase recycled water use. Thus, average annual discharges of treated effluent may continue to decline. While increased use of recycled water is encouraged in the region, an important outcome of increased water reuse is a reduction in the discharge of disinfected effluent that is essentially free of indicator bacteria (e.g., treated effluent must have a weekly average concentration of total coliform bacteria that does not exceed a Most Probable Number [MPN] of 2.2 total coliform bacteria per 100 milliliters [mL]) to impaired waterbodies. As a result, there is less dilution of other sources of dry weather flows in the watershed.

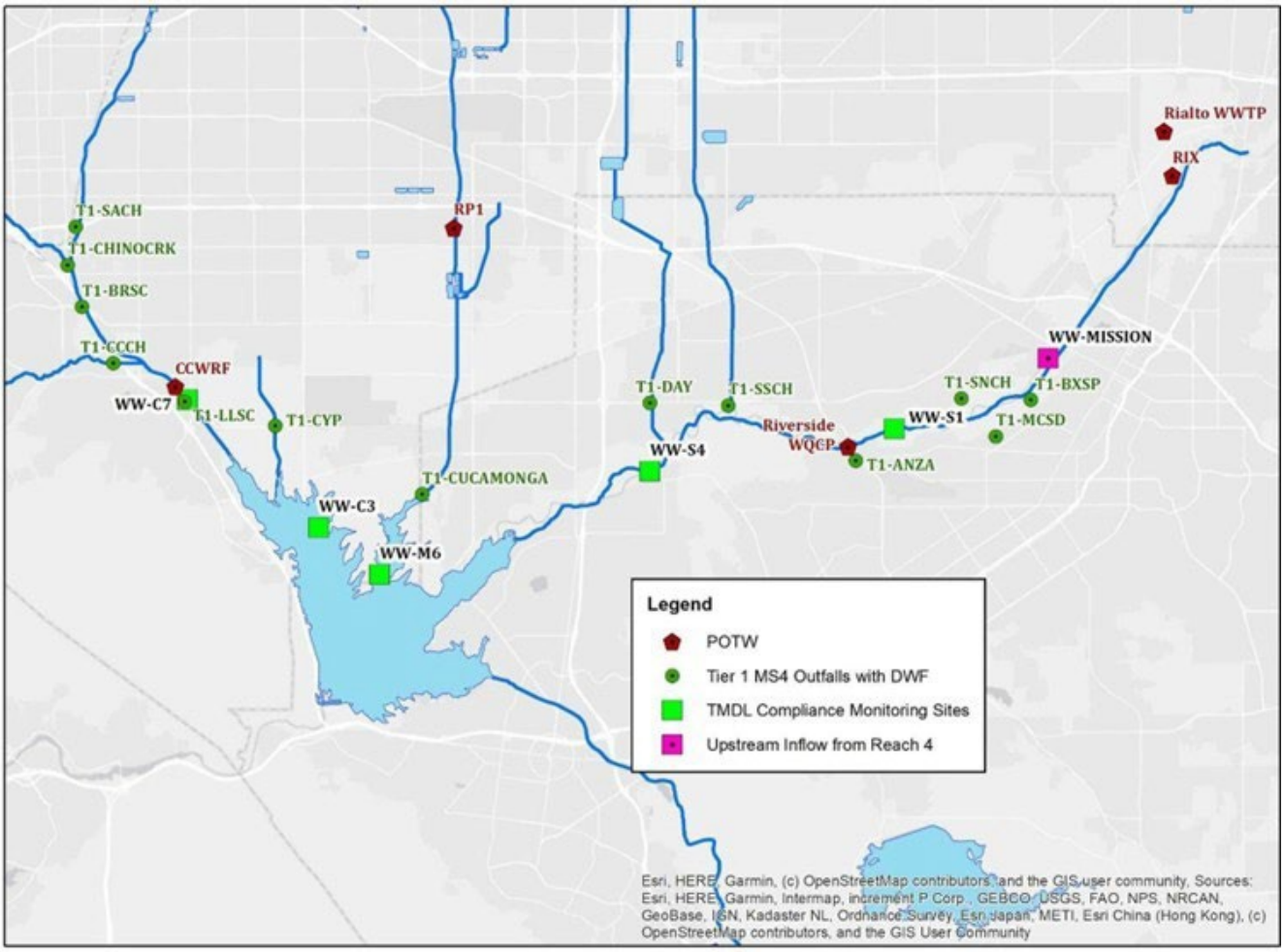


Figure 2-3. Location of POTWs, MS4 Tier 1 Sites, Watershed-wide TMDL Monitoring Sites in the MSAR Watershed (SAWPA, 2023a).

2.2.2 Urban Runoff

Several major tributaries in each subwatershed have the potential to contribute urban runoff to the baseflow. Figure 2-3 illustrates key locations (or Tier 1 sites[12]) where dry weather flow from urban runoff may be discharged to an impaired waterbody in the MSAR watershed. **Figure 2-5** (hatched areas) shows the subwatersheds that are completely or partially detached from downstream impaired waterbodies during dry weather flow. These drainages are detached from the downstream receiving waterbody for the following two reasons:

- Flow is captured and purposefully recharged to groundwater in constructed regional retention facilities. In 2014, SBCFCD previously documented the extent of these facilities in San Bernardino County (see Figure 2-6).

- Dry weather flow is lost to groundwater through an earthen channel bottom. In these channels, the infiltration capacity of the underlying soils exceeded the dry weather runoff generated from upstream drainage areas.

2.3 Water Quality

2.3.1 Surveillance and Monitoring Program

Water quality monitoring for fecal indicator bacteria occurs on a regular basis in the MSAR watershed. Monitoring in the Santa Ana River originally started as a TMDL-implementation specific requirement in 2007 (see Section 4.1.3) and continues as part of the RBMP. The RBMP Monitoring Plan and QAPP (SAWPA, 2022a, 2022b) provides a detailed information regarding the program to collect and analyze field data and bacterial indicator water quality samples across the region.

Within the MSAR watershed sample collection has occurred regularly at five designated watershed-wide TMDL compliance locations (**Table 2-1**): Mill-Cucamonga Creek (WW-M6), Chino Creek at Central Avenue (WW- C7), Prado Park Lake (WW-C3) (Figure 2-4), Santa Ana River at MWD Crossing (WW-S1), and Santa Ana River at Pedley Avenue (WW-S4). Samples are collected each year as follows:

- *Dry Weather Conditions*[13]: Samples are collected during two periods: (a) weekly

[12] Tier 1 sites are defined as locations where urban sources of dry weather flow may directly discharge to a receiving water with a downstream watershed-wide TMDL compliance site (RCFC&WCD, 2011).
[13] As described in the RBMP, "Dry Weather Conditions" is functionally equivalent to "Dry Summer Conditions" as described in the 2005 MSAR TMDLs.

over 20 consecutive weeks, generally from May to September during the TMDL-defined dry season (April 1 - October 31); and (b) weekly over 5 consecutive weeks generally from late October through early December during the TMDL-defined wet season (November 1 – March 31).

- *Wet Weather Conditions*[14]: A single wet weather event is sampled each year. Each event involves the collection of four grab samples: (a) the first sample is collected during active wet weather; and (b) three follow-up samples are currently collected at approximately 24, 48, and 72 hours after collection of the first sample.[15]

During each dry or wet weather conditions sampling event, the sample team gathers field measurements (flow, temperature, electrical conductivity, pH, dissolved oxygen, and turbidity) and collects water samples for laboratory analysis of *E. coli* and total suspended solids (TSS).

[14] As described in the RBMP, "Wet Weather Conditions" is functionally equivalent to "Wet Winter Conditions" as described in the 2005 MSAR TMDLs.
[15] Prior to 2021, collection of wet weather samples occurred at 48, 72, and 96 hours after collection of the first sample.

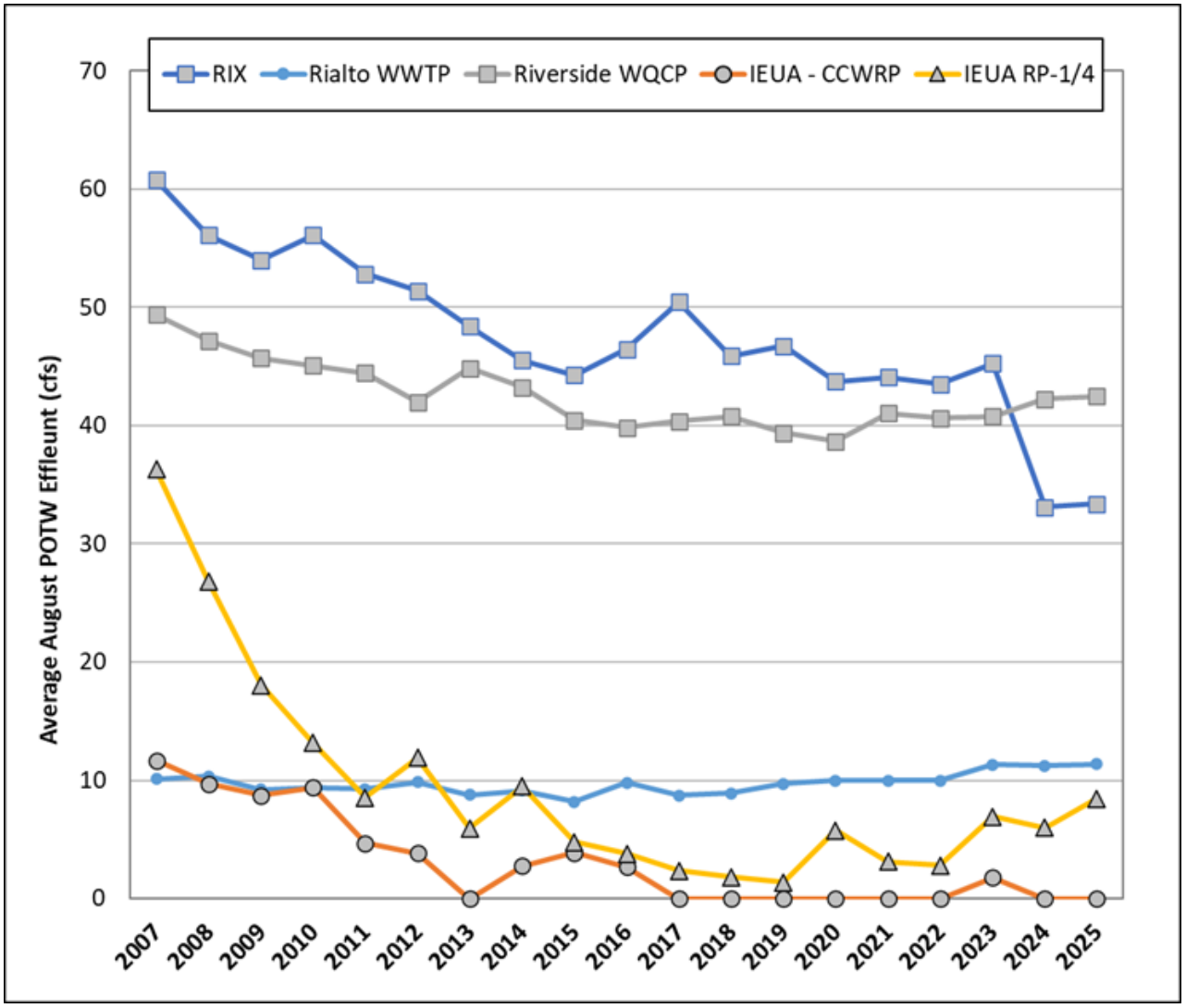


Figure 2-4. Average Daily POTW Effluent in August/September Discharged to Impaired Waters from 2007-2025. Abbreviations as Follows; City of San Bernardino Rapid Infiltration and Extraction Facility (RIX), Rialto Wastewater Treatment Plant (WWTP), Riverside Water Quality Control Plant (WQCP), Carbon Canyon Water Reclamation Plant (CCWRP) and Inland Empire Utilities Agency Regional Water Recycling Plants 1/4 (IEUA RP-1/4).

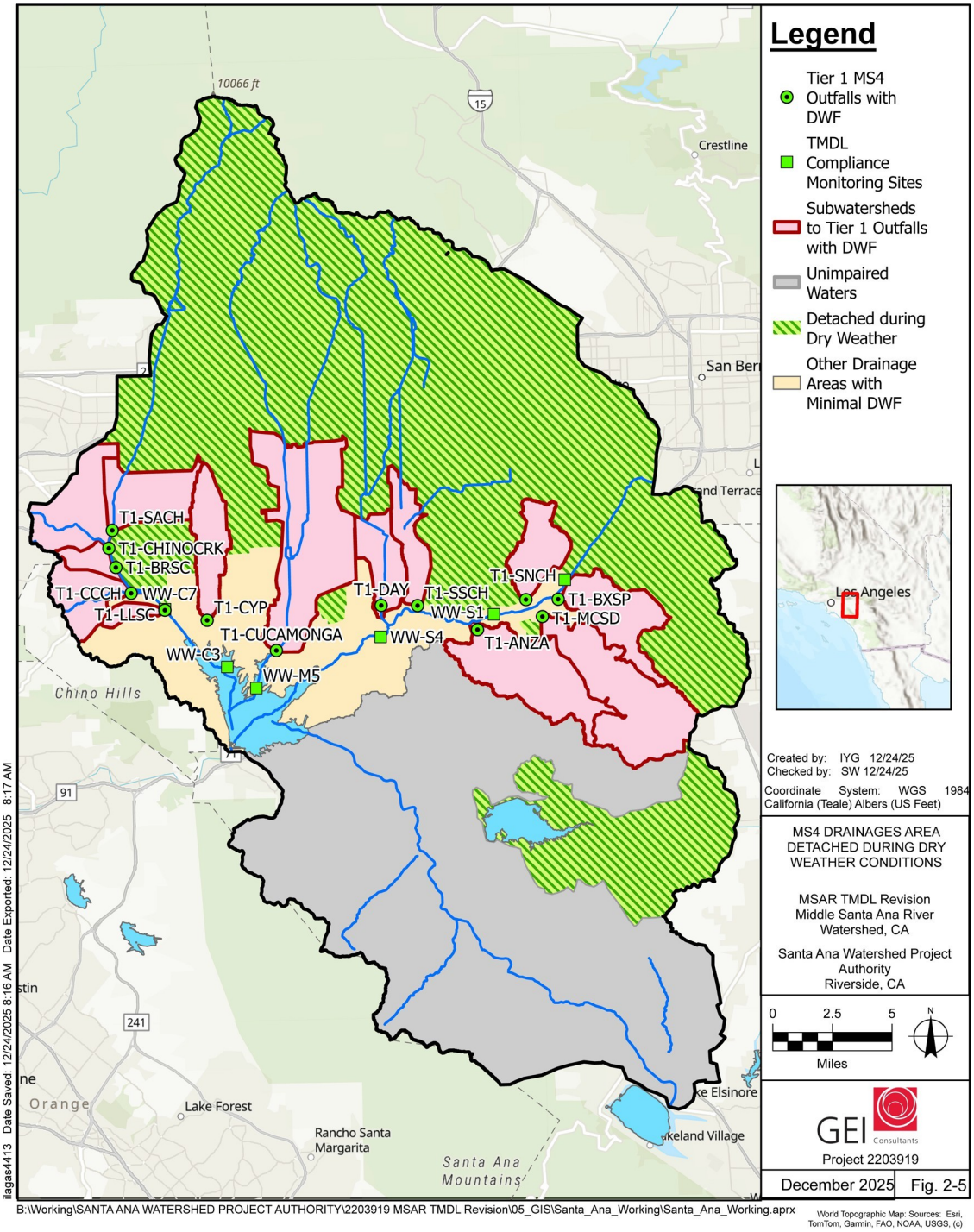


Figure 2-5. Detached Areas in the MSAR Watershed in Relation to MS4 Tier 1 Sites and Watershed-wide TMDL Compliance Monitoring Sites (DWF = Dry Weather Flow) (SAWPA, 2023a).

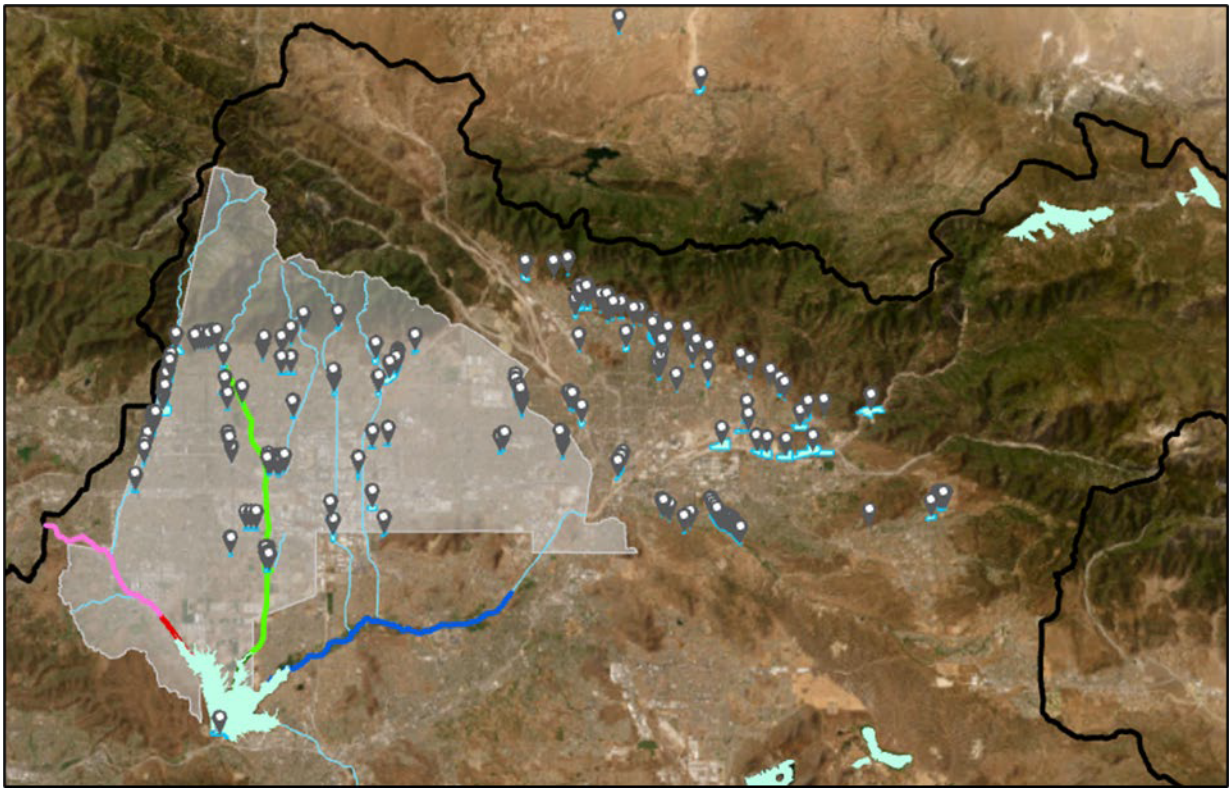


Figure 2-6. Recharge Basin Locations throughout San Bernardino County (shaded area is within the MSAR watershed) (SBCFCD, 2014).

Table 2-1. MSAR Watershed-wide TMDL Compliance Monitoring Sites to Evaluate Attainment with MSAR TMDLs (see Figure 2-3).

Site ID	Site Description	County	Latitude	Longitude
WW-M6	Mill-Cucamonga Creek below Wetlands	San Bernardino	33.9268	-117.6250
WW-C7	Chino Creek at Central Avenue	San Bernardino	33.9737	-117.6889
WW-C3	Prado Park Lake	San Bernardino	33.9400	-117.6473
WW-S1	Santa Ana River Reach 3 at MWD Crossing	Riverside	33.9681	-117.4479
WW-S4	Santa Ana River Reach 3 at Pedley Avenue	Riverside	33.9552	-117.5327

2.3.2 Current Water Quality

2.3.2.1 Dry Weather Conditions

All water quality results obtained since 2016 sampling events are available from the monitoring program's data dashboard: https://sarwqmdashboard.org/. **Figure 2-7** depicts the dry weather *E. coli* geometric mean concentration for warm and cool seasons[16], for each of the watershed-wide TMDL compliance monitoring sites (see Table 2-1), for each year of sampling from 2007 through 2022. **Figures 2-8 through 2-12** provide additional plots of single sample and rolling geometric mean results for the most recent period (i.e., 2020-2025). Recent findings from each of the impaired waters are as follows:

- *Chino Creek* – Week to week variability of 2-3 orders of magnitude suggests an intermittent bacterial indicator source(s). In addition, there may be an intermittent environmental condition that causes significant variability. Recent local studies by SBCFCD have been implemented to provide better understanding of these patterns (SAWPA, 2023a).

- *Mill-Cucamonga Creek* - Warm season *E. coli* concentrations decreased in the mid-2010s and have remained at low levels since then. One possible explanation for this pattern could be attributed to benefits obtained from construction of two key regional treatment facilities in the Cucamonga Creek subwatershed (Mill Creek Wetlands, 2015; Turner Basins, 2013 (SAWPA, 2023a).

- *Santa Ana River Reach 3 (MWD Crossing and Pedley Avenue) – E. coli* concentrations appear to be rising in this waterbody. Samples collected from the upstream at Reach 4 of the Santa Ana River indicates rising *E. coli* loads within Reach 4 are likely causing a surge in *E. coli* concentrations in downstream waters of Reach 3 (SAWPA, 2023a).

- *Prado Park Lake* – Since completion of the Prado Park Lake pipeline reconstruction project[17] in 2017, rolling 5-sample geomean *E. coli* concentration during the dry weather flows remain below TMDL allocations 82 percent of the time based on data reported in the monitoring program's data dashboard. Elevated *E. coli* concentration is limited to the wet weather; with geomeans exceeding allocations in 3 of the past 7 years. Additional study is warranted to understand the sources that may have been causing non-compliance during the wet weather.

[16] Cool season sampling occurs during dry weather in October – November during a period of time that overlaps the Dry Summer Conditions and Wet Winter Conditions as defined by the TMDLs.
[17] A pipeline that carries stormwater under Prado Park Lake was replaced in 2017; this project restored the original MS4 conveyance that ensured that stormwater properly bypasses the lake. During the construction project, the lake was dry. (See section 2.1.4)

Figure 2-7. Seasonal Geomean *E. coli* Concentration (MPN/100 mL) for all Samples Collected at TMDL Compliance Monitoring Sites During Dry Weather in Warm (left panel in red; n = 20) and Cool Seasons (right panel in blue; n = 11 before 2016, n = 5 after 2016); the Bold Line is the Applicable WLA/LA = 113 *E. coli*/100 mL (SAWPA, 2023a).

Santa Ana River at MWD Crossing (WW-S1)

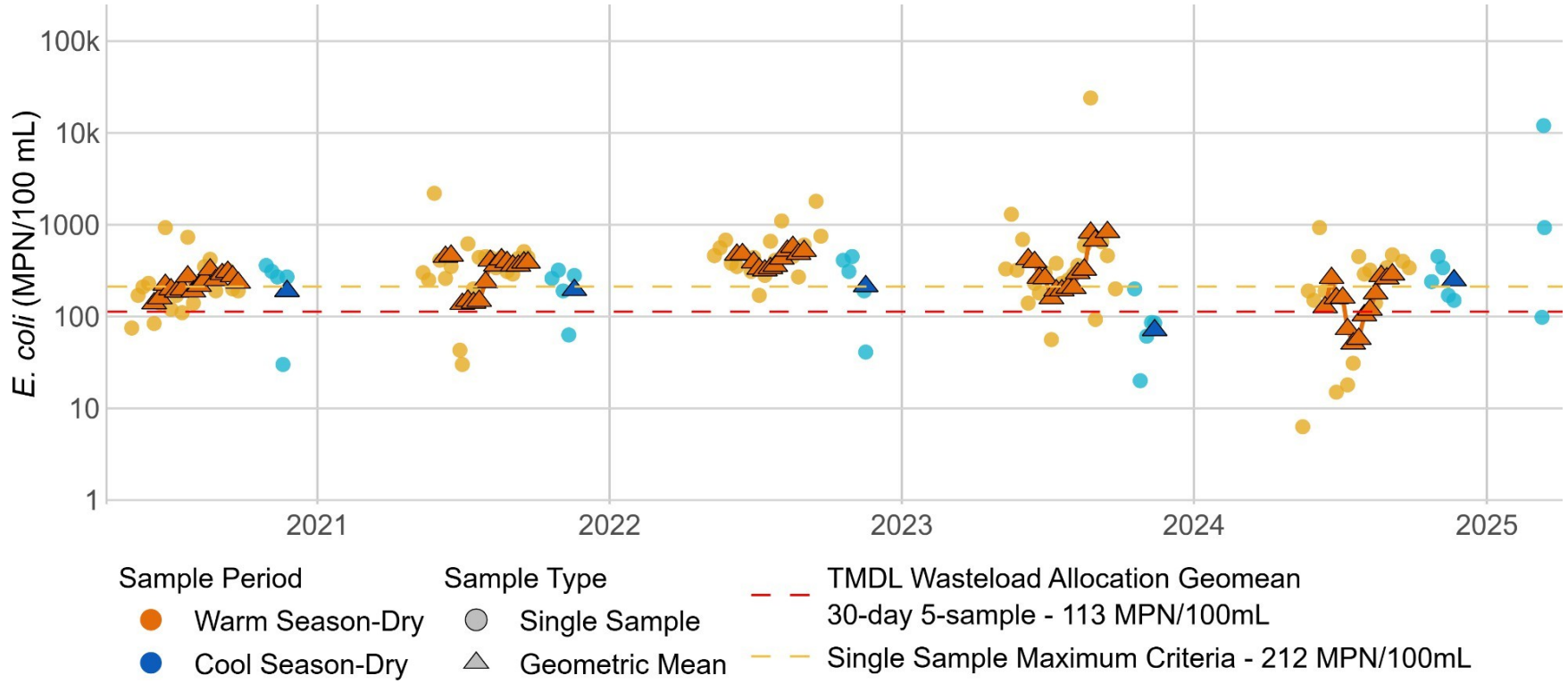


Figure 2-8. Single Sample and Rolling Geometric Mean Results for *E. coli* at the Santa Ana River at MWD Crossing Site (WW-S1) (Spring 2020 – Spring 2025).

Santa Ana River at Pedley Avenue (WW-S4)

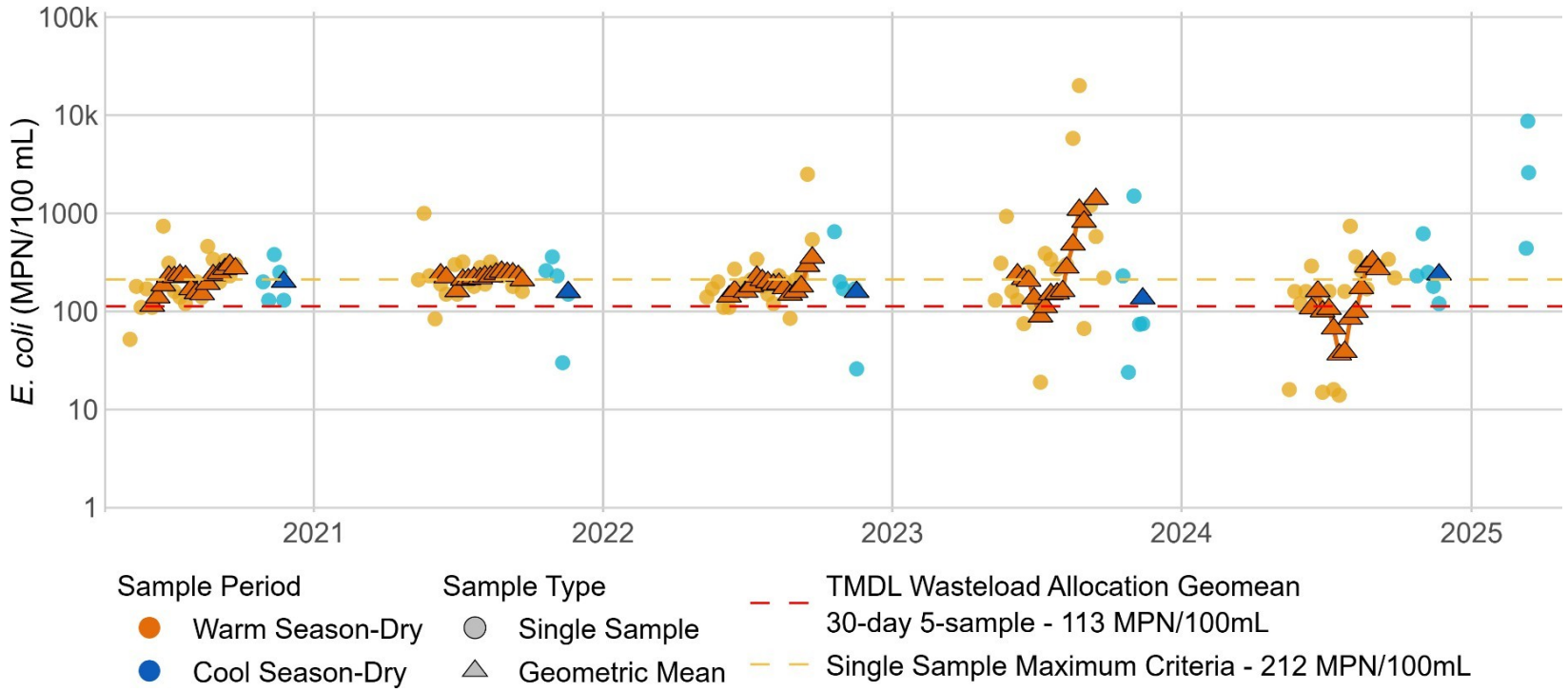


Figure 2-9. Single Sample and Rolling Geometric Mean Results for *E. coli* at the Santa Ana River at Pedley Avenue Site (WW-S4) (Spring 2020 – Spring 2025).

