Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Watershed Monitoring and Assessment Program

Urban Creeks Monitoring Report

Part D: Pollutants of Concern Monitoring Report

Water Year 2023 (October 2022 – September 2023)

Submitted in compliance with provision C.8.h.iv of NPDES Permit No. CAS612008,
Order No. R2-2022-0018

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This report is submitted by the agencies participating in the

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

City of Campbell	City of Milpitas	City of Santa Clara
City of Cupertino	City of Monte Sereno	City of Saratoga
City of Los Altos	City of Mountain View	City of Sunnyvale
Town of Los Altos Hills	City of Palo Alto	County of Santa Clara
Town of Los Gatos	City of San José	Valley Water

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List of Acronyms

BAMSC	Bay Area Municipal Stormwater Collaborative
BASMAA	Bay Area Stormwater Management Agency Association
BMP	Best Management Practice
CEC	Constituents of Emerging Concern
CEDEN	California Environmental Data Exchange Network
CW4CB	Clean Watersheds for a Clean Bay
DQO	Data Quality Objectives
EDD	Electronic Data Deliverable
ECWG	Emerging Contaminants Workgroup
FIB	Fecal Indicator Bacteria
Hg	Mercury
HgT	Total Mercury
IMR	Integrated Monitoring Report
MQO	Measurement Quality Objective
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
ND	Non-detect
NPDES	National Pollutant Discharge Elimination System
PAHs	polycyclic aromatic hydrocarbons
PCBs	Polychlorinated Biphenyls
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
POC	Pollutant of Concern
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RMC	Regional Monitoring Coalition
RMP	Regional Monitoring Program for Water Quality in San Francisco Bay
ROW	Right-of-Way
RWL	Receiving Water Limitations
SAP	Sampling and Analysis Plan
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SPLWG	Sources, Pathways, and Loadings Workgroup
SPoT	Statewide Stream Pollutant Trend Monitoring
SSC	Suspended Sediment Concentration
STLS	Small Tributary Loading Strategy
SWAMP	Surface Water Ambient Monitoring Program
TOC	Total Organic Carbon
TRC	Technical Review Committee
UCMR	Urban Creeks Monitoring Report

WMA	Watershed Management Area
WQO	Water Quality Objective
WY	Water Year

1. INTRODUCTION

This *Urban Creeks Monitoring Report (UCMR) Part D: Pollutants of Concern Monitoring Report, Water Year 2023* (POC Monitoring Report) was prepared by the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP or Program), on behalf of its 15 member agencies (13 cities/towns, the County of Santa Clara, and Valley Water) subject to the National Pollutant Discharge Elimination System (NPDES) stormwater permit for Bay Area municipalities referred to as the Municipal Regional Permit (MRP).

The MRP was first adopted by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB or Regional Water Board) on October 14, 2009 as Order R2-2009-0074 (referred to as MRP 1.0, SFBRWQCB 2009). On November 19, 2015, the Regional Water Board updated and reissued the MRP as Order R2-2015-0049 (referred to as MRP 2.0, SFBRWQCB 2015). The current, and third, version of the MRP (i.e., MRP 3.0, SFBRWQCB 2022) was issued by the Regional Water Board as Order R2-2022-0018 and became effective July 1, 2022. This report fulfills the requirements of provision C.8.h.iv.(1) of MRP 3.0 for the following:

- The allocation of sampling effort for POC monitoring planned for the forthcoming year (i.e., Water Year 2024[1]), and
- What was accomplished for POC monitoring during the preceding water year (i.e., Water Year 2023).

In compliance with provision C.8.h.iv.(1), this report includes monitoring locations, number and types of samples collected, purpose of sampling (i.e., Management Questions addressed), and analytes measured. This report builds on the interpretation and reporting on POC monitoring data that was provided in the March 2020 Integrated Monitoring Report (IMR) (SCVURPPP 2020), the Water Year (WY) 2020 UCMR (SCVURPPP 2021), the WY 2021 UCMR (SCVURPPP 2022), and WY 2022 UCMR (SCVURPPP 2023).

The data described in this report were collected in WY 2023 pursuant to water quality monitoring requirements in provision C.8.f of the MRP. Monitoring data presented in this report were submitted electronically to the Regional Water Board by SCVURPPP. No WY 2023 data were collected in receiving waters (i.e., creeks) by SCVURPPP; therefore, no data were submitted for upload to the California Environmental Data Exchange Network (CEDEN).

1.1. Report Organization

This report is organized into the following sections:

- **Section 1.0** provides the relevant background information and regulatory requirements for POC monitoring pursuant to the MRP.
- **Section 2.0** presents the results of POC monitoring conducted by the Program and summarizes POC monitoring conducted by other groups in the Santa Clara Valley in WY 2023.

[1] Most hydrologic monitoring occurs for a period defined as a water year, which begins on October 1 and ends on September 30 of the named year. For example, water year 2023 (WY 2023) began on October 1, 2022 and concluded on September 30, 2023.

- **Section 3.0** describes the anticipated allocation of sampling effort for POC monitoring in WY 2024.
- **Section 4.0** provides all the references cited within the report.

1.2. POC Monitoring Requirements

MRP 3.0 provision C.8.f requires water quality monitoring for POCs, including polychlorinated biphenyls (PCBs), mercury, copper, and emerging contaminants. Permittees may comply with the monitoring requirements of provision C.8 through a regional collaborative effort, their Stormwater Program, third-party monitoring, or a combination of these mechanisms. POC monitoring must address the six priority management information needs (i.e., Management Questions) identified in provision C.8.f:

1. **Source Identification** – identifying or confirming which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff.
2. **Contributions to Bay Impairment** – identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location).
3. **Management Action Effectiveness** – evaluating the effectiveness or impacts of existing management actions, including compliance with Total Maximum Daily Loads (TMDLs) and other POC requirements and providing support for planning future management actions.
4. **Loads and Status** – providing information on POC loads, concentrations or presence in local tributaries or urban stormwater discharges.
5. **Trends** – evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time.
6. **Compliance with Receiving Water Limitations** - providing information to assess whether receiving water limitations (RWLs) are achieved.

POC monitoring is conducted on a water year basis (i.e., October 1 through September 30). Provision C.8.f specifies yearly (i.e., WY) and total (i.e., permit term) minimum numbers of samples for each POC. For example, in Santa Clara County, MRP 3.0 requires that a minimum total of 75 PCBs samples be collected and analyzed during the permit term, and at least eight PCBs samples be collected each year. The MRP also specifies the minimum number of samples for each POC that must address each Management Question. For example, by the end of the permit term, Management Questions 1 through 3 must be addressed with at least eight PCBs samples each, and Management Questions 4 and 5 must be addressed with at least 16 PCBs samples each. It is possible that a single sample can address more than one Management Question; however, no more than 25 percent of samples for a POC may be used to satisfy requirements for multiple Monitoring Questions.

POC Monitoring requirements from MRP 3.0 are summarized in Table 1.1.

Table 1.1. MRP provision C.8.f pollutants of concern monitoring requirements for SCVURPPP Co-permittees.

Pollutant of Concern	Total Samples [b]	Yearly Minimum	Minimum # of Samples that Must be Collected for Each Management Question by the End of the Permit Term [a]					
			1. Source Identification	2. Contributions to Bay Impairment	3. Management Action Effectiveness	4. Loads and Status	5. Trends	6. Receiving Water Limitations
PCBs	75	8	8	8	8	16	16	--
Total Mercury	60	8	8	8	8	8	8	--
Copper	5	--	--	--	--	5	--	—[f]
Emerging Contaminants [c]	25	--	--	--	--	25	--	--
Ancillary Parameters [d]	--	--	--	--	--	--	--	--
RWLs Assessment (Cu, Zn, FIB, others [e])	5 (4 wet season; 1 dry season)	--	--	--	--	--	--	5

Source: SFBRWQCB 2022

Cu = copper, FIB = fecal indicator bacteria, PCBs = polychlorinated biphenyls, RWLs = receiving water limitations, Zn = zinc

[a] Individual samples can address more than one Management Question simultaneously, up to 25% of total number of samples.

[b] The MRP minimum number of samples must be met by the end of the five-year permit term (i.e., 2027).

[c] The emerging contaminants level of effort described in the MRP can be satisfied through augmentation of the San Francisco Bay Regional Monitoring Program Emerging Contaminants Monitoring Strategy in the amount of $100,000 per year for all Permittees combined.

[d] Total Organic Carbon (TOC) should be collected concurrently with PCBs data when normalization to TOC is deemed appropriate. Suspended sediment concentration (SSC) should be collected in water samples used to assess loads, loading trends, or Best Management Practice (BMP) effectiveness. Hardness data are used in conjunction with copper concentrations collected in fresh water.

[e] Additional RWL analytes are determined under provision C.8.h.iv.

[f] Copper is one of the required RWL analytes.

1.2.1. Receiving Water Limitations Monitoring

MRP 3.0 Provision C.8.f Management Question #6 (Compliance with RWLs) must be addressed with at least four samples collected during the wet season and one sample collected during the dry season. RWL analytes must include copper, zinc, fecal indicator bacteria (FIB), and any additional analytes identified based on assessment of the potential that discharges may result in receiving waters approaching or exceeding water quality objectives (WQOs). The RWL Assessment Report (i.e., Monitoring Plan) required by Provision C.8.h.iv.(2) was developed as a regional effort through the Bay Area Municipal Stormwater Collaborative[2] (BAMSC) Regional Monitoring Coalition (RMC) and was submitted with the WY 2022 UCMR (SMCWPPP 2023) on March 31, 2023. The RWL Assessment Report describes the regional approach to RWL monitoring, including the process used to identify the appropriate analytes to include in addition

[2] The BAMSC was organized by the Bay Area Stormwater Management Agencies Association (BASMAA) Board of Directors to continue the information sharing and permittee advocacy functions of BASMAA in an informal manner after BASMAA's dissolution.

to those listed in Table 1.1, the locations of regionally representative sampling sites, monitoring methods, and relevant WQOs against which to compare monitoring data.

On June 12, 2023, the Regional Water Board Executive Officer issued a letter of Conditional Approval of the RWL Assessment Report (Conditional Approval Letter). The Conditional Approval Letter stated that approval of the RWL Assessment Report is subject to two conditions: inclusion of polycyclic aromatic hydrocarbons (PAHs) in the analyte list, and demonstration of the representativeness of the selected monitoring locations. To address the first condition, participating BAMSC RMC members have augmented the analyte list to include PAHs. This change will be reflected in future POC Monitoring Reports that include RWL monitoring data. To address the second condition, MRP Permittees identified and characterized watersheds in Alameda, Contra Costa, San Mateo, and Santa Clara counties that drain to San Francisco Bay and compared them to the selected monitoring locations. The results of the analysis are described in the RWL Assessment Report Addendum that is included in **Appendix A**.

1.2.2. Emerging Contaminants

Emerging contaminants are a diverse group of chemicals and compounds, broadly defined as synthetic or naturally occurring chemicals that are not regulated or commonly monitored in the environment but have the potential to enter the environment and cause adverse ecological or human health impacts. The MRP allows for Permittees to satisfy the emerging contaminant monitoring requirements through augmentation of the San Francisco Bay Regional Monitoring Program (RMP) Emerging Contaminants Monitoring Strategy in the amount of $100,000 per year for all Permittees combined. SCVURPPP and its RMC partners have elected to exercise this option and are working through the RMP to identify analytes and monitoring strategies to implement. A letter describing this commitment and the approach to developing and implementing a regional emerging contaminant stormwater monitoring strategy through the RMP is included in **Appendix B**. SCVURPPP also continues to participate in the RMP's Emerging Contaminant Work Group (ECWG).

1.3. Third-Party Monitoring

The Program strives to work collaboratively with water quality monitoring partners to develop mutually beneficial monitoring approaches. Provision C.8.a.iii of the MRP allows Permittees to use data collected by third-party organizations to fulfill monitoring requirements, provided the data are demonstrated to meet the required data quality objectives. For example, samples collected in Santa Clara County through the RMP and the State of California's Surface Water Ambient Monitoring Program (SWAMP) Stream Pollution Trend (SPoT) Program may supplement the Program's efforts towards achieving provision C.8.f monitoring requirements. Third party monitoring conducted by the RMP and SPoT monitoring program also provide context for reviewing and interpreting SCVURPPP monitoring results. Third-party monitoring conducted or planned by the RMP and SPoT are briefly summarized in this report.

2. WY 2023 POC MONITORING IN THE SANTA CLARA VALLEY

In compliance with provision C.8.f of the MRP, the Program conducted POC monitoring in WY 2023 for PCBs and mercury. The MRP-required yearly minimum number of eight samples was met for these constituents. Specific monitoring stations, coordinates, and the POC(s) analyzed in each sample are listed in Table 2.1. Station locations are shown in Figure 2.1. Table 2.1 and Figure 2.1 include information about POC monitoring conducted by the RMP and the SPoT program.

Table 2.1. SCVURPPP and third-party monitoring stations and parameters, WY 2022 and 2023.

Organization	Station Code	Sample Date	Latitude	Longitude	Matrix	PCBs	Mercury	Total Copper	Dissolved Copper	Hardness as $CaCO_3$
SCVURPPP Samples										
SCVURPPP	049STA500A	12/01/2022	37.379467	-121.968883	stormwater	1	1	--	--	--
SCVURPPP	049STA600A	12/01/2022	37.377661	-121.968738	stormwater	1	1	--	--	--
SCVURPPP	049STA800A	12/01/2022	37.371955	-121.972038	stormwater	1	1	--	--	--
SCVURPPP	066GAC152A	12/03/2022	37.368161	-121.924160	stormwater	1	1	--	--	--
SCVURPPP	083LGC525A	12/03/2022	37.323867	-121.903164	stormwater	1	1	--	--	--
SCVURPPP	MV-XXX-0823-01	08/28/2023	37.418861	-122.091239	sediment [c]	1	1	--	--	--
SCVURPPP	MV-XXX-0823-02	08/28/2023	37.418798	-122.091071	sediment [d]	1	1	--	--	--
SCVURPPP	MV-XXX-0823-03	08/28/2023	37.418765	-122.091921	sediment [d]	1	1	--	--	--
SCVURPPP	MV-XXX-0823-04	08/28/2023	37.418652	-122.093105	sediment [c]	1	1	--	--	--
SCVURPPP	MV-XXX-0823-05	08/28/2023	37.418609	-122.093430	sediment [d]	1	1	--	--	--
SCVURPPP	MV-XXX-0823-06	08/28/2023	37.419260	-122.100044	sediment [d]	1	1	--	--	--
SCVURPPP	MV-XXX-0823-07	08/28/2023	37.416946	-122.100367	sediment [c]	1	1	--	--	--
SCVURPPP	MV-XXX-0823-08	08/28/2023	37.416969	-122.099376	sediment [d]	1	1	--	--	--
SCVURPPP	SN-SVE-0823-01	08/29/2023	37.398378	-122.020841	sediment [d]	1	1	--	--	--
SCVURPPP	SN-SVE-0823-02	08/29/2023	37.385107	-122.051244	sediment [a,b]	1	1	--	--	--
SCVURPPP	SN-SVW-0823-01	08/29/2023	37.385678	-122.051617	sediment [c]	1	1	--	--	--
SCVURPPP	SN-SVW-0823-02	08/29/2023	37.383233	-122.044415	sediment [c]	1	1	--	--	--
SCVURPPP	SN-SVW-0823-03	08/29/2023	37.384026	-122.048029	sediment [d]	1	1	--	--	--
SCVURPPP	SN-SVW-0823-04	08/29/2023	37.382512	-122.043485	sediment [d]	1	1	--	--	--
SCVURPPP	SN-SVW-0823-05	08/29/2023	37.381542	-122.040467	sediment [c]	1	1	--	--	--
SCVURPPP	SN-SVW-0823-06	08/29/2023	37.380348	-122.039245	sediment [c]	1	1	--	--	--
SCVURPPP	SN-SVW-0823-07	08/29/2023	37.380040	-122.037808	sediment [d]	1	1	--	--	--
SCVURPPP	SN-SVW-0823-08	08/29/2023	37.398378	-122.020841	sediment [d]	1	1	--	--	--
SCVURPPP	SN-SVW-0823-09	08/29/2023	37.385107	-122.051244	sediment [d]	1	1	--	--	--
SCVURPPP	SC-SNV-0923-01	09/19/2023	37.370380	-121.98730	sediment [c]	1	1	--	--	--
SCVURPPP WY 2023 Total						25	25	--	--	--
SCVURPPP WY 2022 Total *						8	8	--	--	--
Total SCVURPPP Samples during MRP 3.0						33	33	--	--	--

Organization	Station Code	Sample Date	Latitude	Longitude	Matrix	PCBs	Mercury	Total Copper	Dissolved Copper	Hardness as $CaCO_3$
Third Party Organizations WY 2023[d]										
SPoT	205COY060	06/2023	37.3954	-121.9149	sediment	1	--	--	--	--
SPoT	205GUA020	06/2023	37.3734	-121.9328	sediment	1	--	--	--	--
RMP	205GUA020	12/01/2022	37.37389	-121.93194	stormwater	1	--	--	--	--
RMP	205GUA020	12/27/2022	37.37389	-121.93194	stormwater	1	--	--	--	--

Notes

* See the WY 2022 SCVURPPP UCMR for additional details regarding individual samples (SCVURPPP 2023).

a A field duplicate was collected at the same location as sample SN-SVE-0823-02 and 066GAC152A-1222. See the QA/QC report (Appendix C) for more information.

b Individual grab sample.

c Composite sample of multiple individual grab samples.

d Data not yet available at the time of this report's publication.

