Bacteria Special Study Monitoring Report
Water Year 2025

South Santa Clara County Regional Partners

Submitted in Compliance with Provision E.15.d of the National Pollutant Discharge Elimination System (NPDES) General Permit for Waste Discharge Requirements (WDRs) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) (Order No. 2013-0001-DWQ, NPDES No. CAS000004)

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1.0 Introduction

This Bacteria Special Study Monitoring Report for Water Year 2025 was prepared collectively by the County of Santa Clara (County), the City of Morgan Hill (Morgan Hill), and the City of Gilroy (Gilroy) in compliance with the Region Specific Requirements for the Total Maximum Daily Loads (TMDL) for Fecal Coliform in the Pajaro River Watershed that are described in Attachment G of the National Pollutant Discharge Elimination System (NPDES) General Permit for Waste Discharge Requirements (WDRs) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) (Order No. 2013-0001-DWQ, NPDES No. CAS000004) (referred to as the "Phase II Permit"). This report fulfills the Bacteria TMDL reporting requirements that are listed in Provision E.15.d.(ii) of the Phase II Permit. The TMDL monitoring requirements in the Phase II Permit were initially described in the March 2009 Final TMDL Project Report, the technical report providing the basis for the TMDL (CCRWQCB, 2009).

The TMDL for Fecal Coliform in the Pajaro River Watershed (also referred to as the "Bacteria TMDL") was approved by the California Office of Administrative Law on July 12, 2010. The TMDL established a concentration-based wasteload allocation (WLA) for fecal coliform for all controllable sources of bacteria with a compliance date of July 12, 2023, to protect water contact recreation (REC-1) beneficial uses. As part of the Bacteria TMDL, the Central Coast Regional Water Quality Control Board (CCRWQCB or Regional Water Board) requested that the County, Morgan Hill, and Gilroy (collectively referred to as the "Regional Partners") develop a Wasteload Allocation Attainment Program (WAAP). The Regional WAAP (EOA, 2019a) describes the strategy that will be used by the Regional Partners to abate bacteria pollutant sources, reduce bacteria pollutant discharges, and attain the Bacteria TMDL wasteload allocation for storm drain discharges. The WAAP includes a monitoring strategy for complying with the Bacteria TMDL (i.e., the South Santa Clara County Regional Bacteria TMDL Monitoring Plan for the Pajaro River Watershed (EOA, 2019b; "Regional Monitoring Plan"))[1]. Consistent with the direction provided by Regional Water Board staff, the Regional WAAP and Monitoring Plan describe targeted source identification studies and development and implementation of new or improved control measures focused on human sources of fecal indicator bacteria (FIB).

The Regional WAAP (EOA, 2019a) and Monitoring Plan (EOA, 2019b) include both desktop and field methods. The emphasis has been on mapping approaches and Microbial Source Tracking (MST) studies. In key years (i.e., Water Years 2021, 2023), field sampling at several receiving water stations for FIB (*E. coli* and fecal coliform)[2] analysis was conducted to assess compliance with the TMDL concentration-based wasteload allocation (WLA). In other years, such as Water Year 2025, monitoring conducted by the Regional Partners focused on targeted source identification or other types of studies that are designed on a case-by-case basis according to ongoing analysis of the expanding dataset.

In Water Year 2025 (WY 2025; October 1, 2024 – September 30, 2025), the Regional Partners conducted a "Bacteria Special Study" to comply with the Regional Bacteria Monitoring Plan (EOA, 2019b). The Bacteria Special Study aimed to address multiple topics of interest to the Regional Partners. While

[1] The WAAP and Regional Monitoring Plan were approved by the Central Coast Regional Water Quality Control Board (Regional Water Board or CCRWQCB) Executive Officer on April 20, 2020.

[2] In 2019, the State Water Resources Control Board adopted *E. coli* as the sole indicator of pathogens in freshwater. However, the 2010 Pajaro River Watershed Bacteria TMDL was not updated to replace fecal coliform with *E. coli*. When monitoring for the purposes of TMDL compliance, the Regional Partners analyze samples for fecal coliform. When monitoring for the purposes of characterization and/or source identification, the Regional Partners analyze samples for *E. coli*.

source identification remains a goal, the WY 2025 Special Study focused on monitoring at locations where attainment of the TMDL WLA is most critical (i.e., sites where REC-1 activities may occur).

The 2025 Bacteria Special Study targeted 11 monitoring locations, including those where water contact recreation is known or thought to occur (n=2), the longstanding monitoring location (n=1), outfalls (n=7), and the Gilroy wastewater treatment plant (n=1). The recreation locations were selected based on online survey responses from WY 2024 and where recreational activities have been previously observed. The Regional Partners coordinated with Valley Water to expand the list of constituents analyzed at many of the monitoring locations.

This Bacteria Special Study Monitoring Report describes the sampling locations and reviews the analytical results. Bacteria control measures, updates to the regional bacteria geodatabase, and recommendations for future actions are described in the Fiscal Year (FY) 2024-25 TMDL Status Report which must be submitted to the Regional Water Board by each Permittee on October 15, 2025, and to which this report is appended.

Consistent with the Project Monitoring Plan (EOA, 2019b), all analytical data from receiving waters generated in WY 2025 will be submitted to the Regional Data Center at Moss Landing (MPSL-MLML Data Center) for upload to the California Environmental Data Exchange Network (CEDEN).

2.0 Background

2.1 Microbial Source Tracking (MST)

Although the presence of fecal coliform or *E. coli* may indicate fecal contamination, not all sources of fecal contamination pose a risk to human health or impair water contact recreational (REC-1) beneficial uses in waterbodies. The source of fecal contamination is critical to understanding the associated human health risk and to developing a control program with appropriate targets. Control of human sources is prioritized since illnesses are thought to be caused by viruses, and human viruses are generally unlikely to occur in animal feces (USEPA 2012a, 2024).

MST investigations include sampling for the bacterial group (i.e., genus) of *Bacteroides*. *Bacteroides* are found primarily in the intestinal tracts and mucous membranes of warm-blooded animals and are sometimes considered pathogenic. They are strict anaerobes (i.e., cannot tolerate oxygen) and therefore, are better indicators of recent fecal contamination in natural waterbodies than *E. coli*, which can proliferate in soil and sediments exposed to the air. *Bacteroides* have a high degree of host specificity and therefore can be used to distinguish between human and other sources of fecal contamination by analyzing gene markers using real-time quantitative polymerase chain reaction (qPCR). The WY 2025 Special Study analyzed all samples for human-specific gene markers (HF183). All sites, except the Gilroy wastewater treatment plant, had at least two other species-specific MST markers analyzed (e.g., chicken, dog, cow, horse) through the Regional Partners collaboration with Valley Water. Past studies conducted in the area have also applied markers for other species.

2.2 Previous FIB Source Investigations in South Santa Clara County

The section below summarizes existing information on MST investigations conducted using qPCR techniques in the region since 2015. The first section summarizes MST sampling approaches conducted between 2016 and 2024. The subsequent three sections describe FIB and MST sampling results for specific areas that have been targeted over the years.

2.2.1 MST Sampling Summary (2016 – 2024)

Between 2016 and 2024, forty-eight (48) sites have been sampled and analyzed for species-specific markers. Sampling locations are illustrated in Figure 2.1.

In WYs 2015 through 2017, the Regional Partners collaborated with Valley Water to investigate species-specific sources of bacteria sources in the Llagas Creek and Pajaro River watersheds. Water samples were collected from up to 12 receiving water stations during up to five monitoring events each year (April/May 2015, March/April 2016). Low (or absent) flowing conditions limited the overall number of samples analyzed for human, dog, cattle, pig, ruminant, horse, and/or bird -specific *Bacteroides* markers based on land uses within the contributing area for the station. Results of the 2015-2017 MST investigations suggested that fecal contamination in the study area is caused by a combination of controllable and uncontrollable sources (Amec 2017, EOA 2017, Tu et al. 2017).