Mill-Cucamonga Creek (WW-M6)

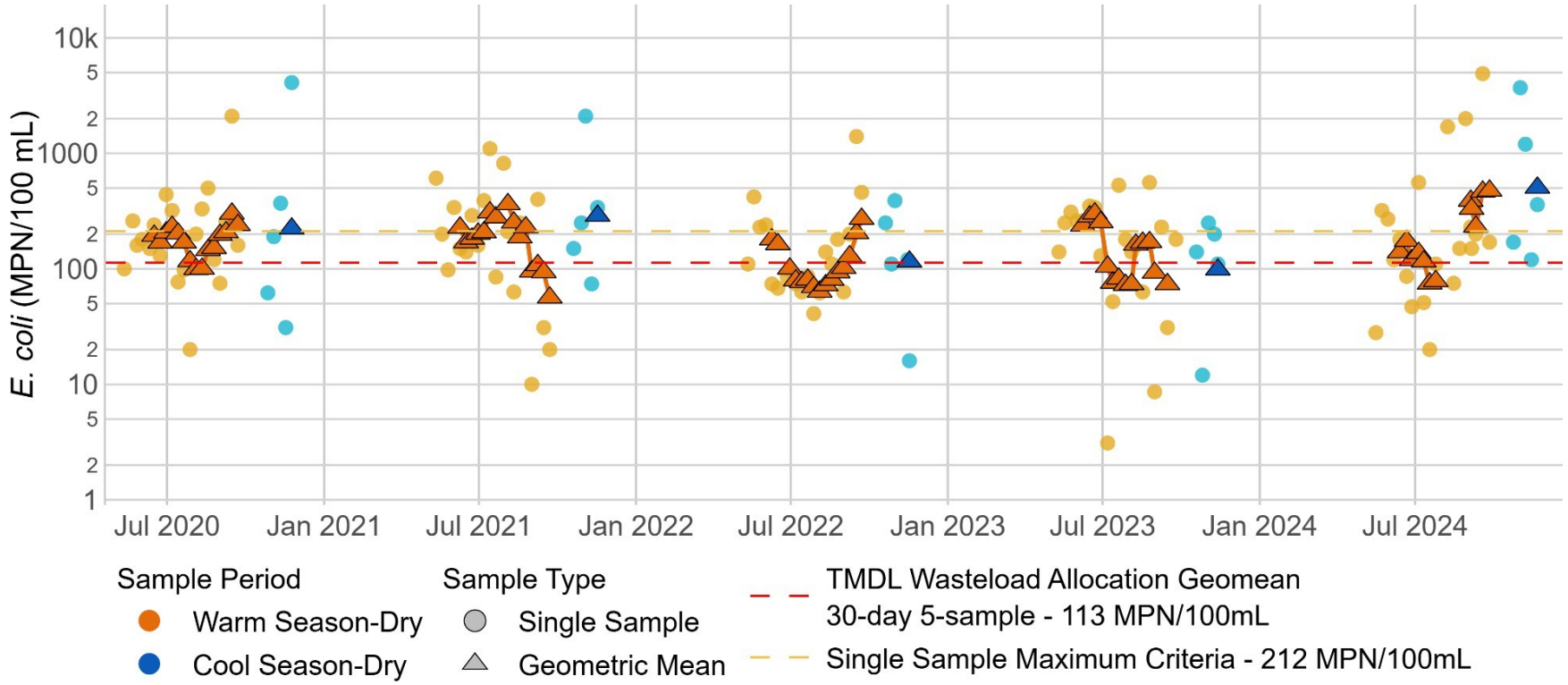


Figure 2-10. Single Sample and Rolling Geometric Mean Results for *E. coli* at the Mill-Cucamonga Creek Site (WW-M6) (Spring 2020 – Fall 2024).

Chino Creek at Central Ave (WW-C7)

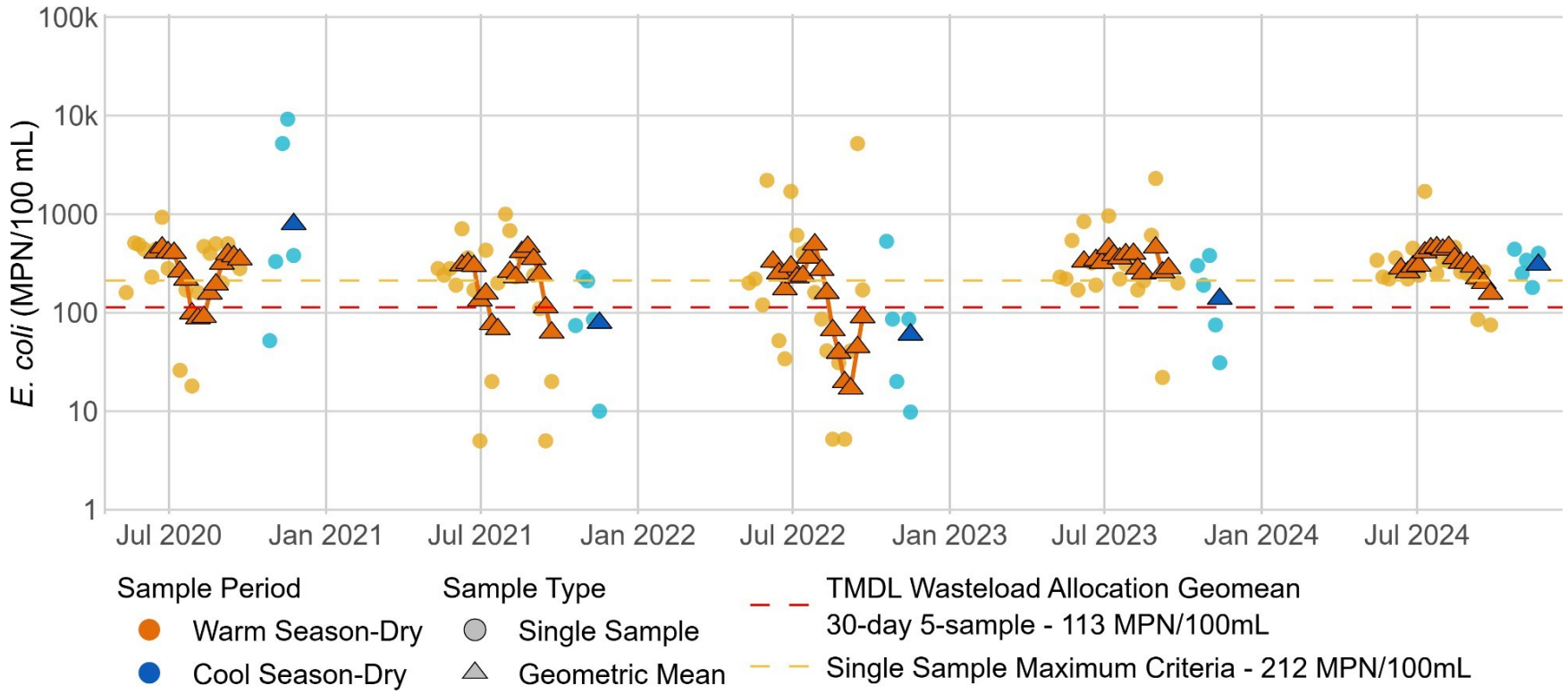


Figure 2-11. Single Sample and Rolling Geometric Mean Results for *E. coli* at the Chino Creek at Central Avenue Site (WW-C7) (Spring 2020 – Fall 2024).

Prado Park Lake (WW-C3)

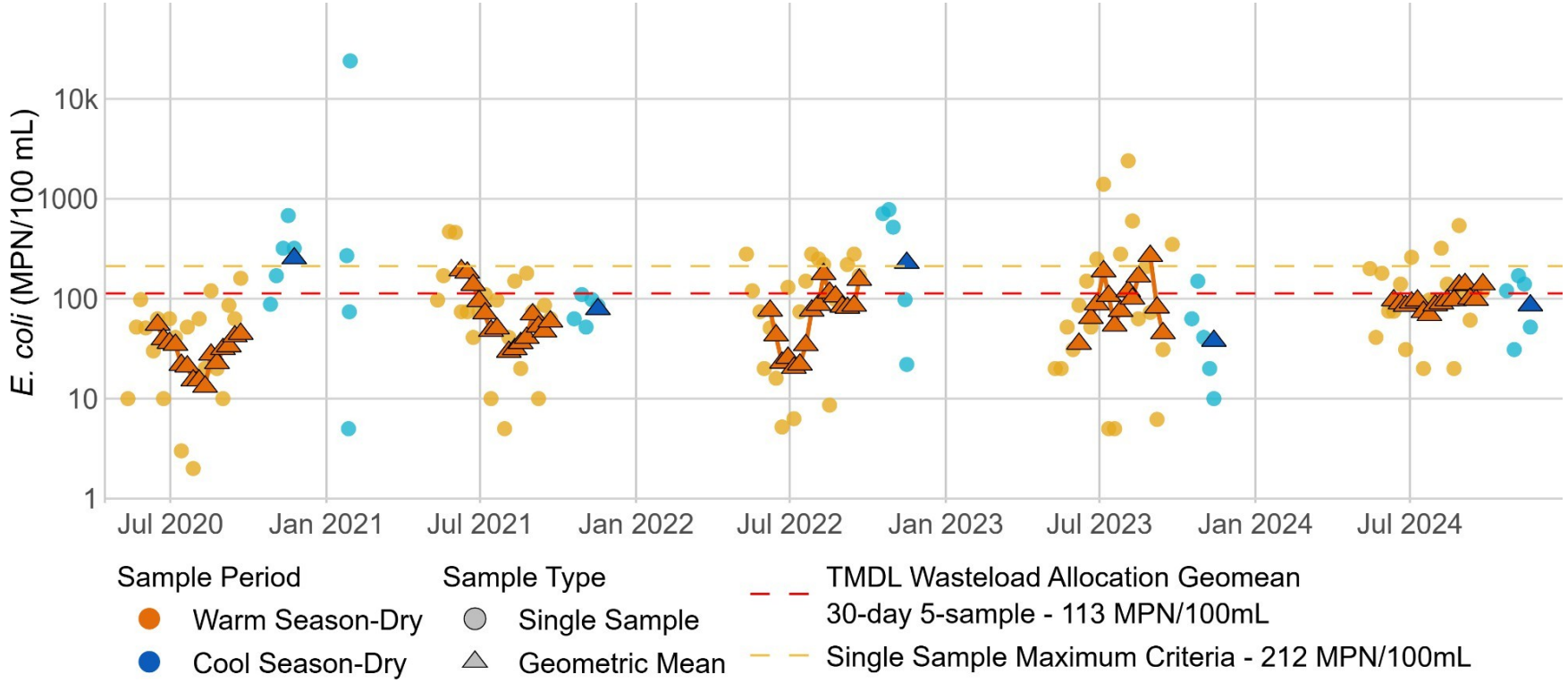


Figure 2-12. Single Sample and Rolling Geometric Mean Results for *E. coli* at the Prado Park Lake Site (WW-C3) (Spring 2020 – Fall 2024).

2.3.2.2 Wet Weather Conditions

Samples collected during and after single annual wet weather events from 2007 to 2025 may be categorized into two types: (a) sample was collected during active wet weather; or (b) sample was collected during post-storm[18] event. Best professional judgement was used in interpretation of co-located USGS 15-minute measurement interval hydrograph analysis to identify the time when runoff returned to pre-event conditions. A summary of this analysis is provided in annual monitoring and reporting program (MRP) reports. **Figure 2-13** shows that, in wet weather, *E. coli* concentrations have higher geometric mean concentrations when collected during active wet weather events when compared with samples collected during post-storm events (SAWPA, 2023a). In addition, *E. coli* concentrations decline sharply within the first 24 hours following a return to a pre-wet weather flow condition in all the impaired waters (**Figure 2-14**).

2.4 Land Use

2.4.1 TMDL Assessment

At the time of 2005 MSAR TMDLs adoption, land uses within the MSAR watershed were grouped into three land use categories: urban, agriculture and open space (Santa Ana Water Board 2005a). **Table 2-2** summarizes the acreage assigned to each of these categories within each of the three counties with acreage in the MSAR watershed. **Table 2-2** also provides the basis for the estimated acreages. The Santa Ana Water Board Basin Plan has described these areas as follows:

- *Urban* – Incorporated cities in the MSAR watershed include the following: Pomona, Chino Hills, Upland, Montclair, Claremont, Ontario, Rancho Cucamonga, Rialto, Chino, Fontana, Norco, Corona and Riverside. In addition, the watershed included areas of urbanized unincorporated areas.[19] The 2005 MSAR TMDLs noted that the watershed "is being steadily and rapidly urbanized." (Santa Ana Water Board, 2005a)

- *Agriculture* – This land use primarily occurred in the "area formerly known as the Chino Dairy Preserve," located in the south-central part of the Chino Creek subwatershed. At the time of 2005 MSAR TMDLs adoption, the estimated number of animal units in the area was 300,000. The TMDLs stated that irrigated agriculture and dry land agriculture land uses in the watershed "principally produce crops grown to support the dairy operations." (Santa Ana Water Board, 2005a)

[18]"Post-storm" is the estimated time that has passed following a wet weather event when flow has returned to a pre-wet weather event flow condition based on samples collected.
[19] Since TMDL adoption, a large portion of the unincorporated area of Riverside County has been incorporated into the cities of Eastvale (2010) and Jurupa Valley (2011).

- *Open Space* – Areas of the watershed that included U.S. National Forest and State Park lands. (Santa Ana Water Board, 2005a)

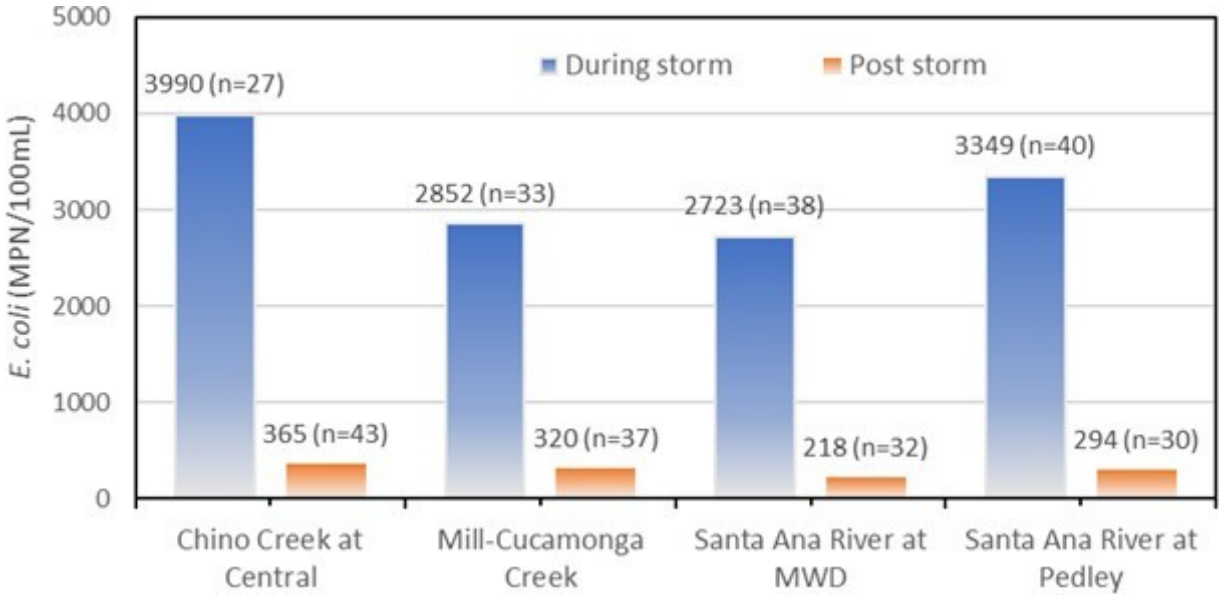


Figure 2-13. Geomean of *E. coli* Concentrations (MPN/100 mL) for Wet Weather Sampling Events During Storm and Post-Storm Events (18 storm events 2007-2025).

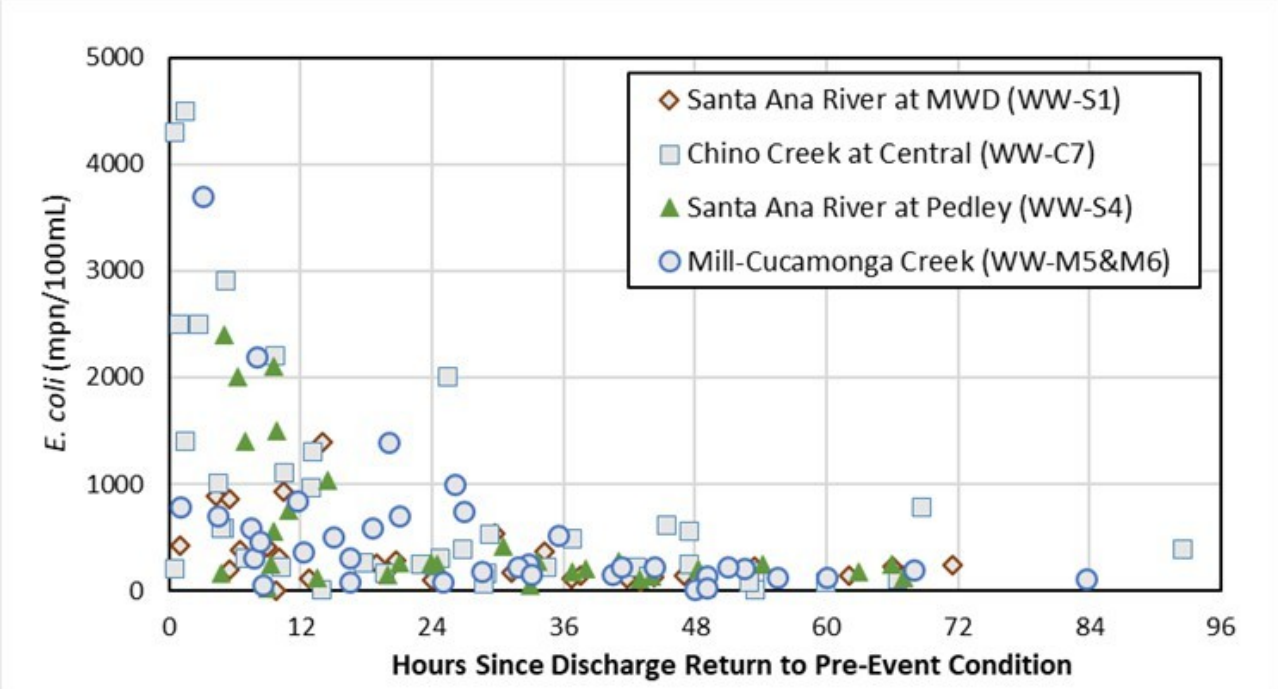


Figure 2-14. E. coli Concentrations for Post-storm Samples Based on the Time Since the Return to Pre-Wet Weather Event Flow Conditions (2007-2025).

Table 2-2. Approximate Acreage of Key Land Use Categories in the MSAR Watershed (SCAG regional land use map 2019 (updated 2022)).

County	Urban[1]	Agriculture[2, 3]	Open Space[4]	Totals
San Bernardino	156,507	7,190	37,039	**200,736**
Riverside	187,380	12,063	59,458	**258,900**
Los Angles	9,908	12	5,941	**15,861**
Orange	2	332	1,813	**2,147**
Totals	**353,797**	**19,597**	**104,251**	**477,645**

[1] Various sources, including city and agency engineering, public works and other departments

[2] Agriculture land use includes both irrigated agriculture, dry land agriculture and Concentrated Animal Feeding Operations (CAFOs)

[3] 1990 data from Chino Basin Water Resources Management Study, Chino Basin Water Resources Management Task Force, 1995 (reference provided in the original)

[4] Estimated based upon United States Geological Survey 7.5-minute topographic maps

2.4.2 Changes in Land Uses

Since the 2005 MSAR TMDLs adoption, the primary change in the MSAR watershed has been the continued conversion of agricultural acreage[20] to urban land uses. **Table 2-3** shows the steady decline in the number of CAFOs in the watershed, from the time of adoption of the first CAFO general WDRs (Order No. 99-11) in 1999. As of 2024, the number of animal units has declined significantly from 300,000 in 2005, when the MSAR TMDLs were first adopted, to less than 30,000 – a reduction of more than 90% from the original estimate.

The number of dairies and cows are expected to continue to decline in the future (Personal communication, Pat Boldt (representative for Agricultural Operators in the MSAR watershed, October 2025) Non-CAFO agricultural land use in the watershed has also significantly declined since the adoption of the TMDLs. An analysis of 2012 land use data showed that the total effective acreage[21] of non-CAFO agricultural land use in the MSAR watershed was approximately 9,200 acres or just 1.9 percent of the total MSAR watershed. While the total reduction in non-CAFO land use between the time of TMDL adoption in 2005 and 2023 is difficult to estimate.

Between 2010 and 2018, the acreage decreased 19 percent (SAWPA, 2023a). Of the remaining effective acreage of non-CAFO agricultural land use in the MSAR watershed, about half is located within the management boundary of the IEUA and half is located outside, e.g., the Arlington Area in Riverside County. Areas within the IEUA management boundary are expected to continue transitioning to urban land uses, as much of this acreage is developer- owned and merely leased for agriculture (SAWPA, 2023a). Updated 2022 land uses for the MSAR watershed are displayed in Figure 2-15.

[20] References to agricultural land use include both dairy facility operations (which operate under the CAFO General Order) and agriculture growing operations (or “non-CAFO” operations) such as those occurring in the Arlington citrus area.

[21] “Acreage” refers to areas of MSAR watershed that are not detached from a downstream receiving water. As noted above, detached areas are drainage areas that do not typically cause or contribute to flow to a downstream TMDL watershed-wide compliance monitoring location. Dry weather flow may be detached from receiving waters because of constructed regional retention facilities or through losses in earthen channel bottoms, where the recharge capacity of the underlying soils exceeds dry weather runoff generated in the upstream drainage area.

Table 2-3. Changes in Number of Dairies and Animal Units in Chino Basin Area of the MSAR Watershed in the Santa Ana Region, 1999 – 2024.

Year	Dairies	Animal Units	Source
1999	297	320,000	General Order No. 99-11 (Santa Ana Water Board, 1999)
2005	NA	300,000	TMDL Staff Report (Santa Ana Water Board, 2005a)
2007	137	185,000	General Order No. R8-2007-0001 (Santa Ana Water Board, 2007)
2010	116	135,560	Personal communication, Pat Boldt (representative for Agricultural Operators in the MSAR watershed), November 2022
2013	99	116,000	General Order No. R8-2013-0001 (Santa Ana Water Board, 2013a)
2018	84	78,000	General Order No. R8-2018-0001 (Santa Ana Water Board, 2018c)
2020	68	67,946	Personal communication, Pat Boldt (representative for Agricultural Operators in the MSAR watershed), November 2022
2021	56	54,117	Personal communication, Pat Boldt (representative for Agricultural Operators in the MSAR watershed), November 2022
2022	44	42,908	Personal communication, Pat Boldt (representative for Agricultural Operators in the MSAR watershed), January 2026

2023	43	39,421	Personal communication, Pat Boldt (representative for Agricultural Operators in the MSAR watershed), January 2026
2024[1]	40	26,000	Personal communication, Pat Boldt (representative for Agricultural Operators in the MSAR watershed), January 2026

[1]Annual reports for 2024 are being processed, the numbers provided have been estimated.

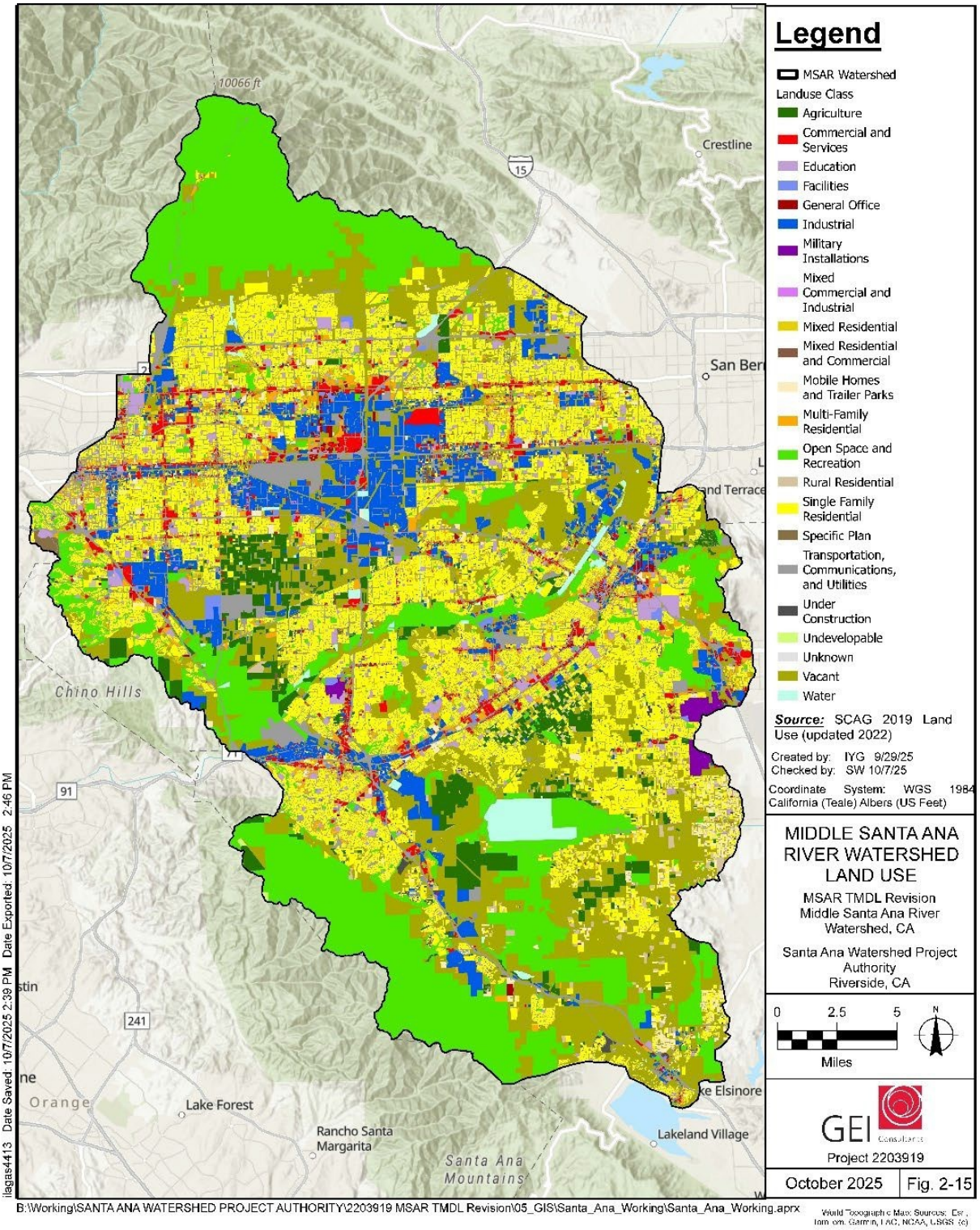


Figure 2-15 Regional land use map for the Middle Santa Ana River Watershed (from the Southern California Association of Governments).