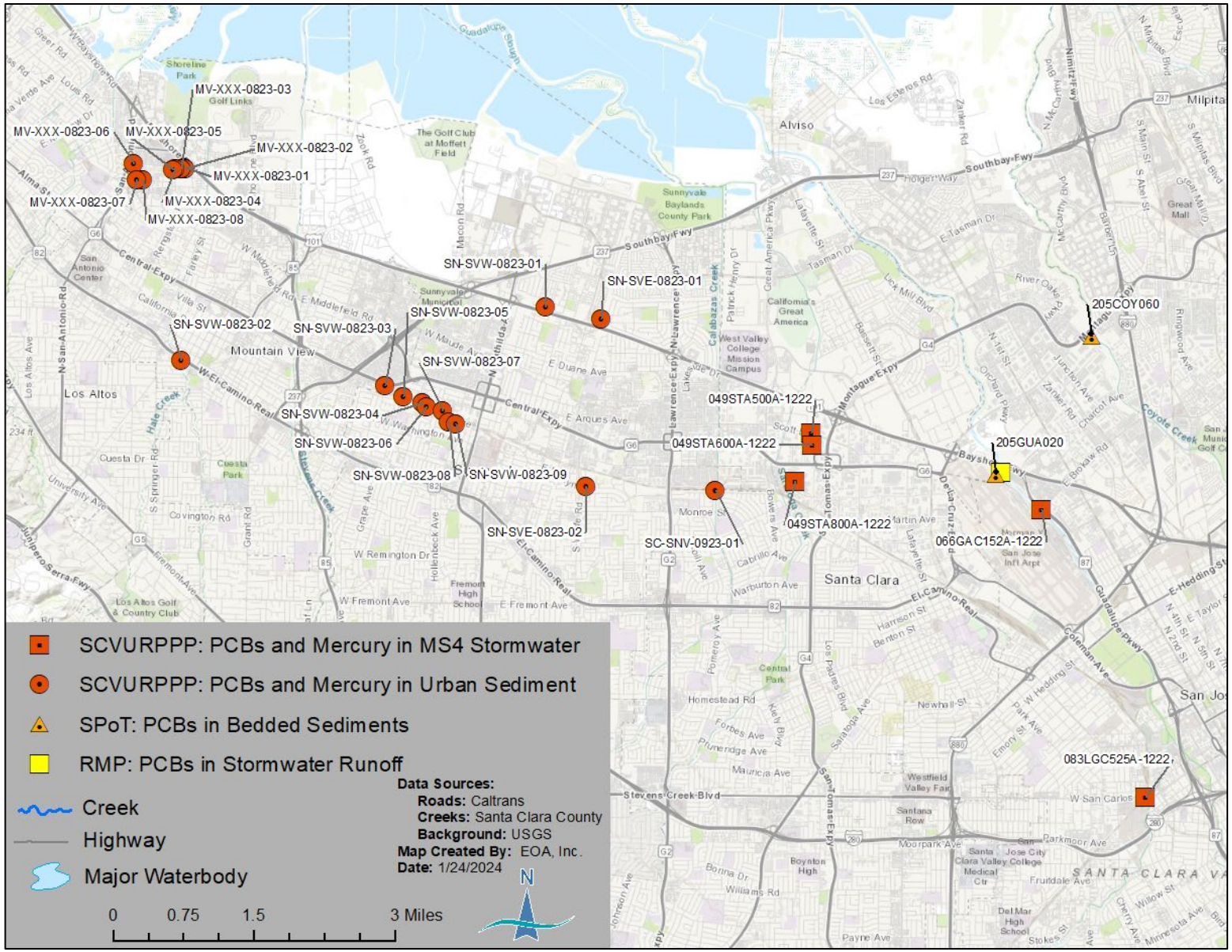

Figure 2.1. Locations of POC monitoring stations in Santa Clara County sampled in WY 2023.

Table 2.2 lists which POC Monitoring management question(s) is addressed by each sample collected by SCVURPPP and third parties, and the progress to date to address the MRP monitoring goals listed in Table 1.1 for PCBs and mercury. The minimum number of samples required to address Management Questions #1 (Source Identification) and #2 (Contributions to Bay Impairment) has been achieved. No progress has been made yet by the Program towards meeting MRP monitoring requirements for copper; however, copper monitoring by SCVURPPP will begin in WY 2024.

Table 2.2. SCVURPPP and third-party monitoring accomplishments for PCBs and mercury, WY 2022 and 2023.

				Management Question [a]				
Organization	Sample ID	Sample Date	Matrix/Type	1. Source Identification	2. Contributions to Bay Impairment	3. Management Action Effectiveness	4. Loads and Status	5. Trends
Water Year 2022 [b]				8	--	--	--	--
SCVURPPP Water Year 2023								
SCVURPPP	049STA500A	12/01/2022	MS4 stormwater	--	--	--	1	--
SCVURPPP	049STA600A	12/01/2022	MS4 stormwater	--	--	--	1	--
SCVURPPP	049STA800A	12/01/2022	MS4 stormwater	--	--	--	1	--
SCVURPPP	066GAC152A	12/03/2022	MS4 stormwater	--	--	--	1	--
SCVURPPP	083LGC525A	12/03/2022	MS4 stormwater	--	--	--	1	--
SCVURPPP	MV-XXX-0823-01	08/28/2023	Urban Sediment	--	1	--	--	--
SCVURPPP	MV-XXX-0823-02	08/28/2023	Urban Sediment	--	1	--	--	--
SCVURPPP	MV-XXX-0823-03	08/28/2023	Urban Sediment	--	1	--	--	--
SCVURPPP	MV-XXX-0823-04	08/28/2023	Urban Sediment	--	1	--	--	--
SCVURPPP	MV-XXX-0823-05	08/28/2023	Urban Sediment	--	1	--	--	--
SCVURPPP	MV-XXX-0823-06	08/28/2023	Urban Sediment	--	1	--	--	--
SCVURPPP	MV-XXX-0823-07	08/28/2023	Urban Sediment	--	1	--	--	--
SCVURPPP	MV-XXX-0823-08	08/28/2023	Urban Sediment	--	1	--	--	--
SCVURPPP	SN-SVE-0823-01	08/29/2023	Urban Sediment	--	1	--	--	--
SCVURPPP	SN-SVE-0823-02	08/29/2023	Urban Sediment	--	1	--	--	--
SCVURPPP	SN-SVW-0823-01	08/29/2023	Urban Sediment	1	--	--	--	--
SCVURPPP	SN-SVW-0823-02	08/29/2023	Urban Sediment	1	--	--	--	--
SCVURPPP	SN-SVW-0823-03	08/29/2023	Urban Sediment	1	--	--	--	--
SCVURPPP	SN-SVW-0823-04	08/29/2023	Urban Sediment	1	--	--	--	--
SCVURPPP	SN-SVW-0823-05	08/29/2023	Urban Sediment	1	--	--	--	--
SCVURPPP	SN-SVW-0823-06	08/29/2023	Urban Sediment	1	--	--	--	--
SCVURPPP	SN-SVW-0823-07	08/29/2023	Urban Sediment	1	--	--	--	--
SCVURPPP	SN-SVW-0823-08	08/29/2023	Urban Sediment	1	--	--	--	--
SCVURPPP	SN-SVW-0823-09	08/29/2023	Urban Sediment	1	--	--	--	--
SCVURPPP	SC-SNV-0923-01	09/19/2023	Urban Sediment	1	--	--	--	--
Third Party Organizations WY 2023								
SPoT	205COY060	06/2023	Waterbody Sediment	--	--	--	--	1

Organization	Sample ID	Sample Date	Matrix/Type	Management Question [a] 1. Source Identification	2. Contributions to Bay Impairment	3. Management Action Effectiveness	4. Loads and Status	5. Trends
SPoT	205GUA020	06/2023	Waterbody Sediment	--	--	--	--	1
RMP	205GUA020	12/01/2022	Receiving Waterbody	--	--	--	--	1
RMP	205GUA020	12/27/2022	Receiving Waterbody	--	--	--	--	1
Total Samples per Management Question during MRP 3.0				**18**	**10**	**0**	**5**	**4**
MRP Minimum per Management Question [c]				**8**	**8**	**8**	**16**	**16**

NA - Not Applicable.

[a] Individual samples can address more than one Management Question simultaneously, up to 25% of total number of samples.

[b] See the WY 2022 SCVURPPP UCMR for additional details (SCVURPPP 2023).

[c] The MRP minimum number of samples must be met by the end of the five-year permit term (i.e., 2027).

2.1. SCVURPPP PCBs and Mercury Monitoring

During WY 2023, the Program collected 20 individual and composite upland sediment samples and five stormwater samples from the municipal separate storm sewer system (MS4). The Program collected and analyzed all samples in accordance with the *Water Year 2016 Pollutant of Concern Monitoring - Sampling and Analysis Plan* (SAP; SCVURPPP 2015). Measurement Quality Objectives (MQOs) for laboratory analyses are based on the Clean Watersheds for a Clean Bay (CW4CB) Quality Assurance Project Plan (QAPP; BASMAA 2013) but modified for differing laboratory analytical methods. Sampling locations were identified by evaluating several types of data, including municipal storm drain infrastructure data showing pipelines and access points (e.g., manholes, outfalls, pump stations), catchment areas delineated from municipal storm drain data, land uses in the contributing area, receiving water (creeks and embayments) characteristics, and logistical/safety considerations (SCVURPPP 2015).

In WY 2023, individual and composite sediment samples were collected from streets, gutters, storm drain inlets, and other MS4 structures (i.e., MS4 sediment samples). Sediment samples were analyzed for PCB congeners (method SW846 8270C SIM CON), total mercury (method EPA 7471A), and total solids[3] (method SM 2540) at Eurofins Calscience of Tustin, California.

Stormwater samples were collected from outfalls draining to receiving waters or manholes at or near the bottom of catchments typically with old industrial land uses. Stormwater samples were analyzed for PCB congeners (method EPA 1668C) at SGS AXYS Analytical Services Ltd. of Sidney, British Columbia, Canada. Total mercury (method EPA 1631E) and suspended sediments[4] (method ASTM D3977-97) were analyzed at Caltest Analytical Laboratory of Napa, California.

[3] Samples were analyzed for total solids so that dry weight (dw) concentrations could be calculated.

[4] Samples were analyzed for suspended sediments so that particle ratios could be calculated.

2.1.1. Monitoring Question 1: Source Identification

As in previous years, one of the primary goals of PCBs and mercury monitoring conducted by SCVURPPP in WY 2023 was to inform identification of source areas where control measures could be implemented to comply with MRP requirements for load reductions of PCBs. Ten samples were used to address POC Monitoring Management Question #1 (Source Area Identification) in WY 2023, and 18 have been collected to date over the permit term. The samples were collected in public right-of-way (ROW) areas near old industrial land use parcels with characteristics associated with potential PCBs use and/or in catchments with previously observed elevated PCBs concentrations.

2.1.2. Monitoring Question 2: Contributions to Bay Impairment

In WY 2023, the Program collected ten samples to address POC Monitoring Management Question #2 (Contributions to Bay Impairment). These samples consisted of grab and composite samples of urban sediment collected in watershed catchments with known elevated PCB concentrations. The intent of these samples is to assess which areas within the County contribute most to Bay impairment. As described in MRP 3.0, this data could also be used to support conceptual models or watershed loading models such as for model calibration and validation or other information needs. In this case, the data could be used to inform land use groups and stormwater contaminant concentrations for each group in SFEI's Watershed Dynamic Model.

2.1.3. Monitoring Question 4: Loads and Status

Five samples were collected by the Program in WY 2023 to address POC Monitoring Management Question #4 (Loads and Status). These stormwater samples were collected within the MS4 at or near the bottom of stormwater catchments to quantify the concentrations of pollutants being discharged during a storm event. The method in which these samples are collected (i.e. a time composite of aliquots collected via grab sampling) approximate an event mean concentration (EMC) for the sampled storm event. The analytical data, along with nearby rainfall data, catchment area, and percent imperviousness within the catchment could be used in the future to develop loads from analytical models, such as the Simple Method (Schueler, 1987). These data could also be used to support development of SFEI's Watershed Dynamic Model.

2.1.4. Monitoring Question 5: Trends

Two samples collected by the SPoT Program and two samples collected by the RMP as a part of long-term studies were used to address POC Monitoring Question #5 (Trends). The SPoT samples were collected from in-stream sediment monitoring stations located at Coyote Creek (station 205COY060) and Guadalupe River at USGS Gaging Station 11169025 (station 205GUA020). The SPoT Program analyzes sediment samples deposited at the base of watersheds for toxicity, metals, PAHs, PCBs, legacy pesticides, current use pesticides, and emerging contaminants such as fipronil and polybrominated diphenyl ethers. The intent of the SPoT study is to provide information on the condition of California waterways with respect to trends in sediment toxicity and contamination (see also Section 2.3.2). The RMP samples, also collected at Guadalupe River station 205GUA020, will be used to extend an existing time series dataset at that station.

2.2. Water Year 2023 Results

This section presents the data results of the PCBs and mercury monitoring conducted by the Program in WY 2023. Concentrations are listed in tables and shown on maps. Additional analysis of these data within the context of other locally-collected data to identify sources and source areas will be presented in future SCVURPPP reports including the Program's 2024 Annual Report. The 2024 Annual Report will detail the outcomes of targeted source investigations and will be submitted in September 2024.

2.2.1. Sediment Samples

Table 2.3 presents the PCBs and mercury concentrations measured in the MS4 sediment samples collected by the Program in WY 2023. Figures 2.2 and 2.3 show the sample locations and magnitudes of the mercury and PCBs concentrations, respectively. A sediment sample is considered highly elevated if it has a PCBs concentration over 0.5 mg/kg, and moderately elevated if it has a concentration from 0.2 to 0.5 mg/kg. Similarly for mercury, an MS4 sediment sample is considered highly elevated if it is over 1.0 mg/kg, and moderately elevated if it has a concentration from 0.3 to 1.0 mg/kg. For both PCBs and mercury, concentrations above 1 mg/kg are considered confirmation of a source. These thresholds are used by the BAMSC as approximate benchmarks for identifying areas that should be considered for future investigation.

Concentrations of total mercury ranged from 0.041 to 0.207 mg/kg, with a median of 0.081 and a mean of 0.093 mg/kg. No sample had an elevated mercury concentration above 0.3 mg/kg. Concentrations of Total PCBs (sum of "RMP 40" congeners[5] calculated using ½ method detection limit (MDL) for censored, i.e., non-detect, congeners) ranged from 0.002 to 0.160 mg/kg, with a median of 0.008 mg/kg and a mean of 0.022 mg/kg. No sample had an elevated PCBs concentration above 0.2 mg/kg.

[5] The RMP 40 PCB congeners include: PCB-8, PCB-18, PCB-28, PCB-31, PCB-33, PCB-44, PCB-49, PCB-52, PCB-56, PCB-60, PCB-66, PCB-70, PCB-74, PCB-87, PCB-95, PCB-97, PCB-99, PCB-101, PCB-105, PCB-110, PCB-118, PCB-128, PCB-132, PCB-138, PCB-141, PCB-149, PCB-151, PCB-153, PCB-156, PCB-158, PCB-170, PCB-174, PCB-177, PCB-180, PCB-183, PCB-187, PCB-194, PCB-195, PCB-201, PCB-203.

Table 2.3. PCBs and mercury concentrations measured in sediment from storm drain infrastructure in Santa Clara County in WY 2023.

Permittee	Sample ID	Sample Date	Sample Location Type	Latitude	Longitude	Total PCBs [a]	HgT
						(mg/kg[b])	
Mountain View	MV-XXX-0823-01	08/28/2023	Street/Curb	37.418861	-122.091239	0.008	0.106
Mountain View	MV-XXX-0823-02	08/28/2023	Manhole Vault	37.418798	-122.09107	0.013	0.207
Mountain View	MV-XXX-0823-03	08/28/2023	Street/Curb	37.418765	-122.091921	0.013	0.076
Mountain View	MV-XXX-0823-04	08/28/2023	Street/Curb	37.418652	-122.093104	0.017	0.070
Mountain View	MV-XXX-0823-05	08/28/2023	Street/Curb	37.4186	-122.08343	0.004	0.143
Mountain View	MV-XXX-0823-06	08/28/2023	Street/Curb	37.41935	-122.10109	0.051	0.111
Mountain View	MV-XXX-0823-07	08/28/2023	Manhole Vault	37.416945	-122.100367	0.014	0.112
Mountain View	MV-XXX-0823-08	08/28/2023	Street/Curb	37.417	-122.09931	0.004	0.059
Sunnyvale	SN-SVE-0823-01	08/29/2023	Surface Soil	37.396625	-122.010033	0.007	0.048
Sunnyvale	SN-SVE-0823-02	08/29/2023	Catch Basin	37.370625	-122.012323	0.007	0.086
Sunnyvale	SN-SVW-0823-01	08/29/2023	Driveway	37.398378	-122.020841	0.004	0.135
Sunnyvale	SN-SVW-0823-02	08/29/2023	Driveway	37.389107	-122.091244	0.002	0.047
Sunnyvale	SN-SVW-0823-03	08/29/2023	Railway	37.385678	-122.051617	0.023	0.101
Sunnyvale	SN-SVW-0823-04	08/29/2023	Railway	37.383233	-122.044415	0.002	0.074
Sunnyvale	SN-SVW-0823-05	08/29/2023	Driveway	37.384026	-122.048029	0.064	0.066
Sunnyvale	SN-SVW-0823-06	08/29/2023	Driveway	37.382512	-122.043485	0.002	0.133
Sunnyvale	SN-SVW-0823-07	08/29/2023	Driveway	37.381942	-122.040467	0.002	0.051
Sunnyvale	SN-SVW-0823-08	08/29/2023	Driveway	37.380348	-122.039245	0.040	0.041
Sunnyvale	SN-SVW-0823-09	08/29/2023	Driveway	37.38004	-122.037808	0.160	0.057
Sunnyvale	SC-SNV-0923-01	09/19/2023	Railway	37.37038	-121.9873	0.004	0.135
					Mean	0.022	0.093
					Median	0.008	0.081

[a] Total PCBs calculated as sum of RMP 40 congeners.

[b] Samples were analyzed for total solids so that dry weight (dw) concentrations could be calculated.