In WY 2020, eight MST samples (human, dog, horse) were collected during a creek walk along a Llagas Creek reach with relatively high *E. coli* densities (EOA, 2020a). This investigation is described in greater detail in Section 2.2.2.

In WY 2021, FIB (*E. coli* and fecal coliform) densities were measured in grab samples collected during 10 sampling events at up to 13 stations within the study area. Eleven of the stations are described in the Regional Monitoring Plan (EOA, 2019b) and were used to assess compliance with the TMDL WLA; two outfall stations in Gilroy (OT6 and OT7) were included in the program. Water samples were collected weekly during two five-week sampling periods to characterize wet and dry season conditions. Samples collected from flowing stations during three wet seasons and three dry season monitoring events were analyzed for human markers. Human markers were detected in reportable concentrations at six of the nine stations monitored for this constituent (EOA, 2021).

In WY 2022, 14 MS4 sites (manholes and outfalls) were sampled during a single storm event for *E. coli* and human and dog markers. Five stations were located within Gilroy's OT6 catchment, three were located within the OT7 catchment, two were located at Morgan Hill outfalls to Little Llagas, and four were located at County outfalls to Upper Llagas Creek (EOA, 2022). For more information on these investigations see Section 2.2.3 (OT6 and OT7 catchments), Section 2.2.4 (Little Llagas Creek), and Section 2.2.2 (Upper Llagas Creek).

In WY 2023, similar to WY 2021, FIB densities were measured in grab samples collected during 10 sampling events at up to 13 stations within the study area for the purposes of TMDL compliance evaluation. A subset of four monitoring stations located along the mainstem of Llagas Creek (OAK, WAT, MON, and LCD) were targeted for human-specific MST markers (HF183) during the first and last dry season monitoring events. The human marker was absent in seven of the eight samples. In the one sample with HF183 present, the concentration was lower than the method detection limit (MDL), suggesting human bacteria sources did not play a major role in bacteria in the sampled receiving waters during the WY 2023 dry season (EOA, 2023).

In WY 2024, a survey was developed and distributed to solicit responses about potential REC-1 sites (i.e., swimming holes) along waterways in South Santa Clara County. The survey was mailed directly to some residents and administered in person at community events. Two potential swimming hole locations were identified from survey responses.

During the beginning of the dry season on May 20, 2024, FIB densities were measured in grab samples collected at seven sites in the study area. Monitoring locations included a recycled water source at the Gilroy wastewater treatment plant (G-WWTP), two Gilroy MS4 outfalls (G-5179 and G-1789), one long-term TMDL monitoring site (MON), and three receiving water locations where REC-1 beneficial use could potentially occur (G-XMAS, SCC-CA, and SCC-REC). The three recreation locations were identified through a combination of survey responses and previous observations of evidence of recreation activities at monitoring locations. Three MS4 locations in Gilroy and Morgan Hill were not sampled due to a lack of flowing water. The human marker was absent in all seven results, suggesting absent, limited, and/or episodic human contributions to overall observed bacteria levels in the study area (EOA, 2024).

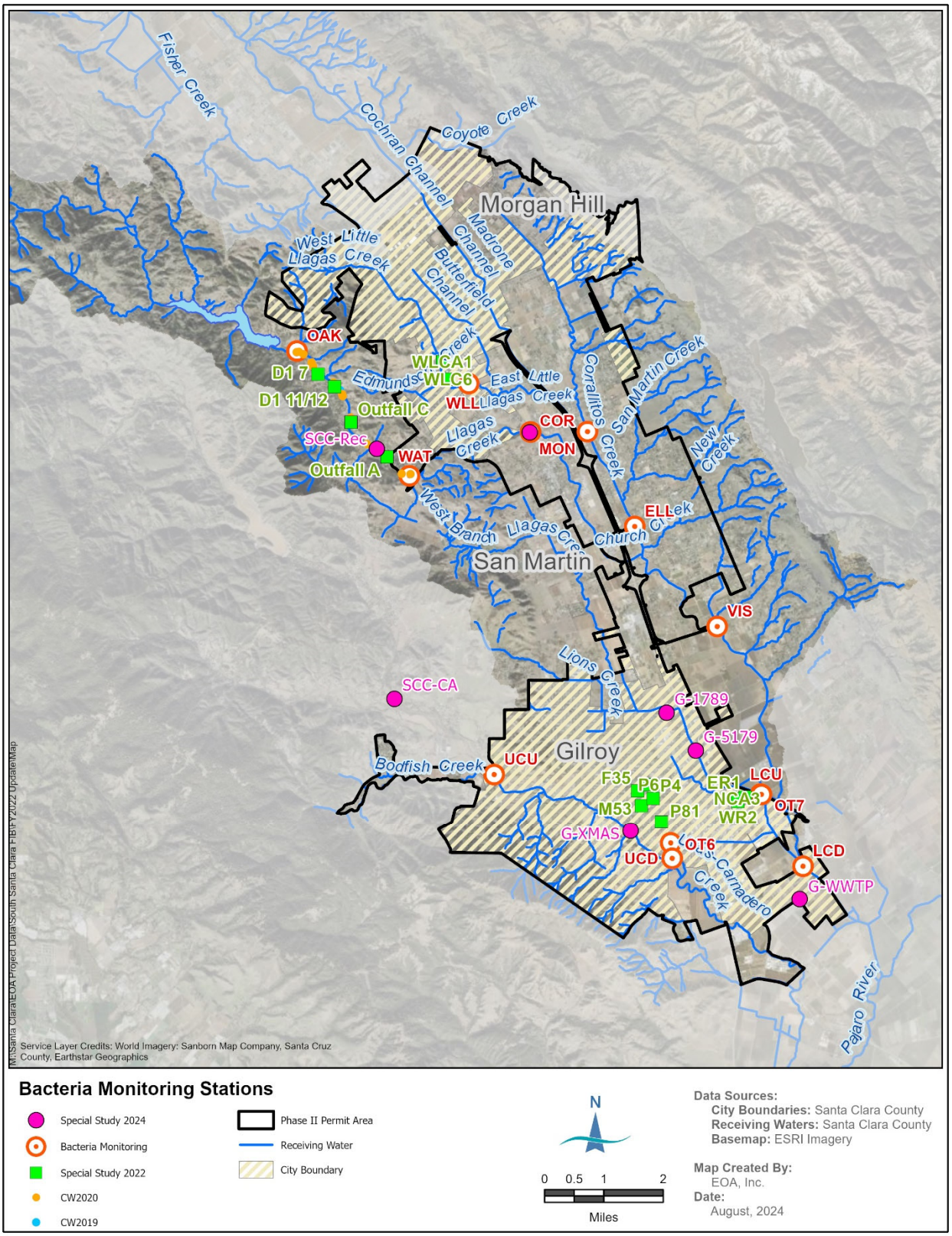

Figure 2.1. FIB monitoring locations sampled between WYs 2016 and 2024. (CW = creek walk).

2.2.2 Upper Llagas Creek (County)

In response to consistently high *E. coli* concentrations at the monitoring station on Llagas Creek at Watsonville Road (station WAT; see Figure 2.1 for station location), the County initiated a FIB source investigation during the dry season of WY 2019 (EOA, 2019c). In April 2019, the County conducted a dry weather creek walk and sampling event along the reach of Llagas Creek that extends from Watsonville Road heading upstream to Oak Glen Avenue, just below the Chesbro Reservoir (station OAK). This reach of Llagas Creek flows year-round as a result of releases from the Chesbro Reservoir, which is owned and operated by Valley Water. The objective of the walk was to identify potential direct sources of bacteria from adjacent land uses or wildlife, and to identify and document tributaries and outfalls with dry season flow along this reach of Llagas Creek.

Water samples were collected at several stations along the reach to develop a longitudinal profile of *E. coli* concentrations. Sampling results indicated that *E. coli* concentrations increased in the downstream direction with the highest concentrations recorded at station XTF, near a commercial Christmas tree farm (Figure 2.1) which has since been closed. There was no flow observed at any tributaries, swales, outfalls, or seeps during the creek walk. As a result, potential bacteria sources were assumed to be pets (e.g., dogs) and wildlife (e.g., deer, raccoons, duck, quail) that are present in the creek and along the banks within the sampling reach.