3. Regulatory Background

3.1 Introduction

The 1972 Federal Water Pollution Control Act and its amendments comprise what is commonly known as the Clean Water Act (CWA). The CWA provides the basis for the protection of all inland surface waters, estuaries, and coastal waters. The federal USEPA is responsible for ensuring the implementation of the CWA and its governing regulations (primarily Title 40 of the Code of Federal Regulations) at the state level.

California's Porter-Cologne Water Quality Control Act of 1970 and its regulations establish the Santa Ana Water Board as the agency responsible for implementing CWA requirements in the Santa Ana River Watershed. These requirements include adoption of a Basin Plan to protect inland freshwater and estuarian waterbodies. The Basin Plan identifies the beneficial uses for waterbodies in the Santa Ana River watershed, establishes the water quality objectives required to protect those uses, and provides an implementation plan to protect water quality in the region (Santa Ana Water Board, 2019b). A beneficial use can be defined as use of waterbody in a way that benefits people or wildlife, e.g., as a drinking water source, place for recreation or habitat for aquatic organisms. On page 3, the Basin Plan includes two recreational beneficial uses, currently defined as follows:

- *Water Contact Recreation (REC-1: Primary Contact Recreation)* - waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs. (Santa Ana Water Board, 2019b)

- *Non-contact Water Recreation (REC-2: Secondary Contact Recreation)* - Waters are used for recreational activities involving proximity to water but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing and aesthetic enjoyment in conjunction with the above activities. (Santa Ana Water Board, 2019b)

Pursuant to CWA Section 305(b), states are required to biennially submit a report to the USEPA on water quality conditions of its surface waters (referred to as the "305(b) report"). In addition, pursuant to CWA Section 303(d), states are also required to biennially submit to the USEPA a list that identifies waterbodies where beneficial uses are impaired. Specifically, this list identifies the waterbodies not currently meeting water quality standards and the water quality constituent that is causing the impairment or excursion of the water quality standard. The State Water Board, working collaboratively with the Regional Boards, prepares an Integrated Report through a public process to fulfill the

CWA reporting requirements of Sections 305(b) and 303(d). Once submitted to the USEPA, the 303(d) list is subject to review and approval by the USEPA. Waterbodies on the 303(d) list require development of a TMDL. A TMDL establishes the maximum amount of a pollutant that a waterbody can receive (from both point and nonpoint sources) and still meet water quality objectives.

3.2 Process to Develop and Adopt Middle Santa Ana River Watershed TMDLs

The Santa Ana Water Board Basin Plan relies on the measurement of "pathogen indicator bacteria" to evaluate whether recreational beneficial uses are being met in inland waters of the Santa Ana River watershed (Santa Ana Water Board, 2012d). Over a number of years, Santa Ana Water Board staff made findings that various waterbodies in the MSAR watershed did not meet the applicable pathogen indicator bacteria water quality objectives, the dates of the findings include the following (Santa Ana Water Board 2005a):

- *Santa Ana River Reach 3* – Portion of the Santa Ana River from Prado Dam upstream to the Mission Boulevard Bridge. In 1988, the lower portion of Reach 3 was placed on the 303(d) list. Based on monitoring data, during development of the TMDL the extent of impairment was expanded to include all of Santa Ana River Reach 3.

- *Chino Creek, Reach 1* – Confluence with the Santa Ana River upstream to the beginning of the concrete-lined channel south of Los Serranos Road. Chino Creek Reach 1 was placed on the 303(d) list in 1994.

- *Chino Creek, Reach 2* – Beginning of concrete-lined channel south of Los Serranos Road. upstream to confluence with San Antonio Creek. Chino Creek Reach 2 was placed on the 303(d) list in 1998.

- *Mill Creek, Prado Area* – Waterbody extends from Mill Creek's confluence with Chino Creek Reach 1 in the lower part of Prado Basin to a location just upstream of Chino-Corona Road (where it becomes Cucamonga Creek Reach 1). Mill Creek was placed on the 303(d) list in 1994.

- *Cucamonga Creek, Reach 1* – From a location just upstream of Chino-Corona Road, where Mill Creek transitions to Cucamonga Creek Reach 1, upstream to near 23rd Street in the City of Upland, California. This waterbody was placed on the 303(d) list in 1998.

- *Prado Park Lake* – 60-acre, constructed lake located within Prado Regional Park near the junction of Highway 83 (Euclid Avenue) and State Highway 71. This lake was placed on the 303(d) list in 1994 due to elevated nutrients. Subsequent

sampling in 1998 indicated high bacterial indicator levels.

Due to the impairment listings, Santa Ana Water Board staff began work on development of the MSAR TMDLs through establishment of a TMDL Workgroup in August 2001.[22] The Workgroup assisted Santa Ana Water Board staff during the TMDL development process including reviewing existing data and supporting the development and implementation of a bacteria source monitoring program from 2002 to 2004 (Santa Ana Water Board 2005a). Staff with SAWPA facilitated the Workgroup meetings and prepared meeting notes.

The first of two public workshops on proposed MSAR TMDLs was publicly noticed and held on February 3, 2005. At this workshop, the Santa Ana Water Board staff presented its draft, "*Staff Report on Bacterial Indicator Total Maximum Daily Loads in the Middle Santa Ana River Watershed*." ("Staff Report") (Santa Ana Water Board 2005a). The Staff Report recommended that proposed TMDLs for fecal coliform be incorporated into the Basin Plan at a future public hearing.

Based on comments received following the first public workshop, a second public workshop was publicly noticed and held on June 24, 2005 (Santa Ana Water Board, 2005b). Santa Ana Water Board staff presented revised proposed MSAR TMDLs and Tentative Resolution R8-2005-0001 (Santa Ana Water Board, 2005c). One of the key changes to the proposed TMDLs was to add *E. coli* targets to take into account USEPA's water quality standards recommendation to use *E. coli* as the bacterial indicator to protect recreational uses[23] and to recognize the work of the SWQSTF that was evaluating bacterial indicators for the protection of recreational uses in inland waters (USEPA, 1986). The TMDLs were also modified to clearly indicate that if fecal coliform was replaced by objectives based on *E. coli* in the Basin Plan, then the fecal coliform targets would no longer be effective. Following the 2012 update to federal recreational water quality criteria, USEPA formally approved the Santa Ana Water Board's corresponding Basin Plan amendments in 2015 (United States Environmental Protection Agency [USEPA], 2015).

Santa Ana Water Board staff made final revisions to the MSAR TMDLs and the adoption resolution based on comments received from the second public workshop. On August 26, 2005, the Santa Ana Water Board adopted the MSAR TMDLs at a public workshop (Santa Ana Water Board, 2005d). The adopted TMDLs were subsequently approved by the State Water Board on May 15, 2006, by the California Office of Administrative Law on September 1, 2006, and by USEPA Region 9 on May 16, 2007 (State Water Board, 2006).

[22] Workgroup participants were as follows: SBCFCD, RCFC&WCD, San Bernardino Municipal Water District, IEUA, Orange County Water District, CBW, Milk Producers Council, Western United Dairymen, City of Riverside, City of Corona and California Department of Water Resources (see Section 12, Santa Ana Water Board 2005a).
[23] In 2012, USEPA updated the 1986 ambient water quality criteria recommendations for recreational water (USEPA, 2012).

3.3 Provisions of the Adopted MSAR TMDLs

The MSAR TMDLs are incorporated into Chapter 6 of the Basin Plan (Santa Ana Water Board, 2019b). The following sections provide a summary of the key elements of the adopted MSAR TMDLs.

3.3.1 MSAR Watershed Bacterial Indicator TMDL Numeric Targets

The numeric targets for both bacterial indicators incorporate an explicit 10% margin of safety to address uncertainties recognized in the development of the TMDLs. These numeric targets[24] are specified as follows:

- Fecal coliform: Log mean less than 200 organisms/100 mL based on five or more samples per 30-day period, and not more than 10% of the samples exceed 400 organisms/100 mL for any 30-day period.

- *E. coli*: Log mean less than 126 organisms/100 mL based on five or more samples per 30-day period, and not more than 10% of the samples exceed 235 organisms/100 mL for any 30-day period.

3.3.2 MSAR Watershed Bacterial Indicator TMDLs, Wasteload Allocations, Load Allocations and Attainment Dates

Table 3-1 provides the MSAR TMDLs, WLAs, LAs and seasonal compliance dates for both fecal coliform and *E. coli* (Santa Ana Water Board, 2005e). WLAs are specified for urban discharges and discharges from CAFOs, including stormwater. LAs are specified for runoff from other types of agriculture and from natural sources (open space/undeveloped forest land).

TMDLs, WLAs and LAs are specified for Dry Summer Conditions (April 1 through October 31) and Wet Winter Conditions (November 1 through March 31). The final TMDLs included an extended schedule for compliance for Wet Winter Conditions, "*in light of the expected increased difficulty in achieving compliance under these conditions*." (Santa Ana Water Board, 2005e).

3.3.3 Margin of Safety

The TMDLs include a 10% margin of safety. Per the TMDLs, the purpose of the margin of safety is to *"account for unknowns, such as bacterial regrowth, bacterial dilution and organism die-off." As additional data on bacterial dynamics in the Middle Santa Ana River*

[24] The adopted 2005 MSAR TMDLs stated that the fecal coliform numeric targets (and other fecal coliform related provisions of these TMDLs) would become ineffective upon the replacement of the fecal coliform REC1 objectives in the Basin Plan with REC1 objectives based on *E. coli* (see Santa Ana Water Board 2005e, Table 6-1x, Footnote c).

watershed are developed, the margin of safety can be adjusted accordingly" (Santa Ana Water Board, 2005e).

3.3.4 Seasonal Variations/Critical Conditions

The TMDLs state the following regarding seasonal or critical conditions:

> "The Basin Plan REC-1 fecal coliform objectives apply year-round; no distinctions based on climate or other conditions that may affect actual REC-1 use are specified. As shown *in Table 5-9x* [Table 6-1x]*, different compliance dates are specified for dry season discharges and wet season discharges. This ensures that dry season recreational beneficial uses are addressed on a priority basis. Additional time is allowed to address complexities associated with the control of wet weather discharges."*

This section of the TMDLs also acknowledges that the SWQSTF, *"…may recommend changes to the REC-1 objectives to reflect conditions, such as high flows, that affect REC-1 use. Any such changes will be considered through the Basin Planning process*." (Santa Ana Water Board, 2005e).

Table 3-1. TMDLs, WLAs, and LAs for Bacterial Indicators in MSAR Waterbodies (adapted from Basin Plan Table 6-1x) [a, b, c]

Indicator	Total Maximum Daily Loads for Bacterial Indicators	WLA for Bacterial Indicators in Urban Runoff including Stormwater Discharges	WLA for Bacterial Indicators in CAFO Discharges	LA for Bacterial Indicators in Agricultural Runoff Discharges	LA for Bacterial Indicators from Natural Sources
Dry Summer Conditions: April 1 through October 31, as soon as possible, but no later than December 31, 2015					
Fecal coliform	5-sample/30-day Logarithmic Mean less than 180 organisms/100 mL, and not more than 10% of the samples exceed 360 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 180 organisms/100 mL, and not more than 10% of the samples exceed 360 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 180 organisms/100 mL, and not more than 10% of the samples exceed 360 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 180 organisms/100 mL, and not more than 10% of the samples exceed 360 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 180 organisms/100 mL, and not more than 10% of the samples exceed 360 organisms/ 100 mL for any 30-day period
E. coli	5-sample/30-day Logarithmic Mean less than 113 organisms/100 mL, and not more than 10% of the samples exceed 212 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 113 organisms/100 mL, and not more than 10% of the samples exceed 212 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 113 organisms/100 mL, and not more than 10% of the samples exceed 212 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 113 organisms/100 mL, and not more than 10% of the samples exceed 212 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 113 organisms/100 mL, and not more than 10% of the samples exceed 212 organisms/ 100 mL for any 30-day period
Wet Winter Conditions: November 1 through March 31, as soon as possible, but no later than December 31, 2025					
Fecal coliform	5-sample/30-day Logarithmic Mean less than 180 organisms/100 mL, and not more than 10% of the samples exceed 360 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 180 organisms/100 mL, and not more than 10% of the samples exceed 360 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 180 organisms/100 mL, and not more than 10% of the samples exceed 360 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 180 organisms/100 mL, and not more than 10% of the samples exceed 360 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 180 organisms/100 mL, and not more than 10% of the samples exceed 360 organisms/ 100 mL for any 30-day period
E. coli	5-sample/30-day Logarithmic Mean less than 113 organisms/100 mL, and not more than 10% of the samples exceed 212 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 113 organisms/100 mL, and not more than 10% of the samples exceed 212 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 113 organisms/100 mL, and not more than 10% of the samples exceed 212 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 113 organisms/100 mL, and not more than 10% of the samples exceed 212 organisms/ 100 mL for any 30-day period	5-sample/30-day Logarithmic Mean less than 113 organisms/100 mL, and not more than 10% of the samples exceed 212 organisms/ 100 mL for any 30-day period

[a] To be achieved as soon as possible, but not later than dates specified.
[b] TMDLs, WLAs, LAs include a 10% Margin of Safety.
[c] Fecal coliform TMDLs, WLAs and LAs become ineffective upon the replacement of the REC-1 fecal coliform objectives in the Basin Plan by approved REC-1 objectives based on *E. coli.*

3.3.5 TMDL Implementation Plan/Schedule

Table 5-9y in the adopted 2005 MSAR TMDLs included a "Phase 1" Implementation Plan/Schedule that "is expected to result in compliance with the water quality objectives/numeric targets for fecal coliform and with the numeric targets for E. coli." (Santa Ana Water Board, 2005e). **Table 3-2** below provides the original table as written in the TMDLs and as shown in the Basin Plan (as Table 6-1y, but note that while the original 2005 TMDLs adoption resolution established a scheduled reference to the date of approval of the TMDLs, the Basin Plan version provides the required dates based on the May 16, 2007, effective date). Section 4 below provides details regarding the requirements associated with each of the implementation tasks, and the entities responsible for compliance with the task and status of implementation.

3.4 Middle Santa Ana River Watershed TMDL Task Force

In January 2006, before the 2005 MSAR TMDLs became effective in May 2007, watershed stakeholders established the MSAR Task Force. The MSAR Task Force, which is a multi-agency[25] collaborative effort administered by SAWPA,[26] coordinates water quality improvement activities designed to support compliance with the MSAR TMDLs. Specifically, the MSAR Task Force have the following roles (https://sawpa.org/task-force/middle-santa-ana-river-watershed-tmdl-task-force/):

- Serves as a forum for MSAR Task Force participants to report to the Santa Ana Water Board regarding progress being made towards compliance with WLAs and LAs;
- Collectively implements watershed-wide monitoring efforts, as required by the MSAR TMDLs; and
- Supports activities designed to manage or eliminate sources of bacterial indicators in local waterbodies, including coordinating activities included in both the Riverside and San Bernardino County MS4 Program CBRP.

[25] Current MSAR Task Force members include SBCFCD (representing County of San Bernardino and Cities of Ontario, Chino, Chino Hills, Montclair, Rancho Cucamonga, Upland, Rialto, and Fontana); County of Riverside; Cities of Claremont, Corona, Eastvale, Jurupa Valley, Norco, Pomona and Riverside; and Agricultural Operators (represented by CBW) and UC Riverside.

[26] SAWPA is a Joint Powers Authority of five member agencies that supports water resources planning: Eastern Municipal Water District, IEUA, Orange County Water District, San Bernardino Valley Municipal Water District, and Western Municipal Water District.

Table 3-2. MSAR Watershed Bacterial Indicator TMDL Implementation Plan/Schedule Due Dates from Table 6-1y, as amended (Santa Ana Water Board 2019b).

Task	Description	Compliance Date – As Soon as Possible but No Later Than
TMDL Phase 1		
Task 1	Revise Existing Waste Discharge Requirements	February 28, 2008
Task 2	Identify Agricultural Operators	June 30, 2007
Task 3	Develop Watershed-wide Bacterial Indicator Water Quality Monitoring Program Implement Watershed-wide Bacterial Indicator Water Quality Monitoring Program	November 30, 2007 • Upon Regional Board approval: Seasonal reports due May 31 and December 31 of each year • Triennial Reports due every 3 years beginning with first report February 15, 2010
Task 4	<u>Urban Discharges</u> 4.1 Develop and Implement Bacterial Indicator Urban Source Evaluation Plan 4.2 San Bernardino County MS4: Revise Municipal Storm Water Management Program (MSWMP) 4.3 Riverside County MS4: Revise Drainage Area Management Plan (DAMP) 4.4 San Bernardino County MS4: Revise Water Quality Management Plan (WQMP) 4.5 Riverside County MS4: Revise Water Quality Management Plan (WQMP)	Plan/Schedule due: 4.1 – November 30, 2007 4.2 – Dependent on Task 4.1 results (see text) 4.3 – Dependent on Task 4.1 results (see text) 4.4 – Dependent on Task 4.1 results (see text) 4.5 – Dependent on Task 4.1 results (see text)
Task 5	<u>Agricultural Discharge</u> 5.1 Develop and Implement Bacterial Indicator Agricultural Source Evaluation Plan 5.2 Develop and Implement Bacterial Indicator Agricultural Source Management Plan	Plan/Schedule due: 5.1 – November 30, 2007 5.2 – Dependent on Task 5.1 results (see text)
Task 6	Review of TMDLs/WLAs/LAs	Once every 3 years to coincide with the Regional Board's triennial review, or more frequently as warranted

SAWPA, as the MSAR Task Force administrator, provides the following services:

- Organize and facilitate MSAR Task Force meetings;
- Perform secretarial, clerical and administrative services, including providing meeting summaries to MSAR Task Force members and maintaining a website that documents the ongoing work of the MSAR Task Force;
- Manage MSAR Task Force funds and prepare annual reports of MSAR Task Force assets and expenditures;
- Serve as the contracting party, for the benefit of the MSAR Task Force, for contracts with all consultants, contractors, vendors and other entities;
- Seek funding grants to assist with achieving goals and objectives of the MSAR Task Force;
- Coordinate with other agencies and organizations as necessary to facilitate MSAR Task Force work; and
- Administer the preparation of reports, as required by the TMDL Implementation Plan, and submit them as required by the TMDL Implementation Plan on behalf of the MSAR Task Force.

MSAR Task Force meetings are held on a regular basis. Associated meeting agendas and meeting materials are available on the SAWPA MSAR Task Force website for the most recent years (https://sawpa.org/task-force/middle-santa-ana-river-watershed-tmdl-task-force/). Older meeting-related materials may be obtained from SAWPA.

3.5 TMDL Grant Funding

In anticipation of USEPA approval of the TMDLs, SAWPA, in cooperation with SBCFCD and RCFC&WCD and on behalf of the MSAR Task Force, submitted a Proposition 40 grant proposal (Middle Santa Ana River Pathogen TMDL BMP Implementation Project) to the State Water Board to support implementation of the TMDLs. The primary purpose of the proposed project was to accelerate the TMDLs implementation process by supporting efforts by urban dischargers to implement TMDLs requirements.

The grant proposal (Proposal Number 8839), submitted on June 9, 2006, requested grant funding of $600,000. Overall, the proposed project was estimated to cost $850,000 with $600,000 from the grant, a monetary contribution of $204,500 from RCFC&WCD and SBCFCD; and a $45,500 in-kind staff time contribution from SBCFCD. The State Water Board approved the grant proposal in fall 2006 and the project was initiated in early 2007.

The Grant Project included the following four tasks:

- *Task 1: Characterize Pathogen Pollution* – This task included the following activities: (a) Develop a water quality Monitoring Plan with QAPP that meets requirements identified in the MSAR TMDLs; (b) Develop and execute an USEP to identify source(s) of *E. coli* using advanced molecular analytical methods; and (c) Prepare draft and final reports summarizing results of all sampling and analysis performed as part of the water quality monitoring plan and the USEP.

- *Task 2: Implement BMP Pilot Study* – Coordinate with project participants to select a minimum of three pilot sites to test BMPs for controlling pathogens during dry weather flows (e.g., direct source control, retention/detention systems, active or passive in-line treatment systems, and interception/diversion strategies) and perform before and after water quality monitoring studies to assess the relative effectiveness of the evaluated BMPs and prepare a draft and final report summarizing the results.

- *Task 3: Develop a BMP Control Strategy and Prioritization Plan* – Using results and recommendations from Task 1 and Task 2, develop and submit a plan to implement additional BMPs to further reduce bacterial indicator concentrations in the MSAR watershed by expanding the most cost-effective control strategies to other locations that have been identified as significant sources of *E. coli* bacteria.

- *Task 4: Prepare and Distribute Materials to Increase Public Awareness* – (a) Develop for approval a plan to increase public awareness regarding bacterial indicator sources and related public health issues; (b) Upon approval of the plan and developed materials, publish and distribute the materials and prepare a report summarizing those activities.

Through the Grant Project the MSAR Task Force completed a substantial number of deliverables[27] between 2007 and 2010 (SAWPA, 2010c). Some of these deliverables included:

- *Monitoring Plan and Quality Assurance Project Plan* – Plan to support all MSAR Task Force TMDL-related monitoring activities, e.g., watershed-wide monitoring, urban source evaluation monitoring and BMP pilot testing (deliverables supported implementation of TMDL Implementation Task 3, see Section 4.1.3 below).

- *Urban Source Evaluation Plan* – Preparation of the USEP for urban dischargers to identify specific activities, operations, and processes in urban areas that contribute bacterial indicators to MSAR waterbodies (SAWPA, 2008b). This deliverable supported implementation of TMDL Implementation Task 4.1 (see Section 4.1.4

[27] Many of the Grant Project deliverables noted above may be found here: https://sawpa.org/task-forces/middle- santa-ana-river-watershed-tmdl-task-force/#resourcesb8a6-4b67

below).

- *Monitoring Program Implementation* – Initiation of MSAR Task Force monitoring activities including data collection from: (a) watershed-wide TMDL compliance sites; and (b) implementation of an urban source evaluation monitoring program to evaluate bacterial indicator sources in urban discharges (supported implementation of TMDL Implementation Tasks 3 and 4).

- *BMP Pilot Study* – Field studies were implemented to evaluate the effectiveness of various types of existing BMPs to mitigate sources of bacterial indicators in the MSAR watershed. SAWPA (2010b) summarizes the findings from this study.

- *Initial Data Analysis Report* – Based on monitoring activities completed in the 2007-2008 time period, the MSAR Task Force developed (a) a risk-based prioritization approach to direct follow-up source evaluation studies and water quality mitigation activities; and (b) the first prioritization of MS4 drainages for follow-up source evaluation work. SAWPA (2009) provides the findings from these activities.

- *BMP Control Strategy and Prioritization Plan (CSPP)* – Using data developed by the monitoring programs and BMP Pilot Study and data available from other sources, the CSPP was developed as a final Grant Project deliverable to guide future or post-grant TDML implementation activities. The CSPP provided information on (1) BMP efficiency, cost, and effectiveness in reducing bacterial indicators during dry weather; and (2) a prioritization plan for implementation of technical and regulatory activities to support TMDL compliance during dry weather conditions (SAWPA, 2010b).

- *Public Awareness Plan and Public Awareness Materials* – Following development of a Public Awareness Plan in 2009, educational materials (including a DVD and a broadcast program) were developed and broadcast to guide homeowners on implementation of residential BMPs to reduce bacterial loads to the MS4.

3.6 Changes to Regulations Since Approval of the 2005 MSAR TMDLs

Since the adoption of the MSAR TMDLs in 2005, both the Santa Ana Water Board and State Water Board have amended regulations applicable to the protection of recreational beneficial uses. These amended regulations could have significant bearing on how the TMDLs are implemented in the future. The following sections summarize the key regulatory changes and their importance regarding the MSAR TMDLs.

3.6.1 Santa Ana Region 2012 Basin Plan Amendment

In 2012, the Santa Ana Water Board adopted amendments to the Basin Plan's water quality standards to protect recreational beneficial uses (Santa Ana Water Board, 2012d). These amendments were based on the work and recommendations of the SWQSTF.[28]

These amendments were subsequently approved by the State Water Board on January 21, 2014 (State Water Board, 2014). Later the amendments were approved by USEPA on May 15, 2015 (United States Environmental Protection Agency [USEPA], 2015).[29] Approved amendments and their potential relevance to the MSAR TMDLs include the following (Santa Ana Water Board, 2019b):

- Revised REC-1 bacteria water quality objectives applicable to freshwaters by replacing fecal coliform with *E. coli* as the bacterial indicator.

- Revised the pathogen narrative water quality objective, such that it incorporated the term "controllable."

- Established implementation language in Basin Plan Section 5 that provides examples of "controllable" and "uncontrollable" bacterial indicator sources.

- Established a high flow suspension provision to temporarily suspend recreational uses under specified conditions and identified inland waters where the high flow suspension may be applied (Basin Plan Appendix VIII [maps of the waterbody segments that have been engineered or modified]; and Basin Plan Appendix IX [ArcGIS files that identify each of engineered or modified waterbodies in a more precise, high-resolution format]).

- In addition to providing examples of controllable/uncontrollable sources of bacteria, the Santa Ana Water Board provided the following guidance on reducing bacterial indicators from these sources:

  Controllable bacteria sources refer to any bacteria indicator source that can be controlled by treatment or management methods. Requirements for the application of Best Available Treatment technology (BAT) and Best Conventional Treatment technology (BCT) apply to some of these sources (e.g., POTWs); in other cases, such as discharges regulated under the areawide municipal separate storm system permits ("MS4" permits), reasonable actions to reduce or eliminate the contribution of these sources to the maximum extent practicable are required. These include the implementation of best management practices or other mechanisms. Controllable sources are predominantly anthropogenic in nature and can be reduced in varying

[28] SWQSTF worked collaboratively on revisions to water quality standards to protect recreational uses in inland freshwater from about 2003 to 2015. Administered by SAWPA, members of this SWQSTF included representatives of the Counties of Orange, Riverside, and San Bernardino; Santa Ana Water Board; Orange County Coastkeeper; Inland Empire Waterkeeper; USEPA and other cities and agencies.

[29] The USEPA Region 9 sent a letter of clarification on its May 15, 2015 letter on August 3, 2015 (USEPA, 2015).

degrees. (Santa Ana Water Board, 2019b, p. 5-107).

- Approved the removal of the REC-1 beneficial use from Reach 1 of Cucamonga Creek through a USEPA-approved UAA.

The approved amendments to the Basin Plan had significant relevance to the MSAR TMDLs, including, but not necessarily limited to the following:

- The MSAR TMDLs do not distinguish between controllable and uncontrollable sources of indicator bacteria. Basin Plan Section 5 provides guidance regarding what constitutes these sources (Santa Ana Water Board, 2019b). Consideration of the differences between these sources affects how and where bacteria mitigation activities are implemented – both under dry and wet weather flow.

- The Wet Winter Conditions TMDLs do not recognize that the REC-1 use may be temporarily suspended due to unsafe flow conditions (or "high flow suspension", as defined by the Basin Plan). That is, there is no provision in the TMDLs for the temporary suspension of the numeric targets and associated WLAs and LAs during wet weather flow. Page 5-111 expands on the importance, especially given that the amended Basin Plan allows for the application of the high flow suspension in Santa Ana River Reach 3 and to concrete-lined sections of Chino Creek Reach 1 and 2 (Santa Ana Water Board, 2019b).