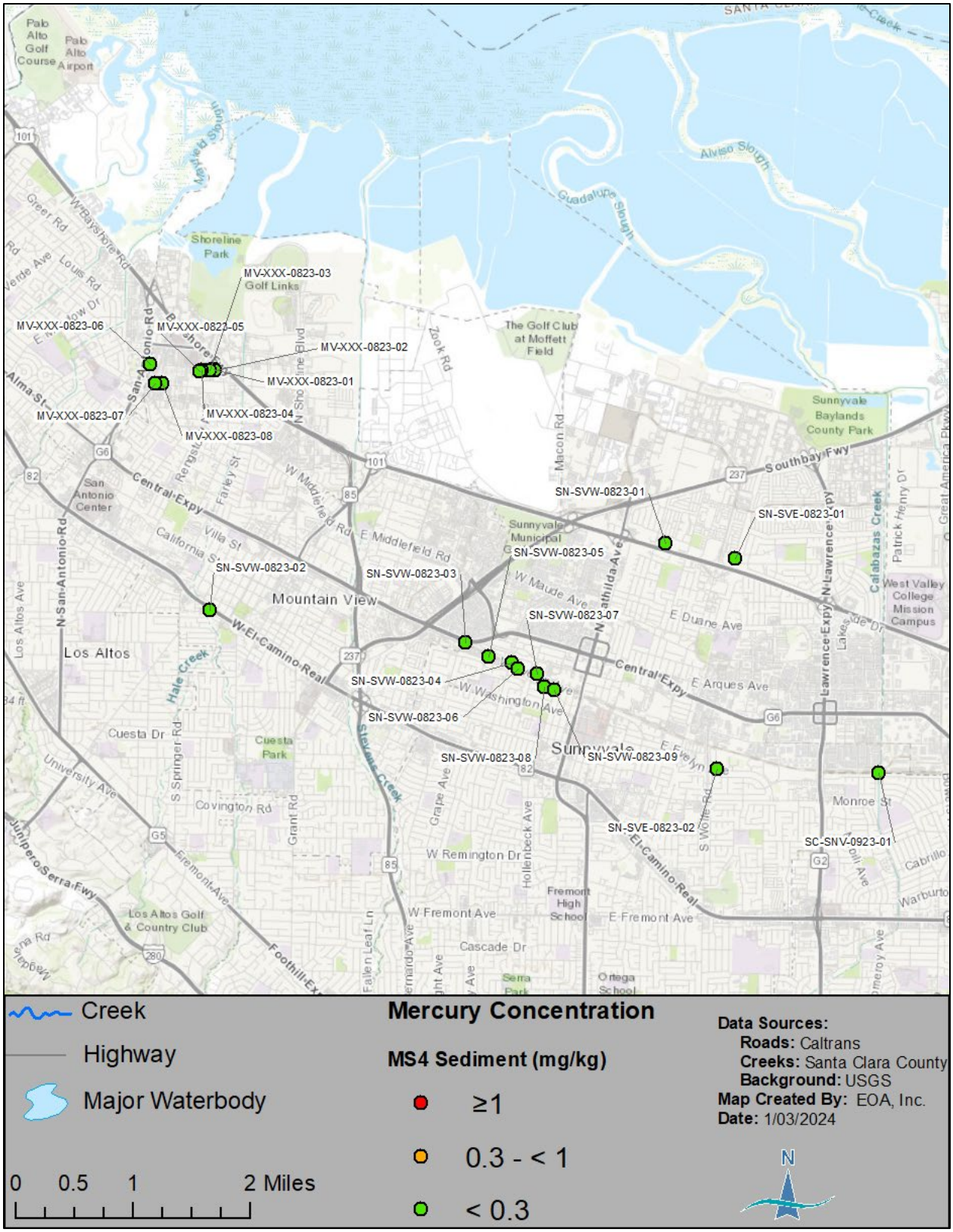

Figure 2.2. Locations of POC MS4 sediment monitoring stations and the magnitude of mercury concentrations measured by SCVURPPP in WY 2023.

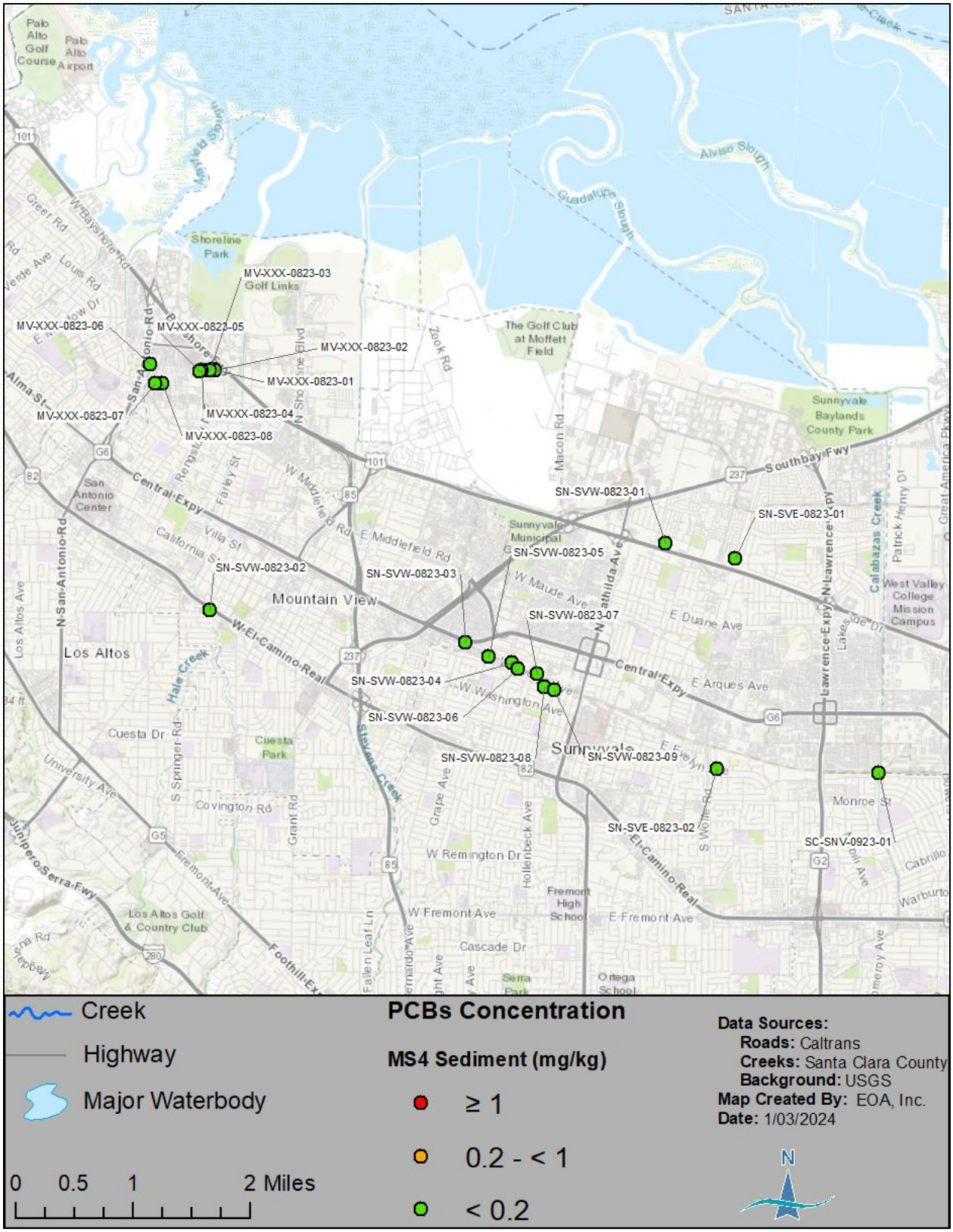

Figure 2.3. Locations of POC MS4 sediment monitoring stations and the magnitude of PCBs concentrations measured by SCVURPPP in WY 2023.

2.2.2. WATER SAMPLES

Tables 2.4 and 2.5 present the PCBs and mercury concentrations as well as particle ratios and suspended sediment concentrations (SSC) in the MS4 stormwater samples collected by the Program in WY 2023. Figures 2.4 and 2.5 show the sample locations and magnitudes of the PCBs and mercury particle ratios, respectively.

Concentrations of total PCBs in stormwater (sum of "RMP 40" congeners, calculated using ½ MDL for censored congeners) ranged from 1.55 to 2.39 ng/L, with a median of 1.73 and a mean of 1.90 ng/L. Stormwater samples are considered elevated above urban background if the PCBs concentration is above 38 ng/L (i.e., the top 15th percentile for stormwater samples collected across the Bay Area), or if the stormwater particle ratio is above 0.2 mg/kg for PCBs, or 0.3 mg/kg for mercury. None of the WY 2023 stormwater samples had elevated PCBs concentrations.

Total PCBs particle ratios in stormwater were calculated by dividing the stormwater concentrations by the SSC. PCBs particle ratios are compared to the same BAMSC thresholds used for sediment samples (i.e., highly elevated if over 0.5 mg/kg, and moderately elevated from 0.2 to 0.5 mg/kg) for identifying areas that warrant additional investigation. Total PCBs particle ratios ranged from 0.024 mg/kg to 0.085 mg/kg, with a median of 0.030 mg/kg and a mean of 0.039 mg/kg. No sample collected in WY 2023 had an elevated PCBs particle ratio above 0.2 mg/kg.

Table 2.4. PCB concentrations measured in stormwater from storm drain infrastructure in Santa Clara County, WY 2023.

Permittee	Sample ID	Sample Date	Sample Location Type	Latitude	Longitude	Total PCBs[a]		SSC
						ng/L	Particle Ratio[b] (mg/kg)	mg/L
Santa Clara	049STA500A-1222	12/01/2022	Manhole Vault	37.379467	-121.968883	1.55	0.032	47.7
Santa Clara	049STA600A-1222	12/01/2022	Outfall Pipe	37.377661	-121.968738	1.73	0.024	73.1
Santa Clara	049STA800A-1222	12/01/2022	Manhole Vault	37.371955	-121.972038	2.39	0.030	80.2
San Jose	066GAC152A-1222	12/03/2022	Manhole Vault	37.368161	-121.92416	1.68	0.085	19.7
San Jose	083LGC525A-1222	12/03/2022	Manhole Vault	37.323867	-121.903164	2.13	0.024	24.3
					Mean	1.90	0.039	49.0
					Median	1.73	0.030	47.7

[a] Total PCBs calculated as sum of RMP 40 congeners.

[b] The PCBs particle ratio in stormwater is calculated by dividing the stormwater concentration by the SSC.

Concentrations of total mercury ranged from 2.6 ng/L to 8.0 ng/L, with a median of 6.2 ng/L and a mean of 5.7 ng/L. Total mercury particle ratios in stormwater were calculated by dividing the stormwater concentrations by the SSC. Mercury particle ratios are compared to the same BAMSC thresholds used for sediment samples (i.e., highly elevated if over 1 mg/kg, and moderately elevated from 0.3 to 0.5 mg/kg) for identifying areas that warrant additional investigation. The particle ratios of total mercury ranged from 0.055 mg/kg to 0.345 mg/kg. One sample (066GAC152A-1222) had a total mercury particle ratio above 0.3 mg/kg.

Table 2.5. Mercury concentrations measured in stormwater from storm drain infrastructure in Santa Clara County, WY 2023.

Permittee	Sample ID	Sample Date	Sample Location Type	Latitude	Longitude	HgT		SSC
						ng/L	Particle Ratio[a] (mg/kg)	mg/L
Santa Clara	049STA500A-1222	12/01/2022	Manhole Vault	37.379467	-121.968883	2.6	0.055	47.7
Santa Clara	049STA600A-1222	12/01/2022	Outfall Pipe	37.377661	-121.968738	5.0	0.068	73.1
Santa Clara	049STA800A-1222	12/01/2022	Manhole Vault	37.371955	-121.972038	8.0	0.100	80.2
San Jose	066GAC152A-1222	12/03/2022	Manhole Vault	37.368161	-121.92416	6.8	0.345	19.7
San Jose	083LGC525A-1222	12/03/2022	Manhole Vault	37.323867	-121.903164	6.2	0.255	24.3
					Mean	5.7	0.165	49.0
					Median	6.2	0.100	47.7

[a] The mercury particle ratio in stormwater is calculated by dividing the stormwater concentration by the SSC.

Figure 2.4. Locations of POC MS4 stormwater monitoring stations and the magnitude of mercury particle ratios measured by SCVURPPP in WY 2023.

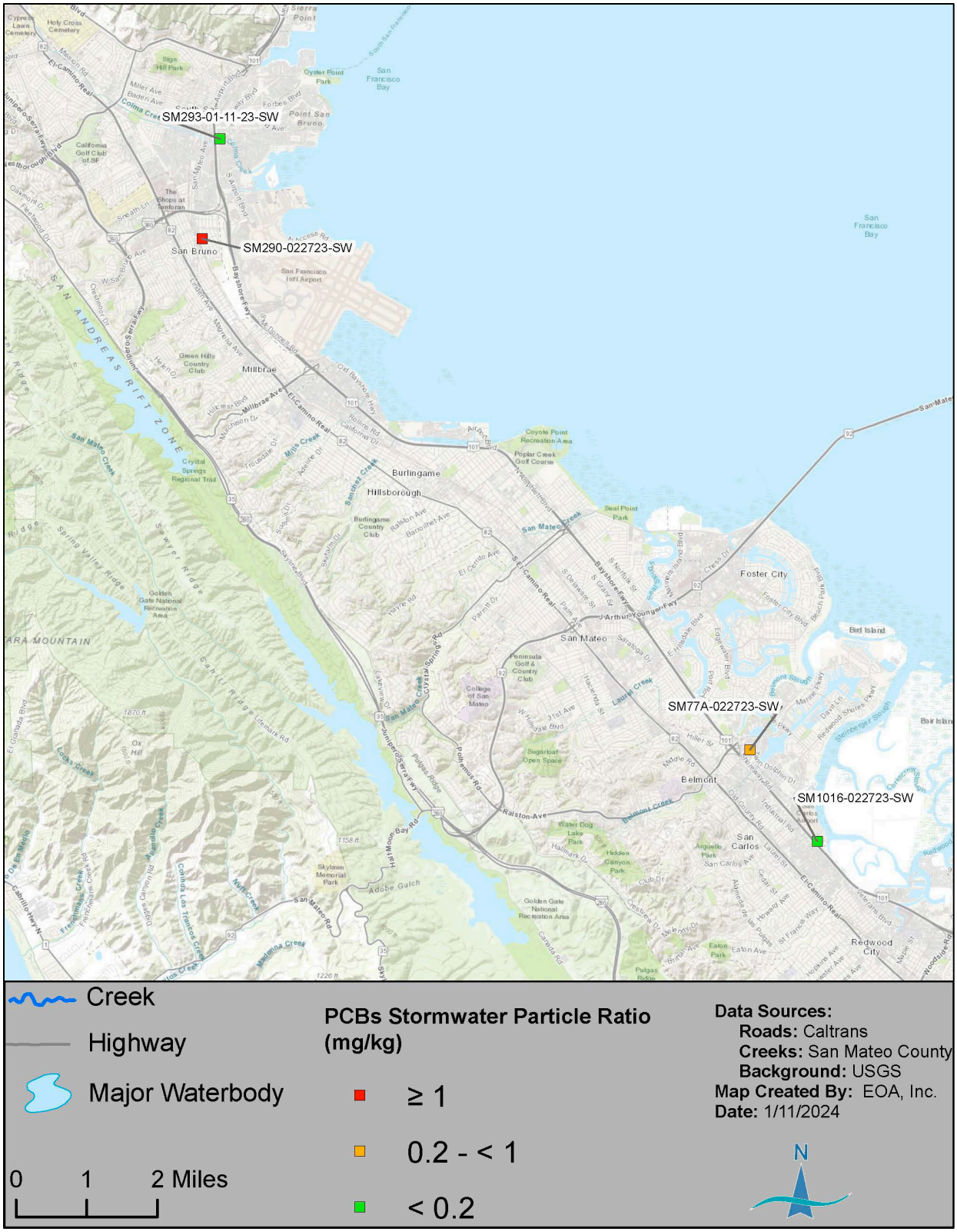

Figure 2.5. Locations of POC MS4 stormwater monitoring stations and the magnitude of PCBs particle ratios measured in Santa Clara County in WY 2023.

2.2.3. Statement of Data Quality

A comprehensive quality assurance/quality control (QA/QC) program was implemented by SCVURPPP covering all aspects of POC monitoring. Monitoring for PCBs and mercury was performed according to protocols specified or referenced in the WY 2016 POC SAP (SCVURPPP 2015) and supplemented by protocols described in the RMC Standard Operating Procedures (BASMAA 2016). The WY 2016 POC SAP references the CW4CB QAPP (BASMAA 2013) and the BASMAA RMC QAPP (BASMAA 2020) as the basis for QA/QC procedures.

Data were assessed for representativeness, comparability, completeness, sensitivity, contamination, accuracy, and precision. These seven attributes are compared to data quality objectives (DQOs), which were established to ensure that data collected are of adequate quality and sufficient for the intended uses. DQOs address both quantitative and qualitative assessment of the acceptability of data. Representativeness and comparability are qualitative while completeness, sensitivity, contamination, accuracy, and precision are quantitative assessments. Specific DQOs are based on Measurement Quality Objectives (MQOs) for each analyte.

Overall, the results of the QA/QC review suggest that the POC monitoring data generated during WY 2023 were of sufficient quality for the purposes of this program. While some data were flagged based on the MQOs and DQOs identified in the QAPPs, none of the data were rejected.

Details of the QA/QC review for the Program's WY 2023 data are provided in **Appendix C**.

2.2.4. Comparison with County and Region-wide Sediment Data

This section presents the WY 2023 PCBs and mercury sediment monitoring results within the context of other sediment samples collected and analyzed for PCBs and mercury in Santa Clara County during prior years, and across the larger San Francisco MRP area region. Over the past 20+ years, sediment samples have been collected and analyzed for PCBs and mercury in Santa Clara County and throughout the region by SCVURPPP, RMC partners and the RMP Small Tributary Loading Strategy (STLS). These data have been compiled to create a Bay Area regional sediment data set. The regional data includes samples collected through WY 2023 within the MRP area in Santa Clara, San Mateo, Alameda, Contra Costa, and Solano Counties.[6] The regional data set is updated regularly as new data become available.