In WY 2020, a follow-up FIB source investigation was conducted along the same reach of Llagas Creek during the wet season to identify potential sources from adjacent land uses. In March 2020, a creek walk was conducted to identify potential sources of bacteria during the wet season when tributaries, outfalls, swales, and seeps might be flowing. However, the wet season of WY 2020 was extremely dry with only 1.26 inches of precipitation recorded in the eight weeks leading up to the creek walk/sampling event. As a result, no outfall or tributary flow was observed due to the dry conditions. During the creek walk, eight water samples were collected from the creek and analyzed for *E. coli*. Five of the eight samples were also analyzed for human, canine, and horse MST markers.

E. coli concentrations generally increased in the downstream direction with the highest concentrations measured again at station XTF, near the commercial Christmas tree farm (EOA, 2020a). Canine MST markers were detected in all five samples. No human or horse MST markers were detected in any of the samples. Similar to creek walk observations during April 2019, there was no flow observed in tributaries, outfalls, or seeps along the creek reach. The lack of flow may in part have been attributed to very low rainfall during wet season of WY 2020.

The lack of seeps observed in WY 2019 and WY 2020 and the lack of human MST markers in WY 2020 are two lines of evidence suggesting that Onsite Wastewater Treatment Systems (OWTS) presence in the watershed is not a likely source of bacteria in the assessed reach.

Recommendations from the WY 2020 creek walk included outreach to nearby residents to clean up dog waste and wet season monitoring for MST (both human and dog) in storm drain catchments to identify potential FIB sources. The WY 2022 Special Study addressed the second recommendation by sampling four outfalls during a single storm event for human and dog markers. In WY 2022, human markers were absent, but dog makers were detected in two of the samples.

2.2.3 Storm Drain Catchments for Outfalls 6 and 7 (Gilroy)

In WY 2016, water samples were collected from Outfall 6 (station OT6) and Outfall 7 (station OT7) in Gilroy at their points of discharge to Llagas Creek (Amec, 2016). Samples were analyzed for FIB and species-specific *Bacteroidales* markers for human, bird, ruminant, and dog using MST techniques. The concentrations of FIB at stations OT6 and OT7 were elevated, ranging from 13,200 to 32,000 CFU/100 mL and human markers were present at both locations (EOA, 2020a).

In accordance with recommendations in the 2019 Regional WAAP (EOA, 2019a), a windshield survey was carried out on March 4, 2020 to identify potential observable sources of human or other sources of FIB within the catchments of OT6 and OT7 (e.g., presence of homeless encampments, recreational vehicles (RVs), dry weather discharges within the MS4). Prior to performing the windshield survey, a desktop analysis of storm drain and sanitary sewer GIS data was conducted to identify areas within the outfall catchments where storm drains may be vulnerable to infiltration, especially in the event of nearby sanitary sewer leaks. Available information (although limited) about the age, location, material, and pipe diameter of the two systems were compared. Locations where the two systems are in close proximity were prioritized for field checks.

During the windshield surveys, no RVs were observed in the OT6 catchment and only one RV was observed in the OT7 catchment (EOA, 2020a). Unhoused people were observed in Miller Park just outside the OT6 catchment. The presence of functional bathroom facilities at the park suggests that this usage generates limited to no direct human waste sources. Signs of a small homeless encampment were observed along the bushes at the southern edge of the OT7 catchment; however, it is unclear whether human waste from this area would enter the storm drain system. Other potentially controllable bacteria sources in the OT7 catchment identified during the windshield survey included dog waste and improperly managed waste receptacles. Trash spilling out of waste receptacles could attract urban wildlife to the area.

In WY 2021, sampling at OT6 and OT7 was attempted during 10 events, i.e., five weekly events during the wet season (1/27/21 through 2/26/21) and five weekly events during the dry season (4/16/21 through 5/14/21); however, flowing conditions were only observed during the first two wet season events (1/27/21 and 2/2/21). Samples collected at OT6 and OT7 during these site visits were analyzed for human MST markers to assess whether the human sources of bacteria identified in WY 2016 were still present (EOA, 2021). Both of the Gilroy storm drain outfalls (stations OT6 and OT7) had reportable HF183 results in the samples collected on January 27 and February 2.

In WY 2022, a Special Study was conducted during a single storm to help identify the geographic source(s) of human markers within the OT6 and OT7 storm drain catchments. A total of eight stations within the MS4 (five in the OT6 catchment and three in the OT7 catchment), all accessed via manholes, were sampled for *E. coli* and human markers. No human markers were detected in the OT7 catchment samples, but all five OT6 catchment samples did have detections of human markers. The data suggest that there were at least two sources of human markers, but specific source locations could not be identified. Recommendations included improved catchment mapping, inspections of sanitary systems at City parks and schools, and repeat monitoring.

2.2.4 Little Llagas Creek (Morgan Hill)

WY 2017 and 2012 monitoring results (EOA, 2017 and EOA, 2021) indicated that both human and dog markers were present in samples collected at creek monitoring stations in Little Llagas Creek within Morgan Hill (sites WLL and ELL, see Figure 2.1). To investigate the source(s) of the human and dog markers, grab samples were collected from two MS4 outfalls to Little Llagas Creek during a wet weather event in WY 2022 for *E. coli* and human and dog marker analysis. One of the targeted outfalls (site WLC3) contained a dog park in the catchment area. Both stations had detectable concentrations of the human marker and one station had detectable concentrations of the dog marker (EOA, 2022). Recommendations included public outreach and follow-up monitoring to investigate the geographic source within the catchment with the dog marker.

3.0 WY 2025 Special Study Design

This section describes the WY 2025 Special Study design. The WY 2025 Special Study was designed to collect information addressing five goals.

1) Augment existing data with an increased number of samples at previously identified potential recreational sites for a more representative understanding of microbial water quality.
2) Evaluate the presence of human sources in dry season MS4 discharges.
3) Add secondary MST markers to help identify controllable animal sources.
4) Build the long-term dataset.
5) Confirm the lack of human-specific bacteria remnants in Gilroy's recycled water source.

All monitoring sites addressing these goals are listed in Table 3.1 and mapped in Figure 3.1. Because the primary goal of the WY 2025 Special Study was to characterize water quality when REC-1 beneficial uses were most likely to occur, monitoring was conducted during the early dry season (May-June, 2025). Results are described in Section 4.0.

3.1 Sampling Locations

The Regional WAAP (EOA, 2019a) and Monitoring Plan (EOA, 2019b) were developed to comply with the Bacteria TMDL, which was adopted by the Regional Water Board to protect REC-1 beneficial uses[3] in the Pajaro River Watershed, including the Llagas and Uvas Creeks which flow through the South Santa Clara County Phase II Permit area (CCRWQCB, 2009). In WY 2024 and WY 2025, the Regional Partners focused monitoring efforts at locations where REC-1 beneficial uses are most likely to occur. While prior monitoring by the Regional Partners in receiving waters within the study area addressed overall characterization goals, the WY 2024 and WY 2025 approach recognizes that bacteria concentrations can differ significantly between locations within a watershed and along a creek reach.

The fate and transport of bacteria in the system is an important factor that affects the concentration of FIB measured at any one location. Removal mechanisms include inactivation (i.e., loss in viability of the microorganism) and physical transport (either downstream or into bed sediments). Inactivation or die-off is dependent on several factors, including temperature, pH, salinity, nutrient concentrations, predation, and ultraviolet (UV) irradiance. Bacteria can attach to sediment particles even under flowing or turbulent conditions resulting in removal from the water column and the formation of biofilms. However, bacteria colonies can grow in the sediment and biofilms and later become resuspended in the water column. Bed sediments thereby can transition from a sink to a source. Modeling of these mechanisms is difficult because the conditions (physical and chemical variables) under which bacteria attach or detach from particles are not fully understood (Walters et al. 2013).