- Removal of REC-1 as a beneficial use in Cucamonga Creek Reach 1 in 2012 potentially modifies the compliance strategy for this waterbody to focus controls downstream to most effectively meet the TMDLs, WLAs, and LAs in the natural segment Mill-Cucamonga Creek.

- Replacement of fecal coliform with *E. coli* results in the fecal coliform TMDLs, WLAs and LAs in the MSAR TMDLs no longer being in effect.[30]

3.6.2 State Water Board – 2018 Amendments to the Water Quality Control Plan for Inland Surface Waters

In 2018, the State Water Board amended the Water Quality Control Plan for Inland Surface Waters to establish new statewide water quality standards for pathogen indicator bacteria (State Water Board, 2018). These standards, which were approved by USEPA Region 9 on March 22, 2019, differ from portions of the Santa Ana Water Board Basin Plan requirements applicable to the protection of recreational uses and differ from how bacterial indicator targets are established in the MSAR TMDLs (USEPA, 2019). For example:

[30]MSAR TMDLs include a footnote indicating that the fecal coliform targets, WLAs and LAs will no longer apply if the Santa Ana Water Board replaces the fecal coliform bacterial indicator with another indicator (Santa Ana Water Board, 2019b).

- MSAR TMDLs are based on an *E. coli* water quality objective of 126 colony forming units (cfu)/100 mL (as a geometric mean); the new State Water Board geometric mean water quality objective is 100 cfu/100 mL;

- State Water Board objectives allow for the calculation of a geometric mean over a 6-week averaging period, instead of the existing 30-day averaging period in the Santa Ana Region Basin Plan and MSAR TMDLs; and

- MSAR TMDLs *E. coli* numeric target includes a provision that not more than 10% of the samples exceed 235 organisms/100 mL for any 30-day period. In contrast, the State Water Board's provisions include a Statistical Threshold Value of 320 cfu/mL, not to be exceeded by more than 10 percent of the samples collected in a calendar month.

- In addition, the Bacteria Provisions refer to a natural source exclusion and/or a reference system/antidegradation approach that may only be used after all anthropogenic sources of bacteria are identified, quantified, and controlled (Section 2.b, 2019 Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE) Bacteria Provisions).

3.6.3 Incorporation of Regulatory Changes into MSAR TMDLs

Recognizing there are differences among the recreational beneficial use provisions of the Santa Ana Region Basin Plan, State Water Board bacteria provisions and the MSAR TMDLs, the MSAR Task Force recommended that the Santa Ana Water Board revise the Basin Plan and the MSAR TMDLs. This recommendation, submitted by letter, requested that the following initiatives be included as a high priority during the next Santa Ana Water Board triennial review planning period (Middle Santa Ana River TMDL Task Force, 2019):

- Revise the water quality objectives for pathogen indicator bacteria in the Santa Ana Region's Basin Plan to be consistent with those recently approved by the State Water Board as amendments to the Basin Plan. In particular, revise the Basin Plan bacterial indicator water quality objectives for inland water (i.e., waters where the salinity is equal to or less than 1 part per thousand (ppt) 95 percent or more of the time during the calendar year) to a six-week rolling geometric mean of *E. coli* not to exceed 100 cfu/mL, calculated weekly, and a Statistical Threshold Value of 320 cfu/100 mL, not to be exceeded by more than 10 percent of the samples collected in a calendar month (calculated in a static manner).

- Update "Table 5-REC-2 Only Targets-FW" table in Section 5 of the Basin Plan (freshwater antidegradation indicator bacteria targets for waterbodies that have had REC-1 removed by an approved UAA) (Santa Ana Water Board, 2019b); and

- Update the MSAR TMDLs to take into account changes to statewide water quality standards for bacterial indicators and changes to the Basin Plan to protect inland

freshwaters (e.g., include provisions for high flow suspension in Chapter 5: Implementation of the Basin Plan).

The MSAR Task Force recommendations were included in the Santa Ana Water Board final Triennial Review Priority List and Work Plan (Fiscal Years 2019-2022) (Santa Ana Water Board, 2019c). However, due to resource limitations, previously recommended changes to the Basin Plan and MSAR TMDLs have not yet been incorporated.

4. Status of TMDL Implementation

4.1 Phase 1 TMDL Implementation Tasks

Basin Plan Table 6-1y provides the Phase 1 TMDL implementation tasks as stated in Table 5-9y in the 2005 MSAR TMDLs (Santa Ana Water Board, 2019b)). The following sections summarize the current status of each of these tasks.

4.1.1 Task 1 – Revise Existing Waste Discharge Requirements

The TMDL identified three specific WDRs that would be reviewed and revised, as needed, to include requirements in the adopted MSAR TMDLs. Other WDRs would be reviewed and/or revised to address bacterial indicator discharges, as appropriate. The following sections describe WDR revisions completed under TMDL Task 1.

4.1.1.1 WDRs Applicable to MS4s

Two MS4 Permits were revised to incorporate TMDL-related requirements:

- WDR for the Riverside County Flood Control and Water Conservation District, the County of Riverside and the Incorporated Cities of Riverside County within the Santa Ana Region, Areawide Urban Runoff, NPDES No. CAS 618033 (Santa Ana Water Board Order No. R8-20010-0033) (“Riverside County MS4 Permit”) (Santa Ana Water Board, 2002a).

- WDR for the San Bernardino County Flood Control and Transportation District, the County of San Bernardino and the Incorporated Cities of San Bernardino County within the Santa Ana Region, Areawide Urban Runoff, NPDES No. CAS 618036 (Santa Ana Water Board Order No. R8-2010-0036) (“San Bernardino County MS4 Permit”) (Santa Ana Water Board, 2002b).

In 2010, the Santa Ana Water Board issued revised Riverside and San Bernardino County MS4 permits through the adoption of Order No. R8-2010-0033 and R8-2010-0036 (Santa Ana Water Board, 2010a, 200b). The permits included new provisions to facilitate implementation of the MSAR TMDLs. The permit-related TMDL provisions and their status of implementation are presented below in Section 4.2.1.

The 2010 MS4 Permits are still in effect; however, the Santa Ana Water Board is currently in the process of developing a new, single regional MS4 permit that will apply to Riverside, San Bernardino, and Orange Counties in the Santa Ana River watershed. This new regional MS4 permit, which may contain updated or new MSAR TMDL implementation provisions, is planned for adoption in 2026.

4.1.1.2 WDRs Applicable to Concentrated Animal Feed Operations

At the time of TMDL adoption, CAFOs were regulated under general WDRs contained in Order No. 99-11 (Santa Ana Water Board, 1999). The Santa Ana Water Board adopted revised general WDRs for dairies and related facilities in 2007, 2013 and 2018 (Santa Ana Water Board, 2007, 2013a,2018c). These revised WDRs included MSAR TMDL implementation requirements. Dairies and related facilities (as defined by the WDRs) are identified as participants in the MSAR Task Force, though it was acknowledged not every individual facility could be represented. The status of implementation of the TMDL-related provisions in the CAFO WDRs is presented in Section 4.2.2.

4.1.1.3 Other WDRs

As noted above, TMDL Task 1 requires the Santa Ana Water Board to review and, as appropriate, revise other WDRs to address bacterial indicator discharges in the MSAR watershed. To date, this periodic review, which has included State Water Board General Orders, has led to the following outcomes:

- *Phase II Small MS4 Permit (2013-0001-DWQ, as amended)* – The State Water Board's General Order applicable to Small MS4s was amended in 2017 to incorporate MSAR TMDL compliance requirements specific to the following four facilities in the watershed (State Water Board 2017): University of California Riverside, California Institute for Men (Chino, California), California Institute for Women (Chino, California) and the California Rehabilitation Center (Norco, California). The applicable permit provisions and the status of compliance by these facilities is discussed below in Section 4.2.1.2.

- *California Transportation Department (CalTrans) MS4 Permit (2022-0033-DWQ)* – This State Water Board Order regulates the discharge of stormwater from State of California Department of Transportation facilities (State Water Board 2022). Although this permit includes requirements to support compliance with TMDLs across the State (see Attachment D of the permit), the 2022 Order does not include any provisions to support compliance with the MSAR TMDLs.

4.1.2 Task 2 – Identify Agricultural Operators

Santa Ana Water Board staff were required to develop a list of all known agricultural owners/operators in the MSAR watershed that are responsible for implementing the requirements of the MSAR TMDLs. In addition, the Santa Ana Water Board staff were to notify operators by informing them of their TMDL responsibilities. Attachment D (Fact Sheet) to the 2018 CAFO General Order stated that Santa Ana Water Board staff "*completed the task of identifying non-CAFO agricultural operators in October 2012*" (Santa Ana Water Board, 2018c).

4.1.2 Task 3 – Develop & Implement Watershed Monitoring Program

4.1.3.1 Watershed-wide Bacterial Indicator Water Quality Monitoring Program

Resolution No. 2005-0001 required responsible parties to the MSAR TMDLs to submit a proposed watershed-wide monitoring program (Santa Ana Water Board, 2005e). Page 8 of the resolution mandates the monitoring program:

> "…will provide data necessary to review and update the TMDLs" and collect and analyze data that "shall address, at a minimum, determination of compliance with the TMDLs, WLAs and LAs." (Santa Ana Water Board, 2005e)

When developing the monitoring program, the TMDLs further stated the following regarding selection of monitoring sites and collection of water quality data (Santa Ana Water Board, 2005e). Specifically, page 8 of the resolution mandates:

> "At a minimum, the stations specified in Tables 5-9z and 5-9aa and shown in Figure 5-6, at the frequency specified in Tables 5-9z and 5-9aa, shall be considered for inclusion in the proposed monitoring plan. If one or more of these monitoring stations are not included, the rationale shall be provided and proposed alternative monitoring locations shall be identified in the proposed monitoring plan."[31]

Entities responsible for implementation of the MSAR TMDLs worked collectively through the MSAR Task Force to implement Task 3. When developing the watershed-wide monitoring program two key factors were used to select watershed sites: (a) sites should be located on waterbodies that are impaired and thus incorporated into the TMDLs; and (b) sites should be located in reaches of the impaired waterbodies where REC-1 activity is likely to occur, i.e., there is an increased risk from exposure to pathogens (SAWPA, 2008c). Using the impaired waters or 303(d) list, recreational use data that has already been developed by the SAWPA SWQSTF, and recommendations from Santa Ana Water Board staff participating in the MSAR Task Force. Following six sites were selected for inclusion in the first MSAR TMDL Watershed-wide Compliance Monitoring Program:

- Icehouse Canyon Creek;
- Chino Creek at Central Avenue;
- Santa Ana River at Pedley Avenue;
- Santa Ana River at MWD Crossing;

[31] The referenced tables/figures in this quote have been moved to Chapter 6 in the Basin Plan as follows (Santa Ana Water Board, 2019b): Table 5-9z = Table 6-1z; Table 5-9aa = Table 6-1aa; Figure 5-6 = Figure 6-8.

- Prado Park Lake at Lake Outlet; and

- Mill Creek at Chino-Corona Road.

All six sites were either already recommended as monitoring locations in the TMDLs or were in close proximity to the recommended sites. As required, the draft Monitoring Plan prepared to support the monitoring program provided the rationale for not including other sites recommended for consideration in the adopted TMDLs (Santa Ana Water Board, 2005e).

In April 2008, the Santa Ana Water Board formally approved the Watershed-wide TMDL Monitoring Program Monitoring Plan and QAPP (SAWPA, 2008c, 2008d). As the TMDL Monitoring Program has evolved based on knowledge and credible scientific information gained during implementation, the Monitoring Plan and QAPP have been periodically updated through the work of the MSAR Task Force and approval of the Santa Ana Water Board staff.

Section 3.6.1, the Santa Ana Water Board adopted a Basin Plan amendment revising recreational water quality standards in inland waters in the Santa Ana Region (Santa Ana Water Board, 2012d). The approved Basin Plan amendment required establishment of a comprehensive RBMP for implementation throughout the Santa Ana Region to support implementation of the revised water quality standards. SAWPA's Regional Water Quality Monitoring Task Force (RWQMTF, which succeeded the SWQSTF) developed the RBMP Monitoring Plan and QAPP to address this Basin Plan requirement (SAWPA, 2016a, 2016b). To facilitate efficient use of resources across the Santa Ana Region, the MSAR TMDL Watershed-wide Compliance Monitoring Program was incorporated into the Santa Ana Region RBMP. On March 11, 2016 (Santa Ana Water Board 2016), the Santa Ana Water Board approved the RBMP Monitoring Plan and QAPP (including the incorporated MSAR TMDL Monitoring Program). The RBMP Monitoring Plan and QAPP will be updated to incorporate changes associated with this TMDLs Wet Winter Conditions extension and future TMDLs revisions.

Originally, the MSAR Task Force prepared two monitoring reports each year: Dry Season Report (by December 31) and Wet Season Report (by May 31). The biannual reporting requirement was prescribed in Task 3 of the MSAR TMDLs Implementation Plan. This biannual reporting requirement was modified into a single annual report submitted by June 30th each year when the MSAR TMDL Watershed-wide Compliance Monitoring program was incorporated into the RBMP. The first RBMP Annual Report, which included water quality monitoring results from the 2016 dry season and 2016-2017 wet season, was prepared by the RWQMTF in June 2017 (SAWPA, 2017a). The most recent RBMP Annual Report was submitted in June 2023 (SAWPA, 2023b).32

[32] Other RWQMTF-related documents are available at the SAWPA-administered website: https://sawpa.org/task-forces/regional-water-quality- monitoring-task-force/#geographic-setting.

4.1.3.2 Triennial Reports

TMDL Implementation Plan Task 3 also requires preparation of a Triennial Report that assesses the data collected for the preceding three-year period and evaluates progress towards achieving the WLAs and LAs in the MSAR TMDLs. The TMDLs became effective on May 16, 2007, following USEPA approval. Given the May 16, 2007, effective date for the TMDLs, Triennial Reports have been submitted in 2010, 2013, 2016, 2020 and 2023 (SAWPA, 2010a, 2013, 2017b, 2020 and 2023a). A four-year gap between submittals, instead of the typical three-year gap, from 2016 to 2020 was approved by the Santa Ana Water Board to allow time for completion of a Synoptic Study (SAWPA, 2020) to consider information critical to the preparation of that Triennial Report (Santa Ana Water Board, 2019a).

4.1.4 Task 4 – Urban Discharges

Task 4 of the Phase 1 TMDL Implementation Plan included several subtasks applicable to the Riverside and San Bernardino County MS4 Programs, which were responsible for addressing TMDLs WLAs applicable to urban runoff, including stormwater. These subtasks were based on the 2002 MS4 permits that were authorized at that time. As discussed below in Section 4.2.1, these permit related requirements were updated when the MS4 permits were re-authorized in 2010. The first Phase 1 subtask was generally applicable to both County MS4 Programs; the other four subtasks are applicable to either the Riverside County or San Bernardino County MS4 Programs. The following sections describe each of the required subtasks and how they have been implemented.

4.1.4.1 Task 4.1 - Urban Source Evaluation Plan

On or before November 30, 2007, urban dischargers named in the TMDLs were required to develop a bacterial indicator USEP. Page 11 of the TMDL Implementation Plan states:

> *"This plan shall include steps needed to identify specific activities, operations, and processes in urban areas that contribute bacterial indicators to Middle Santa Ana River Watershed waterbodies. The plan shall also include a proposed schedule for completion of each of the steps identified. The proposed schedules can include contingency provisions that reflect uncertainty concerning the schedule for completion of the SWQSTF work and/or other investigations that may affect the steps that are proposed"* (Santa Ana Water Board, 2005e).

The Riverside and San Bernardino County MS4 Programs worked collaboratively through the MSAR Task Force and developed a joint USEP that was submitted to the Santa Ana Water Board on March 21, 2008 (SAWPA, 2008b). The Santa Ana Water Board approved the plan on April 18, 2008 (Santa Ana Water Board, 2008).

The approved USEP established a risk characterization methodology to identify and

prioritize sites for additional investigation and mitigation of bacteria sources. This methodology relied on monitoring program data and other information to characterize the risk of exposure to bacterial indicators during REC-1 activities. Three key factors drove the risk characterization process:

- *Exceedance Factor* – Frequency and magnitude by which the bacterial indicator exceeds the water quality objective. The greater the frequency and magnitude of recorded exceedances, the higher the likelihood that the contamination can be tracked back to its source;

- *Contagion Factor* – Exposures to human sources of bacterial indicators was considered a greater risk to human health than exposure to bacterial indicators from non-human sources;

- *Exposure Factor* - A higher priority should be assigned to locations and conditions where recreational activities are most likely to occur. For example, exceedances that occur in natural channels, during warmer months with relatively moderate flows, merit a higher priority than those that may occur in a concrete flood control channel, with the assumption that the number of persons likely to be exposed is much higher in the first case than in the second (SAWPA, 2008b).

Based on these factors the highest priority sites for bacteria source investigation are sites where:

- Magnitude and frequency of the bacterial indicator exceedance are high;

- Human marker analysis indicates the persistent presence of human sources of bacteria;

- Site is in an area, or is close to an area, where recreational activities are likely to occur; and

- Observed exceedances and the presence of human sources of bacteria occur during periods when people are most likely to be present, e.g., during the dry season.

Implementation of the USEP resulted in completion of a number of investigations to identify the most significant sources of bacterial contamination to the impaired waterbodies. These early investigations focused on waterbodies given a high priority ranking based on the findings contained in the MSAR Task Force Grant Project Report: *MSAR Bacterial Indicator TMDL Data Analysis Report*), which reported the findings from urban source monitoring completed in 2007-2008. As directed by the USEP and SAWPA (2009), the MSAR Task Force implemented a number of bacteria source evaluation studies from 2009- 2011 (SAWPA, 2009). These studies are summarized as follows:

- Final Technical Memorandum – Dry Weather Runoff Controllability Assessment for Lower Deer Creek Subwatershed (Chris Basin) Special Study (SAWPA 2010d. The Lower Deer Creek subwatershed within the Cucamonga Creek watershed received a high priority ranking for bacteria source evaluation work, based on data collected in 2007 and 2008. This study included a controllability assessment to evaluate two potential options to control dry weather runoff from Chris Basin (at the base of Lower Deer Creek) before it was discharged into mainstem Cucamonga Creek: (a) construction of a horizontal subsurface flow wetland within Chris Basin; and (b) conceptual project to divert urban runoff from Lower Deer Creek to an existing recharge facility. Before implementing either control option, the final memorandum recommended additional sampling to identify the source(s) of bacteria in the Lower Deer Creek subwatershed that may be responsible for high bacteria concentrations. Bacteria source tracking upstream from Chris Basin was implemented in 2014 and is continued in subsequent years as a key element of the SBCFCD "10-week bacteria source tracking surveys" of Cucamonga Creek.

- Final Technical Memorandum – Source Evaluation Activities in Carbon Canyon Creek and Cypress Channel (SAWPA, 2010e). Two waterbody-specific studies were implemented by the MSAR Task Force for the following reasons:

    - CYPRESS CHANNEL – This waterbody received a high priority ranking for subsequent source evaluation work based on 2007-2008 monitoring data. MSAR Task Force completed a field study that identified several potential sources of elevated bacteria in this watershed. The final memorandum included recommendations for implementation by various entities within the Cypress Channel watershed.

    - CARBON CANYON CREEK – This waterbody received a low priority ranking for source evaluation work based on 2007-2008 monitoring data that showed low dry weather bacteria concentrations (*E. Coli* geomean of 86 cfu/100mL; n=15). A field study was implemented to identify site-specific characteristics that may be factors contributing to reduced bacterial concentrations. The study identified presence of flow dissipation structures in the segment upstream of the monitoring location. Because these structures greatly reduce flow rates, it was hypothesized that the structures potentially reduce bacteria via filtering processes through the structures and increased exposure to sunlight. The study concluded that the flow dissipation structures could be a potential BMP for use in other channels, if structurally appropriate and such structures did not impact the channel function.

- Final Submittal - Source Evaluation Project Activities for Middle Santa Ana River, TMDL Program Support, 2010-2011 (SAWPA, 2011). This MSAR Task Force report included findings from the following bacterial indicator-related studies completed in 2010-2011:

- BOX SPRINGS CHANNEL FOLLOW-UP STUDY – Water quality data from Box Springs Channel (T1-BXSP) in Riverside County in 2007- 2008 found high concentrations of bacterial indicators and regular detections of human source bacteria. A subsequent 2008 MS4 Program investigation identified and corrected a sanitary/storm sewer cross connection in the watershed. This follow-up study was implemented to (a) evaluate post-mitigation water quality conditions; (b) confirm reductions in bacterial indicators; and (c) verify that human source bacteria were no longer present. While the study confirmed significant reductions in bacteria and human source of bacteria were eliminated, E. coli water quality objectives were still exceeded in the channel.

- PRELIMINARY CHARACTERIZATION OF BACTERIA LOADING FROM MS4 IN POMONA AND CLAREMONT – Study gathered bacterial indicator data during the dry season to provide a preliminary characterization of bacterial water quality conditions in the Chino Creek portion of the MSAR watershed located within the jurisdictions of the Cities of Pomona and Claremont. These data supported efforts to prepare a CBRP applicable to the portion of the MSAR watershed within each jurisdiction.

- SURVEY OF DRY WEATHER FLOWS FROM MS4 OUTFALLS TO MAJOR TRIBUTARIES – Study gathered updated information regarding the variability of dry weather flow levels in MS4 channels/outfalls in the MSAR watershed. These data were used to support initial assessments of in the watershed to support CBRP development.

- CALCULATE MASS BALANCE FOR DRY WEATHER CONDITIONS – Relying on dry weather flow and bacteria water quality data collected to date. This study quantified, to the extent possible, the mass balance of bacterial indicators under dry weather conditions in the MSAR watershed. Findings supported CBRP development in the MSAR watershed.

The USEP, which was prepared to satisfy implementation of Phase 1 TMDL Task 4.1 was later superseded by the CBRP prepared by the Riverside and San Bernardino County MS4 Programs and Cities of Claremont and Pomona. Discussed more in Section 4.2.1, CBRPs were developed to comply with new TMDL-related requirements established in the Santa Ana Region and Los Angeles Region MS4 Permits adopted in 2010 and 2012.

4.1.4.2 Task 4.2 – San Bernadino County MS4: Revise Municipal Storm Water Management Plan (MSWMP)

Upon notification from the Santa Ana Water Board's Executive Officer, the San Bernardino County MS4 Program was required to update the MS4 Program's MSWMP, as necessary to incorporate measures to address the results of the USEP and/or other

studies and provide a proposal and schedule to evaluate: (a) effectiveness of BMPs and other control actions implemented; and (b) compliance with the bacterial indicator WLAs for urban runoff. Notification to revise the MSWMP to incorporate results of USEP and/or other studies was included as a requirement of the new San Bernardino County MS4 Permit adopted January 29, 2010 (Santa Ana Water Board, 2010b). The San Bernardino County MS4 Program has updated its MSWMP, as needed, to support TMDL implementation, this is discussed more in Section 4.2.1.1.

4.1.4.3 Task 4.3 - Riverside County MS4: Revise Drainage Area Management Plan (DAMP)

Upon notification from the Santa Ana Water Board's Executive Officer, the Riverside County MS4 Program was required to update the MS4 Program's DAMP as necessary to incorporate measures to address the results of the USEP and/or other studies and provide a proposal and schedule to evaluate: (a) effectiveness of BMPs and other control actions implemented; and (b) compliance with the bacterial indicator WLAs for urban runoff. Notification to revise the DAMP to incorporate results of USEP and/or other studies was included as a requirement of the new Riverside County MS4 permit was adopted through Order No. R8-2010-0033 on January 29, 2010 (Santa Ana Water Board, 2010a). The Riverside County MS4 Program has updated its DAMP, as needed, to support TMDL implementation and discussed more in Section 4.2.1.1.

4.1.4.4 Task 4.4 – San Bernardino County MS4: Revise Water Quality Management Plan (WQMP)

Upon notification from the Santa Ana Water Board's Executive Officer, the San Bernardino County MS4 Program was required to update the MS4 Program's water quality management plan (WQMP) that addresses the bacterial indicator input from new developments and significant redevelopments to assure compliance with the bacterial indicator WLAs for urban runoff. Notification to revise the WQMP was included as a requirement of the new San Bernardino County MS4 Permit which was adopted on January 29, 2010 (Santa Ana Water Board, 2010b). The San Bernardino County MS4 Program updated its WQMP as required to prioritize selection of post-construction BMPs that are effective for fecal bacteria load reduction and discussed further in Section 4.2.1.1.

4.1.4.5 Task 4.5 – Riverside County MS4: Revise Water Quality Management Plan

Upon notification from the Santa Ana Water Board's Executive Officer, Riverside County MS4 Program was required to update the MS4 Program's WQMP that addresses the bacterial indicator input from new developments and significant redevelopments to assure compliance with the bacterial indicator WLAs for urban runoff. Notification to revise the WQMP was included as a requirement of the new Riverside County MS4 permit which

was adopted on January 29, 2010, through Order No. R8-2010-0033 (Santa Ana Water Board, 2010a). The Riverside County MS4 Program updated its WQMP as required to prioritize selection of post-construction BMPs that are effective for fecal bacteria load reduction.

4.1.5 Task 5 – Agricultural Discharges

TMDL Task 5 established the Phase 1 tasks applicable to agricultural discharges that included stormwater runoff, wastewater release and tailwater runoff from agricultural land uses (including CAFOs and irrigated and dry-land farming) in the MSAR watershed. The TMDL Implementation Plan included two agricultural-related subtasks, as described below.

4.1.5.1 Task 5.1 – Develop and Implement Bacterial Indicator Agricultural Source Evaluation Plan (AgSEP)

The TMDL required submittal of an AgSEP on or before November 30, 2007, that would identify the steps needed to identify specific activities, operations and processes in agricultural areas that contribute bacterial indicators to MSAR watershed waterbodies (Santa Ana Water Board, 2005e). On March 21, 2008, the AgSEP was submitted to the Santa Ana Water Board and subsequently approved on April 18, 2008 (Santa Ana Water Board, 2008). The AgSEP included a brief wet weather monitoring program for implementation during the wet season of 2009-2010. The findings from this monitoring activity were reported in the 2010 TMDL Triennial Report (SAWPA, 2010a).

4.1.5.2 Task 5.2 - Develop and Implement Bacterial Indicator Agricultural Source Management Plan (BASMP)

Upon notification by the Executive Officer of the Santa Ana Water Board, the TMDLs required agricultural operators to submit a BASMP to replace the AgSEP that was to include plans and schedules for the following:

- Implementation of bacteria indicator controls, BMPs and reduction strategies designed to meet load allocations;
- Evaluation of effectiveness of BMPs; and
- Development and implementation of compliance monitoring program(s).

This notification occurred through the reauthorization of the CAFO General Order in 2013 (Santa Ana Water Board, 2013a).[33] Section II.B.2.a.iii.d of the General Order stated:

[33] At the time of TMDL adoption, CAFO's were permitted under General Order 99-11 (Santa Ana Water Board, 1999). This Order was replaced first in 2007 (Santa Ana Water Board, 2007) and then in 2013 (Santa Ana Water Board, 2013a).

"Based on the annual evaluation of the monitoring results and the source evaluation report, the Dischargers in the Middle Santa Ana River Watershed shall develop and submit for approval by the Regional Board or Executive Officer an Agricultural Bacterial Source Management Plan by December 31, 2014."

Consistent with the MSAR Phase 1 TMDL Implementation Plan, the 2013 General Order required that the BASMP include, at a minimum, the following:

- Description of tasks for completing a detailed evaluation of bacterial indicator sources and discharge pathways associated with CAFOs;
- Specific steps that the Dischargers have taken or will take to achieve compliance with the CAFO wet weather wasteload allocations by December 31, 2025;[34]
- Description of specific BMPs that have been implemented or will be implemented to reduce the discharge of wastes containing bacteria associated with CAFO operations to surface waters;
- Description of any improvements needed to the design, construction, operation and maintenance of waste containment facilities at CAFOs to minimize accidental discharge of wastes from waste containment facilities;
- Description of any additional good housekeeping practices needed at CAFO facilities to minimize the discharge of any runoff, including precipitation, from the production areas to surface waters;
- Description of specific metrics that will be used to demonstrate the effectiveness of the Plan and acceptable progress toward meeting the CAFO wasteload allocations for bacterial indicators by December 31, 2025; and
- Schedule for completing the tasks described in the Plan.