The Bay Area regional data set of POC concentrations measured in sediment now includes 1,733 samples with PCBs concentrations and 1,555 samples with mercury concentrations. The data set includes samples collected from roadways, curb and gutters, driveways, sidewalks, storm drain inlets and manholes, culverts, ditches, and surface soils within public ROWs and on

[6] The sources of the regional data set include the following: ACCWP 2016, 2017, 2018, 2019, 2023, BASMAA 2017, CCWP 2016, 2017, 2018, 2019, City of San Jose and EOA 2003, EOA 2007, Geosyntec 2023,Gilbreath et al. 2016, Gilbreath et al. 2020, Gunther et al. 2001, KLI and EOA 2002, Kleinfelder 2005, 2006, McKee et al. 2012, 2013, 2017, Salop et al. 2002a, 2002b, SCVURPPP 2016a, 2017a, 2018a, 2019a, 2020a, SMCWPPP 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, SMSTOPPP 2002, 2003, 2004, Yee and McKee 2010.

private properties (i.e., sediment samples). Thirty-two percent (32%) of the PCBs and mercury sediment samples in this data set were collected in Santa Clara County.

Figures 2.6 and 2.7 display the Bay Area regional sediment data for PCBs concentrations (n=1,733) and mercury concentrations (n=1,555), respectively. The vast majority of PCBs samples collected to-date (>76%) are below the urban background threshold concentration of 0.2 mg/kg. Nearly 14% of the samples had concentrations at or above the threshold of 0.5 mg/kg used to indicate proximity to a nearby source. Eight percent (8%) of the samples are above the 1 mg/kg threshold that Bay Area stormwater programs currently use to identify a PCBs source area. While most (approximately 75%) mercury samples were below the urban background threshold of 0.3 mg/kg, approximately 7% are above 1 mg/kg, suggesting a nearby source (Figure 2.7).

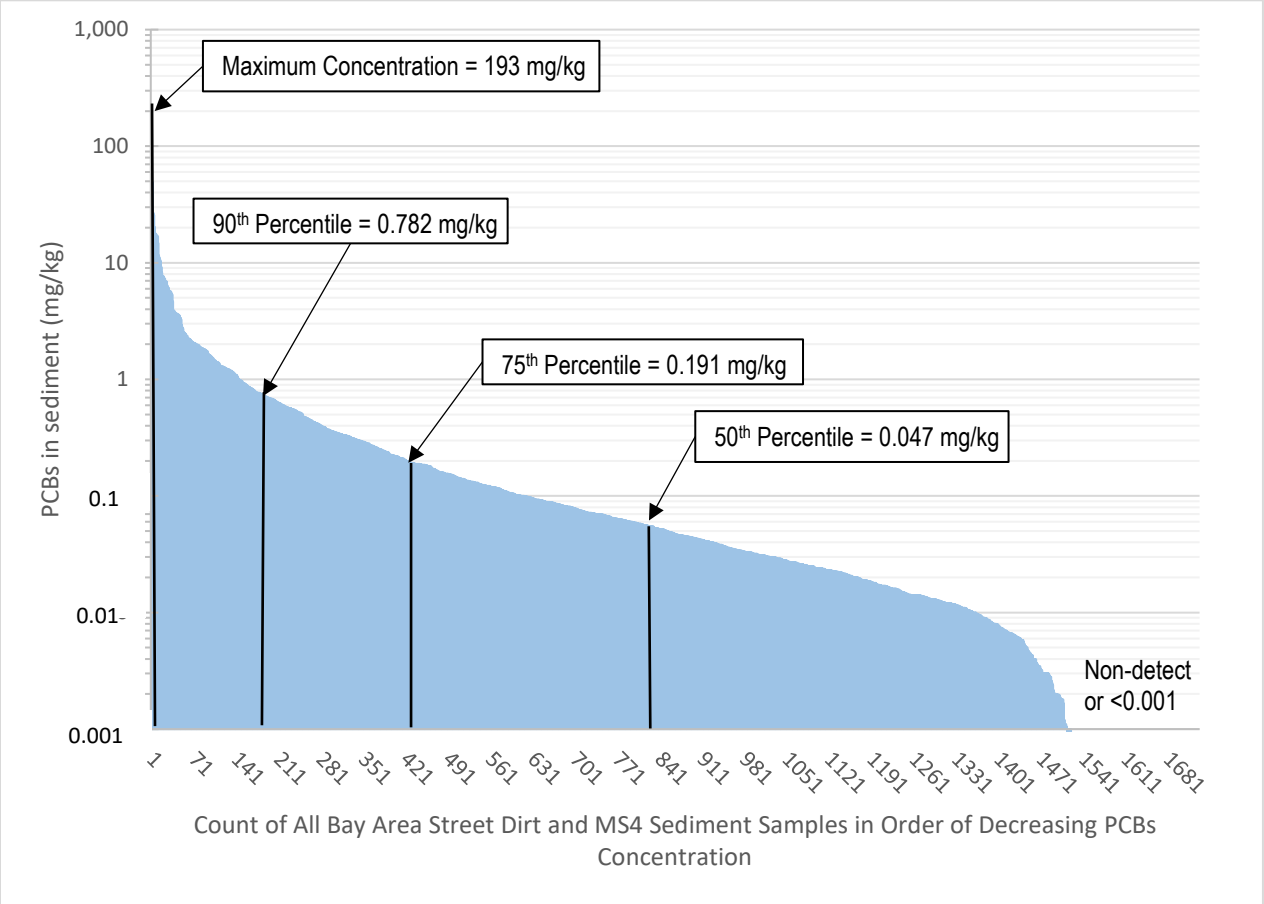

Figure 2.6. Distribution of PCBs concentrations measured in sediment collected across the Bay Area.

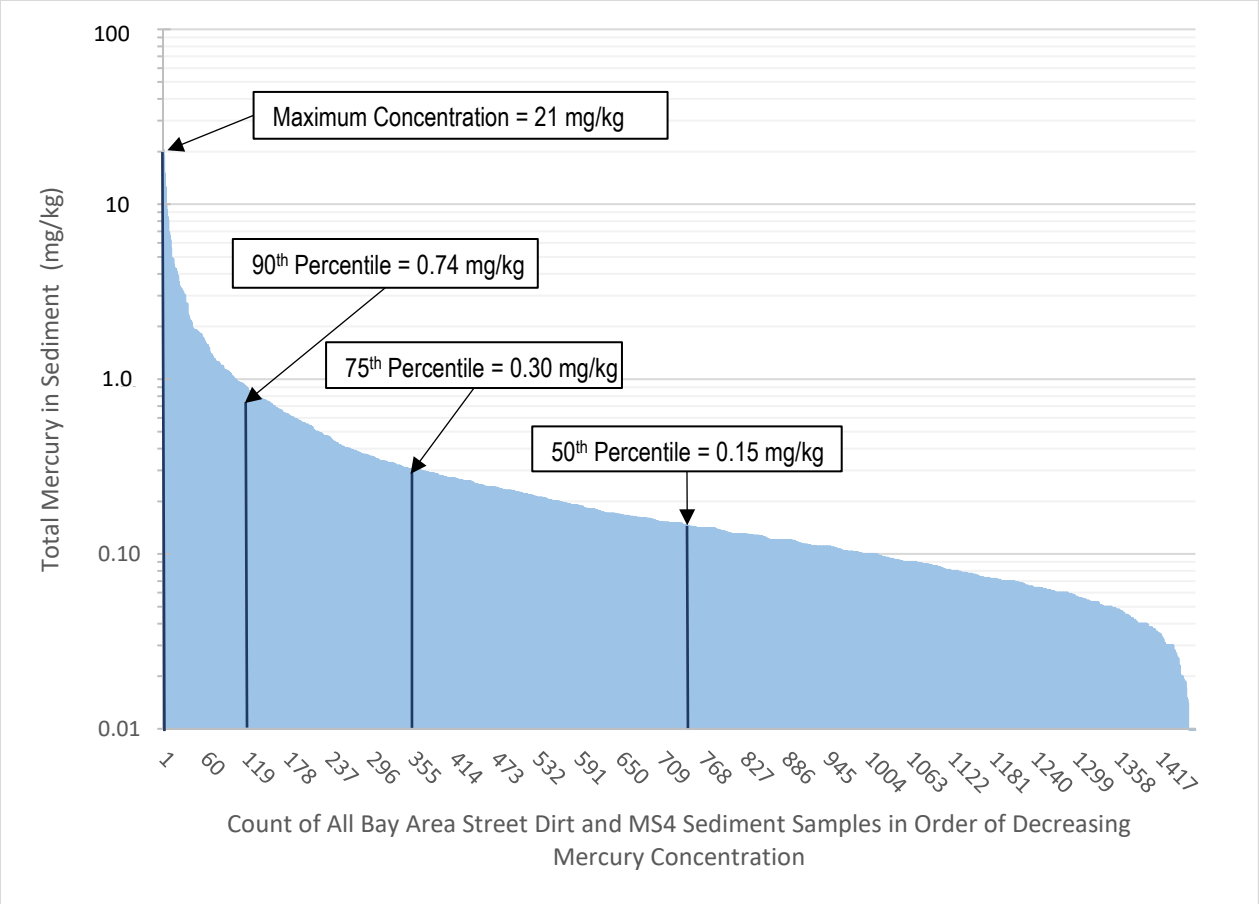

Figure 2.7. Distribution of mercury concentrations measured in sediment collected across the Bay Area.

Table 2.6 compares descriptive statistics for PCBs and mercury concentrations in the entire Bay Area regional sediment data set, Santa Clara Valley samples through WY 2023, and Santa Clara Valley samples collected in WY 2023. Across the Bay Area, PCBs concentrations range from non-detect (ND) to 193 mg/kg, with a median (i.e., 50th percentile) of 0.047 mg/kg. Mercury concentrations range from ND to 20.6 mg/kg, with a median of 0.15 mg/kg. As can be seen in Figures 2.6 and 2.7, there are a few samples with highly elevated concentrations that substantially increase the mean (i.e., average) concentration statistic over the median (i.e., 50th percentile) for both PCBs and mercury.

The Program is planning to collect additional MS4 sediment samples in WY 2024 to increase the number of samples in these datasets.

Table 2.6. Descriptive statistics of PCBs and mercury concentrations in sediment measured across the San Francisco Bay MRP area, in Santa Clara Valley in all years (through WY 2023) and from Santa Clara Valley in WY 2023.

Statistic	Total PCBs[a] (mg/kg)			HgT (mg/kg)		
	All Bay Area Data	Santa Clara Valley through WY 2023	Santa Clara Valley in WY 2023	All Bay Area Data	Santa Clara Valley through WY 2023	Santa Clara Valley in WY 2023
count	1,733	557	20	1,555	538	20
Minimum	ND	ND	0.00197	ND	0.020	0.041
10th percentile	ND	ND	0.00198	0.053	0.053	0.048
25th percentile	0.0127	0.0120	0.0035	0.085	0.076	0.058
50th percentile	0.047	0.033	0.007	0.150	0.127	0.075
75th percentile	0.191	0.132	0.018	0.300	0.251	0.111
90th percentile	0.782	0.463	0.052	0.741	0.760	0.136
Maximum	193	26.75	0.160	20.60	18.90	0.207

[a] Total PCBs calculated as sum of RMP 40 congeners.

2.2.5. Comparison with County and Region-wide Stormwater Data

The Bay Area regional data set of POC concentrations measured in stormwater now includes 451 samples with PCBs concentrations and 277 samples with mercury concentrations collected during 444 storms in 181 MS4 catchments and 31 receiving waters throughout the Bay Area. Approximately 34% of the PCBs and 35% of the mercury stormwater samples were collected in Santa Clara County.

The MS4 catchment sites include storm drain manholes, outfalls, pump stations, and artificial channels. The sites in receiving waters have watersheds ranging in size from less than 3,000 acres (i.e., Lower Penitencia Creek) to the entire Sacramento–San Joaquin River Delta watershed (i.e., Mallard Island). Many of the sites have been sampled during multiple storm events and had multiple samples collected during each storm event. Multiple samples were collected at 18 of the receiving water sites. At each of the 18 sites, between 2 and 126 samples were collected across multiple storm events. Multiple samples were also collected at 27 of the 163 MS4 sites, with between 2 and 80 samples collected at these sites across multiple storm events. Each of these samples was analyzed for PCBs, and a subset was also analyzed for mercury. For sites with more than one sample collected during a given storm event, the particle ratio is calculated by dividing the sum of PCBs (or mercury) concentrations by the sum of suspended sediment concentrations. Performing the calculation in this way is effectively the equivalent of compositing all the individual samples that have been collected at a site. This is consistent with the RMP STLS approach to data evaluation (Gilbreath et al. 2020).

Figures 2.8 and 2.9 display the Bay Area regional stormwater data for PCBs concentrations (n=451) and PCBs particle ratios (n=449). Figures 2.8 and 2.9 also show the current thresholds for elevated PCBs in stormwater (38 ng/L; the top 15% of stormwater samples) and PCBs stormwater particle ratios (0.2 mg/kg). These threshold values are used as screening levels to prioritize catchments for additional PCBs source investigation sampling.

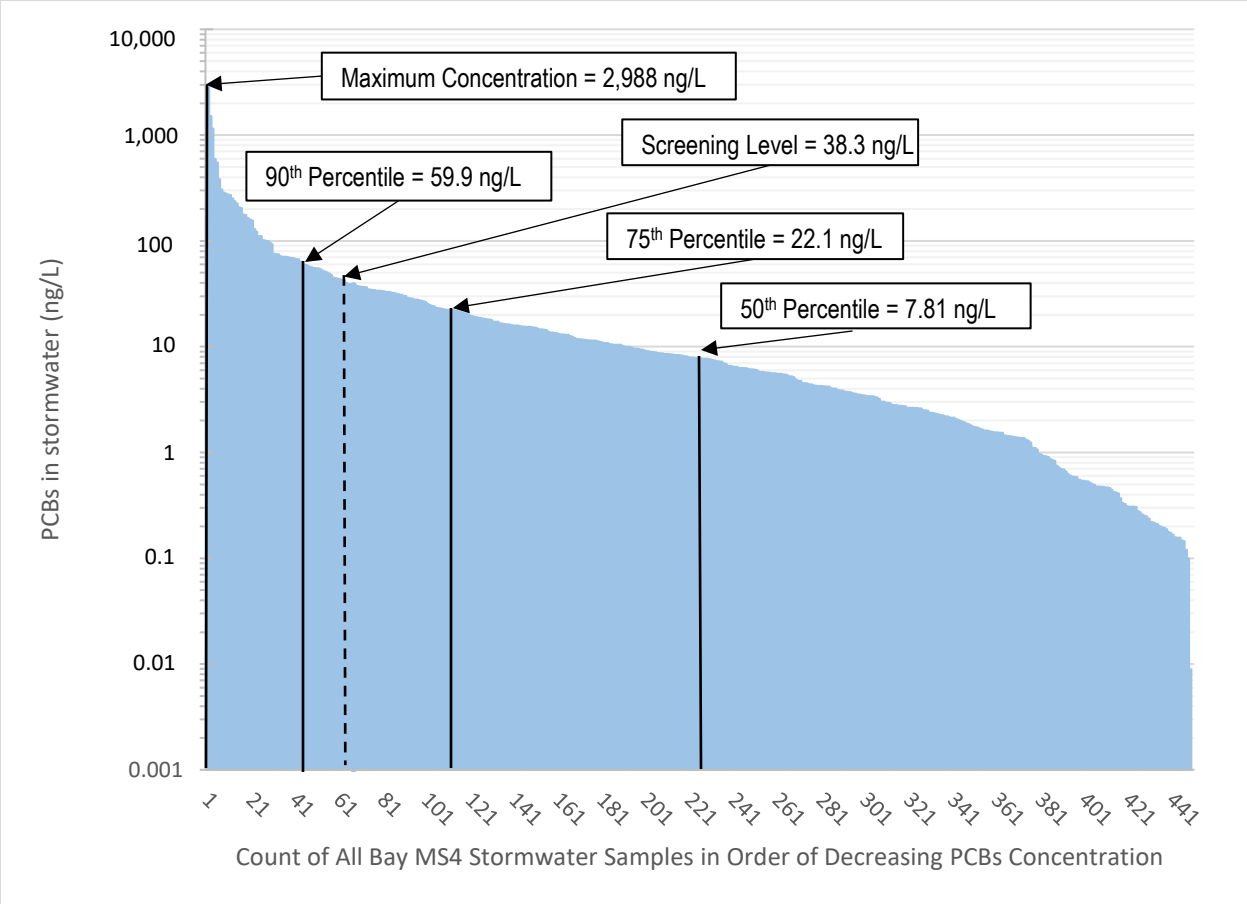

Figure 2.8. Distribution of PCBs in stormwater collected in watersheds across the Bay Area.