The WY 2025 Special Study seeks to gain an understanding of microbial conditions and bacteria sources at potential REC-1 sites (**goals #1 and #3**). In WY 2024, three sites where water-contact recreation might occur were identified, and each was sampled once (May 20, 2024; EOA, 2024). One of those WY 2024 sites was subsequently eliminated because field observations at that site found it to be inaccessible; tall fencing, dense vegetation, and posted signage indicated that swimming does not occur there. In WY 2025, sampling at the remaining two sites (G-XMAS and SCC-REC) was expanded to five weekly events to

[3] The REC-1 beneficial use designation is intended for activities where full-body contact or accidental ingestion of water is possible (e.g., swimming, water-skiing, surfing, diving).

allow calculation of the geometric mean of *E. coli* concentrations, the statistic used for bacteria water quality objectives. These sites were also sampled for human markers and secondary MST markers (canine, horse, cow/ruminant, chicken) to help identify controllable bacteria sources (**goal #3**). Uvas Creek at Christmas Hill Park (G-XMAS) is characterized by relatively deep water and is easily accessed at a road crossing (i.e., Miller Ave); however, there is a prominent sign prohibiting swimming (see Figure 3.2). Llagas Creek near Yvonne Drive (SCC-REC) is characterized by a shady riparian corridor. The presence of a picnic table suggests that people recreate on the creek banks. However, water levels were low at this location (i.e. roughly less than six inches) during WY 2025. While people may wade in the creek at this location, the potential for water ingestion is very low.

Sites sampled to address **goal #2** (evaluate presence of human sources in dry season MS4 discharges) and **goal #3** (add secondary MST markers to help identify controllable animal sources) were identified through review of Morgan Hill and Gilroy annual dry season Illicit Discharge Detection and Elimination (IDDE) MS4 surveys. In compliance with Provision E.9 of the Phase II Permit, both cities survey high priority MS4 outfalls annually in late summer (July/August/September). Outfalls with ponded or flowing water are documented and sampled for a variety of constituents to help identify the source of the discharge. Several years of IDDE data were examined to identify MS4 outfalls with consistent dry season flow. A total of seven outfall sites were initially identified for special study sampling during WY 2025. However, due to a lack of flow during WY 2025 monitoring, one Gilroy outfall and one Morgan Hill outfall were not sampled.

The long-term monitoring site (MON) was sampled in WY 2025 to address **goal #4**. In addition, one sampling station was located at the wastewater treatment plant in Gilroy (G-WWTP). The wastewater treatment plant provides recycled water to customers throughout South Santa Clara County. This sample was repeated from WY 2024 to confirm recycled water does not contain traces of human-specific HF183 bacteria markers (**goal #5**).

A description of the nine sites sampled in WY 2025 are provided in Table 3.1. A Map showing station locations is provided in Figure 3.1.

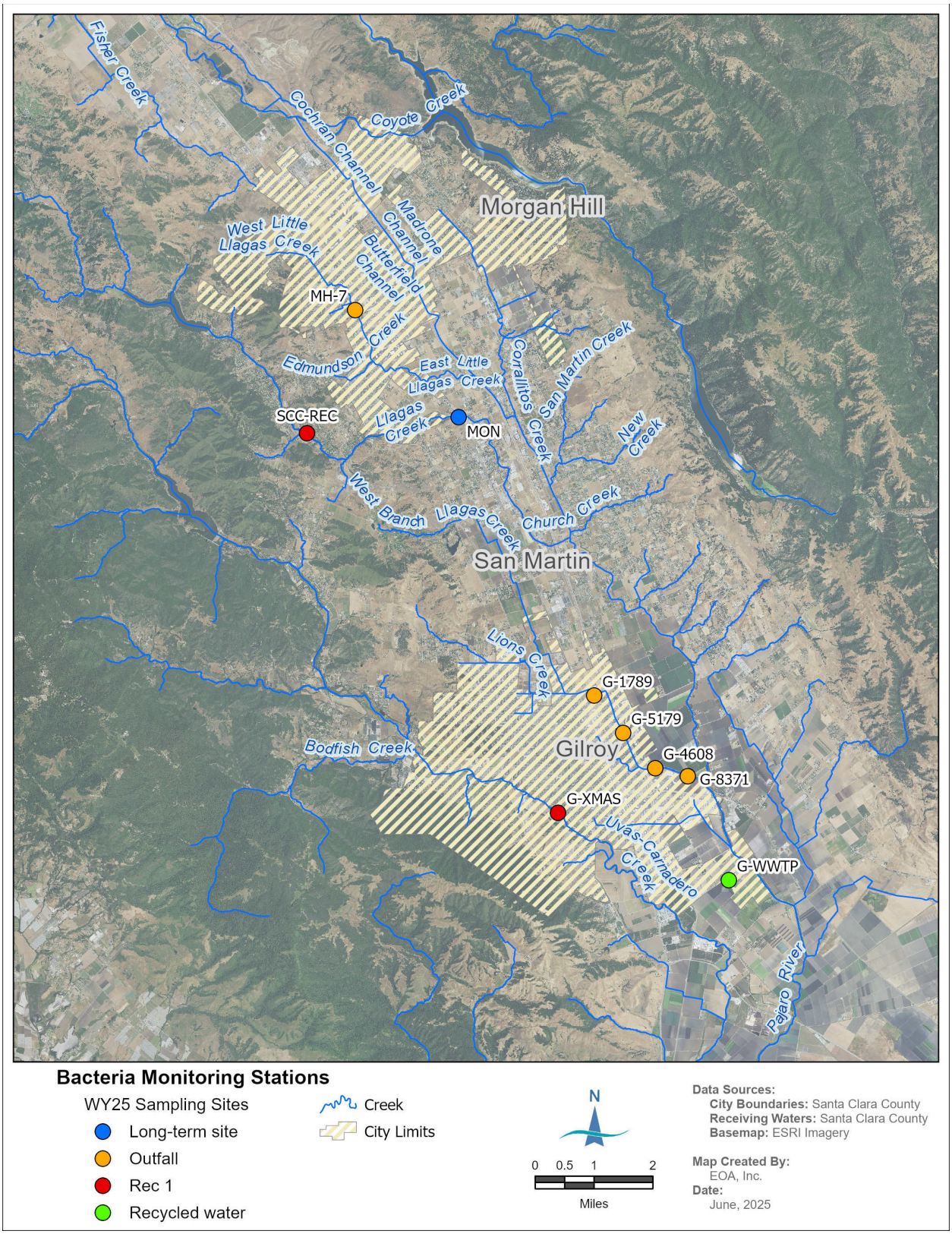

Figure 3.1. WY 2025 Special Study Monitoring Locations.

Figure 3.2. Uvas Creek at Miller Ave and No Swimming sign (site G-XMAS). Images captured from Google Street View, dated March 2023.

Table 3.1. Bacteria sample locations for stormwater and receiving waters in the City of Gilroy, City of Morgan Hill, and County of Santa Clara.

Station ID	Creek/Location	Jurisdiction	Latitude	Longitude	Comments
Potential REC-1 Sites					
G-XMAS	Uvas Creek at Miller Ave	Gilroy	36.998442	-121.584935	Potential recreation site at Christmas Hill Park identified from survey.
SCC-REC	Llagas Creek at Yvonne Drive	Unincorporated Santa Clara County	37.091147	-121.663594	Potential recreation site within a Valley Water easement identified during previous creek surveys via presence of a creekside picnic table. Shallow water depth prevents swimming.
Dry Season Outfall - Potential dry season source of FIB, identified during City of Gilroy IDDE survey					
G-5179	Outfall to the west branch of Llagas Creek near Adams Ct.	Gilroy	37.018327	-121.565306	Potential dry season source of FIB, identified during City of Gilroy IDDE surveys.
G-1789	Outfall to the west branch of Llagas Creek at Murray Ave.	Gilroy	37.027482	-121.574314	Potential dry season source of FIB, identified during City of Gilroy IDDE surveys.
G-4608	Outfall to lower Llagas Creek (Miller Slough) at Camino Arroyo Dr.	Gilroy	37.0097	-121.555312	Potential dry season source of FIB, identified during City of Gilroy IDDE surveys.
G-8371	Outfall to lower Llagas Creek (Miller Slough) near SE end of Renz Ln.	Gilroy	37.0078	-121.545233	Potential dry season source of FIB, identified during City of Gilroy IDDE surveys. Previous EOA bacteria monitoring site (WY 2021). Previous sampling completed by another consultant (AMEC, 2016).
MH-7	Outfall to West Little Llagas Creek at Spring Ave.	Morgan Hill	37.121676	-121.649145	Potential dry season source of FIB, identified during City of Morgan Hill IDDE surveys.
Long-term Monitoring Site					
MON	Llagas Creek at Monterey Highway	Morgan Hill	37.095567	-121.61701	Long-term monitoring site.
Recycled Water Source – Wastewater Treatment Plant					
G-WWTP	Gilroy Wastewater Treatment Plant	Gilroy	36.982279	-121.533243	Recycled water source for South Santa Clara County.