The final BASMP was submitted to the Santa Ana Water Board in December 2014 (CBW Agricultural Pool 2014). This document was prepared on behalf of all agricultural operators (CAFO and non-CAFO) in the MSAR watershed except, "*citrus growers and nurseries in the Arlington Greenbelt Area, with the exception of Altman Plants*" (CDM Smith, 2014). Per the BASMP, it was expected that the agricultural operators not covered by the BASMP would comply with TMDL requirements separately from the other agricultural operators in the watershed.

4.1.6 Task 6 – Review of TMDLs/WLAs/LAs

[34] Text shown is verbatim from the permit; however, the referenced "wet weather wasteload allocations" compliance date of December 31, 2025 applies to "wet winter" conditions (emphasis added).

TMDL Implementation Plan Task 6 required Santa Ana Water Board staff to re-evaluate the basis for the TMDLs and implementation schedule at least once every three years to determine the need for modifying the WLAs, LAs, numeric targets, and TMDLs. Per the TMDL, this review would consider results generated through the monitoring programs, special studies, modeling analysis, efforts of the SWQSTF or special studies by one or more responsible parties.

After periodic review of the TMDLs and MSAR Task Force discussions it was recognized that the TMDLs require a full revision in the future (see Section 3.6). This limited revision does not address all changes that are required and is intended to provide the time necessary to gather additional data, through the Phase 2 Implementation Plan, for the future revision. The future revision will not only need to consider findings from Phase 1 and Phase 2 studies but to incorporate significant changes that have occurred to the Santa Ana Region Basin Plan (Santa Ana Water Board, 2012d). The future revision will also need to include the State Water Board bacteria provisions to protect inland waters (State Water Board, 2018). Key areas of the TMDLs that could be revised based on updated regulations are summarized in Section 3.6.3.

4.2 Additional TMDL Implementation Requirements (Post-TMDLs Adoption)

Since the MSAR TMDLs became effective in 2007, modifications to regional or statewide MS4 permits and the CAFO General Order have affected TMDL implementation. These modifications and their impact on TMDL implementation to date are described below.

4.2.1 Urban Runoff

4.2.1.1 Municipal MS4 Permits

Phase I Municipal MS4 Permits at Time of TMDLs Adoption

When the TMDLs were adopted in 2005 the Riverside and San Bernardino County MS4s were authorized to discharge urban runoff under MS4 Permits R8-2002-0011 and R8-2002- 0012, respectively (Santa Ana Water Board, 2002a, 2002b). Accordingly, the Phase 1 TMDL Implementation Plan tasks applicable to urban discharges resulted in a general requirement to update the respective MS4 Program's stormwater management plans (DAMP for Riverside County; MSWMP for San Bernardino County) to include TMDLs requirements, as needed.

Further, the TMDLs required implementation of urban source evaluation studies (Task 4.1), the findings from which (through USEP implementation or findings from other studies) were intended to result in further modifications to the MSWMP or DAMP when needed to support efforts to mitigate sources of indicator bacteria.

Reauthorization of Phase I Municipal MS4 Permits in the MSAR Watershed after TMDLs Adoption

In 2010, the Santa Ana Water Board adopted new MS4 permits for the portions of Riverside and San Bernardino Counties within the Santa Ana River watershed (Santa Ana Water Board 2010 a,b). These 2010 MS4 Permits, which significantly updated the MSAR TMDLs requirements applicable to these MS4 Programs, remain in effect at this time. The MSAR TMDL-related requirements included in the newly adopted 2010 MS4 permits are discussed below.

The portions of the cities of Claremont and Pomona located within the MSAR watershed are in Los Angeles County and subject to the MS4 permit requirements established for that County. At the time of TMDL adoption, the MS4s for these cities were authorized to discharge under Order 01-182 (Los Angeles Water Board, 2001). Notably, while the MSAR TMDLs specifically identified the cities of Claremont and Pomona as jurisdictions responsible for compliance with the MSAR TMDLs WLAs (e.g., they were required to implement Task 4.1), the Phase 1 TMDL Implementation Plan did not include MS4 permit-specific requirements for these Cities, i.e., comparable to Tasks 4.2 to 4.5 that applied to the San Bernardino County and Riverside County MS4 programs. To implement the TMDLs, the Santa Ana Water Board adopted Order R8-2013-0043. This Order *required* the cities of Claremont and Pomona to develop final water quality based effluent limits (WQBELs) using their CBRP to attain the waste load allocation for dry weather by its final compliance deadline. The Order *allowed* the cities to develop final WQBELs using their CBRP to attain the waste load allocation for wet weather by its final compliance deadline of December 31, 2025.

Santa Ana Region MS4 Permits

The 2010 MS4 permits updated the TMDLs implementation requirements applicable to the MS4s by establishing interim and final WQBELs for both dry summer and Wet Winter Conditions. Figures 4-1 and 4-2 summarize the Dry Summer Conditions requirements for the Riverside and San Bernardino County MS4 Permits, respectively while Figure 4-3 summarizes the Wet Winter Conditions requirements.

Figure 4-1. Interim WQBELs in Riverside and San Bernardino County MS4 Permits (Order No. R8-2010-0033 - Section VI.D.1 (Santa Ana Water Board, 2010a) and Order No. R8-2010-0036 – Section V.D.1 (Santa Ana Water Board, 2010b)) Interim WQBELs (effective upon adoption of the Order)

a. The MSAR Permittees...shall:[1, 2]

i. Continue to implement the watershed-wide water quality monitoring program (including any future amendments thereto) approved by the Regional Board (Resolution No. R8-2007-0046) as per Task 3 of the MSAR TMDL Implementation Plan.

ii. Submit reports summarizing all relevant data from the MSAR watershed-wide water quality monitoring program. Beginning in 2010, the cool (or wet) season report is due to the Executive Officer by May 31st of each year (for monitoring conducted from November 1st through
March 31st) and the warm (dry) season report is due to the Executive Officer by December 31st of each year (for monitoring conducted from April 1st through October 31st).

iii. Submit comprehensive reports every three years summarizing the data collected for the preceding 3-year period and evaluating progress towards achieving the Urban WLA by the dates specified in the TMDL. The first report is due to the Executive Officer on February 15, 2010.

iv. Continue to implement the approved (Regional Board Resolution No. R8-2008-0044) USEP developed as per Task 4.1 of the MSAR TMDL Implementation Plan. The USEP must describe the specific methods that will be used to identify urban sources, strategies, and BMPs to address those sources. Submit semi-annual reports on January 31st and July 31st of each year as required under the approved USEP, and any amendments thereto. In years where the comprehensive report referenced in VI.D.1.a.iii above is due on February 15, the comprehensive report, Dry Season report (Due December 31st) and the January 31st USEP reports may be combined into a single submittal due February 15.

v. Revise the MSWMP or DAMP (as relevant to each County's MS4 Program) as specified in Task 4.3 of the MSAR-TMDL Implementation Plan. Summarize any such revisions in the annual report due to the Executive Officer by November 30 of each year.

vi. Revise the WQMP as specified in Task 4.5 of the MSAR TMDL Implementation Plan. Summarize any such revisions in the Annual Report due to the Executive Officer by November 30 of each year.

vii. Amend the Local Implementation Plan (LIP) to be consistent with the revised DAMP and WQMPs within 90 days after said revisions are approved by the Regional Board. Summarize any such LIP amendments in the Annual Report due to the Executive Officer by November 30 of each year.

[1] Riverside County MS4 Permit: County of Riverside, Cities of Corona, Norco and Riverside (and Eastvale and Jurupa Valley, after these cities incorporated in 2010 and 2011, respectively) (Santa Ana Water Board, 2010a).

[2] San Bernardino County MS4 Permit: County of San Bernardino and Cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Rancho Cucamonga, Rialto and Upland (Santa Ana Water Board, 2010b).

Figure 4-2. Final WQBELs in Riverside and San Bernardino County MS4 Permits (Order No. R8- 2010-0033 - Section VI.D.2 (Santa Ana Water Board, 2010a) and Order No. R8-2010-0036 – Section V.D.2 (Santa Ana Water Board, 2010b)) Final WQBELs – Dry Season Condition[1]

b. The final WQBELs for Bacterial Indicators during the Dry Season shall be achieved by December 31, 2015. These final Effluent Limits shall be considered effective for enforcement purposes on January 1, 2016.

c. The Final WQBELs for MSAR Bacterial Indicator TMDL during the Dry Season shall be developed and implemented in the following manner:

   i. The MSAR Permittees shall prepare for approval by the Regional Board a Comprehensive Bacteria Reduction Plan (CBRP) describing, in detail, the specific actions that have been taken or will be taken to achieve compliance with the Urban WLA during the Dry Season (April 1st through October 31st) by December 31, 2015. The CBRP must include:

      (1) The specific ordinance(s) adopted to reduce the concentration of Bacterial Indicator in urban sources.

      (2) The specific BMPs implemented to reduce the concentration of Bacterial Indicator from urban sources and the water quality improvements expected to result from these BMPs.

      (3) The specific inspection criteria used to identify and manage the urban sources most likely causing exceedances of Water Quality Objectives for Bacterial Indicators.

      (4) The specific regional treatment facilities and the locations where such facilities will be built to reduce the levels of Bacterial Indicator discharged from urban sources and the expected water quality improvements to result when the facilities are complete.

      (5) The scientific and technical documentation used to conclude that the CBRP, once fully implemented, is expected to achieve compliance with the Urban WLA for Bacterial Indicator by December 31, 2015.

      (6) A detailed schedule for implementing the CBRP. The schedule must identify discrete milestones to assess satisfactory progress toward meeting the Urban WLA during the Dry Season by December 31, 2015. The schedule must also indicate which agency or agencies are responsible for meeting each milestone.

      (7) The specific metric(s) that will be established to demonstrate the effectiveness of the CBRP and acceptable progress toward meeting the Urban WLA for Bacterial Indicator by December 31, 2015.

      (8) The DAMP, WQMP and LIPs shall be revised consistent with the CBRP no more than 180 days after the CBRP is approved by the Regional Board.

      (9) Detailed descriptions of any additional BMPs planned, and the time required to implement those BMPs, in the event that data from the watershed-wide water quality monitoring program indicate that Water Quality Objectives for Bacterial Indicator are still being exceeded after the CBRP is fully implemented.

      (10) A schedule for developing a CBRP needed to comply with the Urban WLA for Bacterial Indicator during the Wet Season (November 1st thru March 31st) to achieve compliance by December 31, 2025.

Figure 4-2. Final WQBELs in Riverside and San Bernardino County MS4 Permits (Order No. R8- 2010-0033 - Section VI.D.2 (Santa Ana Water Board, 2010a) and Order No. R8-2010-0036 – Section V.D.2 (Santa Ana Water Board, 2010b)) Final WQBELs – Dry Season Condition[1]

ii. The draft CBRP must be submitted to the Regional Board by December 31, 2010. The Permittees may submit the plan individually, jointly or through a collaborative effort with other urban dischargers such as the existing MSAR-TMDL Task Force. Regional Board staff will review the draft CBRP and recommend necessary revisions no more than 90 days after receiving the draft CBRP. The MSAR Permittees must submit the final version of the CBRP no more than 90 days after receiving the comments from Regional Board staff. The Regional Board will schedule a public hearing to consider approving the CBRP, as a final WQBEL for the Dry Season Urban WLA, no more than 120 days after the final plan is submitted by the MSAR Permittees. In approving the CBRP as the final WQBELs, the Regional Board shall find that the CBRP, when fully implemented, shall achieve the Urban WLA for Bacterial Indicator by December 31, 2015.

iii. Once approved by the Regional Board, the CBRP shall be incorporated into this Order as the final WQBELs for Bacterial Indicator for the Dry Season. Based on BMP effectiveness analysis, the CBRP shall be updated, if necessary. The updated CBRP shall be implemented upon approval by the Regional Board.

d. Should the process set forth in subdivision, b, of this section not be completed by December 31, 2015, then the urban wasteload allocations for dry weather conditions specified in the MSAR-TMDL shall become the final numeric WQBELs for indicator bacteria in Dry Weather Conditions, effective January 1, 2016 as follows: (the same values as WLAs as shown in Basin Plan Table 6-1x, or see Table 3.1 above)

[1] Although permit text states “Dry Season Condition”, permit requirements are consistent with the Dry Summer Conditions WLAs in the MSAR TMDLs.

Figure 4-3. Final WQBELs in Riverside and San Bernardino County MS4 Permits Under Wet Season Conditions (Orders R8-2010-0033 - Section VI.D.2 (Santa Ana Water Board, 2010a) and Order R8-2010-0036 – Section V.D.2 (Santa Ana Water Board, 2010b))

In the event this Order is still in effect on December 31, 2025, and the Regional Board has not adopted alternative final WQBEL during the Wet Season1 by that date, then the Urban WLAs specified in the MSAR TMDL for the Wet Season (November 1st through March 31st) will automatically become the final numeric WQBEL for the MSAR Permittees on January 1, 2026.

[1] Although permit text states “Wet Season”, text is consistent with the Wet Winter Conditions compliance schedule in the MSAR TMDLs

Los Angeles Region MS4 Permit

In 2012, the Los Angeles Water Board reauthorized the MS4 permit applicable to most of Los Angeles County through Order No. R4-2012-0175 (Los Angeles Water Board, 2012). Because most of the Chino Creek subwatershed falls within the jurisdiction of the Santa Ana Water Board, the 2012 Los Angeles Region MS4 permit stated that the Santa Ana Water Board would implement the MSAR TMDLs within the portions of the Cities of Claremont and Pomona discharging urban runoff into the MSAR watershed. This finding was formalized in a Santa Ana Water Board Order, which established requirements for the Cities of Claremont and Pomona to address the MSAR TMDLs in Order R8-2013-0043 (Santa Ana Water Board, 2013b). These requirements were effectively the same as the requirements established for MS4s in Riverside and San Bernardino Counties (see Figures 4-1 through 4-3). The Los Angeles Water Board's most recently adopted Regional MS4 Permit (Order No. R4-2021- 0105) maintains the same implementation approach established by the 2012 MS4 Permit (Los Angeles Water Board, 2021, see Attachment F, page F-22):

> "Per an agreement between the Los Angeles Water Board and the Santa Ana Water Board dated May 31, 2013, the Santa Ana Water Board is designated as the regulator of discharges of bacteria by the cities of Claremont and Pomona through their MS4s to receiving waters within the Santa Ana River Watershed addressed by the Middle Santa Ana River Watershed Bacterial TMDL...Per this agreement, both the Santa Ana Water Board and Los Angeles Water Board have the authority to enforce the terms of any MS4 permit issued to the cities of Claremont and Pomona if the MS4 discharges occur with the Los Angeles Water Board's geographic jurisdiction."

Development of Dry Summer Conditions Comprehensive Bacteria Reduction Plans to Address Urban Runoff in Phase I Permits

On June 28, 2011, as required by their respective MS4 Permits, the Riverside and San Bernardino County MS4 Programs each submitted a Comprehensive Bacteria Reduction Plan (CBRP) to the Santa Ana Water Board (RCFC&WCD, 2011). The Santa Ana Water Board subsequently approved these CBRPs on February 10, 2012 (Santa Ana Water Board 2012b, 2012c). In a joint effort and consistent with Resolution No. R8-2013-0043, the Cities of Claremont and Pomona submitted their CBRPs to the Santa Ana Water Board (Santa Ana Water Board, 2013b). The Santa Ana Water Board approved the plans for Claremont and Pomona on March 14, 2014 (Santa Ana Water Board, 2014a).

Per the county MS4 permits and Resolution No. R8-2013-0043, the CBRP becomes the final WQBEL for the Dry Summer Conditions WLA (Santa Ana Water Board, 2013b). Consistent with this requirement, each approval resolution stated that the CBRP: "*will serve as the final Water Quality Based Effluent Limitations for bacterial indicators during the dry season (annually April 1 through October 31)*" (Santa Ana Water Board, 2012b, 2012c, 2014a, 2014b).

As part of the development of the CBRPs, the risk-based approach first developed for the USEP under Phase 1 TMDL Implementation Task 4.1 was updated and used to form the foundation for the development of CBRP implementation priorities (SAWPA, 2008b).[35] In general, each CBRP's implementation program relied on an iterative process focused on the following key activities:

- Implement (a) CBRP non-structural BMP activities (e.g., street sweeping, illicit discharge, detection and elimination program, ordinance development and implementation, etc.); and (b) conduct Tier 1 source evaluation activities to identify controllable urban sources of dry weather flow/bacterial indicators from MS4 outfalls.

- Prioritize identified controllable urban sources using flow volume to estimate bacteria load data developed from urban source evaluation activities.

- Identify alternatives for reducing or eliminating controllable urban flow or bacterial indicator sources from MS4 outfalls.

- Identify structural BMP solutions, where non-structural BMPs are insufficient to achieve compliance; complete project identification phase of the local capital improvement project (CIP) process.

- Where needed, complete UAAs to support structural BMP solutions; implement the next phases of the CIP process for structural BMP projects: budget/planning, design, and permitting.

- Construct approved structural BMPs.

The activities above are iterative in nature, meaning that data collection from Tier 1 sites with subsequent bacteria source studies at upstream Tier 2 sites resulted in a regular reassessment of the highest priorities for mitigation of bacterial indicator sources through implementation of structural BMP projects.

The MS4 permittees have been implementing their respective CBRPs individually as an MS4 permittee, collaboratively with their respective MS4 Programs, or collectively through the MSAR Task Force. The MS4 programs collectively summarize CBRP implementation activities in their MS4 Annual Reports submitted in November of each year. In addition, the MS4 program regularly report on the status of CBRP-related implementation activities at MSAR Task Force meetings and prepare the required TMDL Triennial Reports to periodically assess progress towards attainment of TMDLs WLAs and LAs in the MSAR watershed (SAWPA, 2010a, 2013, 2017b, 2020 and 2023a).

[35] CBRPs state that the source evaluation activities described in the CBRP were intended to supersede the USEP and become the focus of bacterial indicator source evaluation activities planned in the MSAR watershed.

The Santa Ana Water Board conducted an audit of the Riverside and San Bernardino County MS4 Program CBRPs between February 13 and May 29, 2018. Per the audit report:

> "the audit was performed to review and assess the MSAR Permittees' efforts in complying with the 2010 MS4 Permit and determine the program's timely progress in implementing the CBRP according to the Permit's requirements" (Santa Ana Water Board, 2018a, 2018b).

The October 2018 audit report found that the MS4 Programs were in compliance with their respective CBRPs (Santa Ana Water Board, 2018a, 2018b). In addition, the audits recommended revisions to the CBRPs, but only after the Basin Plan and MSAR TMDLs were revised to be current with state and/or regional regulations to protect recreational uses

4.2.1.2 Phase II Small MS4 Dischargers

The State Water Board authorizes the discharge of stormwater from Small MS4s under a statewide General Permit (State Water Board, 2017). This General Permit incorporated TMDL requirements for specific entities in the State of California. Several nontraditional MS4s in the MSAR watershed were named as entities responsible for compliance with the WLAs for bacterial indicators in urban runoff including stormwater discharges. These entities include (State Water Board, 2017; see Attachment G) the following:

- University of California Riverside, Riverside California
- California Institute for Men, Chino, California
- California Institute for Women, Chino, California
- California Rehabilitation Center, Norco, California

Attachment G of the Phase II Small MS4 permit establishes facility specific MSAR TMDL requirements for each of the above entities, including:

- *Monitoring Program*: Submit for approval by the Santa Ana Water Board or its designee a watershed-wide attainment monitoring and facility specific bacterial indicator monitoring program that is adequate to determine attainment with the dry and wet season wasteload allocation. The Permittees may alternatively participate in a stakeholder group monitoring program for the same purpose. The monitoring program must be consistent with the existing Santa Ana River Watershed Bacteria Monitoring Program – Monitoring Plan, approved by the Santa Ana Water Board on March 11, 2016 (or the most current, Santa Ana Water Board approved revision).

- *Facility-specific Bacterial Indicator Reduction Plan* – By January 1, 2019, either (a) develop a facility-specific Bacterial Indicator Reduction Plan (or FBRP), or (b) join an updated watershed-based Bacterial Indicator Reduction Plan (within the Santa Ana River watershed).

For those entities that choose to develop an FBRP, the following requirements apply:[36]

- Dry Season – Develop an FBRP that details the plan and schedule for achieving the dry season bacterial indicator WLA as soon as feasible.

- Wet Season – Develop an FBRP that details the plan and schedule for achieving the wet season bacterial indicator WLA by December 31, 2025.

The dry and wet season FBRPs should include the following (Note: These requirements are essentially the same as the CBRPs described above in Section 4.2.1.1):

- The specific BMPs implemented to reduce the concentration of indicator bacteria from the facility and the water quality improvements expected to result from these BMPs.

- Any specific regional treatment facilities and the locations where such facilities will be built to reduce the concentration of indicator bacteria discharged from the facility and the expected water quality improvements to result when complete.

- The technical documentation used to conclude that the FBRP, once fully implemented, is expected to achieve attainment of either the dry season or wet season urban WLA for indicator bacteria by the specified attainment date.

- A detailed schedule for implementing the FBRP. The schedule must identify measurable and verifiable milestones to assess satisfactory progress toward meeting the dry and wet season WLAs.

- The specific metric(s) that will be established to demonstrate the effectiveness of the FBRP.

- Detailed descriptions of any additional BMPs planned, and the time required to implement those BMPs, in the event that data from the watershed-wide water quality monitoring program indicate that water quality objectives for indicator bacteria are still being exceeded after the FBRP is fully implemented.

[36] State Water Board's Small MS4 Permit refers to "dry season" and "wet season"; this permit text was intended to align with the "dry summer" and "wet winter" conditions compliance schedules in the TMDLs

Compliance with Small MS4 Permit Requirements Applicable to MSAR TMDLs

University of California Riverside

UC Riverside is an active participant in the MSAR Task Force and thus participates in the TMDL Watershed-wide Compliance Monitoring Program implemented through the RBMP. UC Riverside submitted a Dry Season FBRP to the Santa Ana Water Board on September 26, 2022 (University of California Riverside [UC Riverside], 2022). The FBRP includes a characterization of dry weather flow hydrology within the UC Riverside jurisdictional area relative to its location in the MSAR watershed. This analysis demonstrates no contribution of dry weather flow or indicator bacteria to downstream impaired waters during dry weather conditions. Accordingly, the analysis concluded that the UC Riverside campus is currently in compliance with the dry season WLA. The FBRP describes various MS4 program elements that ensure dry season compliance is maintained, including: (a) existing campus dry weather urban runoff management BMPs being implemented to reduce or eliminate dry weather urban runoff sources; and (b) active management of trash and transient encampment activity to minimize these as potential sources of indicator bacteria not just during dry conditions but wet weather conditions as well.

Because the university does not contribute indicator bacteria to downstream waters during dry weather conditions, the FBRP does not propose any new BMP programs or the development of any specific regional treatment facilities to reduce concentrations of indicator bacteria during dry season or dry weather conditions. However, the FBRP describes (a) long- range policies, goals and objectives for future land use related to water conservation that will ensure continued compliance with the dry season WLA; and (b) long-range planning goals and objectives for stormwater management which include the transition of campus lands to manage stormwater in a manner that replicates natural drainage patterns, promotes infiltration, and allows plants and soil to remove pollutants from stormwater runoff. These features also serve to capture any dry season urban runoff if it occurs.

Other Small MS4s: California Institute for Men, California Institute for Women, California Rehabilitation Center

The status of the preparation of a Dry Season FBRP is unknown for these facilities. None of these facilities are currently participants in the MSAR Task Force (and therefore participants in the RBMP); nor have any of these MS4s joined an updated watershed-based Bacterial Indicator Reduction Plan.

4.2.1.3 Agricultural Dischargers

Dairies and related facilities were permitted under General Order 99-11 at the time of adoption of the MSAR TMDLs. This permit has been revised and reauthorized three times since the TMDLs became effective:

- *General Order R8-2007-0001* – Adopted by the Santa Ana Water Board on September 7, 2007, this order incorporated the following tasks from the Phase 1 TMDL Implementation Plan: (a) Task 3 – Participate in a Watershed-wide Bacterial Indicator Water Quality Monitoring Program; and (b) Task 5.1 – Develop and Implement Bacterial Indicator Agricultural Source Evaluation Plans. Agricultural operators complied with TMDL Task 3 through participation in the MSAR TMDL Task Force. To comply with Task 5.1, as required agriculture operators submitted an AgSEP to the Santa Ana Water Board by November 30, 2007 (SAWPA, 2008d). The AgSEP was submitted on March 21, 2008 (SAWPA, 2008a). The Santa Ana Water Board approved the AgSEP on April 18, 2008 (Santa Ana Water Board, 2008).

- *General Order 2013-0001* – The 2007 CAFO General Order was reauthorized by the Santa Ana Water Board on June 7, 2013 (Santa Ana Water Board, 2013a). TMDL-related requirements included: (a) Continued participation in the Watershed-wide TMDL Monitoring Program (TMDL Task 3), which occurred through the MSAR Task Force; and (b) and notification to submit BASMP by December 31, 2014 (originally included as Task 5.2 in the Phase 1 TMDL Implementation Plan). As noted above, the BASMP was submitted to the Santa Ana Water Board in 2014 (CDM Smith, 2014).

- *General Order 2018-0001* - The CAFO General Order was again re-authorized in December 2018 (Santa Ana Water Board 2018c) and became effective on March 17, 2019. This Order, which remains in effect, requires continued implementation of the Watershed-wide Compliance Monitoring Program. In addition, Section IV.H.1 of the Order states the following regarding compliance with the Wet Winter Conditions WLA:

  > *"If the analysis of the water quality monitoring results does not indicate that the CAFO waste load allocations are being met; that waste load allocations are not likely to be met by December 31, 2025; and that water quality objectives are not being attained, the Discharger, in cooperation with other stakeholders, must propose improvements to watershed-wide projects or programs that may improve water quality."*

Except as allowed for by the temporary suspension of the REC-1 beneficial use under high flow suspension conditions if after December 31, 2025, the discharger fails to comply with the provisions of IV.H.1 of the General Order (see above paragraph), the discharger must immediately comply with the TMDLs Wet Winter Conditions WLAs for *E. coli* (Santa Ana Water Board, 2019b).

4.3 Status of Compliance with MSAR TMDLs

Task 3 in the Phase 1 TMDL Implementation Plan requires submittal of a Triennial Report

every three years with the first report being due by February 15, 2010. Per the TMDLs, the purpose of this report is to facilitate review and update numeric targets and/or the TMDLs, WLAs, LAs and evaluate compliance with the WLAs/LAs (Santa Ana Water Board 2005e, 2019b). The following sections provide a summary of the status of compliance with the MSAR TMDLs.

4.3.1 Compliance with WLAs (Urban Dischargers and CAFOs)

The 2023 Triennial Report provides the most recent assessment of compliance with WLAs (SAWPA, 2023a). The key findings from this compliance assessment are provided below. Previous assessments are available in SAWPA (SAWPA, 2010a, 2013, 2017b, 2020 and 2023a).

4.3.1.1 Dry Weather Conditions

Tables 4-1 and 4-2 summarize the frequency of compliance with geometric mean and single sample WLAs and LAs for *E. coli* (geometric mean maximum: 113 MPN/100 mL; single sample maximum: 212 MPN/100 mL) during dry weather in the 2020, 2021 and 2022 warm seasons and 2019-2020, 2020-2021 and 2021-2022 cool seasons, respectively. The frequency of compliance (geometric mean and single sample value) varies from site to site.

As noted in Table 4-1, non-compliance with the Dry Summer Conditions WLAs and LAs remains relatively common.