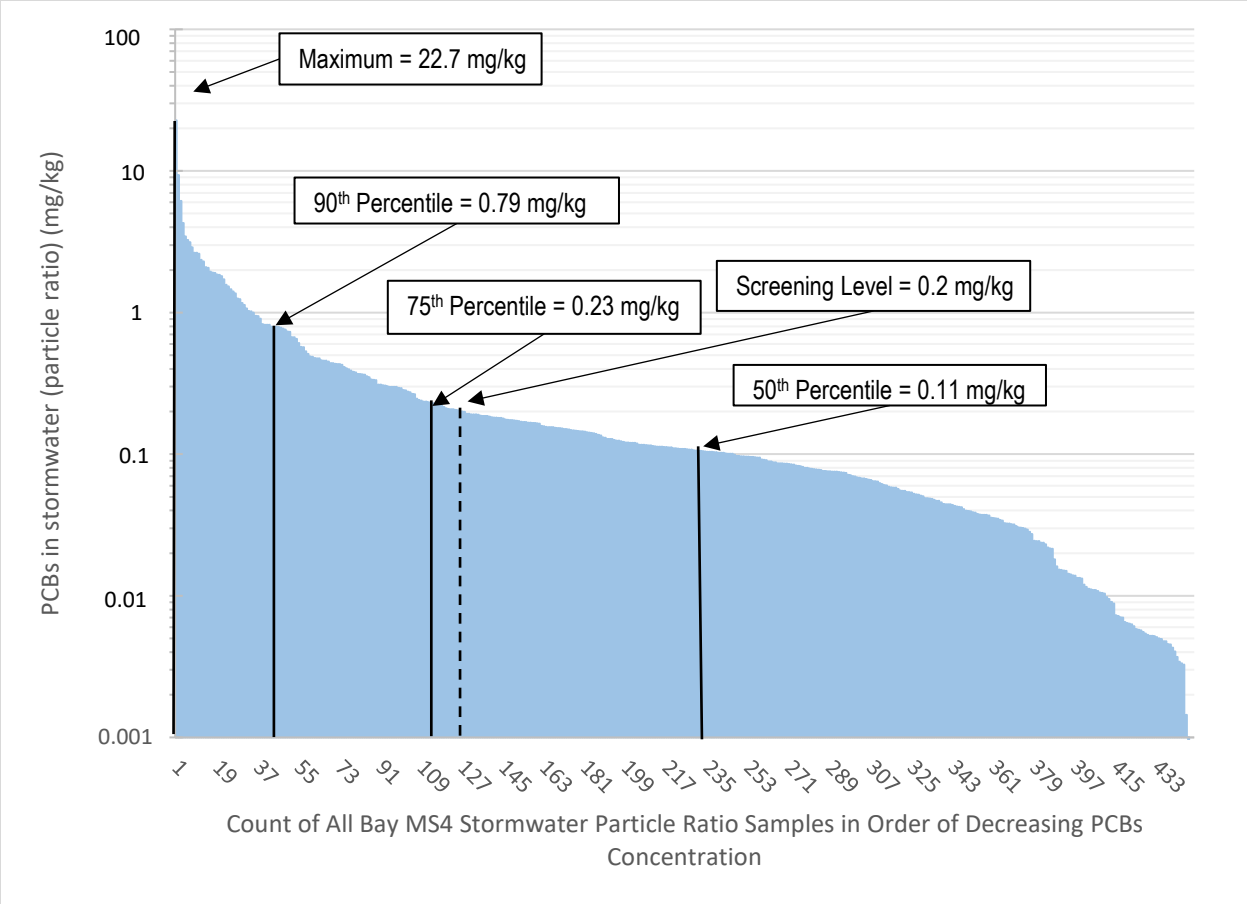

Figure 2.9. Distribution of PCBs stormwater particle ratios collected in watersheds across the Bay Area.

Table 2.7 presents descriptive statistics for the Bay Area PCBs stormwater concentrations (n=451) and PCBs particle ratios (n=449) dataset. The median concentration of PCBs in stormwater is 7.81 ng/L, and the mean is 44 ng/L. Similar to sediment samples, a few stormwater samples with highly elevated concentrations substantially increase the mean concentration statistic over the median for PCBs in stormwater.

The median PCBs particle ratio is 0.11 mg/kg, and the mean is 0.37 mg/kg. Both SCVURPPP and the RMP are planning to collect stormwater composite samples in WY 2024 to increase this dataset. In future years, it may be informative to correlate measured concentrations to various factors such as storm size, rainfall intensity, antecedent dry weather, land use characteristics, and age of development.

Table 2.7. Descriptive statistics of PCBs concentrations and particle ratios measured in stormwater across the San Francisco Bay MRP area, in Santa Clara Valley in WY 2023, and in Santa Clara Valley in all years (through WY 2023).

Statistic	Total PCBs[a]					
	Stormwater Concentration (ng/L)			Stormwater Particle Ratio (mg/kg)		
	All Bay Area Data	Santa Clara Valley through WY 2023	Santa Clara Valley in WY 2023	All Bay Area Data	Santa Clara Valley through WY 2023	Santa Clara Valley in WY 2023
Count	451	154	5	449	154	5
Minimum	ND	0.19	1.55	ND	0.005	0.024
10th percentile	0.49	1.54	1.60	0.01	0.03	0.026
25th percentile	2.20	2.75	1.68	0.05	0.05	0.030
50th percentile	7.81	8.15	1.73	0.11	0.09	0.032
75th percentile	22.1	21.2	2.13	0.23	0.18	0.085
90th percentile	59.9	50.8	2.28	0.79	0.37	0.087
Maximum	2,988	274	2.39	22.7	9.34	0.088

a: Total PCBs calculated as sum of RMP 40 congeners.

Figures 2.10 and 2.11 display the Bay Area regional stormwater data for mercury concentrations (n=296) and mercury particle ratios (n=277). Figure 2.11 also shows the current mercury particle ratio screening level (0.3 mg/kg) used to prioritize catchments for additional source investigation sampling.

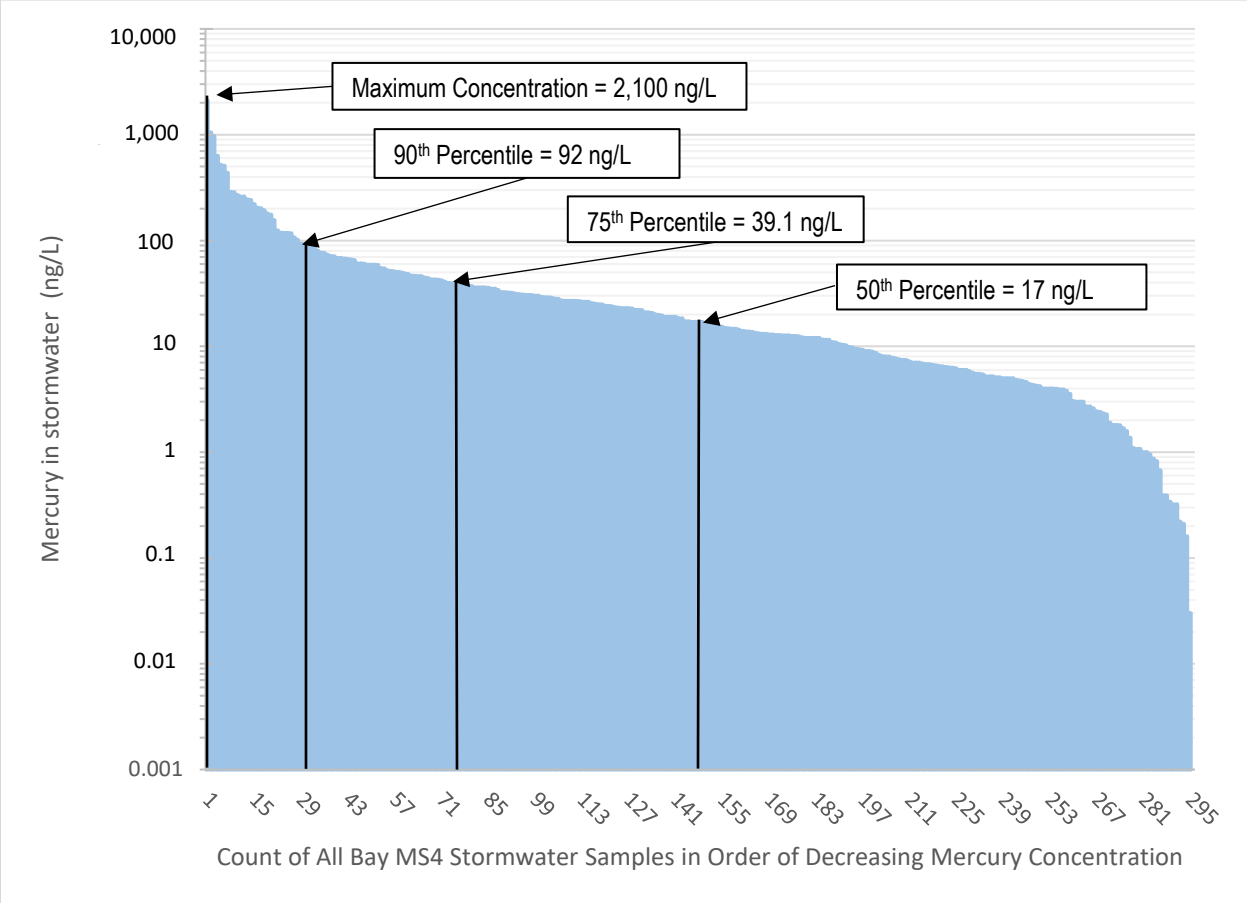

Figure 2.10. Distribution of mercury in stormwater collected in watersheds across the Bay Area.

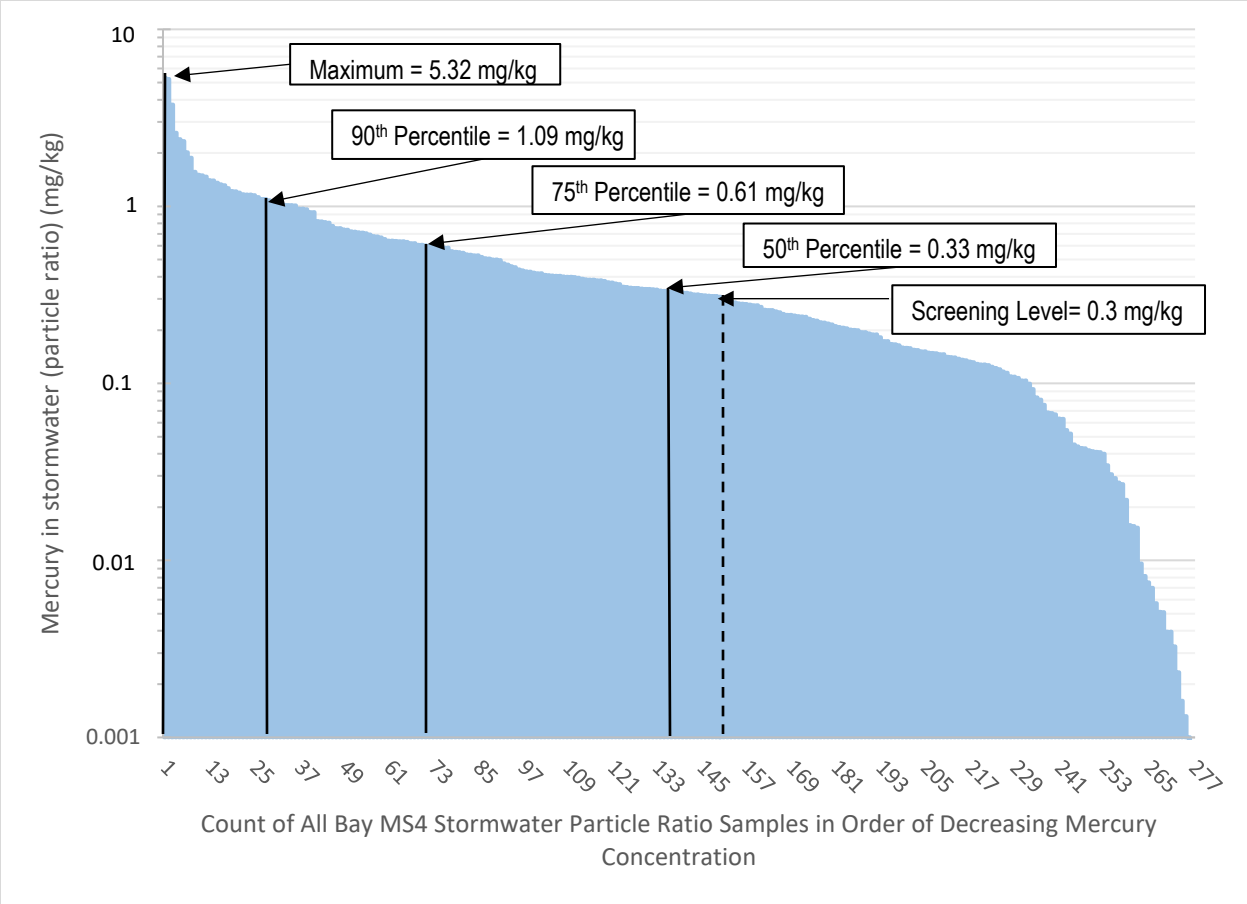

Figure 2.11. Distribution of mercury stormwater particle ratios collected in watersheds across the Bay Area.

Table 2.8 compares descriptive statistics for mercury concentrations (n=296) and mercury particle ratios (n=277) for the entire Bay Area regional stormwater data set, Santa Clara Valley samples through WY 2023, and Santa Clara Valley samples collected in WY 2023. Across the Bay Area, mercury concentrations range from ND to 2,100 ng/L, with a median (i.e., 50th percentile) of 17 ng/L. Mercury particle ratios range from ND to 5.32 mg/kg, with a median of 0.33 mg/kg. Similar to PCBs in stormwater, there are a few samples with highly elevated concentrations that substantially increase the mean concentration statistic over the median for mercury.

Table 2.8. Descriptive statistics of mercury concentrations and particle ratios measured in stormwater across the San Francisco Bay MRP area, in Santa Clara Valley in WY 2023, and in Santa Clara Valley in all years (through WY 2023).

Statistic	HgT (ng/L)			HgT Particle Ratio (mg/kg)		
	All Bay Area Data	Santa Clara Valley through WY 2023	Santa Clara Valley in WY 2023	All Bay Area Data	Santa Clara Valley through WY 2023	Santa Clara Valley in WY 2023
Count	296	104	5	277	103	5
Minimum	ND	0.03	2.60	ND	0.001	0.05
10th percentile	2.52	1.08	3.56	0.04	0.03	0.06
25th percentile	6.35	5.15	5.00	0.15	0.13	0.07
50th percentile	17.0	15.9	6.20	0.33	0.24	0.10
75th percentile	39.1	38.0	6.80	0.61	0.47	0.26
90th percentile	92.0	79.5	7.52	1.09	1.07	0.31
Maximum	2,100	1,053	8.00	5.32	1.88	0.35

a: Total PCBs calculated as sum of RMP 40 congeners.

2.3. Third-party Monitoring Accomplishments

2.3.1. SF Bay Regional Monitoring Program (RMP)

The RMP's **Small Tributaries Loading Strategy (STLS)** was developed in 2009. The RMP STLS Team includes BAMSC representatives, Regional Water Board staff, RMP staff, and technical advisors and is overseen by the RMP's Sources, Pathways, and Loadings Workgroup (SPLWG). The objective of the RMP STLS is to develop a comprehensive planning framework to coordinate POC monitoring/modeling between the RMP and RMC participants.

The RMP's **Emerging Contaminants Workgroup (ECWG)** was established in 2006. Similar to the STLS, the RMP ECWG includes BAMSC representatives, Regional Water Board staff, RMP staff, and technical advisors. The objective of the RMP ECWG is to develop cost-effective strategies to identify and monitor constituents of emerging concern (CECs) to support management actions to minimize impacts to San Francisco Bay.

The STLS, ECWG, and other RMP workgroups typically conduct annual monitoring for POCs and other pilot and special studies on a region-wide basis. The RMP Special Studies address specific scientific issues that RMP committees, workgroups, and strategy teams identify as priority for further study. These studies are developed through an open selection process at the workgroup level and selected for funding through the Technical Review Committee (TRC) and the Steering Committee. The pilot and special studies associated with the RMP STLS are intended to fill data gaps associated with loadings of POCs from relatively small tributaries to the San Francisco Bay. The RMP ECWG works closely with the STLS on special studies that specifically target CECs in Bay tributaries. SCVURPPP is an active participant in the RMP STLS and ECWG and works with other Bay Area municipal stormwater programs to identify opportunities to direct RMP funds and monitoring activities towards addressing both short- and long-term MRP management questions.

POC-related RMP monitoring projects and special studies that were ongoing across the region in WY 2023 include the following:

- Watershed characterization through wet weather reconnaissance-style monitoring. Since WY 2015, the RMP STLS monitoring has conducted reconnaissance-style wet weather monitoring for POCs (primarily PCBs and mercury) to characterize catchments of interest and identify POC sources and source areas. Prior to the start of each wet weather season, the STLS team identifies locations across the Bay Area to conduct this monitoring. Wet weather reconnaissance monitoring has been deprioritized for WY 2023 but may be resumed in future years.

- Stormwater monitoring for emerging contaminants through the RMP ECWG. The ECWG coordinates with the STLS to sample creeks for CECs as part of the "CEC Stormwater Loads Modeling Exploration" project and to support development of the "Stormwater CECs Strategy." Additional financial contributions to the RMP for emerging contaminant monitoring by the BAMSC RMC (see Section 1.2.2) will help support this work through the permit term.
    - Bay Prey Fish and Near-field / Margins Sediment Sampling. In WY 2023, the RMP Status and Trends Program completed a sampling and analysis plan (SAP) and started field collection of samples to spatially characterize contaminant concentrations of PCBs and PFAS in fish and sediment found within the margins

of Central Bay, South Bay, and Lower South Bay. This study builds on previous Surface and Trends efforts to characterize surface sediment contamination across the Bay while piloting routine monitoring of prey fish.

- Near-Field Water Sampling. In 2022, the Status & Trends (S&T) Program and added a pilot effort to quantify contaminants of emerging concern (CECs) in Bay water in areas near ("near-field" of) expected loading pathways during or shortly after storm events and during the dry season. For the first year of the pilot (Water Year 2022), the near-field design included three targeted, near-field stations and four ambient Bay stations. In WY 2023, the RMP Status and Trends Program completed a SAP and field collection at two stations in Santa Clara County, during or shortly after two storm events, and once in the dry season. The analytes measured included bisphenols, organophosphate esters (OPEs), PFAS, and a suite of stormwater CECs.

The results of these activities during WY 2023 are presented in reports produced by the San Francisco Estuary Institute (SFEI) that are available through the SFEI website (https://www.sfei.org/)

2.3.2. State Water Board's SPoT Monitoring

The SPoT Monitoring Program conducts annual dry season monitoring (subject to funding constraints) of sediments collected from a statewide network of large rivers. The goal of the SPoT program is to monitor trends in sediment toxicity and sediment contaminant concentrations in selected large rivers throughout California and relate contaminant concentrations and toxicity to watershed land uses. Results from these large catchment stations provide context for the monitoring conducted by the Program.

Sites are targeted in bottom-of-the-watershed locations with slow water flow and appropriate micromorphology to allow deposition and accumulation of sediments, including stations near the mouth of Coyote Creek (station 205COY060) and the Guadalupe River (station 205GUA020). These sites are identified on Figure 2.1. In most years, sediments are analyzed for PCBs, mercury, metals (including copper), toxicity, pesticides, and organic pollutants (Phillips et al. 2014). However, in WY 2023, SPoT monitoring in Coyote Creek and Guadalupe River was limited to toxicity and PCBs.