3.2 Sampling Methods

Water quality grab samples were collected weekly at up to nine stations during dry weather sampling between May 5, 2025 and June 2, 2025. The sampling locations are described in Table 3.1 and illustrated in Figure 3.1.

All samples were collected by hand directly into the sample container, without the use of an intermediate container. All samples (except G-WWTP) were analyzed for *E. coli* (SM9223B-2016 Colliert) and human markers of bacteroides (HF183). All sites except for G-WWTP were analyzed twice for at least two additional species-specific MST markers, including canine (BacCan), chicken/duck (CytB; mitochondrial), horse (HoF597F), and cow (BacCow). In addition, for the purposes of Quality Assurance/Quality Control (QA/QC), several samples were analyzed for the Universal Bacteroides

(UniBac) to confirm the presence of this species in the region and a ruminant marker (Rum2Bac) to assess sensitivity of the cow marker.

All water samples were analyzed by Cel Analytical (in San Francisco) following Surface Water Ambient Monitoring Program (SWAMP) analysis protocols described in the Project Quality Assurance Project Plan (QAPP) (EOA, 2020b).

General water quality parameters (temperature, specific conductance, and pH) were measured in water samples collected in a transfer bottle at each site. Additional field observations (e.g., estimated flow depth, water clarity) were recorded in the field notes. Data were validated for representativeness, comparability, completeness, sensitivity, precision, accuracy, and contamination per the QAPP. A statement of data quality is provided in Section 3.3 of this report.

3.3 Statement of Data Quality

Data QA/QC was performed in accordance with the protocols established in the South Santa Clara County Regional Bacteria TMDL Monitoring for the Pajaro River Watershed – Quality Assurance Project Plan (Project QAPP; EOA, 2020b) that was based on the SWAMP Quality Assurance Program Plan (QAPrP; SWAMP, 2017), which was developed in accordance with USEPA guidance (USEPA 2012b and USEPA 2003). The Project QAPP establishes Data Quality Objectives (DQOs) to ensure that data collected are sufficient and of adequate quality for their intended use. These DQOs include both quantitative and qualitative assessments of the acceptability of data. The qualitative goals include representativeness and comparability, and the quantitative goals include completeness, sensitivity (detection and quantization limits), precision, accuracy, and contamination. Measurement Quality Objectives (MQOs) are the acceptance thresholds or goals for the data.

Overall, data for the WY 2025 Bacteria Special Study met the QA/QC objectives. Based on the QA/QC review, no data collected during the Bacteria Special Study were rejected. Likewise, the laboratory case narratives provided for *E. coli* analyses confirmed that all laboratory QA/QC requirements were met.[4] The following is a description of the DQOs/MQOs and how data collected for the WY 2025 Special Study conform to these metrics.

Representativeness – The representativeness of data is the ability of the sampling locations and the sampling procedures to adequately represent the true condition of the sample sites. For this project, all samples are assumed to be representative as they were performed according to the protocols specified in the Regional Monitoring Plan (EOA, 2019b), Project QAPP (EOA, 2020b), and Bacteria Special Study Proposal. All field personnel received and reviewed these documents and the laboratory personnel received and reviewed the Project QAPP. Involved personnel followed prescribed protocols, including field and laboratory methods to ensure the collection of representative, uncontaminated samples.

Comparability – Comparability is the degree to which data can be compared directly to other relevant studies. The Surface Water Ambient Monitoring Program is considered to be a relevant study for comparison, and the Project QAPP includes the same MQOs as SWAMP's QAPrP (SWAMP 2022[5]). Data results were considered comparable to SWAMP if the protocols in the Monitoring Plan and Project QAPP were followed. All laboratory procedures conformed to protocols listed in the Project QAPP and field

[4] Case narratives are not provided for MST analyses; however, results of laboratory control and QC samples are provided in the electronic data deliverables.

[5] https://www.waterboards.ca.gov/water_issues/programs/swamp/docs/swamp-qaprp-2022.pdf

work followed protocols in the Monitoring Plan. Thus, all data collected are considered comparable with SWAMP and project protocols.

Completeness – Completeness is the percentage of valid data collected and analyzed compared to the total expected to be obtained under normal operating conditions. Overall completeness accounts for both sampling (in the field) and analysis (in the laboratory). Although not all MS4 outfalls could be sampled due to lack of flow, this outcome was expected. Therefore, the number of field samples (n=9) is considered complete.

The Bacteria Special Study requires the collection of three QA/QC samples (two field duplicates and one field blank). All field QA samples were collected as planned and analyzed for *E. coli* and MST analytes. The field duplicates analyzed *E. coli* and HF183 while the one field blank analyzed *E. coli* and universal bacteroides, which could help identify sample contamination from a broad genus of bacteria for the latter analyte. Additionally, all laboratory QC samples (i.e., one laboratory duplicate and one laboratory blank per batch) were analyzed for the sampling event, resulting in 100% completeness for field and laboratory QA/QC samples.

Sensitivity – Indicators of the sensitivity of an analytical method to measure a target parameter include instrument detection limits (IDLs), method detection limits (MDLs), and reporting limits (RLs). For this project and for comparable programs, such as SWAMP, reporting limits are the measurement of primary interest. The Project QAPP identifies a lower end target reporting limit of 2 MPN /100 mL for *E. coli*. All *E. coli* samples met the target RL, and there is no target reporting limit identified in the Project QAPP for MST samples.

Precision – Precision is used to measure the degree of agreement among individual measurements of the same property under prescribed similar conditions. Overall precision usually refers to the degree of agreement for the entire sampling, operational, and analysis system. For this project, precision was evaluated via reanalysis of individual samples (laboratory duplicates) and multiple collocated samples (field duplicates) analyzed on equivalent instruments.

To determine the laboratory precision for bacterial analyses, the results from the preceding 15 positive laboratory duplicate samples of a specific type (matrix) are used to calculate a running mean. These preceding 15 positive duplicate samples are to be the previous 15 analyzed sequentially by the laboratory and most likely will not all be from samples from the current project. In order for the laboratory to demonstrate an acceptable level of precision, the range of logarithms for a particular duplicate must be less than the mean of the range of logarithms multiplied by 3.27. For this analysis, the laboratory found that the range of logarithms was acceptable. The relative percent difference (RPD) was also calculated as another metric for laboratory precision. If either the original sample or the field duplicate is detected at a concentration below the reporting limit, an RPD cannot be calculated. The highest RPD for laboratory duplicates was calculated to be 60.38% with the *E. coli* split from the May 12 MON sample. However, a lab duplicate with a >200% RPD was split from the SCC-REC HF183 sample collected on May 5. The original sample was non-detect so the RPD is not valid. All other RPDs were considered acceptable.

While the Project QAPP requires the collection of one field duplicate, there is no MQO. Field duplicates were evaluated with a 200% maximum RPD threshold, similar to other field duplicates collected for earlier stages of the Regional Monitoring Program. The highest field RPD for *E. coli* was 16.67% and HF183 results were all non-detects. All results are considered acceptable.