Table 4-1. Frequency of Exceedance of WLAs/LAs for *E. coli* during the 2022, 2023 and 2024 Warm Seasons, Dry Weather Conditions Only (compliance assessment based on Dry Summer Conditions WLAs/LAs)

Site	Geometric Mean Criterion Exceedance Frequency (%)			Single Sample Value Exceedance Frequency (%)		
	2022	2023	2024	2022	2023	2024
Prado Park Lake	19%	31%	19%	30%	30%	15%
Chino Creek	63%	100%	100%	40%	70%	90%
Mill-Cucamonga Creek	33%	50%	83%	25%	45%	35%
Santa Ana River at MWD Crossing	100%	100%	69%	95%	75%	55%
Santa Ana River at Pedley Ave.	100%	86%	38%	30%	60%	45%

Table 4-2. Compliance with WLAs/LAs for *E. coli* during the 2022, 2023 and 2024 Cool Seasons,[1] under Dry Weather Conditions Only (Note: Only one geometric mean can be calculated from the five-sample cool season data set – table provides that value)

Site	Geometric Mean Value (Compliance Status)			Single Sample Value Exceedance Frequency (%)		
	2022	2023	2024	2022	2023	2024
Prado Park Lake	228 (Exceeds)	38 (Complies)	86 (Complies)	60%	0%	0%
Chino Creek	60 (Complies)	138 (Exceeds)	306 (Exceeds)	20%	40%	80%
Mill-Cucamonga Creek	116 (Exceeds)	98 (Complies)	504 (Exceeds)	40%	20%	60%
Santa Ana River at MWD Crossing	214 (Exceeds)	71 (Complies)	248 (Exceeds)	60%	0%	60%
Santa Ana River at Pedley Ave.	158 (Exceeds)	136 (Exceeds)	238 (Exceeds)	20%	40%	60%

1 Cool season sampling occurs in October – November during a time period that overlaps the Dry Summer Conditions and Wet Winter Conditions seasons as defined by the TMDLs. However, because the WLAs/LAs are the same for both conditions, the compliance status can still be evaluated.

Table 4-3. Wet Weather Events *E. coli* (MPN/100 mL) Sample Results during Active Wet Weather and Post-Storm Baseflow Condition, 2021 – 2024

Compliance Site	Active Wet Weather Samples	Post-Storm Event Samples[1]
2021-22 Wet Weather Event (March 29 – April 1, 2022)		
WW-C3 (Prado Park Lake)	41	41, 62, 150
WW-C7 (Chino Creek at Central Avenue)	8700	960, 490, 74
WW-M6 (Mill-Cucamonga Creek below Wetlands)	8200	710, 230, 200
WW-S1 (Santa Ana River at MWD Crossing)	16000	420, 280, 130
WW-S4 (Santa Ana River at Pedley Avenue)	16000	1000, 260, 140
2022-2023 Wet Weather Event (Nov 8 – Nov11, 2022)		
WW-C3 (Prado Park Lake)	2200, 24000	510, 36
WW-C7 (Chino Creek at Central Avenue)	7700	1400, 2000, 17
WW-M6 (Mill-Cucamonga Creek below Wetlands)	11000, 3700	1000, 36
WW-S1 (Santa Ana River at MWD Crossing)	24000, 16000, 34000	100
WW-S4 (Santa Ana River at Pedley Avenue)	13000, 8700, 2100	52
2023-24 Wet Weather Event (Feb 20 – Feb 23, 2024)		
WW-C3 (Prado Park Lake)	20000, 24000	11000, 24000
WW-C7 (Chino Creek at Central Avenue)	3200, 10000	1300, 6700
WW-M6 (Mill-Cucamonga Creek below Wetlands)	12000, 3900	750, 220
WW-S1 (Santa Ana River at MWD Crossing)	14000, 5800	930, 360
WW-S4 (Santa Ana River at Pedley Avenue)	16000, 14000	1500, 270

1 Best professional judgement was used in interpretation of co-located USGS 15-minute measurement interval hydrographs to identify the time when runoff returned to pre-event conditions and classification of subsequent samples as “post-storm”. A summary of this analysis is provided in annual monitoring program reports.

4.3.1.2 Wet Weather Conditions

Table 4-3 summarizes the single sample value results for all sites observed during each wet weather sample event in 2021-22, 2022-23, and 2023-24. The most common pattern is to have the highest *E. coli* concentration observed in the sample collected during active wet weather. Post storm event sample results are typically much lower.

The currently approved wet weather sampling protocol for the MSAR TMDLs results in the collection of only four samples around a single wet weather event during each wet season. Currently, it is not possible to assess compliance with the Wet Winter Conditions *E. coli* geometric mean WLA/LAs (which require a minimum of 5 samples over a 30-day period). The *E. coli* WLAs/LAs also state that, "not more than 10% of the samples exceed 212 organisms/100 mL for any 30-day period." Given that the wet weather event sampling occurs within a four-day period and only results in the collection of four samples, the applicability of this compliance metric to the wet weather data is limited. Accordingly, it is not possible at this time to appropriately assess compliance with the Wet Winter Conditions WLAs/LAs. To address this data gap, not only will wet weather monitoring need to be increased, but an approach will need to be developed that considers how compliance should be assessed if a high flow suspension is applicable.

4.3.2 Compliance with LAs Assigned to Agricultural Operators

The LAs in the MSAR TMDLs applicable to discharges from agricultural runoff (see Table 3-1) are the same as the WLAs applicable to discharges of urban runoff including stormwater and CAFOs. Section 4.3.1 above summarizes the status of compliance with WLAs, which cross apply to the LAs applicable to agricultural operators. Accordingly, the information provided above is not repeated here.

4.3.3 Compliance with LAs Assigned to Natural Sources

The LAs applicable to natural sources of bacterial indicators are the same as the LAs applicable to agricultural operators (see Table 3-1). The MSAR Task Force has periodically assessed contributions of bacteria from various sources, including non-urban/non-agricultural sources. Even though these assessments have identified sources of bacteria (ranging from human to feral pigs), these sources are insufficient to account for all the bacteria in the watershed.

5. Proposed Revisions to MSAR TMDLs

5.1 Introduction

Task 6 in the MSAR TMDLs Phase 1 TMDL Implementation Plan (Review/Revision of the Bacterial Indicator TMDL, "TMDL Reopener") provides the basis for revising or reopening the MSAR TMDLs through the Basin Plan amendment process (Santa Ana Water Board, 2005e, pages 14-15 of 15):

> "...Based on results generated through the monitoring programs, special studies, modeling analysis, efforts of the Storm Water Quality Standards Task Force...and/or special studies by one or more responsible parties, changes to the TMDLs, including revisions to the numeric targets, WLAs and LAs, may be warranted. Such changes would be considered through the Basin Plan Amendment process."

The MSAR TMDLs need modification because of regulatory changes, new scientific data, and lessons learned through the adaptive management process of the Phase 1 TMDL Implementation Plan.

Table 5-1 summarizes the elements of the existing TMDLs proposed for modification as part of this limited revision. Section 5.2 below provides a more detailed regulatory and technical rationale for each of these proposed revisions. In addition to the specific proposed limited revision to the MSAR TMDLs, this Technical Report also identified other areas where additional revisions to the MSAR TMDLs may be recommended in the future. These are discussed below in Section 5.3.

5.2 Proposed Revisions to the MSAR TMDLs

This section provides a summary of the proposed limited revision to the MSAR TMDLs. For each section the specific proposed revision is stated. This is followed by the technical or regulatory justification for the proposed change.

5.2.1 Extend the Wet Winter Conditions Compliance Date

5.2.1.1 Proposed Revision

Table 5-9x in the MSAR TMDLs (Basin Plan Table 6-1x) established two schedules to comply with the TMDLs, WLAs and LAs for bacterial indicators in MSAR waterbodies (Santa Ana Water Board, 2005e):

- Dry Summer Conditions: April 1 through October 31, as soon as possible, but no later than December 31, 2015.

- Wet Winter Conditions: November 1 through March 31, as soon as possible, but no later than December 31, 2025.

Table 5-1. Summary of Proposed Revisions to the MSAR TMDLs

TMDL Component	Proposed Revision	Primary Justification
Wet Winter Conditions Compliance Date	Extend the final Wet Winter Conditions compliance date from December 31, 2025 to December 31, 2035	A. Priority of TMDL implementation has focused on dry weather conditions when recreational use protection is most likely to occur; accordingly, data from wet weather conditions is limited B. Findings to date demonstrate challenges to comply with Dry Summer Conditions TMDLs C. Feasibility of compliance with WLAs/LAs under Wet Winter Conditions needs additional consideration due to the complexities associated with meeting bacterial indicator standards during these conditions D. Opportunity to consider changes in baseline watershed characteristics such as land use since adoption of the TMDLs
Phase 2 Implementation Plan	Incorporate a Phase 2 Implementation Plan to replace the implemented Phase 1 Implementation Plan, with emphasis on compliance with Wet Winter Conditions TMDLs	2005-adopted TMDLs included only a Phase 1 Implementation Plan, which has been implemented; establishment of new tasks will support attainment of Wet Winter Conditions TMDLs

Section D (Seasonal Variations/Critical Conditions) of the TMDLs, provides the following explanation for the different compliance schedules (Santa Ana Water Board 2005e, page 5 of 15):

> As shown in Table 5-9x [Table 6-1x], different compliance dates are specified for dry season discharges and wet season discharges. This ensures that dry season recreational beneficial uses are addressed on a priority basis. Additional time is allowed to address complexities associated with the control of wet weather discharges.

It is proposed that the compliance date associated with the Wet Winter Conditions TMDLs, WLAs and LAs be changed from December 31, 2025 to December 31, 2035. Section 5.2.3 below provides the proposed Phase 2 TMDL Implementation Plan to facilitate efforts to comply with the Wet Winter Conditions TMDLs - WLAs and LAs by the proposed new

compliance date. The basis for this 10-year extension is provided below.

5.2.1.2 Justification for Proposed Revision

Three key reasons, which are discussed in more detail below, provide the basis for the proposed extension of the existing TMDLs Wet Winter Conditions compliance schedule:

- To date, MSAR TMDL implementation activities have focused on efforts to comply with the Dry Summer Conditions TMDLs when the REC-1 beneficial use is most likely to occur in the watershed.

- Findings from studies conducted since 2007 have demonstrated the challenges of achieving compliance during dry weather. Given the increased volume of water to be managed during wet weather, the challenge of complying under the Wet Winter Conditions TMDLs is expected to be orders of magnitude greater.

- Original TMDLs peer review comment noted that treating or managing large quantities of rainfall runoff to reduce or eliminate sources of bacterial indicators would pose significant logistical, technical, and economic difficulties. This finding has not changed since the 2005 TMDLs adoption. Thus, consideration of the feasibility of structural BMPs to comply with TMDLs WLAs/LAs during wet weather requires additional investigation.

The following sections provide the regulatory and/or technical basis for each of the reasons provided above to justify an extension of the Wet Winter Conditions compliance schedule.

Priority of Implementation Has Focused on Recreational Use Protection When It Most Likely Occurs

The MSAR TMDLs recognized that protection of recreational uses during the dry season was a higher priority than protection of recreational uses during the wet season. This was a key justification for establishing separate compliance schedules for dry and wet seasons (Santa Ana Water Board 2005e, page 5 of 15, underline emphasis added):

> "As shown in Table 5-9x [Table 6-1x], different compliance dates are specified for dry season discharges and wet season discharges. <u>This ensures that dry season recreational</u> <u>beneficial uses are addressed on a priority basis</u>. Additional time is allowed to address complexities associated with the control of wet weather discharges."

Phase 1 TMDL implementation began in 2006 through the work of the MSAR Task Force. Early TMDL deliverables approved by the Santa Ana Water Board (in particular, Task 3 - Monitoring Plan and Task 4.1 - USEP) purposefully targeted implementation activities not just to meet the Dry Summer Conditions TMDLs WLAs/LAs, but WLAs/LAs during dry

weather flow regardless of the season. In particular:

- *Phase 1 TMDL Task 3 – Watershed-wide Bacterial Indicator Water Quality Monitoring Program* – The selection of watershed-wide monitoring sites for this program was based on two factors: (1) sites should be located on waterbodies that are impaired and thus incorporated into the TMDLs; and (2) sites should be located in reaches of the impaired waterbodies where REC-1 activity is likely to occur, i.e., there is an increased risk from exposure to pathogens (SAWPA, 2008c).

- *Phase 1 TMDL Task 4.1 – Develop and Implement Bacterial Indicator Urban Source Evaluation Plan (USEP)* – The MSAR TMDLs required urban dischargers to submit a USEP specific activities, operations, and processes contributing bacterial indicators to watershed waterbodies (Santa Ana Water Board, 2005e). A central component of the approved USEP was the "Risk Characterization Framework," which was used to rank and prioritize investigation sites (SAWPA, 2008b). Developed by the USEPA and detailed on page 3-1, the framework incorporates three key factors which guide the prioritization of follow-up investigations for urban bacterial indicator sources:

    - *Exceedance Factor – The first factor to be evaluated in the framework is the frequency and magnitude by which the bacterial indicator exceeds the water quality objective. The greater the frequency and magnitude of recorded exceedances, the higher the likelihood that the contamination can be tracked back to its source. Intermittent, low intensity events are more difficult to detect and, therefore, more difficult to trace;*

    - *Contagion Factor – Human beings, particularly children are believed to be at greater risk of infection from water-borne pathogens generated by other people. Accordingly, the risk of illness resulting from recreational use* [REC-1] *is believed to be highest where microbiological methods (e.g., Bacteroides) indicate the probable presence of human pathogens. After human sources, exposure to fecal contamination from agricultural animals is the next most important concern; and*

    - *Exposure Factor - A higher investigation/implementation priority should be assigned to locations and conditions where recreational activities are most likely to occur. Exceedances that occur in natural channels, during warmer months with relatively moderate flows, merit a higher priority than those that may occur in a concrete flood control channel during a winter rainstorm. This different priority is based on the assumption that the number of persons likely to be exposed is much higher in the first case than in the second* (SAWPA, 2008b).

The 2010 MS4 permits authorizing discharge of stormwater in portions of Riverside and San Bernadino Counties within the Santa Ana Region further emphasized the importance

of focusing on sources of bacterial indicators during the Dry Summer Conditions (Santa Ana Water Board, 2010a). These permits required urban dischargers to develop CBRPs to establish a BMP-based program to comply with the WLAs applicable during Dry Summer Conditions. Importantly, the Dry Summer Conditions addressed through implementation of the CBRPs effectively address dry weather conditions, regardless of season. The approved CBRPs incorporated the risk-based approach (as originally envisioned in the USEP) into its program to identify, investigate and mitigate sources of bacterial indicators (RCFC&WCD, 2011).

A requirement for development of the Dry Summer Conditions, CBRP was to provide a schedule for the development of a CBRP to address the Wet Winter Conditions WLA/LAs. On page 4-1 of RCFC&WD's CBRPs scheduled development of Wet Winter Conditions specifies:

> *The RWQCB [Regional Water Quality Control Board] will issue the next MS4 permit on or after January 29, 2015 when the existing MS4 permit expires. Similar to the requirements contained in the existing MS4 permit, it is recommended that the next MS4 permit includes a requirement to develop a CBRP for wet weather conditions. Given the expected challenges associated with compliance with wasteload allocations under wet weather conditions, the wet weather CBRP will require more time to develop. Accordingly, the earliest a draft wet weather condition CBRP will be submitted to the RWQCB for review will be 24 months following adoption of the next MS4 permit. (RCFC&WCD, 2011)*

At this time, reauthorized permits have not been adopted and the MS4 Programs continue to operate their MS4 facilities as authorized under the 2010 MS4 Permits. Thus, the trigger to develop a Wet Winter Conditions CBRP has not occurred, and given the challenges associated with compliance with the Dry Summer Conditions TMDLs, the MS4 permitees have remained focused on continued implementation of the CBRPs applicable to Dry Summer Conditions.

Demonstrated Challenges to Comply with Dry Summer Conditions TMDLs/WLAs/LAs

Implementation of the USEP and CBRPs has been the key driver for the process to address sources of bacterial indicators in dry weather flows in urban runoff.[37] The CBRP laid out a three-part strategy: Prioritize, Investigate and Mitigate (**Figure 5-1**). MS4 outfalls (Tier 1 sites) with the potential to discharge dry weather flows

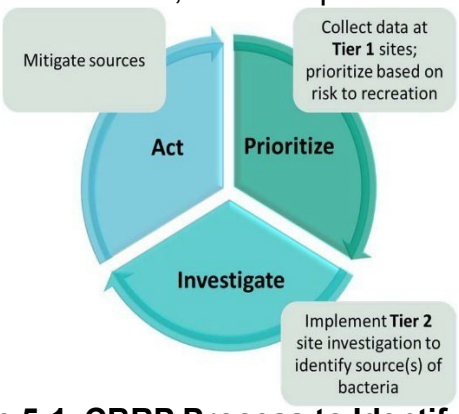


Figure 5-1. CBRP Process to Identify Sources of Bacterial Indicators in Urban Runoff in the MSAR Watershed

[37] Even though the focus of USEP/CBRP implementation was on compliance with the TMDL's "Dry Summer Conditions" WLAs and LAs (specifically required by MS4 permits), mitigation activities to address bacterial sources during dry conditions are effective regardless of the season.

from MS4s directly to a downstream impaired waterbody are prioritized based on periodic data collection activities in the MSAR watershed. Priorities were based on the potential risk to recreational uses in the receiving water (e.g., *E. coli* concentration and presence of human sources of bacteria). Prioritization focused investigation activities to identify and mitigate sources of bacterial indicators. Where investigations identified a specific bacteria source, the source was mitigated as soon as possible. In cases where a specific source was not apparent, other mitigation activities have been implemented, e.g., construction of storm drain to sewer diversion projects.

Table 5-2 summarizes the key prioritization events completed to date based on monitoring results and subsequent projects that have been implemented or continue to be implemented.[38] As can be seen, the highest priority waters for follow-up Tier 2 investigations and/or mitigation activities have changed over time (SAWPA, 2013, 2017b). For example, Table 3-16 in SAWPA [2020] that provides a more detailed illustration of how priorities change over time. These changes occur for varying reasons – not just because of variability in *E. coli* concentrations or presence/absence of human sources of bacteria, but because the volume of dry weather flow varies (see Section 2.2.2). Variability in the characteristics of the urban runoff that discharges to a downstream impaired waterbody creates challenges in determining where best to dedicate resources to mitigate a potential urban source of bacteria.

At the same time dry weather flow characteristics in MS4s are found to be variable, receiving waterbody characteristics have changed over time. Section 2.2.1 illustrated how the primary source of dry weather flows in the MSAR watershed (tertiary treated POTW effluent) has declined markedly since adoption of the TMDLs in 2005 (e.g., see Figure 2-4).

These findings illustrate the ongoing compliance challenges associated with the MSAR TMDLs WLAs/LAs applicable to Dry Summer Conditions. Although the MS4 programs are found to be in compliance with their BMP-based CBRPs, it is clear that additional mitigation of dry weather urban sources of bacterial indicators through continued implementation of the three step cyclical approach (prioritize, investigate and mitigate) will be necessary for impaired receiving waters in the MSAR watershed to attain water quality objectives under dry weather conditions (Santa Ana Water Board, 2018a, 2018b).

Against this backdrop is the need to also comply with the Wet Winter Conditions WLAs/LAs. Even considering potential application of the high flow suspension provision (see discussion in Section 5.2.2 below), the volume of wet weather urban runoff that would need to be captured and treated is likely substantial. For example, **Figure 5-2** illustrates the weather (rainfall) conditions that the existing Dry Summer Conditions CBRP addresses. That is, the existing CBRPs address the condition shown on the left side of Figure 5-2 - when daily rainfall is ≤ 0.1 inches. This ≤ 0.1 inch threshold is based on the definition of “dry weather” contained in the CBRPs (RCFC&WCD, 2011, see Attachment F).

[38] For more detailed information about these projects, see TMDL Triennial Reports 2020 and 2023a.

By default (per the Basin Plan), a high flow suspension that temporarily suspends recreational uses would apply to days with a daily rainfall of ≥ 0.5 inches (see right side of Figure 5-2; although this threshold could be modified on a site-specific basis, see Section 5.2.2) (Santa Ana Water Board, 2019b). Therefore, the need to mitigate bacterial indicators present in flows that occur when the high flow suspension would automatically apply is not necessary because recreational uses would be suspended. However, when the daily rainfall is less than 0.5 inches, but greater than 0.1 inches (middle portion of Figure 5-2), recreational uses apply and sources of bacterial indicators that cause exceedances of WLAs/LAs during those flow conditions will need to be mitigated to comply with the TMDLs requirements applicable during the Wet Winter Conditions.

To date, the most effective method to mitigate or substantially reduce *E. coli* loads in dry weather flow is to capture and recharge (e.g., see Figure 2-6) or capture and treat (e.g., either through sanitary sewer diversions such as Phoenix Storm Drain) or through wetlands (e.g., Mill Creek wetlands) (SAWPA, 2023a). In comparison to the volume of water these dry weather projects can manage, the volume of flow that could occur within MS4 subwatersheds that drain into impaired waters under wet weather could be substantial.

Table 5-2. Prioritization of Tier 1 Waterbodies for Follow-up Investigation to Mitigate Sources of Bacterial Indicators

Priority Identified	Highest Priorities	Outcomes to Date
• SAWPA (2009) • Data Analysis Report (SAWPA, 2009) • Based on 2007-2009 data collection • Provided the basis for the CBRPs	Box Springs Channel	Investigation showed source of bacterial indicators was a cross-connection with a wastewater sewer; repaired in 2008.
	Chris Basin	Basin modification project initiated in 2010. Lengthy permit process/approval process to modify Basin; Retrofit completed in 2022
	County Line Channel	• Priority lowered by anticipated approval of UAA that proposed removal of REC-1 use from downstream receiving waterbody Cucamonga Creek (adopted by Santa Ana Water Board in 2012; approved by USEPA in 2015) • Downstream project diverts portion of Mill-Cucamonga Creek flow below Cucamonga Creek into Mill Creek wetlands for treatment before discharge back to creek – completed in 2014
• Based on 2012 data collection • 2013 Triennial Report (SAWPA, 2013)	Eastvale Lines D& E	Storm drain to sewer diversion project initiated in 2015. Still working with Jurupa Valley Sewer District on potential to divert dry weather flows to sewer for treatment
	Anza Drain	Anza Drain homeless encampment clean-up project completed in 2019
	San Sevaine Channel	Flow diversion completed in 2004; additional flow diversions under consideration
	Boys Republic South Channel	Tier 2 investigation conducted by City of Chino Hills that identified and mitigated human bacteria sources
	Upper Chino Creek	In Table 4-5, the volume of dry weather flow had greatly declined by 2022 (SAWPA, 2023a).
	Cypress Channel	Tier 1 site no longer contributed dry weather flow to downstream waters in 2019
	Chris Basin	See above – Efforts continued to work with agencies to obtain permits/approvals
	Eastvale Lines A & B	• Priority lowered by anticipated approval of UAA that proposed removal of REC-1 use from downstream receiving waterbody Cucamonga Creek (adopted by Santa Ana Water Board in 2012; approved by USEPA in 2015) • Downstream project diverts portion of Mill-Cucamonga Creek flow below Cucamonga Creek into Mill Creek wetlands for treatment before discharge back to creek – completed in 2014
• Based on 2019 data collection • 2020 Triennial Report (SAWPA, 2020)	Magnolia Street Drain	Comprehensive investigations have been occurring (SAWPA 2023a). The City of Riverside has initiated a storm drain to sewer diversion project for this waterbody.
	Sunnyslope Channel	Evaluation of potential approach to manage dry weather flows ongoing
	Anza Drain	Homeless encampment removed from Hole Lake area in 2019
	Phoenix Storm Drain (Lower Priority)	Although rated as a lower priority for mitigation, a storm drain to sewer diversion project was completed in 2021

Feasibility of Compliance with Wet Winter Conditions WLAs/LAs during Wet Weather Flows

The feasibility to comply with the TMDLs WLAs/LAs in wet weather flow conditions, which is necessary to meet the TMDLs target(s) prescribed for the Wet Winter Conditions, was evaluated to support justification of the extended compliance deadline in this proposed limited revision of the TMDLs.

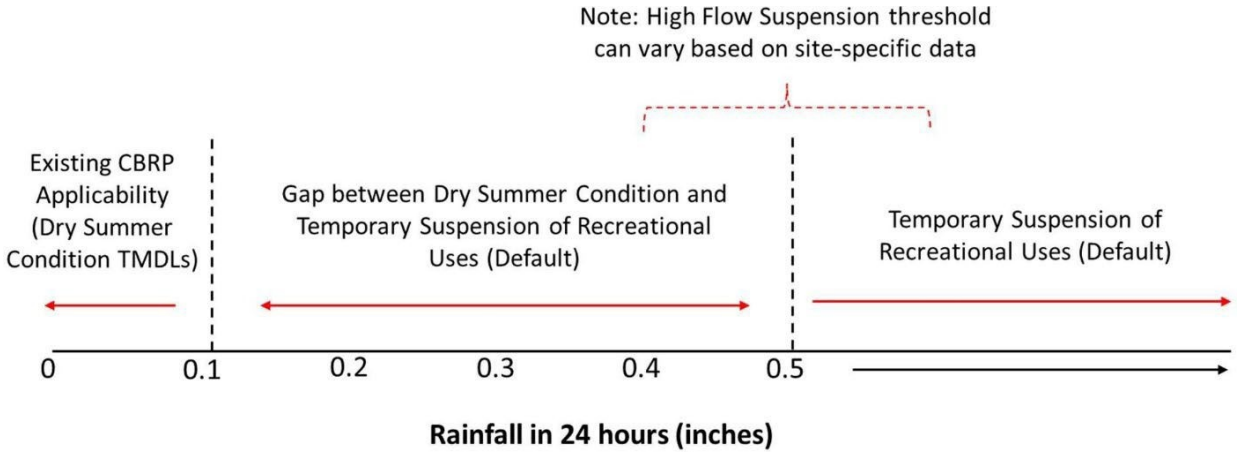


Figure 5-2. Rainfall Conditions and Potential Applicability of a High Flow Suspension (based on Basin CBRP and Basin Plan, see text).

Even though the adopted Wet Winter Conditions TMDLs specify a season during which they are applicable (November 1 through March 31), the documentation supporting the adoption of the TMDLs clearly demonstrates that the reason for establishing a separate compliance schedule for the Wet Winter Conditions was recognized because of the potential challenges to comply with the TMDLs during wet weather flows (e.g., see Santa Ana Water Board 2005c with discussion regarding reasons for proposed changes to the draft TMDLs in June 2005). In addition, it was recognized that it may be necessary to reopen the TMDLs after the ongoing work of the SWQSTF was completed.[39]

Ultimately, the 2012 Basin Plan amendment not only included the high flow suspension during unsafe conditions, but it also included language regarding the controllability of bacterial indicators in the MS4. Specifically, the Basin Plan states the following:

> *Controllable bacteria sources refer to any bacteria indicator source that can be controlled by treatment or management methods. Requirements for the application of Best Available Treatment technology (BAT) and Best Conventional Treatment technology (BCT) apply to some of these sources(e.g., POTWs); in other cases, such as discharges regulated under the areawide municipal separate storm system permits ("MS4" permits), reasonable actions to reduce or eliminate the contribution of these sources to the maximum extent practicable are required. These include the*

[39] The work of the SWQSTF is now being implemented through the work of the SAWPA RWQMTF: https://sawpa.org/task-force/regional-water-quality-monitoring-task-force/

implementation of best management practices or other mechanisms. (Santa Ana Water Board, 2019b, p. 5-107)

This Basin Plan language recognizes that sources of bacterial indicators in MS4s are to be reduced or eliminated to the "maximum extent practicable." What that means with regards to the management of controllable sources of bacterial indicators in wet weather flows in the MSAR will be evaluated with collaborative efforts as a key task in a future phase of TMDL implementation plan.

5.2.2 Clarify Applicability of Basin Plan High Flow Suspension to MSAR TMDLs

The MSAR TMDLs were developed before the adoption of the high flow suspension into the Basin Plan. Even though the high flow suspension provision was incorporated into the Basin Plan in 2012 (Santa Ana Water Board, 2012d), the MSAR TMDLs have not been revised to incorporate the provision. Moreover, the 2012 Basin Plan amendment did not include any language that explicitly stated that the high flow suspension provision would apply to the existing MSAR TMDLs.