The most recent technical report prepared by SPoT program staff was published in 2020 and describes 10-year trends from the initiation of the program in 2008 through 2017 (Phillips et al. 2020).

3. CONCLUSIONS AND RECOMMENDATIONS

In WY 2023, SCVURPPP collected and analyzed POC samples in compliance with provision C.8.f of the MRP. The MRP 3.0 yearly minimum requirements were met for all relevant monitoring parameters. In addition, SCVURPPP continued to work with the RMP's STLS and ECWG to supplement WY 2023 monitoring accomplishments.

Conclusions from WY 2023 POC monitoring included the following:

- SCVURPPP collected ten MS4 sediment samples for PCBs and mercury analysis to inform identification of source areas where control measures could be implemented, i.e., Management Question #1 (Source Area Identification), ten MS4 sediment samples for PCBs and mercury analysis to inform Management Question #2 (Contributions to Bay Impairment), and five stormwater samples for PCBs and mercury analysis to inform Management Question #4 (Loads and Status).
- No sediment or water samples collected by the Program exceeded BAMSC thresholds for identifying sources and/or identifying areas that warrant additional investigation.
- Two sediment samples were collected by the SPoT Program for PCBs and two stormwater samples were collected by the RMP for PCBs to inform Management Question #5 (Trends).
- In accordance with MRP requirements, a comprehensive QA/QC program was implemented by SCVURPPP covering all aspects of POC monitoring during WY 2023. Overall, the results of the QA/QC review suggest that the data generated during WY 2023 POC monitoring were of sufficient quality for the purposes of this program. While some data were flagged in the project database based on the MQOs and DQOs identified in the QAPPs, none of the data were rejected.
- SCVURPPP worked with BAMSC RMC members to prepare an addendum to the RWL Assessment Report demonstrating the representativeness of the selected RWL monitoring sites.

Recommendations for WY 2024 POC monitoring include the following:

- SCVURPPP will continue to collect grab and composite urban sediment samples in MS4 catchments for PCBs and mercury analysis to identify sources of PCBs and mercury contamination to address Monitoring Question #1 (Source Identification).
- SCVURPPP will continue to collect composite stormwater samples in MS4 catchments during storm events for PCBs and mercury analysis. Some samples will address Monitoring Question #4 (Loads and Status), with the goal of collecting the data necessary to calculate PCB and mercury loads to the Bay. Others will be collected in previously monitored catchments to address Monitoring Question #5 (Trends).
- SCVURPPP will begin monitoring at two Low Impact Development (LID) facilities in WY 2024. Flow weighted composites will be collected at the influent and effluent of the LID facilities during three storm events (if feasible), and samples will be analyzed for POCs, including mercury, PCBs, and copper. Additional analytes will include PFAS, total suspended solids (TSS), zinc, and total petroleum hydrocarbons (TPH). These samples will be used to address POC Monitoring Management Questions #3 (Management Action Effectiveness) and #4 (Loads and Status).

- SCVURPPP will work with its RMC regional partners to begin implementation of the RWL Assessment Report/Monitoring Plan. Samples collected through this effort will be used to address POC Monitoring Management Question #6 (Compliance with RWLs).
- SCVURPPP will continue to work with the SPoT Program to address POC Monitoring Management Question #5 (Trends). The SPoT Monitoring Program conducts annual dry season monitoring (subject to funding constraints) of sediments collected from a statewide network of large rivers to investigate long-term trends in water quality (Management Question #5 – Trends), including two stations in Santa Clara County (Coyote Creek and Guadalupe River). In most years, sediments are analyzed for PCBs, mercury, other metals, toxicity, pesticides, and organic pollutants.
- SCVURPPP will continue to participate in the RMP's STLS and ECWG and will continue to provide augmented financial contributions to support the ECWG and associated stormwater monitoring for emerging contaminants.
- SCVURPPP will continue to comply with all provision C.8.f POC monitoring requirements in the MRP.

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APPENDICES

Appendix A

Regional Receiving Water Limitations Assessment Report

Receiving Water Limitations Assessment Report Addendum

Demonstration of the Representativeness of the Selected Monitoring Locations

Submitted in compliance with Provision C.8.h.iv of National Pollutant Discharge Elimination System (NPDES) Permit No. CAS612008, Order No. R2-2022-0018

Submitted by

Alameda Countywide Clean Water Program (ACCWP)
Contra Costa Clean Water Program (CCCWP)
Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)
San Mateo Countywide Water Pollution Prevention Program (SMCWPPP)

March 31, 2024

FINAL

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ACRONYMS AND ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
CCCWP	Contra Costa Clean Water Program
MP	Monitoring plan
MRP	Municipal Regional Stormwater Permit
NPDES	National Pollutant Discharge Elimination System
PAH	Polycyclic aromatic hydrocarbon
RWL	Receiving water limitations
RWL MP	Receiving Water Limitations Monitoring Plan
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program

1. INTRODUCTION

This *Receiving Water Limitations Assessment Report – Demonstration of the Representativeness of the Selected Monitoring Locations* was prepared collaboratively by the Alameda Countywide Clean Water Program (ACCWP), the Contra Costa Clean Water Program (CCCWP), the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), and the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) per the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (Water Board; Order No. R2-2022-0018)[1].

MRP Permittees are required to develop and implement a plan for monitoring receiving waters (creeks and rivers that flow to San Francisco Bay) to provide information to assess whether receiving water limitations (RWLs) are achieved. Per MRP Provisions C.8.f and C.8.h.iv, the monitoring program should assess "the potential that discharges of these analytes may result in levels in receiving waters approaching or exceeding water quality objectives and the basis of the determination." The RWL monitoring methods must include the following attributes:

- Collection and analysis of analytes during the wet season in receiving waters (i.e., creeks and rivers that flow to San Francisco Bay) influenced by urban stormwater runoff.
- Collection and analysis of analytes during the dry season in receiving waters (i.e., creeks and rivers that flow to San Francisco Bay) influenced by dry season urban runoff.
- Sampling locations for RWLs assessment monitoring shall be spatially and temporally representative of the sampled waterbody. Sampled waterbodies shall be representative of the range of receiving waterbody types.

The MRP Permittees collectively developed and submitted a Receiving Water Limitations Assessment Report on March 31, 2023, as required by Provision C.8.h.iv.(2) of the MRP. The Receiving Water Limitations Assessment Report, herein referred to as the RWL Monitoring Plan (MP or RWL MP), provided the following information:

- Relevant water quality objectives against which to compare monitoring data;
- Analytes in addition to those listed in MRP Provision C.8 Table 8.2 to monitor based on assessment of the potential that discharges of these analytes may result in levels in receiving waters approaching or exceeding water quality objectives and the basis of the determination;

[1] SFBRWQCB. 2022. San Francisco Region Water Quality Municipal Regional Stormwater NPDES Permit. Order R2-2022-0018, NPDES Permit No. CAS612008

- Identification of waterbodies to be sampled, sampling locations within those waterbodies, and the basis for which those waterbodies were selected (i.e., watershed size, percent impervious watershed area, percent developed, presence of upstream impoundment, availability of prior water quality monitoring data); and

- Sampling schedule consistent with the requirements in MRP Tables 8.1 and 8.2.

On June 12, 2023, the SFBRWQCB Executive Officer issued a letter of Conditional Approval of the RWL MP (Conditional Approval Letter). The Conditional Approval Letter stated that approval of the RWL MP is subject to two conditions:

1. Inclusion of polycyclic aromatic hydrocarbons (PAHs) in the analyte list, and
2. Demonstration of the representativeness of the selected monitoring locations submitted with the March 2024 Urban Creeks Monitoring Report.

To address the first condition, MRP Permittees have augmented the analyte list to include PAHs. This change will be reflected in the Pollutants of Concern Monitoring Reports submitted annually with the Urban Creeks Monitoring Reports on March 31. To address the second condition, MRP Permittees identified and characterized watersheds in Alameda, Contra Costa, San Mateo, and Santa Clara counties that drain to San Francisco Bay and compared them to the selected monitoring locations. The purpose of this report addendum is to present this watershed characterization approach and results and to demonstrate the representativeness of the four selected monitoring locations.

2. BACKGROUND

Table 8.1 of MRP Provision C.8.f requires Permittees to choose "sampling locations for RWLs assessment monitoring spatially and temporally representative of the sampled waterbody. Sampled waterbodies shall be representative of the range of receiving waterbody types." As explained in the RWL MP, each of the four Countywide Stormwater Programs selected a single sampling location for RWL monitoring within their respective county, for a total of four sites. The proposed receiving water bodies include Castro Valley Creek, Walnut Creek, San Mateo Creek, and Saratoga Creek. These sites were selected as representative based on a combination of watershed size, percent developed, percent imperviousness, and channel type. Additional considerations included the existence of upstream impoundments, the availability of existing monitoring data, and the presence of flow gauges within the watershed.

The site selection process involved identification of potential sites within each County that were safe, feasible, and accessible to monitor under high and low flow conditions. The candidate sites were then sorted into a 2x2 matrix showing watershed size and percent developed so that a variety of watershed types were represented regionally. Watershed size and percent

developed were based on USGS StreamStats[2] delineations, which was based on the 2011 suite of the National Land Cover Database (NLCD) products[3]. Table 1 shows the matrix with selected sites indicated in red font.

Table 1. RWL Monitoring Site Selection Matrix

	Watershed Size (sq mi)	
% Developed	**<25 sq mi**	**>25 sq mi**
≤50%	Alhambra Creek	Arroyo Mocho
	Crow Creek	Coyote Creek
	Rodeo Creek	Mt. Diablo Creek
	Saratoga Creek	San Francisquito Creek (lower)
	Stevens Creek	San Francisquito Creek (upper)
	Wildcat Creek	San Lorenzo Creek
		San Mateo Creek
		San Pablo Creek
>50%	Castro Valley Creek	Guadalupe River
	Cerrito Creek	Lower Silver Creek
	Colma Creek	San Ramon Creek
	Grayson Creek	Walnut Creek
	Kirker Creek	
	Line A - Hayward Industrial Storm Drain	

The Conditional Approval Letter asserted that the "representativeness of the four proposed creeks is questionable since they have predominately suburban watersheds with low to moderate percent impervious area."

In meetings held in December 2023, and January 2024, Countywide Stormwater Program and Permittee representatives and Water Board staff agreed upon a method to conduct the watershed characterization and evaluate representativeness. The following subsections describe the approach and the results of this regional and countywide watershed analysis, including a list of watersheds represented by the selected four monitoring sites and a list of other watersheds not well represented, as required in the Conditional Approval Letter.

3. METHODS

Each Countywide Stormwater Program identified watersheds in their respective counties that drain to San Francisco Bay, herein referred to as the *baseline watersheds*, for a total of 137 watersheds region wide. The watershed data sources for each county are provided in Table 2.

[2] https://www.usgs.gov/streamstats
[3] https://www.usgs.gov/centers/eros/science/national-land-cover-database

As described in the RWL MP, each of the four Countywide Stormwater Programs selected a single sampling location for RWL monitoring within their respective county, for a total of four sites. The catchment areas to the selected monitoring locations, herein referred to as the *monitored watersheds*, were delineated using USGS StreamStats[4]. The baseline and monitored watersheds are shown on Figure 1.

Table 2. Baseline Watershed Data Sources

County	Number of Watersheds	Data Source
Alameda	54	Alameda County Watershed Map, Alameda County Resource Conservation District[1]
Contra Costa	26	Contra Costa County Watershed Atlas, Contra Costa County Public Works[2]
San Mateo	28	County of San Mateo
Santa Clara	29	Valley Water
Total	**137**	

1. https://acrcd.org/projects/alameda-county-watershed-map/
2. https://www.cccleanwater.org/userfiles/kcfinder/files/Watershed%20Atlas.pdf

Collectively, the Countywide Stormwater Programs and Water Board staff agreed that the key watershed attributes to assess representativeness are watershed size, percent developed, and percent impervious. These attributes can be estimated and compared regionally and are likely correlated to water quality in the receiving waters. Percent developed and percent impervious were calculated for the baseline and monitored watersheds using the 2021 suite of the National Land Cover Database (NLCD) products[5]. The results were compared regionally and countywide and are presented in tabular and graphical summaries in the next sections.

[4] https://streamstats.usgs.gov/ss/

[5] https://www.usgs.gov/centers/eros/science/national-land-cover-database

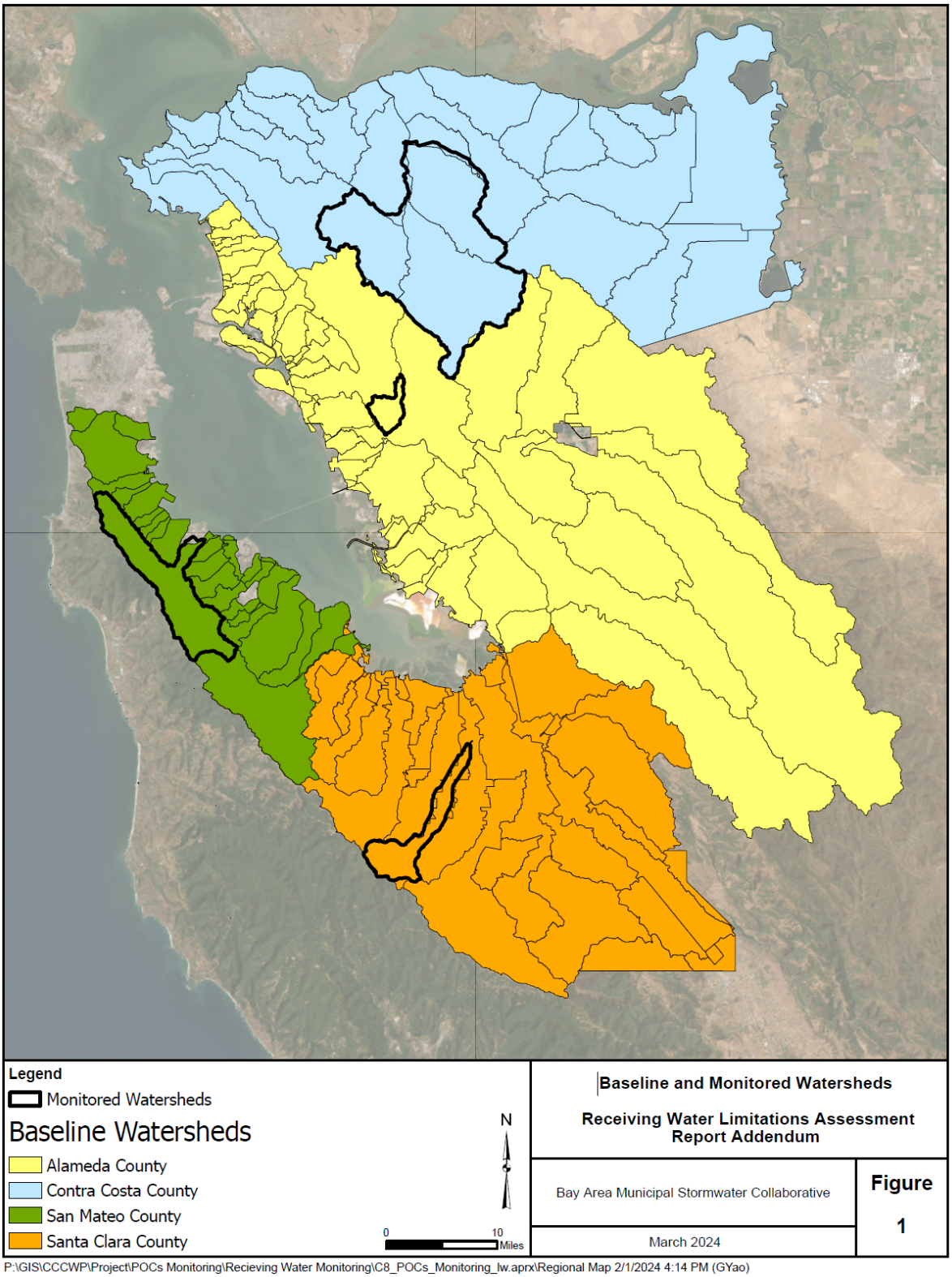

Figure 1. Baseline and Monitored Watersheds in Alameda, Conta Costa, San Mateo, and Santa Clara Counties

4. RESULTS

4.1 Watershed Characteristics

4.1.1 Baseline Watersheds

Summary statistics for the baseline watersheds are provided in Table 3 and Table 4, respectively, for the four counties collectively and individually.

Table 3. Baseline Watershed Characteristics for Alameda, Conta Costa, San Mateo, and Santa Clara Counties Combined

Attribute	Min	25th Percentile	Median	75th Percentile	Max
Watershed Size (sq mi)	0.05	2.5	5.7	22.7	167.8
Developed (%)	0.0	32.4	80.6	96.7	100
Impervious (%)	0.04	15.5	38.0	56.7	90.9

Table 4. Baseline Watershed Characteristics by Individual County

Attribute	Min	25th Percentile	Median	75th Percentile	Max
ALAMEDA COUNTY					
Watershed Size (sq mi)	0.05	1.7	3.5	15.3	167.8
Developed (%)	0.15	46.9	92.5	98.9	100
Impervious (%)	0.04	24.1	52.2	67.7	90.9
CONTRA COSTA COUNTY					
Watershed Size (sq mi)	2.8	10.4	17.9	38.2	87.9
Developed (%)	2.5	25.2	47.9	77.3	95.4
Impervious (%)	0.35	9.2	20.4	37.9	58.8
SAN MATEO COUNTY					
Watershed Size (sq mi)	0.24	1.4	3.3	5.1	40.6
Developed (%)	0.0	65.2	87.7	94.6	99.4
Impervious (%)	0.77	27.9	39.4	53.5	64.4
SANTA CLARA COUNTY					
Watershed Size (sq mi)	0.05	2.2	9.6	25.2	55.0
Developed (%)	3.1	27.6	61.2	90.3	99.5
Impervious (%)	0.42	13.5	33.1	52.5	68.9

4.1.2 Monitored Watersheds

A summary of the size, percent developed, and percent impervious for the monitored watersheds is provided in Table 5.