Accuracy – Accuracy describes the degree of agreement between a measurement (or the average of measurements of the same quantity) and an acceptable reference or true value. For this project, accuracy of *E.coli* and MST analysis was evaluated with positive and negative laboratory controls. All positive laboratory controls elicited a positive response and the negative controls elicited a negative response (i.e., non-detect).

Note that accuracy for MST samples is also evaluated via a laboratory fortified spike (analogous to a laboratory control sample (LCS) for chemical analytes), which is run for each batch during extraction for universal bacteroidales. Though blank water is spiked with a known concentration, a percent recovery cannot be calculated due to the complexity of whole genomic DNA. These QA samples are only used by the laboratory in comparison to the positive control samples. The laboratory did not note any issues associated with these QA samples since all recoveries were below the highest value of 157.48% for *E. coli.*

Contamination – Blank samples evaluated at multiple points in the process chain help assure that detected analytes measured in samples originated from the *E. coli* and bacteriodales target matrix in the sampled environment and are not contaminated artifacts of the collection or analytical process. Field and laboratory method blanks can be used to assess contamination during each stage, including sample collection, preparation and analysis.

All laboratory blanks for both *E. coli* and MST samples exhibited no detections. There was one field blank that was analyzed for *E. coli* and MST (universal) analytes. The MST result was a non-detect and the *E. coli* result was < 1 MPN/100mL. As field blanks are not required by the project QAPPP, there is no MQO for this QA attribute. For traditional water chemistry analytes, the MQO is for concentrations to be less than the reporting limit. This upper threshold was used to evaluate the *E. coli* field blanks, thus making the outcome acceptable since both the MDL and RL are 1 MPN/100mL.

4.0 Results of WY 2025 Special Study

The primary goal of the WY 2025 Special Study was to assess microbial conditions at potential REC-1 sites during the dry season when water contact recreation (i.e., swimming) is most likely. A five-week monitoring program was implemented at the receiving water sites (G-XMAS, SCC-REC, MON) so that the geometric mean of *E. coli* could be calculated. Weekly sampling began on May 5, 2025 and concluded on June 2, 2025. Several MS4 outfalls were visited during two of the weekly sampling events (5/5/25 and 5/19/25) and samples were collected if water was observed flowing through the outfall. In addition, one sample of municipal recycled water was analyzed for human markers (HF183) to confirm that absence of this marker in this widely used water source.

Laboratory results[6] and field measurements are shown in Table 4.1. Results for each of the analyte groups are described below.

4.1 *E. coli*

Statewide bacteria Water Quality Objectives (WQOs) for the protection of REC-1 beneficial uses in freshwater were adopted by the State Water Board on August 7, 2018 and approved by the USEPA on March 22, 2019. The statewide WQOs use *E. coli* as the sole indicator organism for freshwaters (i.e., where salinity is equal to or less than 1 part per thousand 95 percent or more of the time). The WQOs consist of both a geometric mean (GM) and a statistical threshold value (STV). The GM criteria of 100 CFU/100 mL applies when there are at least five samples distributed over a six-week period. The STV criterion of 320 CFU/100 mL should not be exceeded by more than 10 percent of the samples taken in a month, and therefore the STV approximates a single sample maximum. In this evaluation, the Most Probable Number (MPN) of bacteria colonies given by the analytical method is compared directly with the Colony Forming Units (CFU) specified the WQO. [7]

E. coli WQOs apply to receiving waters (i.e., potential REC-1 sites and long-term monitoring site), but not to MS4 discharges (i.e., outfall sites). All samples collected at potential REC-1 sites (n=10), outfall sites (n=8), and the long-term monitoring site (n=5) were analyzed for *E. coli*. The GM of *E. coli* concentrations was calculated for all three receiving water sites, and similar values were observed (230 MPN/100 mL at SCC-REC, 233 MPN/100 mL at G-XMAS, 247 MPN/100 mL at MON). All three sites had an *E. coli* GM that exceeded the WQO of 100 CFU/100 mL. In addition, the *E. coli* STV WQO of 320 CFU/100 mL was exceeded in one sample from G-XMAS (460 MPN/100 mL on 5/12/25) and two samples from MON (690 MPN/100 mL on 5/12/25; 460 MPN/100 mL on 5/27/25). These results suggest that REC-1 WQOs beneficial uses at the monitoring sites may be impaired by microbial conditions.

While *E. coli* WQOs do not apply to outfall sites, *E. coli* concentrations can provide useful characterization information. Concentrations at outfall sites ranged from 54 MPN/100 mL (MH-7 on 5/5/25) to >2400 MPN/100 mL (G-5179 on 5/19/25 and G-8371 on 5/19/25), which is the laboratory's upper testing limit. Overall, concentrations at outfall sites were generally higher than those measured at

[6] Laboratory results were provided by Cel Analytical in electronic data deliverable (EDD) format and are available upon request. Receiving water data have been submitted for upload to CEDEN.

[7] Water quality objectives are given in units of colony forming units (CFU) per 100 milliliters (CFU/100 mL); however, most laboratory methods present results in units of most probably number of colony forming units (MPN) per 100 mL (MPN/100 mL). The two units are generally considered interchangeable.

receiving water sites and exhibited greater variability. These results suggest that there may be episodic *E. coli* sources within the contributing catchments.

The following sections describe the results of the associated MST monitoring, which provides information on the potential sources of bacteria measured at the receiving water and outfall sites. Overall, based on the MST results, it appears that wildlife or biofilm sources were the likely sources of FIB.

4.2 Human Marker (HF183)

All 24 samples collected in WY 2025 were analyzed for the human genetic marker (HF183). HF183 was detected in three of these samples; however, all HF183 detections were extremely low and censored. In one sample (potential REC-1 site G-XMAS on 5/27/25), HF183 was detected below the limit of detection (DBLOD). This indicates that HF183 was present, but at a level too low for the testing equipment to give an exact number. In two samples (potential REC-1 site SCC-REC on 5/5/25 and outfall site MH-7 on 5/5/25), HF183 was above the limit of detection but below the reporting limit. These J-flagged results are also considered estimated concentrations, but with 99% confidence that HF183 is present in the sample. These HF183 results suggest that human sources of bacteria were not contributing to the overall FIB load at these stations during these sampling events.

The lack of detection of HF183 in the recycled water sample (G-WWTP) supports the WY 2024 finding that recycled water use in the study area is not complicating HF183 data analyses by contributing HF183 remnants to the study area.

4.3 Secondary MST Markers

Four additional markers (canine, chicken/duck, horse, cow) were analyzed at receiving water sites and two of those markers (canine, chicken/duck) were analyzed at outfall sites on 5/5/25 and 5/19/25. While many of these markers can pick up genetic contributions from uncontrollable wildlife species, they were used to identify whether potentially controllable sources of bacteria are present in the contributing watersheds and catchments.

Canine (BacCan) – Measured in receiving water and outfall samples

Canine sources of bacteria in the samples include wash-off of dog waste from upland areas, dogs defecating directly in receiving waters, and seepage from dumpsters containing dog waste. These sources of FIB are generally considered controllable because pet owners could be educated on proper pet waste management and encouraged to do so through incentive programs. Wildlife, such as coyotes and fox, can also contribute to this analyte.

The canine marker (BacCan) was detected in all six receiving water samples and one of eight outfall samples. All detections were low and four of the seven results censored for being DBLOD (potential REC-1 site G-XMAS on 5/5/25; outfall site G-1789 on 5/5/25) or below the reporting limit (G-XMAS on 5/19/25; long-term monitoring site MON on 5/5/25). These results suggest that canine associated bacteria is present in the riparian corridors, but of low concern in the catchments draining to the outfall sites. It is unknown whether the canine marker detections were caused by pet dogs or wild canine species.

Chicken/Duck (CytB) – Measured in receiving water and outfall samples

The mitochondrial chicken/duck marker (CytB) is highly sensitive to chicken waste sources in samples and can give an indication if backyard chicken coops are causing water pollution. This marker is also somewhat sensitive to duck waste sources and, because it is a mitochondrial marker, it could be introduced through food sources. For example, waste from humans or canines who have consumed chicken could result in positive detections. Therefore, chicken/duck markers results must be considered within the context of overall watershed/catchment area characteristics and land uses.