5.2.2.1 Proposed Revision

The 2012 Basin Plan amendment not only established a high flow suspension provision to temporarily suspend recreational uses under specified conditions, but it also identified inland waters where the high flow suspension may be applied (Santa Ana Water Board, 2012d). Appendices VII and IX within the 2019 amendment further clarified the high flow suspension provision may be applied to the following waterbodies included in the MSAR TMDLs: Santa Ana River Reach 3 and concrete-lined portions of Chino Creek Reaches 1 and 2 (Santa Ana Water Board, 2019b). While the high flow suspension provision could also have been applied to Cucamonga Creek Reach 1, the 2012 Basin Plan amendment removed the REC-1 use from this waterbody through a UAA that was approved by Region 9 of the USEPA (Santa Ana Water Board, 2012d). Given the applicability of the high flow suspension provision to selected impaired waters in the MSAR watershed, it is proposed that a study be conducted to develop a methodology for use in the MSAR watershed to support assessments of attainment with the MSAR TMDLs when high flow suspension conditions apply. Application of the high flow suspension to an impaired waterbody must be consistent with Basin Plan's high flow suspension provisions.

The proposed Phase 2 TMDL Implementation Plan includes a specific task to determine how to best apply the high flow suspension as part of the wet weather compliance strategy (See Section 5.2.3 below, in particular Task 5).

5.2.2.2 Justification for Proposed Revision

The MSAR TMDLs were adopted in 2005, seven years before the high flow suspension provision was incorporated into the Basin Plan. Therefore, the TMDLs include language that is inconsistent with the Basin Plan. For example, MSAR TMDLs Section D (Seasonal Variations/Critical Conditions, Santa Ana Water Board, 2005e, page 5 of 15) states:

> The Basin Plan REC-1 fecal coliform objectives apply year-round; no distinctions based on climate or other conditions that may affect actual REC-1 use are specified.[2]

However, the referenced Footnote 2 provided the following information (Santa Ana Water Board, 2005e, page 5 of 15):

> The SWQSTF may recommend changes to the REC-1 objectives to reflect conditions, such as high flows, that affect REC-1 use. Any such changes will be considered through the Basin Planning process.

A key outcome of the work of the SWQSTF was the recommendation that the Basin Plan be revised to temporarily suspend the REC-1 beneficial use when conditions were deemed unsafe to recreate in the waterbody. The 2012 Basin Plan amendment incorporated this recommendation, establishing the conditions when the REC-1 use could be suspended and where such a suspension would apply. **Table 5-4** provides excerpts from the Basin Plan describing the conditions when a high flow suspension may be applied.

Section 5.2.1 above describes some of the expected challenges to achieving compliance with WLAs and LAs during wet weather events (see discussion Reasons B and C regarding proposed extension of wet winter condition compliance schedule). Revision of the MSAR TMDLs to explicitly allow application of a high flow suspension to temporarily suspend recreational uses when the use does not exist, is expected to be a key tool to support development of strategies to comply with TMDLs, WLAs and LAs applicable to wet weather discharges during a future TMDL revision. The proposed Phase 2 TMDL Implementation Plan includes a specific task to determine the applicability of high flow suspension as part of the wet weather compliance strategy (See Section 5.2.3 below, in particular Task 5).

5.2.3 Establish Phase 2 TMDL Implementation Plan

Section 5.2.1 describes the proposal to extend the MSAR TMDLs schedule to comply with the TMDLs, WLAs and LAs applicable to the Wet Winter Conditions. To support the extension request, the proposed limited revision to the MSAR TMDLs includes a proposed Phase 2 TMDL Implementation Plan. The tasks included in this Plan are based on the approval of the proposed limited revision to the TMDLs presented herein.

5.2.3.1 Proposed Revision

Table 5-9y in the 2005 adopted TMDLs included a “Phase 1” TMDL Implementation Plan (see Table 5-9y, (Santa Ana Water Board, 2005e). Paragraph 17 in the adoption resolution for the TMDLs anticipated additional implementation phases may be needed:

> The Regional Board has considered the costs associated with implementation of this amendment, as well as costs resulting from failure to implement bacteria control measures necessary to prevent adverse effects on beneficial uses. The implementation plan in the TMDLs/Basin Plan amendment, which includes extended compliance schedules and employs a phased TMDLs approach to provide for refinement based on additional studies and analyses, will ensure that implementation expenditures are reasonable and fairly apportioned among responsible parties (emphasis added). (Santa Ana Water Board, 2005e)

Section 4 describes how each of the Phase 1 tasks were implemented. To support the proposed extension of the Wet Winter Condition compliance schedule, a Phase 2 TMDL Implementation Plan is proposed for adoption as part of the revision of the MSAR TMDLs. While most Phase 2 tasks are focused on compliance with the Wet Winter Condition WLAs/LAs, the proposed Phase 2 Implementation Plan includes some tasks that support ongoing efforts to comply with the Dry Summer Conditions WLAs/LAs. **Table 5-3** below summarizes the key elements and schedule associated with the proposed Phase 2 implementation tasks. **Figure 5-2** illustrates the overall schedule for completion of these tasks over the 10-year proposed compliance schedule extension.

Task 1 – Stakeholder Coordination

Santa Ana Water Board staff worked with stakeholders during development of the TMDLs through a TMDL Workgroup (facilitated and administered by SAWPA) established in August 2001. Subsequently, the MSAR Task Force was established in January 2006 (see Section 3.4). Administered by SAWPA, the MSAR Task Force included many of the same entities that participated in the original TMDL Workgroup.

Since its inception in 2006, the MSAR Task Force and its members have worked collaboratively to implement elements of the Phase 1 TMDL Implementation Plan, including collaboration on numerous studies that have supported efforts to understand bacterial indicator sources in the MSAR watershed. Recognizing the success of the MSAR Task Force and its efforts to date, the Santa Ana Water Board supports continuation of the MSAR Task Force and its collaborative efforts for implementation of the Phase 2 TMDL Implementation Plan.

During Phase 2, the Santa Ana Water Board encourages continued stakeholder coordination through the MSAR Task Force and recommends that the MSAR Task Force meet routinely through Phase 2 of TMDL implementation. Further, where identified, it is expected that certain Phase 2 TMDLs tasks may be implemented by the MSAR Task Force on behalf of its members. However, ultimate responsibility for implementation of various tasks falls on the individual agencies and/or entities identified as such tasks are

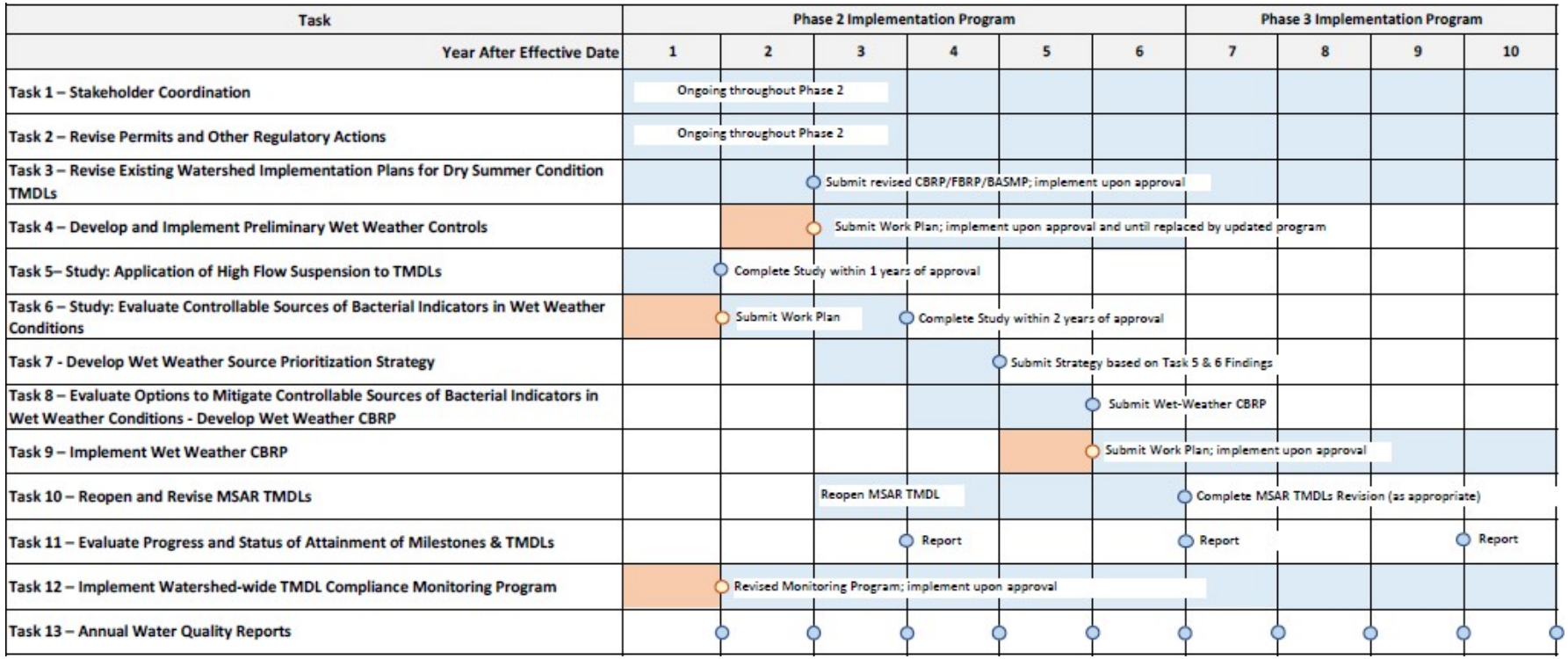
incorporated into permits or other regulatory actions.

Table 5-3. Proposed Phase 2 TMDL Implementation Plan Tasks for Revised MSAR TMDLs

Task	Description	Compliance Date As Soon As Possible but No Later Than
Task 1	Stakeholder Coordination	Ongoing throughout Phase 2
Task 2	Revise Permits and Other Regulatory Actions	As appropriate, when needed, at the discretion of the regulatory agency.
Task 3	Revise Existing Watershed Implementation Plans (Comprehensive Bacteria Reduction Plans (CBRPs)) for the Dry Summer Conditions TMDLs.	Phase 1 MS4s submit revised CBRP (or equivalent watershed management plan) to the Regional Board within two (2) years of revised TMDLs being incorporated into permit or other order, as applicable; Phase II/Small MS4s submit revised FBRPs to the Santa Ana Water Board within two (2) years of revised TMDLs being incorporated into permit or other order, as applicable. Continue to implement existing CBRP or FBRP, as applicable, until revised CBRP/FBRP (or equivalent watershed management plan) is approved by the Santa Ana Water Board or the Executive Officer of the Santa Ana Water Board.
Task 4	Develop and Implement Preliminary Wet Weather Controls	Within two (2) years of revised TMDLs effective date, submit Work Plan to the Santa Ana Water Board.
Task 5	Study: Application of High Flow Suspension to TMDLs	Within one (1) year of revised TMDLs effective date, submit Study to the Santa Ana Water Board.
Task 6	Study: Evaluate Controllable Sources of Bacteria Indicators in Wet Weather Conditions	Within one (1) year of revised TMDLs effective date, submit Work Plan to the Santa Ana Water Board Executive Officer for review and approval. Within two (2) years from Santa Ana Water Board Executive Officer's approval of the Work Plan, submit completed study to the Santa Ana Water Board Executive Officer.
Task 7	Develop Wet Weather Source Prioritization Strategy	Within four (4) years of revised TMDLs effective date, or within one (1) year of submittal of the Study in Task 6, whichever is later, submit Wet Weather Source Prioritization Strategy to Santa Ana Water Board Executive Officer.
Task 8	Evaluate Options to Mitigate Controllable Sources of Bacterial	Within five (5) years of revised TMDLs effective date, or within one (1) year of submittal of the Strategy in Task 7, whichever is later, submit wet weather

	Indicators in Wet Weather Conditions – Develop Wet Weather CBRP	CBRP to Santa Ana Water Board for Santa Ana Water Board or Santa Ana Water Board Executive Officer approval.
Task 9	Implement Wet Weather CBRP	Within six (6) months of Santa Ana Water Board or Santa Ana Water Board Executive Officer approval of the Wet Weather CBRP, submit Work Plan for Implementation of Wet Weather CBRP. Implement Wet Weather CBRP upon approval of the Work Plan by the Santa Ana Water Board Executive Officer.
Task 10	Reopen and Revise MSAR TMDLs	No later than within two (2) years of the effective date of the revised TMDLs, begin process to reopen and revise MSAR TMDLs in their entirety. Within six (6) years of the effective date of the revised TMDLs, complete MSAR TMDL Revisions.
Task 11	Evaluate Progress and Status of Attainment of Milestones and TMDLs	By February 1 of every third year from the effective date of the revised TMDLs, submit Triennial Report that evaluates the progress and status of attainment of TMDLs to the Santa Ana Water Board's Executive Officer.
Task 12	Implement Watershed-wide TMDL Compliance Monitoring Program	Within one (1) year of revised TMDLs effective date, submit a revised monitoring program to the Santa Ana Water Board Executive Officer for review and approval. Implement revised monitoring program upon approval by the Santa Ana Water Board Executive Officer.
Task 13	Annual Water Quality Reports	By July 1 each year, after the effective date of the revised TMDLs, submit an Annual Water Quality Report to the Santa Ana Water Board based on the currently approved program.

Figure 5-3. Phase 2 Implementation Schedule, Task 1 through Task 13 (see Table 5-3 and text for detailed description of each task and required deliverables/submittal schedule)



Task 2 – Revise Permits and Other Regulatory Actions

The Santa Ana Water Board will update existing permits or other pertinent orders, as appropriate, to incorporate provisions of the Phase 2 TMDL Implementation Plan and actions to be completed based on deliverables approved by the Santa Ana Water Board during Phase 2 implementation.

Existing permits (and current order/permit number) that may require updates include:

- Riverside County MS4 Permit (Order R8-2010-0033);
- San Bernardino County MS4 Permit (Order R8-2010-0036); and
- Dairy General Order (Order R8-2018-0001).

At the discretion of the Santa Ana Water Board, to support compliance with the MSAR TMDLs, additional regulatory actions may be taken to facilitate implementation of the Phase 2 Implementation Plan, including but not limited to the following regulatory:

- Notifications to other entities in the MSAR watershed that are responsible for compliance with WLAs or LAs;
- Reauthorizations of the General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (De Minimis) Threat to Water Quality (R8-2020-0006) (Santa Ana Water Board, 2020);
- Adoption of Orders pursuant to Water Code section 13267; and
- Other General Orders or Waivers.

Task 3: Revise Existing Watershed Implementation Plans (Comprehensive Bacteria Reduction Plans (CBRPs)) for the Dry Summer Conditions TMDLs

Since adoption of the TMDLs in 2005, the Santa Ana Water Board has required submittal of the following Watershed Implementation Plans to comply with the WLAs/LAs applicable to Dry Summer Conditions, including the following:

- The 2010 MS4 permits authorizing the discharge of stormwater in Riverside and San Bernardino Counties required entities responsible for compliance with the WLAs applicable to urban runoff including stormwater to submit a CBRP to comply with the Dry Summer Conditions WLAs. These CBRPs, which are BMP-based compliance plans, were approved in 2012. Upon approval they became the final WQBEL for the Dry Summer Conditions WLAs. In 2018, the Santa Ana Water Board completed a compliance audit for the Riverside and San Bernardino County MS4 CBRPs. While the

MS4s were found to be in compliance with their CBRPs, it was recommended that the CBRPs be updated to incorporate the most recent understandings regarding water quality conditions and status of water quality management activities in the watershed. However, it was also recommended that an update should not be prepared until after planned revisions to the TMDLs had occurred.

- The 2012 Los Angeles Region MS4 permit authorizing the discharge of stormwater in Los Angeles County required the Cities of Claremont and Pomona to submit CBRPs to comply with the MSAR TMDLs WLAs applicable to urban runoff including stormwater for the portions of the MSAR watershed located within their respective jurisdictions. These CBRPs, which are BMP-based compliance plans, were approved in 2014. Upon approval they became the final WQBEL for the Dry Summer Conditions WLAs.

- The 2013 Santa Ana Region CAFO general order required the submittal of a BASMP to comply with the Dry Summer Conditions WLAs applicable to CAFO dischargers (Santa Ana Water Board, 2013a). Most of the MSAR watershed's non-CAFO agricultural operators subject to the TMDLs LAs worked in collaboration with the CAFO dischargers to submit a BASMP to the Santa Ana Water Board in 2014.

- The 2017 State Water Board's Phase II Small MS4 permit required four entities within the MSAR watershed to submit FBRPs to comply with the Dry Summer Conditions WLAs applicable to urban runoff, including stormwater. As of January 2026, only UC Riverside has submitted a FBRP to the Santa Ana Water Board (UC Riverside, 2022).

Under this task, the referenced existing Watershed Implementation Plans (CBRPs, FBRP) will be updated, as needed or upon the Santa Ana Waterboard's request, during the Phase 2 TMDL Implementation Plan.[40] All revisions will be submitted to the Santa Ana Water Board's Executive Officer within two years of the effective date of the revised TMDLs being incorporated into a permit or other orders. All entities currently responsible for the implementation of the existing Watershed Implementation Plans must continue to implement their existing plans until the revised plans are approved by the Santa Ana Water Board. The BASMP submitted in 2014 will continue to effectively apply to CAFOs and non- CAFO agricultural sources as the Santa Ana Water Board determines appropriate and may be updated on an as needed basis.

Task 4 – Develop and Implement Preliminary Wet Weather Controls

At the beginning of Phase 2, based on existing data and the best available information, the entities responsible for compliance with the MSAR TMDLs will identify, evaluate and select early projects for implementation to initiate efforts to attain the Wet Winter Conditions WLAs/LAs. Within two (2) years of the effective date of the revised TMDLs, the stakeholders will prepare a Work Plan for submittal to the Santa Ana Water Board's Executive Officer. The

[40] Small MS4 Permit states "Dry Weather Condition WLAs" but requirement is intended to be applicable to the "Dry Summer Conditions" WLAs in the MSAR TMDLs.

Work Plan will describe the projects selected for implementation, expected water quality benefits and stakeholder(s) responsible for implementation of each project(s), and the schedule for implementation. Upon approval of the Work Plan by the Executive Officer, the responsible agencies will begin implementation of the Work Plan.

Based on the findings from Tasks 5, 6, and 7 below, under Task 8 of this Phase 2 Implementation Plan, the Work Plan prepared under this task may be updated, or if more appropriate, replaced by a new Work Plan that incorporates new or modified projects, and updates the schedule of implementation (see Task 8 discussion below).

Task 5 –Study: Application of High Flow Suspension to TMDLs

The Basin Plan was amended in 2012 to include a high flow suspension provision to temporarily suspend recreational uses under specified conditions and identified inland waters where the high flow suspension may be applied (Santa Ana Water Board, 2019b, see Sections 3.6.1 and 5.2.2). The high flow suspension provision may be applied to some or all of portions of several waterbodies included in the MSAR TMDLs. Although the Basin Plan allows for application of a high flow suspension under specific conditions, the Basin Plan does not provide direction with respect to evaluating attainment with WLAs or LAs in the MSAR TMDLs. Better understanding this issue will be critical to the development and implementation of water quality controls to mitigate sources of bacterial indicators during wet weather flow.

The purpose of this study is to develop a methodology for use in the MSAR watershed to support assessments of attainment with the MSAR TMDLs when the high flow suspension conditions apply. Elements of this study may include: (a) establishment of the conditions under which a high flow suspension would apply to MSAR waterbodies (spatially and temporally, including definition of the pre-storm condition); (b) evaluation of the default high flow suspension triggers in the Basin Plan to determine if any site-specific adjustments should be considered when the high flow suspension applies; (c) consideration of how a high flow suspension could be implemented in conjunction with design criteria for downstream structural controls; and (d) other factors that could affect TMDLs attainment assessments in conjunction with implementation of the high flow suspension.

Within one (1) year of the revised TMDLs effective date, the entities responsible for implementation of this Phase 2 implementation plan will submit to the Santa Ana Water Board Executive Officer a High Flow Suspension Study. The Work Plan will be implemented as approved by the Santa Ana Water Board.

Task 6 – Study: Evaluate Controllable Sources of Bacterial Indicators in Wet Weather Conditions

During TMDL development, bacterial indicator data collection under wet weather flow conditions was limited to samples collected at locations in the Chino Basin in 1993 (1 event) and in 1996-1998 (11 events). Additional data collection occurred from 2002-2004 to gather data during both dry and wet weather, but due to dry conditions, no storm event data was

collected. For early data collection activities, bacterial analyses were limited to fecal coliform and total coliform. Laboratory analyses did not include *E. coli* (Santa Ana Water Board 2005a).

As noted in the 2005 Technical Report, the sources of bacterial indicators during dry or wet weather were largely unknown (Santa Ana Water Board 2005a). Accordingly, the Phase 1 TMDL Implementation Plan included a task (Task 4.1) to develop and implement an USEP to provide information on urban sources of bacterial indicators in the watershed. The USEP was later replaced by the CBRPs, which supported efforts to understand urban sources of bacterial indicators during dry weather conditions. The Phase 1 TMDL Implementation Plan also included a requirement to develop and implement an AgSEP (Task 5.1). Implementation of the approved AgSEP resulted in additional wet weather data collection during the wet season of 2009-2010 in selected locations within the Chino Basin (SAWPA, 2010b).

The MSAR TMDLs Phase 1 implementation purposefully focused on identifying and mitigating sources of bacterial indicators during dry weather when recreational use was most likely to occur in impaired waterbodies. Accordingly, wet weather data collection since the TMDLs became effective in 2007 has been limited to one storm event/year (as required by the TMDL watershed-wide monitoring program). The purpose of the data collection was to understand variability in *E. coli* concentrations during and immediately after the storm event. Information on urban sources of bacterial indicators during wet weather has not yet been developed.

The purpose of this study is to collect bacteria-related data (including appropriate bacterial indicators, human markers and pathogens) during wet weather to identify specific activities, operations, and processes in urban or agricultural areas that contribute controllable sources of bacterial indicators. This study should be conducted over two to three wet seasons to (a) increase the number of samples collected across the multiple MSAR subwatersheds; (b) provide data needed to understand the degree of variability in *E. coli* concentrations both spatially and temporally; and (c) provide data regarding degree to which human sources of bacterial indicators or viruses are present in wet weather flows. As appropriate, the Task 8 study design should also consider how this data will be evaluated to determine whether identified sources of bacterial indicators pose a significant risk to human health (and thus should be considered a priority for mitigation).

Within one (1) year of the effective date of the revised TMDLs, the entities responsible for the implementation of the revised TMDLs will prepare and submit a Study Plan (consistent with existing watershed Monitoring Plan and QAPP) that identifies sample locations, constituents to be sampled, sampling protocols/frequency, data analysis procedures, source tracking, prioritization and risk assessment protocols, etc. The Study Plan will be submitted to the Santa Ana Water Board's Executive Officer for approval. Within two (2) years after the approval of the Study Plan, the entities responsible for implementation of revised TMDLs will complete this study and submit a Wet Weather Controllable Sources Report to the Santa Ana Water Board.

Task 7 – Develop Wet Weather Source Prioritization Strategy

Considering the findings from Tasks 5 and 6 and other available or relevant information developed under this Phase 2 TMDL Implementation Plan, the entities responsible for attainment with the TMDLs will develop a prioritization strategy for the implementation of additional water quality controls to facilitate attainment of the Wet Winter Conditions TMDLs. This prioritization strategy will focus on ensuring that mitigation of bacterial indicator sources in wet weather conditions target controllable sources of bacterial indicators in the MSAR watersheds. Within four (4) years of the revised TMDLs effective date, or within one (1) year of submittal of the Study in Task 6, whichever is later, the entities responsible for implementation of revised TMDLs will submit a Wet Weather Source Prioritization Strategy to Santa Ana Water Board's Executive Officer.

Task 8 – Evaluate Options to Mitigate Controllable Sources of Bacterial Indicators in Wet Weather Conditions – Develop Wet Weather CBRP

Based on the findings from Tasks 5 and 6 and consistent with the Prioritization Strategy prepared under Task 7, the entities responsible for attaining the MSAR TMDLs will update the Preliminary Wet Weather Water Quality Control Work Plan prepared under Task 4. This update will identify and evaluate feasible water quality control options, including structural BMPs or source treatment options, that may be implemented to reduce or eliminate controllable sources of bacteria and improve water quality in the MSAR watershed to protect REC-1 beneficial uses. Multiple control options may be evaluated to identify what option (or options) may provide the highest level of improved water quality that is both technically and economically feasible, consistent with the requirement to manage controllable sources of bacterial indicators to the maximum extent practicable. The assessment of potential water quality control options should consider and evaluate potential impacts to overall use and management of water in the Santa Ana River watershed, e.g., considering instream flow needs to protect habitat and aquatic species, legal requirements to deliver water to downstream water users, and cost of implementing the control option(s).

Based on the evaluation of water quality control options to mitigate controllable sources of bacterial indicators in wet weather sources, entities responsible for attainment of the Wet Winter Conditions TMDLs will submit a wet weather CBRP to the Santa Ana Water Board's Executive Officer. Within five (5) years of the revised TMDLs effective date, or within one (1) year of submittal of the Strategy in Task 7, whichever is later, entities responsible for attainment of the Wet Winter Conditions TMDLs will submit a wet weather CBRP(s) to the Santa Ana Water Board Executive Officer or Santa Ana Water Board for approval. The wet weather CBRP will (a) identify preferred options or set of options for responsible entities to implement to attain the Wet Winter Conditions WLAs and LAs; (b) a preliminary implementation schedule; and (c) identify potential funding sources that may be available to support implementation.

Task 9 – Implement Wet Weather CBRP

Based on the written direction provided by the Santa Ana Water Board from its review of the Wet Weather CBRP (Task 8), the responsible entities will work to implement the preferred option or set of options. To facilitate implementation, the responsible entities will prepare a Work Plan for submittal to the Santa Ana Water Board's Executive Officer within six (6) months after written directions are provided. The Work Plan will include a schedule with milestones to implement the preferred option of the set of options in the Task 8 CBRP (taking into consideration available funding). Upon approval by the Executive Officer, responsible entities will begin implementation of the Work Plan.

Task 10 – Reopen and Revise the MSAR TMDLs

The revised TMDLs are phased TMDLs and the Santa Ana Water Board will reconsider these revised TMDLs in their entirety. During Phase 3 of the revised TMDLs, the Santa Ana Water Board intends to reopen and fully revise the MSAR TMDLs. The Santa Ana Water Board will complete the full revision of the MSAR TMDLs to address planned changes that are not included in the proposed limited revision of the TMDLs that includes:

- Clarify where the REC-1 use now applies in the Cucamonga Creek and Mill-Cucamonga Creek watersheds given a previous approval of a UAA;
- Clarify that the existing Dry Summer Conditions and Wet Winter Conditions compliance schedules should be based on "weather" conditions rather than "seasons;"
- Incorporate the definition of "dry weather" into the TMDLs;
- Make consistent distinctions between wet and dry weather. Remove references to warm and cool season, as appropriate;
- Incorporate the ISWEBE Bacteria Provisions to establish updated water quality objectives for the protection of waterbodies with REC-1 use; and
- Update baseline land use characteristics since 2005 adoption of the MSAR TMDLs.

Findings and recommendations from early studies in the Phase 2 program of implementation could support other revisions to the MSAR TMDLs. Specifically, the following special studies are intended to generate data and analysis to support future limited revisions:

- Develop methodology to apply existing high flow suspension provisions to the MSAR watershed and clarify impact of such provisions as they relate to attainment of TMDLs taken into account: (a) applicability of the provision to waterbody types as defined in the Basin Plan and their location; (b) varying flow regimes in channel segments; (c) spatial variability in rainfall; and (d) other considerations, as appropriate.

- Develop methods to demonstrate attainment of the WLA/LAs that account for high flow suspension provisions and new credible scientific understanding of controllability.