Table 5. Monitored Watershed and Associated Characteristics

County	Creek Name	Watershed Size (sq mi)	Developed (%)	Impervious (%)
Alameda	Castro Valley Creek	5.5	90.2	49.3
Contra Costa	Walnut Creek	116.6	53.8	18.7
San Mateo	San Mateo Creek	33.3	20.6	6.6
Santa Clara	Saratoga Creek	16.7	49.4	22.5

4.2 Regional Comparison

This section presents a regional comparison of the monitored watersheds to the baseline watersheds for the three selected attributes. A scatterplot showing the relationship between watershed size versus percent developed and watershed size versus percent impervious for the baseline and monitored watersheds is shown in Figure 2. To standardize the comparison, the percentile, rather than the value, is plotted. The median value (see Table 2 for the median values) for each attribute is used to group the data into quadrants.

A description of the quadrants of the number of baseline watersheds in each quadrant is summarized in Table 6. The comparison shows a negative association between watershed size versus percent developed and percent impervious (i.e., more watersheds are in Quadrants 2 and 4 compared to Quadrants 1 and 3). This negative relationship is expected since larger watersheds typically include more undeveloped areas in the upper reaches of the watershed. Three of the four monitored watersheds are also in Quadrant 4. Only Castro Valley Creek is in Quadrant 2.

Table 6. Summary of Watershed Grouping for Alameda, Conta Costa, San Mateo, and Santa Clara Counties Combined

Quadrant No.	Quadrant Description (median values from Table 2)		Number of Baseline Watersheds	
	Watershed Size	Percent Developed or Percent Impervious	Watershed Size vs. Percent Developed	Watershed Size vs. Percent Impervious
1	< 5.7 sq mi	< 81% developed or 38% impervious	17	17
2	< 5.7 sq mi	> 81% developed or 38% impervious	52	52
3	> 5.7 sq mi	> 81% developed or 38% impervious	16	16
4	> 5.7 sq mi	< 81% developed or 38% impervious	52	52

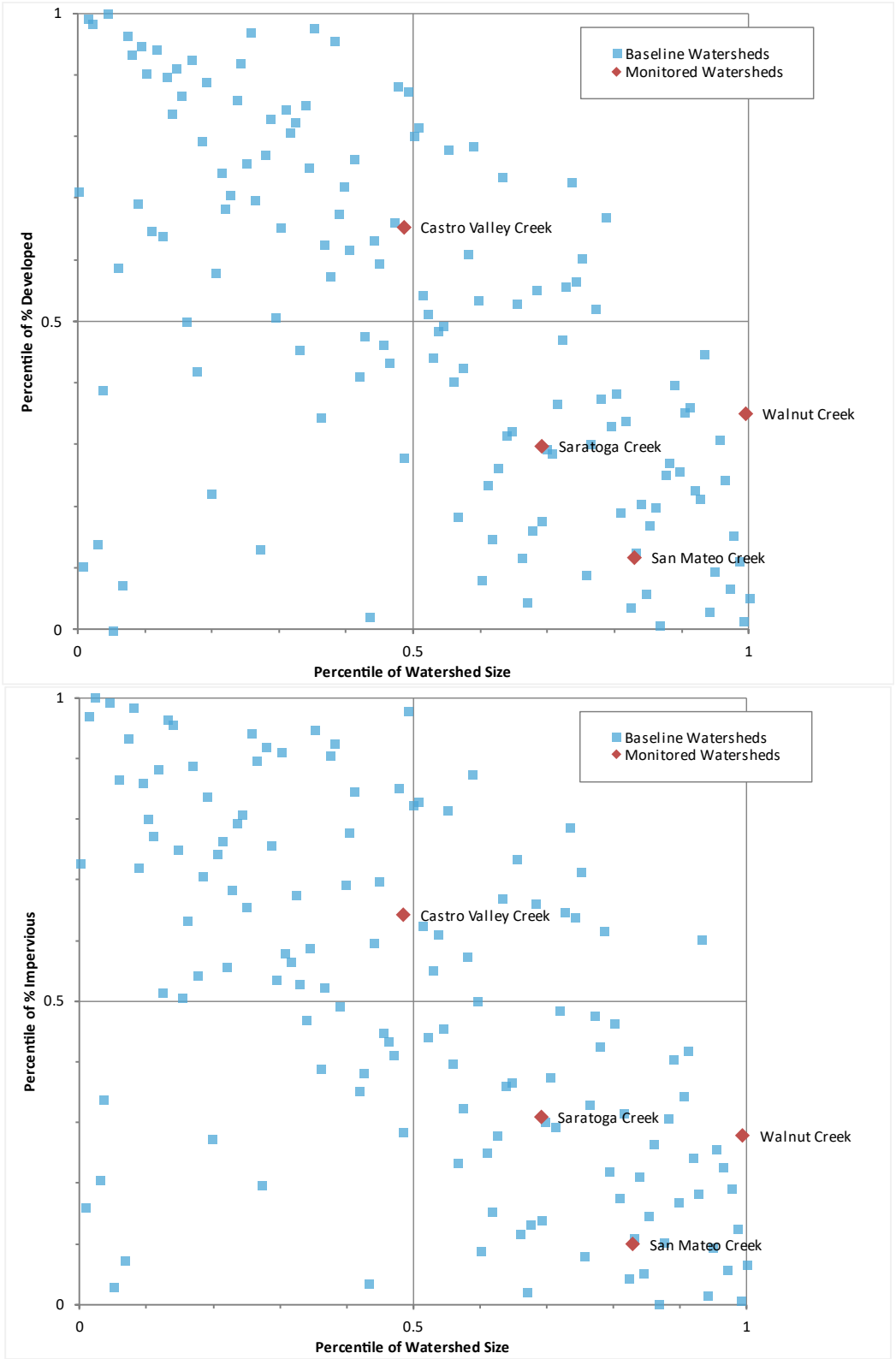

Figure 2. Regional Comparison of Watershed Size vs Percent Developed (top) and Percent Impervious (bottom)

4.3 Countywide Comparison

This section presents the countywide comparison of the monitored watershed to the baseline watersheds within each of the individual four counties. Scatterplots showing the relationship between watershed size versus percent developed and watershed size versus percent impervious are shown in Figures 3 to 6. Like the regional comparison, the percentile, rather than the value, is plotted. The median value for each attribute is used to group the data into quadrants.

A description of the quadrants and the number of baseline watersheds in each quadrant is summarized in Table 7. The comparison shows a negative association between watershed size versus percent developed and percent impervious from some counties (e.g., Alameda County) but not others (e.g., San Mateo). Each of the monitored watersheds fall within Quadrant 4 of their respective counties, except for Walnut Creek in Contra Costa County for watershed size versus percent developed.

Table 7. Summary of Watershed Grouping by Individual County

Quadrant No.	Quadrant Description (median values from Table 3)		Number of Baseline Watersheds	
	Watershed Size	Percent Developed or Percent Impervious	Watershed Size vs. Percent Developed	Watershed Size vs. Percent Impervious
ALAMEDA COUNTY				
1	< 3.5 sq mi	< 92% developed or 52% impervious	4	7
2	< 3.5 sq mi	> 92% developed or 52% impervious	23	20
3	> 3.5 sq mi	> 92% developed or 52% impervious	4	7
4	> 3.5 sq mi	< 92% developed or 52% impervious	23*	20*
CONTRA COSTA COUNTY				
1	< 17.9 sq mi	< 48% developed or 20% impervious	6	5
2	< 17.9 sq mi	> 48% developed or 20% impervious	7	8
3	> 17.9 sq mi	> 48% developed or 20% impervious	6*	5
4	> 17.9 sq mi	< 48% developed or 20% impervious	7	8*
SAN MATEO COUNTY				
1	< 3.3 sq mi	< 88% developed or 39% impervious	6	5
2	< 3.3 sq mi	> 88% developed or 39% impervious	8	9
3	> 3.3 sq mi	> 88% developed or 39% impervious	6	5
4	> 3.3 sq mi	< 88% developed or 39% impervious	8*	9*

Quadrant No.	Quadrant Description (median values from Table 3)		Number of Baseline Watersheds	
	Watershed Size	Percent Developed or Percent Impervious	Watershed Size vs. Percent Developed	Watershed Size vs. Percent Impervious
SANTA CLARA COUNTY				
1	< 9.6 sq mi	< 61% developed or 33% impervious	5	6
2	< 9.6 sq mi	> 61% developed or 33% impervious	10	9
3	> 9.6 sq mi	> 61% developed or 33% impervious	4	5
4	> 9.6 sq mi	< 61% developed or 33% impervious	10*	9*

Notes:

*Quadrant of the monitored watershed within the county.

A list of the individual watersheds along with the associated attributes and quadrant number is provided for each county in Appendix A. Watersheds in the same quadrant as the monitored watershed may be represented by the monitored watershed. Watersheds in the other three quadrants may not be well represented by the monitored watershed.

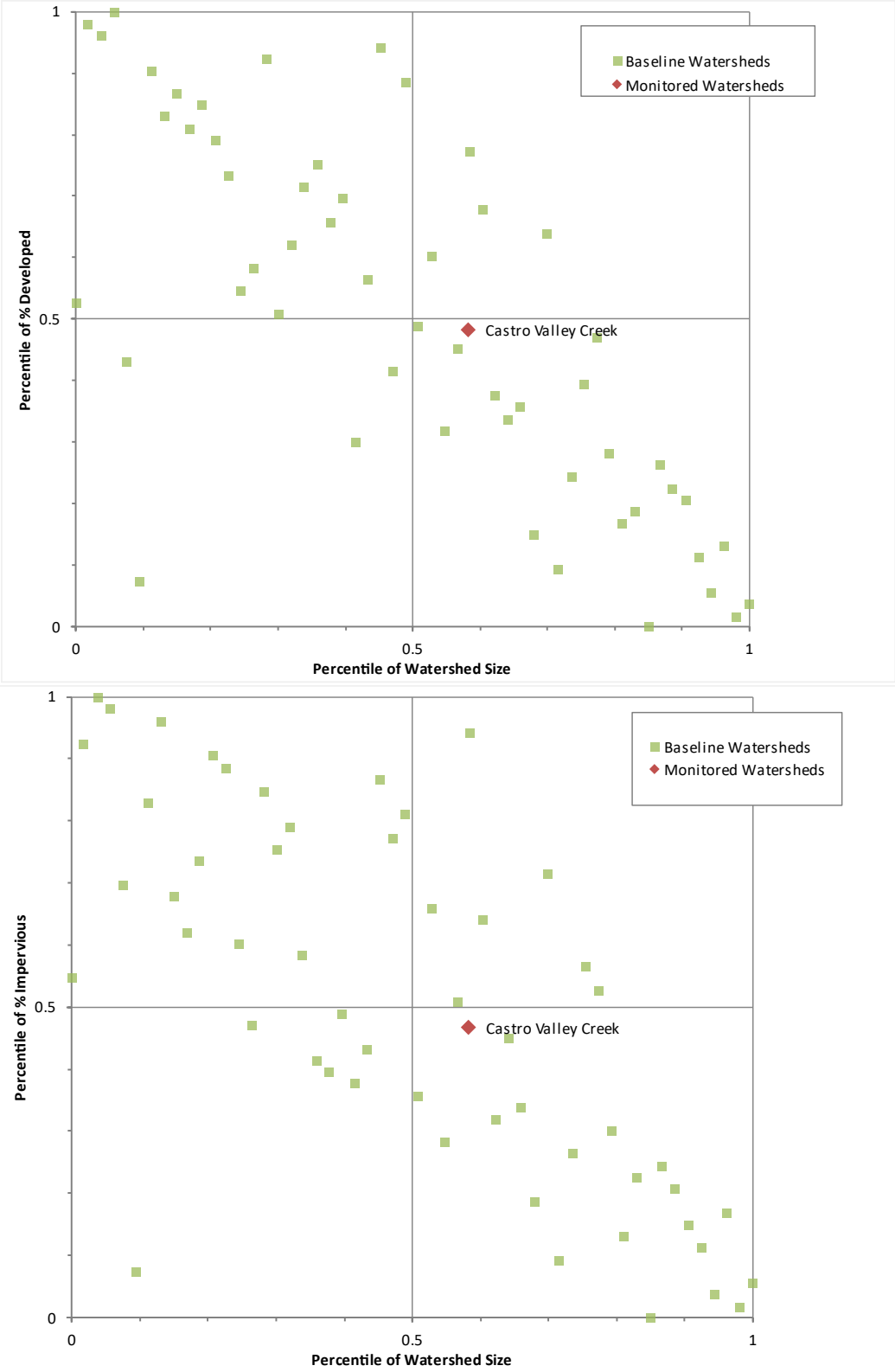

Figure 3. Watershed Size vs Percent Developed (top) and Percent Impervious (bottom) for Alameda County

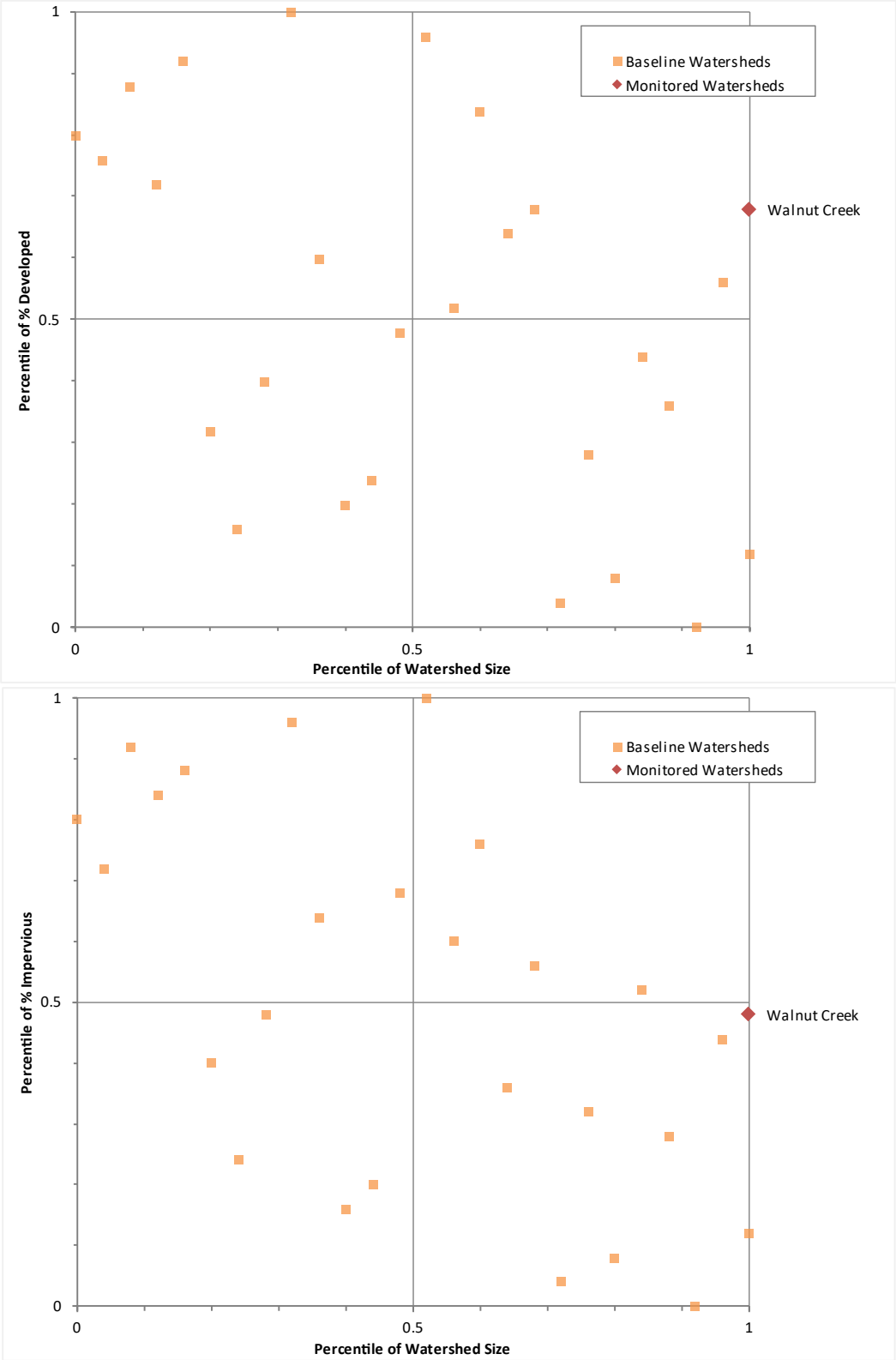

Figure 4. Watershed Size vs Percent Developed (top) and Percent Impervious (bottom) for Contra Costa County