The chicken/duck marker was detected in four of six receiving water samples and none of the outfall samples. All detections were extremely low and the results were censored for being DBLOD. These findings suggest that improperly managed backyard chicken coops or chicken manure applications are not of concern in the outfall catchments that were monitored. Chicken waste may be present in the larger receiving water watersheds, but the extremely low detections suggest that this is not a high priority source of bacteria.

Horse (HoF597F) – Measured in receiving water samples only

The horse marker was not detected in any of the six receiving water samples. This finding is consistent with prior horse marker monitoring in the study area (see Section 2.2).

Cow (BacCow) – Measured in receiving water samples only

The cow marker (BacCow) is highly sensitive to cattle waste sources in samples and can give an indication as to whether cattle manure is causing water pollution. While it is most sensitive to cattle, this marker can be influenced by interference from deer and other ruminants. Therefore, cow marker (BacCow) results must be considered within the context of overall watershed characteristics and land uses. Regardless of these complications, cow sources of bacteria should be carefully scrutinized because studies have shown that cattle fecal material poses a greater threat to human health and REC-1 beneficial uses than other non-human domestic or livestock waste sources (Soller et al. 2010).

The cow marker was detected in all six receiving water samples, with just one result censored for being below the reporting limit (long-term station MON on 5/19/25). Concentrations ranged from 9 gc/mL (MON on 5/19/25) to 30 gc/mL (G-XMAS on 5/5/25). Cow marker concentrations were higher at all sites in the 5/5/25 samples (ranging from 27 gc/mL at MON to 30 gc/mL at G-XMAS) compared to the 5/19/25 samples (ranging from 9 gc/mL at MON to 18 gc/mL at SCC-REC). These results suggest that cattle waste may be present in the larger receiving water watersheds.

4.4 Field Measurements

Field measurements of temperature, specific conductance, and pH were collected in all samples from potential REC-1 sites (n=10), outfall sites (n=8), and the long-term monitoring site (n=5). In receiving waters, specific conductance ranged from 235 uS/cm (G-XMAS on 5/12/25) to 362 uS/cm (MON on 5/27/25). At outfall sites, specific conductance ranged from 373 uS/cm (G-1789 on 5/5/25) to 648 uS/cm (G-5179 on 5/19/25). While the specific conductance, temperature, and pH results for both types of sites were within expected ranges, the highest values were measured at outfall site G-5179 on 5/19/25. This site exhibited very low flow that was approaching stagnant water, and foam was observed in the ponded area to which the outfall discharged (Figure 4.1 and Table 4.1). Other observations from the study include unhoused individuals' encampments evident at outfall sites G-8371, G-4608, and G-1789. Trash was observed around the encampments, at potential REC-1 site G-XMAS, and at least once at all outfall locations (Table 4.1).

Figure 4.1. Outfall site G-5179 on 5/5/26. Sample collected from a ponded area to which the outfall discharged.

4.5 Long-Term Trends (Station MON)

Long-term trends are characterized at station MON because this location has the longest and most complete monitoring record. The *E. coli* monitoring data collected at MON during wet (October through March) and/or dry (April through September) season 5-week sampling windows are available from WYs 2016, 2017, 2018, 2021, 2023, and 2025. Monitoring in WY 2024 had just one *E. coli* sampling event. Monitoring results between October 5, 2012 and May 6, 2014 are from weekly sampling events. All results are shown in Figure 4.2 with the STV WQO of 320 MPN/100 mL shown for reference. Overall patterns suggest station MON has higher concentrations of *E. coli* during the wet season compared to the dry season. While none of wet or dry season sample results from WY 2023 and WY 2024 exceeded 320 MPN/100mL, 40% (two of five) of the results from WY 2025 did exceed this threshold. Overall, *E. coli* concentrations at station MON have remained relatively steady from 2012 through 2025.

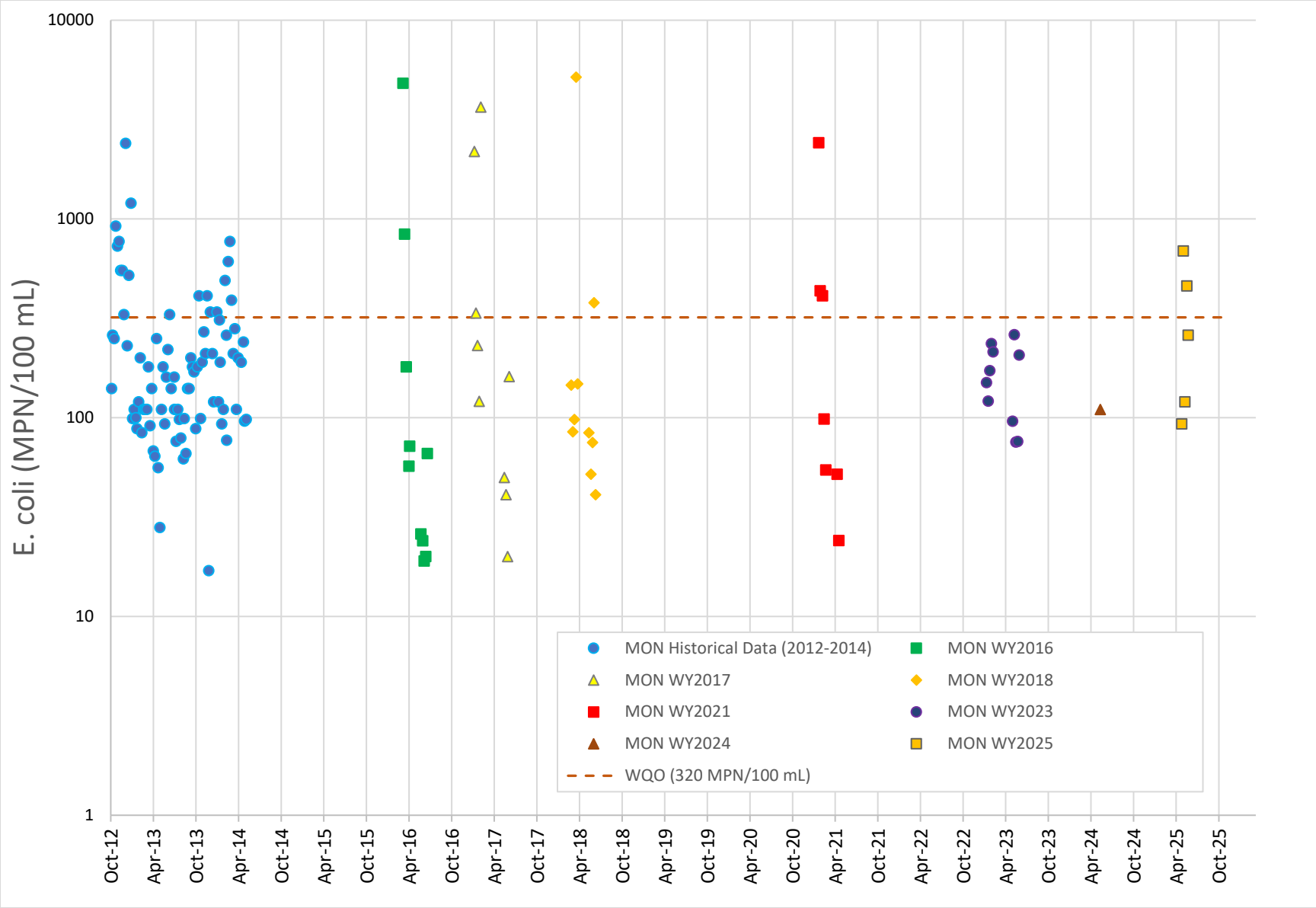

Figure 4.1. Long-term monitoring record for *E. coli* water grab samples at station MON. Results are shown on a logarithmic scale.