- Employ results of the Phase 2 studies to create a Phase 3 framework to implement the wet weather source prioritization strategy, wet weather CBRPs, and other preferred options identified as appropriate. The Phase 3 program will also involve a collaboration through the MSAR Task Force to evaluate the feasibility of meeting the Wet Winter Conditions WLAs and LAs, and the time and resources necessary for achieving TMDLs attainment.

Studies and efforts necessary to develop Phase 3 and identify additional revisions to the MSAR TMDLs shall start no later than two (2) years after the effective date of the revised MSAR TMDLs, and revised TMDLs should be available for consideration by the Santa Ana Water Board no later than six (6) years after the revised TMDLs effective date.

Task 11 – Evaluate Progress and Status of Attainment of Milestones and TMDLs

The MSAR Task Force, on behalf of the entities responsible for attainment of the WLAs and LAs, has prepared Triennial Reports to evaluate attainment with the WLAs and LAs based on the preceding 3-year period approximately every three years since 2010.

By February 1 of every third year from the effective date of these TMDLs, responsible entities must submit a report on status of TMDLs attainment (i.e., progress towards achieving Dry Summer Conditions and Wet Winter Conditions WLAs and LAs) to the Santa Ana Water Board's Executive Officer. The responsible entities shall continue to coordinate development and submittal of these triennial reports through the MSAR Task Force. These reports will provide a means to assess progress towards attainment of the TMDLs, facilitate review, and update the numeric targets and/or the TMDLs, WLAs, and LAs, as needed.

Task 12 – Implement Watershed-wide TMDL Compliance Monitoring Program

Most entities responsible for attaining the MSAR TMDLs WLAs/LAs have been collaboratively implementing a TMDL Watershed-wide Monitoring Program since 2007. This monitoring program is implemented as part of the larger Santa Ana Region's RBMP (see Section 4.1.3). Under this task, the responsible entities will update the portion of the RBMP that addresses MSAR TMDLs monitoring requirements. Elements to be updated include the following:

- Incorporation of the collection of other pathogen indicator data (e.g., human marker and viruses), to support attainment of the MSAR TMDLs and demonstrate protection of recreational beneficial uses;

- Enhance collection of wet weather water quality data for bacterial indicators, where needed, to support implementation of the revised TMDLs (consistent with other regional monitoring requirements and consistent with statewide bacteria provisions);

- Where appropriate and if an entity requests to participate in the RBMP, incorporate additional entities responsible for WLAs and LAs that are not currently participating in the existing TMDLs monitoring requirements. (Entities seeking incorporation into the RBMP may be subject to certain requirements as a condition thereof, including financial support, as determined by the MSAR Task Force administrator. The Santa Ana Water Board does not have control of conditions and/or requirements to participate in the (optional) MSAR Task Force).

Within six (6) months of the effective date of the revised TMDLs, entities implementing the existing monitoring program will submit an updated Monitoring Plan and QAPP to the Santa Ana Water Board's Executive Officer for approval (this may be submitted as an updated RBMP and QAPP if the TMDL Watershed-wide Monitoring program remains a part of the RBMP). Until the Executive Officer approves the updated Monitoring Plan and QAPP, the existing TMDLs monitoring program will continue to be implemented.

After the revised TMDLs effective date, the Santa Ana Water Board's Executive Officer shall make reasonable efforts to notify entities required to attain the WLAs or LAs in the revised TMDLs but not participating in the existing TMDL Watershed-wide Monitoring Program of their responsibility to comply with the surveillance and monitoring requirements of the revised TMDLs. Within a reasonable time-period after receiving this notification, as determined appropriate by the Santa Ana Water Board, the notified entities must either begin participating in the existing TMDL Watershed-wide Monitoring Program being implemented by the MSAR Task Force or submit their own MSAR TMDL Watershed-wide Monitoring program with Monitoring Plan and QAPP to the Santa Ana Water Board's Executive Officer for approval. The approved Monitoring Plan and QAPP submitted separately by any of these entities shall be implemented immediately upon Executive Officer approval.

Task 13 – Annual Water Quality Reports

Annual dry and wet weather monitoring results from the MSAR TMDL Watershed-wide Monitoring Program sites under the Phase 1 Implementation Plan are reported annually in the RBMP's Annual Water Quality Report, which is required as a final report submission to the Santa Ana Water Board by July 1 of each year. Under the Phase 2 TMDL Implementation Plan program, annual reporting of water quality results from sites sampled under the approved Watershed-wide TMDL Monitoring Program's Monitoring Plan and QAPP (see Task 12) will continue. Submittal of Annual Water Quality results shall be reported as part of the RBMP's Annual Water Quality Report or they may be submitted separately. Such results and the annual report must be submitted by July 1 of each year.

Entities that are responsible for implementation of the Watershed-wide TMDL Monitoring Program but have opted to implement their own monitoring program rather than as part of the program implemented by the MSAR Task Force (see Task 12) shall submit an Annual Water Quality Report to the Santa Ana Water Board by July 1 of each year.

5.2.3.2 Justification for Proposed Revision

The Phase 2 tasks are planned for implementation over a period not to exceed 10 years (see Figure 5-3). Attainment of the Wet Winter Conditions TMDLs WLAs/LAs will require management of urban sources of bacterial indicators in wet weather flows. The most effective means to achieve these WLAs/LAs is to prioritize mitigation efforts towards controllable sources having the greatest impact on downstream water quality and protection of the REC-1 beneficial use.

To prioritize these mitigation efforts, three key elements of technical information must be developed:

- What are the most viable sources of bacterial indicators in wet weather runoff and which waterbodies with a REC-1 beneficial use are most significantly impacted by identified sources?

- To what degree are sources of bacterial indicators in wet weather runoff controllable?

- Considering the potential to temporarily suspend the recreation standards during at least a portion of a wet weather runoff event (through application of the Basin Plan high flow suspension), to what degree is mitigation of controllable bacterial indicators required to attain WLAs/LAs and where should mitigation be targeted?

The following is additional information regarding the nature of studies to be completed to support attainment of Wet Winter Conditions WLAs/LAs. **Figure 5-8** provides an overview of key categories of Phase 2 Implementation Plan tasks over the proposed 10-year schedule, especially as related to compliance with the Wet Winter Conditions TMDLs. The figure illustrates the relationship between the studies to be completed and the activities to be implemented to mitigate controllable wet weather sources of bacterial indicators within the context of the proposed 10-year compliance schedule. These key categories of tasks include the following:

- *Assessment activities*: Includes the continued implementation of the MSAR TMDLs Surveillance and Monitoring Program that provides detailed information regarding the program to collect and analyze field data and bacterial indicator water quality samples across the region. Based on findings from these assessments and various planned studies, the process to reopen and revise the TMDLs will begin by Year 2 and completed by Year 6.

- *Studies*: Phase 2 Implementation Plan includes a number of studies to gather data to support attainment of the TMDLs, especially the Wet Winter Conditions TMDLs. These studies are to be completed early in the Phase 2 schedule.

- *Wet Weather Mitigation Activities*: Early in Phase 2, wet weather mitigation activities will

be underway based on existing data (Task 4). The preliminary approach to mitigate controllable sources of bacterial indicators in wet weather will be updated based on the findings of various studies (Tasks 5 & 6). When the TMDLs are revised by Year 6, then the wet weather CBRP may be further modified (Task 9).

- *Reporting*: Annual Water Quality Reports (Task 13) and periodic Triennial Reports (Task 11) provide regular opportunities to report on the status of Phase 2 implementation.

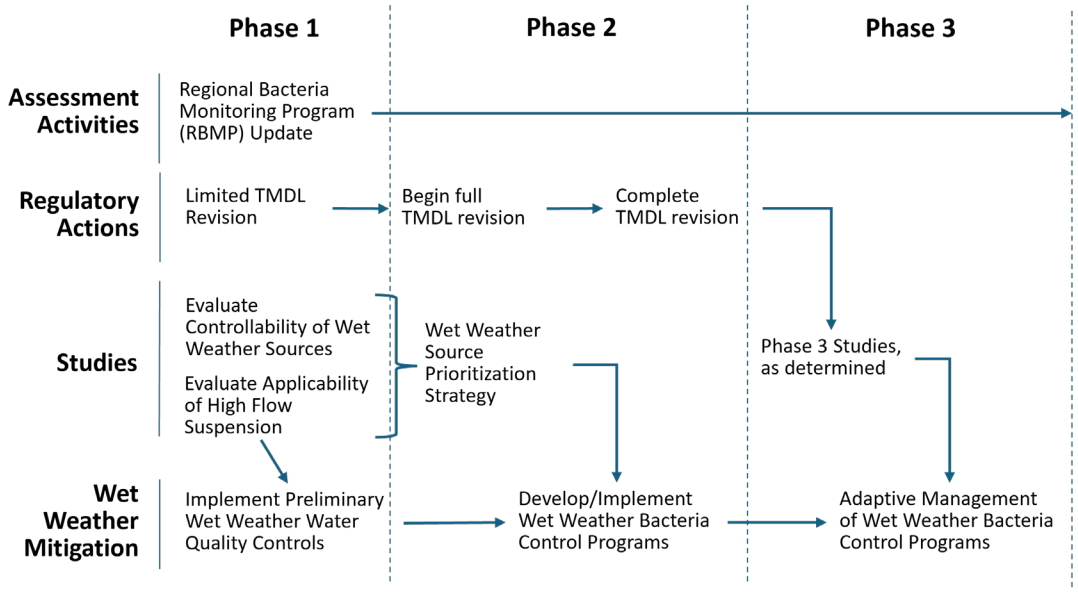


Figure 5-8. Overview of Key Types of Tasks Over the Proposed 10-Year Phase 2 Implementation Plan Schedule (see text; also see Table 5-4 and Figure 5-3 for additional details)

5.2.3.2.1 Description of Technical Studies

Ideally, the most effective TMDLs implementation approach to attain the Wet Winter Conditions WLAs/LAs would be to prioritize wet weather bacterial indicator mitigation activities. To facilitate this approach, key studies must be completed to gather the necessary data to establish a basis for the prioritization of subsequent mitigation activities. These studies and how the findings from them will be used to prioritize activities to mitigate sources of controllable bacterial indicators are described below.

Clarify Applicability of High Flow Suspension

The 2012 Basin Plan amendment (a) included a high flow suspension provision to temporarily suspend recreation standards under specified conditions, i.e., under conditions when it was

deemed unsafe to recreate in a waterbody; (b) identified inland waters where the high flow suspension may be applied; and (c) established parameters for implementation of the high flow suspension (Santa Ana Water Board, 2012a). Table 5-4 describes the default conditions or criteria for when a high flow suspension may be applied to a waterbody. These default conditions or criteria may be modified on a site-specific basis.

Implementation of a high flow suspension when conditions are unsafe to recreate is expected to be an important tool to achieve attainment of the WLAs/LAs applicable during wet weather events and facilitate compliance with the Wet Winter Conditions TMDLs. However, to date, the high flow suspension has not been used as a tool to comply with TMDL regulatory requirements. Further, the Basin Plan does not provide guidance on how such a provision would be implemented in practice with regards to determining compliance with WLAs or LAs in TMDLs.

Understanding this issue will be critical to the development and implementation of water quality controls to mitigate sources of bacterial indicators and comply with the applicable TMDLs. Of particular interest is defining the conditions under which mitigation of bacterial indicators is required to attain WLAs/LAs. This information is key to prioritizing and implementing effective treatment controls in the watershed. **Figure 5-2** illustrates the general parameters under which evaluation of the applicability of a high flow suspension is required. By default (per the Basin Plan), a high flow suspension that temporarily suspends recreation standards would apply to days with a daily rainfall of ≥ 0.5 inches (see right side of Figure 5-2).

The Phase 2 Implementation Plan includes a study to develop an approach for applying a high flow suspension within the context of compliance with the MSAR TMDLs (Task 5), e.g., as illustrated in Figure 5-2. As noted in the task description, elements to be investigated in this study include (See Section 5.2.2 of the Technical Report): (a) establishment of the conditions under which a high flow suspension would apply to waterbodies in the MSAR watershed (spatially and temporally, including definition of the pre-storm condition); (b) evaluation of the default high flow suspension triggers in the Basin Plan to determine if any site-specific adjustments should be considered generally or locally; (c) consideration of how a high flow suspension could be implemented in conjunction with regional treatment controls; and (d) other factors that could affect TMDLs compliance assessments in conjunction with implementation of the high flow suspension. The outcome of this study will provide critical input into the development of a prioritization strategy to mitigate controllable bacterial indicator sources in the MSAR watershed.

Table 5-4. Key Elements of the High Flow Suspension Provision Applicable to Certain Waterbodies in the Santa Ana Region (Santa Ana Water Board, 2019b)

Element	Basin Plan
High Flow Suspension Purpose	For waterbodies designated REC-1 and REC-2, the narrative and numeric pathogen objectives are temporarily suspended when high flows preclude safe recreation in or near freshwater stream channels that have been engineered, heavily modified or maintained to serve as temporary flood control facilities.
Key Definitions	*Unsafe Flows* - Flow conditions in freshwater streams in the Santa Ana watershed are presumptively unsafe if either of the following conditions occurs: (1) stream velocity is greater than 8 feet-per-second (fps); or (2) the product of stream depth (feet) and stream velocity (fps) (the depth-velocity product) is greater than 10 ft_2/s. Where representative stream gauge data are not available, unsafe flows are presumed to exist in stream channels that have been engineered or heavily modified for flood control purposes when rainfall in the area tributary to the stream is greater than or equal to 0.5 inches in 24 hours. Rainfall measurements may be estimated using gauges, Doppler radar data, or other scientifically defensible methods. *Engineered or Heavily Modified Channels* - The temporary suspension of recreational uses and related water quality objectives during unsafe flow conditions applies only to streams that have been engineered or heavily modified to enhance flood control protection. Engineered streams include all man-made flood control facilities with a box-shaped, V-shaped or trapezoidal configuration that have been lined on the side(s) and/or bottom with concrete or similar channel- hardening materials. Heavily modified channels include once natural streams that have been substantially re-engineered, using levees, bank stabilization (rip-rap), channel straightening, vegetation removal and other similar practices, to facilitate rapid evacuation of increased urban runoff during storm events.
Applicability to MSAR Waterbodies	• General Applicability - When high flows preclude safe recreation in or near freshwater stream channels that have been engineered, heavily modified or maintained to serve as temporary flood control facilities (Basin Plan Appendices VIII and IX identify waterbodies where a high flow suspension may be applied). • Specific Applicability to Santa Ana River Reach 3 – Per the Basin Plan - the upper half of the reach has been channelized with reinforced levees armored by rip-rap. Below Van Buren Boulevard, Reach 3 remains largely natural. However, numerous flood control facilities have been constructed/modified in the multiple streams tributary to this area. These changes have modified the natural stream hydrology of the Reach by re-directing and accelerating stormwater runoff from the upper Santa Ana watershed that can create exceptionally hazardous flow conditions in the Reach.
Trigger to Initiate High Flow Suspension	• Default Trigger: Where representative stream gauge data are not available, unsafe flows are presumed to exist in stream channels that have been engineered or heavily modified for flood control purposes when rainfall in the area tributary to the stream is greater than or equal to 0.5 inches in 24 hours. • Site-specific Triggers: Thresholds and presumptions related to rainfall and stream flow established for the default trigger may be adjusted based on site-specific data analysis and/or runoff models (subject to approval by the Santa Ana Water Board through the normal public participation process).

Trigger to End High Flow Suspension	• Default Trigger: Stream flows presumed to return to safe conditions and the temporary suspension of recreation standards will cease 24-hours after the end of the storm event. • Site-specific Trigger: Presumptive default trigger applies unless actual flow data demonstrate that the suspension should terminate sooner or later. In such cases, the suspension terminates once stream flows (measured as cubic-feet/second (cfs) have returned to the range of normal pre-storm conditions (cfs < 98th percentile as calculated from a calibrated hydrograph for the stream).

Evaluate Controllability of Wet Weather Sources

Chapter 4 of the Basin Plan states the following regarding water quality objectives for pathogen indicator bacteria in lakes and streams:

> Waste discharges shall not cause or contribute to excessive risk of illness from microorganisms pathogenic to human beings. Pathogen indicator concentrations shall not exceed the values specified in Table 4-pio below as a result of controllable water quality factors (see also Chapter 5, Recreation Water Quality Standards, Controllable and Uncontrollable Sources of Bacteria) unless it is demonstrated to the Regional Board's satisfaction that the elevated indicator concentrations do not result in excessive risk of illness among people recreating in or near the water. If this demonstration is made, then site-specific consideration of appropriate pathogen indicator concentrations will be necessary. In all cases, the level of water quality necessary to protect existing uses must be maintained. (Santa Ana Water Board, 2019b, pp. 4-15-4-16)

Chapter 5 of the Basin Plan provides the following guidance regarding controllable and uncontrollable sources of bacteria:

> As described in Chapter 4, certain water quality objectives established in this Basin Plan refer to "controllable sources" or "controllable water quality factors. Whether or not sources are "controllable" affects the ability of the Regional Board and dischargers to assure that waste discharges are regulated and controlled so as to assure the reasonable protection of beneficial uses.
>
> "Uncontrollable bacteria sources refer to contributions of bacteria within the watershed from nonpoint sources that are not readily managed through technological or natural mechanisms or through source control and that may result in exceedances of water quality objectives for indicator bacteria. Specific uncontrollable indicator bacteria sources within the Santa Ana Region may include:
>
> - Wildlife activity and waste
> - Bacterial regrowth within sediment or biofilm
> - Resuspension from disturbed sediment

- Marine vegetation (wrack) along high tide line
- Concentrations (flocks) of semi-wild waterfowl
- Shedding during swimming

“Controllable bacteria sources refer to any bacteria indicator source that can be controlled by treatment or management methods. Requirements for the application of Best Available Treatment technology (BAT) and Best Conventional Treatment technology (BCT) apply to some of these sources (e.g., POTWs) ; in other cases, such as discharges regulated under the areawide municipal separate storm system permits(“MS4” permits), reasonable actions to reduce or eliminate the contribution of these sources to the maximum extent practicable are required. These include the implementation of best management practices or other mechanisms. Controllable sources are predominantly anthropogenic in nature and can be reduced in varying degrees.

“Specific anthropogenic controllable indicator bacteria sources within the Santa Ana Region may include:

- Improper use of fertilizers on residential and commercial properties and agricultural lands
- Improper handling of pet waste
- Cross-connections between the sanitary and storm sewer systems
- Leaky sanitary sewer conveyances
- Discharges from POTWs
- Improper handling and disposal of food waste
- Improper management of CAFO waste and washwater
- Runoff from yards containing fertilizers, pet waste, and lawn trimmings
- Homeless encampments

“Certain techniques are available to identify human sources; when practical, those techniques should be used in areas where persistent exceedances of bacteria objectives occur.

“These source definitions and categories may be further refined as more science

becomes available." (Santa Ana Water Board, 2019b, see pages 5-107 and 5-108):

The degree to which wet weather sources of bacterial indicators are controllable or uncontrollable has not been determined in the MSAR watershed. Understanding the nature of sources is critical to developing a strategy to mitigate controllable sources so that available resources can be directed to where they are needed most, i.e., to reduce or eliminate bacterial indicators that may impact human health. A recent study conducted in the San Diego River Watershed found that this may be a significant challenge, at least in that particular watershed:

> "Based on the widespread quantification of HF183 at levels of concern during wet weather, watershed managers in the San Diego River have stopped asking "if human fecal sources are present in wet weather discharges?", but rather "which human source is present in wet weather discharges?". In separate sanitary and storm drain systems, such as the San Diego River, this is a challenging question to answer since many potential sources exist, such as sanitary sewer overflows, the subsurface exfiltration of a sanitary sewer system that surfaces at some point downslope, leaking or overflowing private laterals, nonfunctioning onsite wastewater treatment systems, and/or insufficient sanitation services for people experiencing homelessness camping along the river corridor. Quantifying these different sources during wet weather when they commingle and transport downstream is the next research challenge for effective watershed management and public health protection." (Schiff, 2023)

The extent to which the findings in the San Diego River watershed may also apply to the MSAR watershed is unknown. However, a similar understanding of sources of bacterial indicators in the MSAR watershed is needed so that it can be determined where to prioritize mitigation efforts and ensure the protection of human health.

Phase 1 implementation of the MSAR TMDLs purposefully focused on identifying and mitigating sources of bacterial indicators during dry weather when recreational use was most likely to occur in impaired waterbodies. Accordingly, wet weather data collection, since the TMDLs became effective in 2007, has been limited to one storm event/year (as required by the TMDL watershed-wide monitoring program). The primary purpose of this one annual wet weather sample event has been to understand variability in *E. coli* concentrations during and immediately after the storm event. Thus, information about urban sources of bacterial indicators during wet weather has not been developed.

The Phase 2 Implementation Plan includes a study to collect bacterial indicator source data during wet weather flow conditions to identify specific activities, operations, and processes in urban or agricultural areas that contribute sources of bacterial indicators under wet weather conditions (Task 6). Given the limited wet weather season in the region, it will likely be necessary to collect samples over a wide area and over a period of three to four wet seasons to provide sufficient data to understand wet weather bacterial indicator sources. This comprehensive sample collection will provide data to better understand the degree of variability in *E. coli* concentrations both spatially (across the watershed) and temporally (e.g., during and after storm events). The study will need to be designed in a manner to support

other TMDL-related data needs, e.g., to facilitate understanding regarding: (a) applicability of the high flow suspension to MSAR watershed waterbodies, in particular targeting storms with rainfall ranging from 0.1 to 0.5 inches (see discussion above); (b) controllability of sources of bacterial indicators during wet weather conditions (which will support efforts to establish mitigation priorities); and (c) provide data to support efforts to evaluate the efficacy of developing site-specific adjustments in the MSAR watershed.

Wet Weather Source Prioritization Strategy

The Phase 2 Implementation Plan requires entities responsible for TMDL compliance to implement a Preliminary Wet Weather Control Program, based on existing data and information, from the beginning of Phase 2 (see Task 4 in Section 5.2.3.1 of the Technical Report). However, based on the findings from the high flow suspension and Controllability of Wet Weather Sources studies (see above), this Preliminary Wet Weather Control Program will be reviewed and updated as needed to ensure that mitigation control activities are prioritized based on a review of controllable sources of bacterial indicators. To facilitate preparation of this updated Wet Weather Control Program (under Task 7, see Section 5.2.3.1 in the Technical Report), entities responsible for compliance with WLAs/LAs in the MSAR TMDLs will prepare a Prioritization Strategy that provides a technical justification regarding where to prioritize/target resources to mitigate controllable sources of bacterial indicators.

Summary of Technical Studies and Phase 2 Implementation Schedule

From the beginning of the Phase 2 Implementation Plan, entities responsible for compliance with the Wet Winter Conditions TMDLs will implement a Preliminary Wet Weather Control Program to mitigate known controllable sources of bacterial indicators. At the same time in parallel, study-related tasks to gather data and information to facilitate a more prioritized and targeted approach to mitigating controllable sources of bacterial indicators will be implemented. It is estimated that several years will be required to complete these study-related tasks, especially given that the focus of these studies is on collecting data during wet weather flow conditions, which can be highly variable both spatially and temporally. Accordingly, the schedule provides for up to three and half years to complete the following Phase 2 studies:

- Application of the high flow suspension to the TMDLs (Task 5); and
- Evaluate controllable sources of bacterial indicators in Wet Weather Conditions (Task 6).

Based on the findings of these studies, the Wet Weather Source Prioritization Strategy (Task 7) is to be completed within one year of submittal of the Wet Weather Controllable Sources Report prepared under Task 6. Following completion of this strategy, responsible entities will identify options (various BMPs including treatment controls) to mitigate prioritized wet weather sources. The outcome of this effort, which will be the development of a Wet Weather CBRP to

comply with the Wet Winter Conditions TMDLs (Task 8), resulting in an updated Wet Weather Control Program by end of Year 5. Once this updated program is approved, the Wet Weather CBRP will be implemented (see Task 9).

6. CEQA Analysis

The Secretary of Resources has certified the Basin Planning process as functionally equivalent to the preparation of an Environmental Impact Report (EIR) or a Negative Declaration pursuant to the California Environmental Quality Act (CEQA). However, in lieu of these documents, the Santa Ana Water Board is required to prepare the following: the Basin Plan amendment; an Environmental Checklist that identifies potentially significant adverse environmental impacts of the Basin Plan amendment; and, a staff report that describes the proposed amendment, reasonable alternatives, and mitigation measures to minimize any significant adverse environmental impacts identified in the Checklist. The Basin Plan amendment, Environmental Checklist, and staff report together are functionally equivalent to an EIR or Negative Declaration.

In 2005, the Santa Ana Water Board adopted Resolution No. R8-2005-0001, which amended the Basin Plan to incorporate Pathogen TMDLs for Santa Ana River Reach 3, Mill Creek-Prado Area, Cucamonga Creek-Reach 1, Chino Creek-Reach 1, Chino Creek-Reach 2, and Prado Park Lake in the Middle Santa Ana River Watershed. As part of Resolution No. R8-2005-0001, the Santa Ana Water Board prepared "substitute environmental documentation" for the establishment of the Pathogen TMDLs for identified water bodies pursuant to California Code of Regulations, title 23, sections 3775 et seq., and Public Resources Code section 21159. That documentation contained the required environmental documentation as required by the State Water Board's CEQA regulations. (23 Cal. Code Regs. §§ 3777, 3779.5.). In preparing the previous substitute environmental documentation, the Santa Ana Water Board considered the requirements of Public Resources Code section 21159 and California Code of Regulations, title 14, section 15187, and intended those documents to serve as a tier 1 environmental review.

The previous substitute environmental documentation found that adoption of the Basin Plan amendment to incorporate Bacterial Indicator TMDLs for Middle Santa Ana River Watershed waterbodies will not have any direct impact on the environment and any potential adverse environmental effects associated with TMDL implementation will be subject to project-specific CEQA analysis and certification to assure appropriate avoidance/minimization and mitigation. The previous substitute environmental documentation also considered alternatives.

The Basin Plan amendment here does not alter the environmental analysis that was previously prepared because the deadline extensions and renewed implementation tasks do not alter or change the TMDLs call for reductions in bacterial indicator contributions to the waterbodies. Adoption of the extended deadline and new tasks will not result in any direct environmental impacts. The previous substitute environmental documentation did acknowledge that implementation of actions necessary to implement the TMDLs may affect the environment, but any such potential adverse environmental effects will be subject to project-specific CEQA analysis and certification to assure appropriate avoidance/minimization and mitigation of such impacts. The previous acknowledgment applies these amendments as

well.

Consistent with California Code of Regulations, title 14, section 15162, the Santa Ana Water Board has determined that no subsequent environmental documents shall be prepared because the Amendments do not involve new significant environmental effects, a substantial increase in the severity of the previously identified significant effects, or mitigation measures or alternative that are considerably different from those analyzed in the previous substitute environmental documentation.

7. Economic Considerations

When adopting Basin Plan amendments, there are three statutory triggers that require the consideration of economics in basin planning. These triggers are:

- Adoption of an agricultural water quality control program (Water Code Section 13141). The Santa Ana Water Board must estimate costs and identify potential financing sources in the Basin Plan before implementing any agricultural water quality control plan.

- Adoption of a treatment requirement or performance standard. The Santa Ana Water Board must comply with CEQA when amending the Basin Plan. CEQA requires that the Board consider environmental effects of reasonably foreseeable methods of compliance with Basin Plan amendments that establish performance standards or treatment requirements, such as TMDLs. The costs of the methods of compliance must be considered in this analysis.

- Adoption of water quality objectives (Water Code Section 13241). The Santa Ana Water Board is required to consider a number of factors, including economics, when establishing or revising water quality objectives in the Basin Plan.

When the TMDLs for bacteria indicators in the Middle Santa Ana River watershed were adopted in 2005, the Santa Ana Water Board estimated costs for triggers one and two. The amendments incorporating the TMDLs into the Basin Plan did not include adoption of new or revised water quality objectives, so the third statutory trigger did not apply.

The Basin Plan amendments here extend the time to achieve TMDLs for Wet Winter Conditions and renew implementation tasks. The extension of time and renewal of implementation tasks does not constitute adoption of an agricultural water quality control program or treatment requirement or performance standard that is different than those already considered when the TMDLs were adopted in 2005.

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