Table 4.1. Concentrations of *E. coli* and species-specific markers in samples collected during dry weather from May to June, 2025 in Gilroy, Morgan Hill and Santa Clara County. Exceedances of *E. coli* STV (320 CFU/100 mL) and GM (100 CFU/100 mL) WQOs in receiving waters are shown in bold red font.

Station Code	Sample Date	*E. coli* (MPN/ 100 mL)	*E. coli* GeoMean (MPN/ 100 mL)	Human (HF183) (gc/mL)	Canine (BacCan) (gc/mL)	Chicken/ Duck (CytB) (gc/mL)	Horse (HoF597F) (gc/mL)	Cow (BacCow) (gc/mL)	Temp (˚C)	Specific Cond (uS/cm)	pH (units)	Comments
Potential REC-1 Sites (Receiving Water)												
G-XMAS	5/5/2025	120	**233**	0	5 (DBLOD)	2 (DBLOD)	0	30	12.9	303	7.9	Minimal trash on banks.
	5/12/2025	**460**		0	NS	NS	NS	NS	12.8	235	7.0	--
	5/19/2025	200		0	11 J	5 (DBLOD)	0	14	13.9	249	7.5	--
	5/27/2025	200		5 (DBLOD)	NS	NS	NS	NS	14.1	280	7.1	Man with bike sitting by the water.
	6/2/2025	310		0	NS	NS	NS	NS	15.8	297	7.0	--
SCC-REC	5/5/2025	110	**230**	9 J	15	2 (DBLOD)	0	28	13.4	322	7.8	--
	5/12/2025	310		0	NS	NS	NS	NS	11.8	257	7.3	--
	5/19/2025	310		0	12	0	0	18	16.0	266	8.1	--
	5/27/2025	210		0	NS	NS	NS	NS	12.8	309	7.4	No trash or evidence of recreation.
	6/2/2025	290		0	NS	NS	NS	NS	13.8	308	7.5	--
Outfall Sites - Potential dry season source of FIB, identified during Cities of Gilroy and Morgan Hill IDDE surveys												
G-1789	5/5/2025	>2400	NA	0	4 (DBLOD)	0	NS	NS	15.4	373	8.3	Occupied homeless encampment on opposite bank. Trash in creek at outfall.
	5/19/2025	150		0	0	0	NS	NS	18.7	482	7.9	--
G-4608	5/5/2025	2400	NA	0	0	0	NS	NS	19.4	571	8.0	Trash and encampment debris under bridge.
G-5179	5/19/2025	>2400	NA	0	0	0	NS	NS	21.2	648	8.0	Very low flow rate, approaching stagnant conditions. Foam observed.
G-8371	5/5/2025	490	NA	0	0	0	NS	NS	14.4	571	7.4	Some trash. Homeless population around area.
	5/19/2025	>2400		0	0	0	NS	NS	20.5	432	8.8	--
MH-7	5/5/2025	54	NA	10 J	0	0	NS	NS	18.4	505	7.9	Trash.
	5/19/2025	1000		0	0	0	NS	NS	20.7	467	8.3	--
Long-term Monitoring Site (Receiving Water)												
MON	5/5/2025	93	**247**	0	6 J	3 (DBLOD)	0	27	15.9	358	7.9	Valley Water construction upstream.
	5/12/2025	**690**		0	NS	NS	NS	NS	14.8	290	7.5	--
	5/19/2025	120		0	15	0	0	9 J	18.8	300	8.2	--
	5/27/2025	**460**		0	NS	NS	NS	NS	15.7	362	7.2	No anthropogenic observations.
	6/2/2025	260		0	NS	NS	NS	NS	16.4	343	7.3	--
Recycled Water Source – Wastewater Treatment Plant												
G-WWTP	5/5/2025	NS	NA	0	NS	NS	NS	NS	NS	NS	NS	--

DBLOD = Detected below limit of detection (used for PCR analysis only)
J = Detected below reporting limit but above limit of detection
NA = Not Applicable
NS = Not Sampled

5.0 Conclusions and Recommendations

In WY 2025, the Regional Partners continued to successfully implement the Regional Bacteria TMDL Monitoring Plan (EOA, 2019b). FIB sources and exposures in South Santa Clara County were investigated by monitoring outfalls and receiving waters during the dry season, when recreators are most likely to be exposed to FIB. Samples were analyzed for human genetic markers, up to four additional MST markers, and *E. coli.* Several conclusions and recommendations can be made based on the findings.

Conclusions:

- There are few locations within the Phase II Permit area where people participate in water contact (REC-1) recreation, which is the type of water recreation where incidental ingestion of water, the predominant exposure pathway, may occur. While three sites were identified as potentially supporting REC-1 uses in WY 2024, one was eliminated based on field observations. Of the two remaining sites, one has a "No Swimming" sign clearly posted (site G-XMAS). The other has very shallow water (less than six inches), likely precluding submerged heads and incidental water ingestion (site SCC-REC).
- The geometric mean of *E. coli* concentrations measured during five weekly sampling events at three receiving water locations (potential REC-1 sites G-XMAS and SCC-REC; long-term monitoring station MON) exceeded the WQO of 100 CFU/100 mL at all three sites. These results suggest that REC-1 WQOs beneficial uses at the monitoring sites may be impaired by microbial conditions.
- *E. coli* concentrations measured at outfall sites were generally higher than those measured at receiving water sites and exhibited greater variability. These results suggest that there may be episodic *E. coli* sources within the contributing catchments.
- A review of historical data from receiving water station MON shows that *E. coli* concentrations are higher in the wet season compared to the dry season. Within this seasonal variability, *E. coli* concentrations have remained relatively steady from 2012 through 2025.
- Overall, based on the MST results, it appears that wildlife or biofilm sources are the likely sources of FIB.
- The human marker (HF183) was not detected above the reporting limit at any of the receiving water or outfall sampling stations in WY 2025. The lack of positive samples suggests that human bacteria sources may be absent, limited, and/or episodic during the dry season at the monitored sites. A similar conclusion was reached with the WY 2024 sampling outcomes.
- The human marker was not detected in the G-WWTP sample, which indicates that the study area's municipally supplied recycled water is unlikely to introduce this analytical constituent to receiving waters. Similar results were analyzed during WY 2024 sampling. While it was noted during the visits to the wastewater treatment plant that recycled water delivery will continue to increase each year, it is unlikely to increase the likelihood that HF183 will be present (personal communication, May 5, 2025).
- Canine associated bacteria is present in the riparian corridors, but of low concern in the catchments draining to the outfall sites. It is unknown whether the canine marker detections were caused by pet dogs or wild canine species.

- Improperly managed backyard chicken coops are not of concern in the outfall catchments that were monitored. Chicken waste may be present the larger receiving water watersheds, but the extremely low detections suggest that this is not a high priority source of bacteria.
- The horse marker was not detected in any of the six receiving water samples. This finding is consistent with prior horse marker monitoring in the study area.
- Cattle fecal material poses a greater threat to human health and REC-1 beneficial uses than other non-human domestic or livestock waste sources (Soller et al. 2010). Cattle markers were detected in all six receiving water samples.

Recommendations:

The recommendations below are not presented in order of priority and should instead be considered as time and resources allow.

- **Expanded Exposure Monitoring.** The potential REC-1 sites sampled in WY 2024 and WY 2025 represent an initial study of where South Santa Clara County recreators may be exposed to FIB. While none of the sites had concentrations of the human marker (HF183) above reporting limits, the geometric mean *E. coli* WQO was exceeded at all three receiving water sites. Future special studies should continue collecting weekly data at potential REC-1 locations to calculate a 5-week geometric mean. If possible, human, cattle, and other MST markers should be analyzed to continue tracking these potential bacteria sources.
- **Expanded IDDE Efforts.** Annual IDDE surveys may be helpful in identifying dry weather sources of bacteria. Morgan Hill and Gilroy should consider including HF183 in their IDDE sampling programs to assess whether human sources of bacteria are present in dry weather discharges. Outfall samples generally had higher levels of *E. coli* concentrations when compared to receiving water samples. However, no human markers were detected in the MS4 samples from WY 2024 and WY 2025.

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