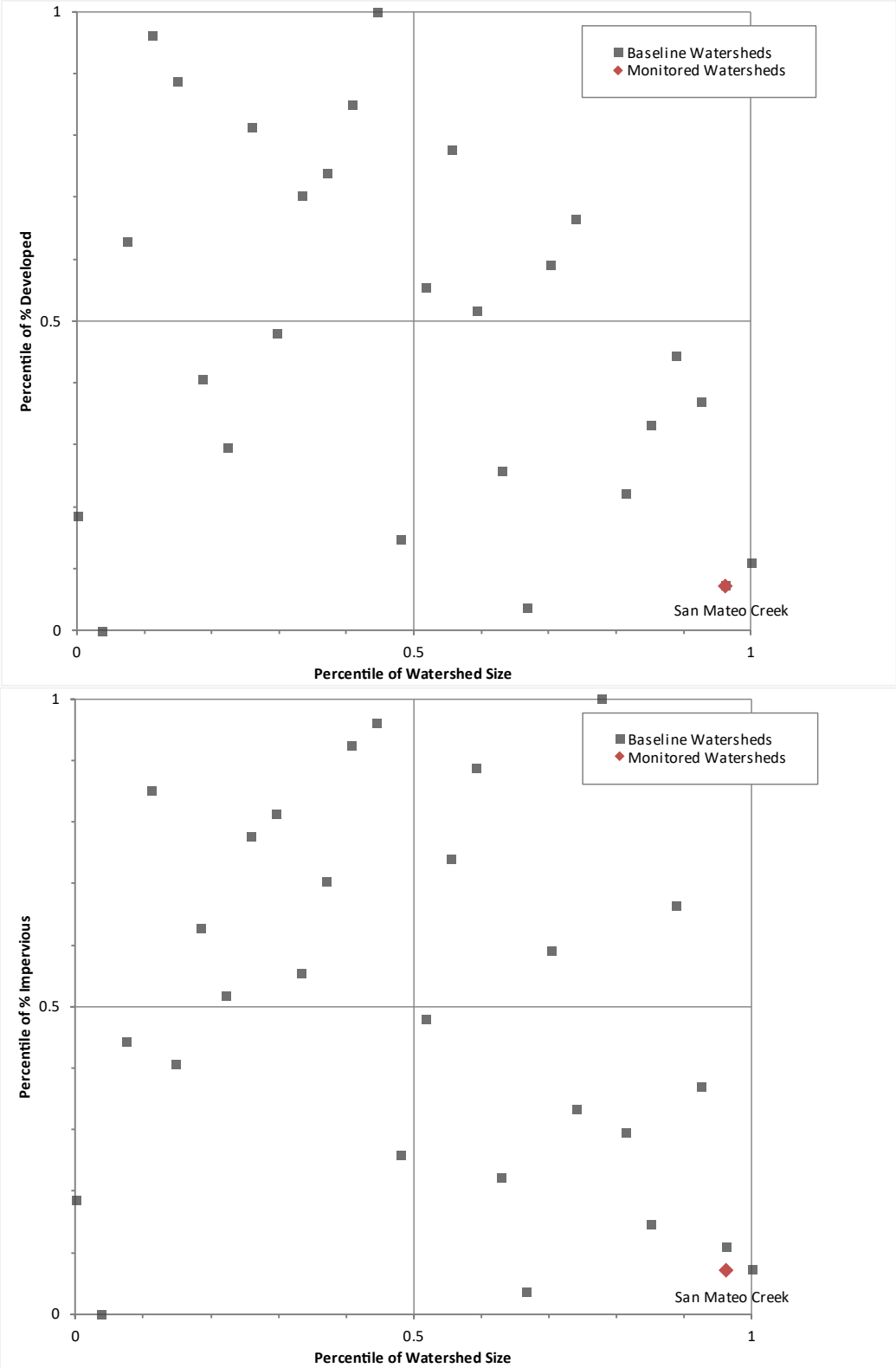

Figure 5. Watershed Size vs Percent Developed (top) and Percent Impervious (bottom) for San Mateo County

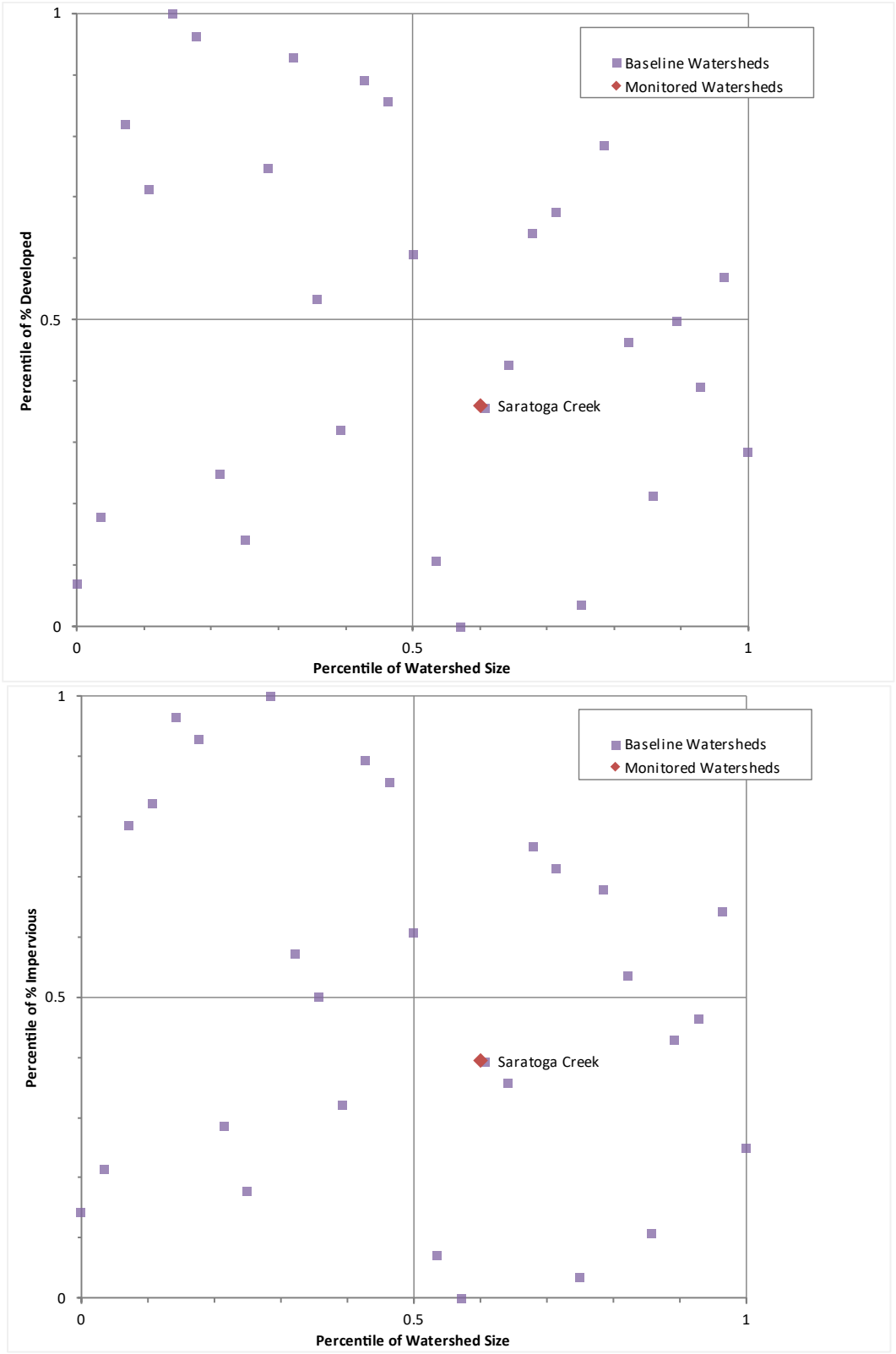

Figure 6. Watershed Size vs Percent Developed (top) and Percent Impervious (bottom) for Santa Clara County

5. SUMMARY AND NEXT STEPS

The watershed analysis presented herein demonstrates the representativeness of the four selected POCs RWL monitoring locations regionally and within an individual county. The resultant quadrant grouping shown in Figure 2 (regional) and Figures 3 to 6 (countywide) and detailed in Appendix A addresses the requirement to provide a list of creeks that are represented by the chosen four and a list of creeks that are not well represented. Future site selection will consider watersheds that are safe, feasible, and accessible to monitor and will be determined through discussions with the Regional Water Board.

The Countywide Stormwater Programs will continue to conduct POCs RWL monitoring per MRP Provision C.8.f and the RWL MP, through WY2024 and WY2025. The Countywide Stormwater Programs will also work towards meeting the March 31, 2026, reporting requirements specified in the MRP and the Letter of Conditional Approval of the RWL MP:

- MRP Provision C.8.h.iv.(2)(c): *By no later than March 31, 2026, or as part of the Integrated Monitoring Report, Permittees will submit an updated Receiving Water Limitations Assessment Report with proposed monitoring to be conducted during the next permit term*.
- Letter of Conditional Approval of the RWL MP: *Permittees must evaluate the representativeness of the waterbodies included in the Report by including in the March 31, 2026, Integrated Monitoring Report required by Provision C.8.h.iv (2)(c), a statistical evaluation of RWL data. Specifically, Permittees shall compare data collected for all RWL analytes to all available data for the same county and analyte collected during the last 10 years. Data distributions should be presented in tabular (distribution summary statistics like minimum, maximum, mean, median, and percentiles) and graphical form (e.g., data density plots, histograms, box and whisker plots, etc.). Graphical data distributions should indicate (e.g., using color and/or symbol shape) the individual waterbodies and sampling locations so that the RWL data can be clearly discerned in the distributions.*

APPENDIX A
List of Watersheds, Watershed Attributes, and Quadrant Groupings

SUMMARY

Per the Letter of Conditional Approval of the RWL MP, MRP Permittees must provide a list of creeks that are represented by the chosen four monitoring sites and a list of other creeks that are not well represented. To address this requirement, Table A-1 lists the monitored watersheds and resultant quadrant grouping in the regional and countywide comparison; Table A-2 lists the baseline watersheds in Alameda, Contra Costa, San Mateo, and Santa Clara counties, the associated watershed attributes and resultant quadrant grouping in the regional and countywide comparison.

The watershed attributes – size, percent developed, and percent impervious – are shaded to show relative differences. Small, medium, and large sized watersheds, for example, are shaded white, yellow, and green, respectively. Shading is relative to each attribute within the applicable county.

Baseline watersheds in the same quadrant as the monitored watershed are represented by the monitored watershed. Baseline watersheds in the other three quadrants may not be well represented by the monitored watershed. See Figure 2 (regional) Figures 3 to 6 (countywide) in the main report for a graphical representation.

Table A-1. Monitored Watersheds and Resultant Quadrant Grouping

County	Creek Name	Regional Comparison		Countywide Comparison	
		Size vs % Developed	Size vs % Impervious	Size vs % Developed	Size vs % Impervious
Alameda	Castro Valley Creek	2	2	4	4
Contra Costa	Walnut Creek	4	4	3	4
San Mateo	San Mateo Creek	4	4	4	4
Santa Clara	Saratoga Creek	4	4	4	4

Watershed Name	Size[1] (sq mi)	% Developed[1]	% Impervious[1]	Quadrant Number			
				Regional Comparison		Countywide Comparison	
				Size vs % Developed	Size vs % Impervious	Size vs % Developed	Size vs % Impervious
ALAMEDA COUNTY							
Agua Fria Watershed (Alameda)	8.1	25.7	14.9	4	4	4	4
Alameda Creek Watershed	11.9	52.0	27.5	4	4	4	4
Alamo Canal Watershed	43.8	53.9	26.7	4	4	4	4
Arroyo de la Laguna Watershed	29.3	28.9	10.9	4	4	4	4
Arroyo del Valle Watershed	167.8	4.5	1.7	4	4	4	4
Arroyo Hondo Watershed	99.2	1.1	0.1	4	4	4	4
Arroyo Las Positas Watershed	80.7	22.8	12.0	4	4	4	4
Arroyo Mocho Canal Watershed	38.9	29.1	16.5	4	4	4	4
Arroyo Mocho Watershed	53.6	13.4	6.3	4	4	4	4
Arroyo Viejo Watershed	6.2	82.7	33.3	3	4	4	4
Bay Farm Island Watershed	3.2	96.5	45.4	2	2	2	1
Bockman Canal Watershed	2.8	98.5	56.8	2	2	2	2
Cerrito Creek Watershed	3.1	98.3	51.2	2	2	2	1
Codornices Creek Watershed	2.9	98.8	44.6	2	2	2	1
Crandall Creek Watershed	6.5	80.0	46.7	4	3	4	4
Dry Creek Watershed	9.9	10.3	5.2	4	4	4	4
Elmhurst Creek Watershed	2.6	100.0	74.3	2	2	2	2
Estudillo Canal Watershed	9.4	97.7	66.9	3	3	3	3
Gilman Street Watershed	0.5	99.9	73.0	2	2	2	2
Glen Echo Creek Watershed	2.6	96.9	50.0	2	2	2	1
Hayward Landing Watershed	3.4	86.0	68.5	2	2	1	2
Indian Gulch/Pleasant Valley Creek Watershed	3.0	98.1	42.7	2	2	2	1
Johnson Landing Watershed	0.3	86.9	65.7	2	2	1	2
Laguna Creek Watershed	25.1	58.3	33.0	4	4	4	4
Line J-2 Watershed	1.8	96.2	57.1	2	2	2	2
Lion Creek Watershed	3.5	91.1	37.7	2	1	4	4
Lower Sulphur Creek Watershed	2.7	97.5	68.9	2	2	2	2
Mowry Slough Watershed	13.0	83.5	55.9	3	3	4	3
Mt Eden Creek Watershed	0.7	99.5	79.1	2	2	2	2
Newark Slough Watershed	4.8	88.1	53.3	2	2	4	3
North Alameda Watershed	3.4	99.8	70.0	2	2	2	2
Oakland Estuary Watershed	5.6	99.1	79.0	2	2	3	3
Old Alameda Creek Watershed	22.0	88.3	54.8	3	3	4	3
Oyster Point Watershed	1.2	99.3	77.1	2	2	2	2
Peralta Creek Watershed	5.7	98.1	62.7	3	3	3	3
Plummer Creek Watershed	2.6	93.8	67.4	2	2	2	2
Point Isabel Watershed	0.1	100.0	77.3	2	2	2	2
Potter and Derby Creeks Watershed	3.9	97.3	63.8	2	2	3	3
Powell Street Watershed	0.2	100.0	81.0	2	2	2	2
San Antonio Creek Watershed	39.5	0.1	0.0	4	4	4	4
San Leandro Bay Watershed	1.3	98.6	76.6	2	2	2	2
San Leandro Creek Watershed	49.4	30.5	12.0	4	4	4	4
San Leandro Marina Watershed	1.2	99.5	67.1	2	2	2	2
San Lorenzo Creek Watershed	48.3	31.7	15.2	4	4	4	4
Sausal Creek Watershed	4.2	79.4	29.2	1	1	4	4
Schoolhouse Creek Watershed	1.0	99.7	65.2	2	2	2	2
Southwest Alameda Watershed	1.0	99.3	61.4	2	2	2	2
Strawberry Creek Watershed	3.1	75.1	39.2	1	2	1	1
Temescal Creek Watershed	6.7	80.3	34.7	4	4	4	4

Watershed Name	Size[1] (sq mi)	% Developed[1]	% Impervious[1]	Quadrant Number			
				Regional Comparison		Countywide Comparison	
				Size vs % Developed	Size vs % Impervious	Size vs % Developed	Size vs % Impervious
Upper Alameda Creek Watershed	73.8	4.7	1.6	4	4	4	4
West Albany Hill Watershed	0.1	94.3	55.6	2	2	2	2
West Coyote Hills Watershed	0.4	4.7	2.2	1	1	1	1
West Oakland bayshore Watershed	0.2	100.0	90.9	2	2	2	2
West Oakland Watershed	3.2	100.0	76.5	2	2	2	2
CONTRA COSTA COUNTY							
Alhambra Creek	16.70	25.5	8.5	4	4	1	1
Baxter / Cerrito Richmond Drainages	18.49	95.0	58.8	3	3	3	3
Brushy Creek	38.18	4.5	1.6	4	4	4	4
Carquinez Straits Drainages	10.27	32.0	15.8	4	4	1	1
Concord	8.67	89.0	44.4	3	3	2	2
East Antioch Creek	11.35	95.4	50.9	3	3	2	2
East County Delta Drainages	87.90	16.7	8.0	4	4	4	4
Garrity Creek	6.02	85.3	48.0	3	3	2	2
Grayson Creek / Murderers Creek	23.99	83.1	37.2	3	4	3	3
Kellogg Creek	32.61	3.0	0.9	4	4	4	4
Kirker Creek	17.36	45.4	27.7	4	4	1	2
Las Trampas Creek	26.91	53.4	13.7	4	4	3	4
Lower Marsh Creek	42.29	43.5	22.2	4	4	4	3
Mt. Diablo Creek	38.16	29.5	13.1	4	4	4	4
Peyton Slough	6.41	72.7	40.2	4	3	2	2
Pine Creek / Galindo Creek	31.46	53.5	23.8	4	4	3	3
Pinole Creek	15.17	24.2	8.4	4	4	1	1
Refugio Creek	4.87	75.7	33.9	1	1	2	2
Rheem Creek	2.80	82.2	40.2	2	2	2	2
Rodeo Creek	10.40	22.0	9.5	4	4	1	1
San Pablo Creek	43.59	33.0	10.8	4	4	4	4
San Ramon Creek	54.03	51.2	15.8	4	4	3	4
Upper Marsh Creek	51.46	2.5	0.4	4	4	4	4
West Antioch Creek	12.79	52.9	27.7	4	4	2	2
Wildcat Creek	10.97	38.3	18.7	4	4	1	1
Willow Creek and Coastal Drainages	23.58	50.5	25.5	4	4	3	3
SAN MATEO COUNTY							
ATHERTON CHANNEL	8.19	71.7	23.9	4	4	4	4
BAY SLOUGH	0.28	0.0	0.8	1	1	1	1
BELMONT CANAL	1.36	80.6	48.0	1	2	1	2
BELMONT CREEK	3.32	89.4	38.6	2	2	3	4
BELMONT SLOUGH	1.40	69.3	40.2	1	2	1	2
BOREL CREEK	2.23	99.0	60.0	2	2	2	2
BROADMOOR	2.51	99.4	61.5	2	2	2	2
COLMA CREEK	16.49	85.4	50.6	3	3	4	3
CORDILLERAS CREEK	4.04	68.6	27.2	1	1	4	4
EASTON CREEK	1.35	99.0	38.2	2	2	2	1
EL PORTAL CREEK	1.34	99.4	56.7	2	2	2	2
EL ZANJON CREEK	2.03	93.8	51.3	2	2	2	2
GREENWOOD DRAINAGE	1.19	89.8	38.5	2	2	2	1
GUADALUPE VALLEY	3.24	53.7	30.0	1	1	1	1
GUANOLD	0.24	59.9	25.6	1	1	1	1
HIGHLINE CREEK	5.13	99.1	64.4	2	2	3	3
LAUREL CREEK	4.69	89.5	46.5	2	2	3	3
MILLS CREEK	1.43	98.0	53.8	2	2	2	2

Watershed Name	Size[1] (sq mi)	% Developed[1]	% Impervious[1]	Quadrant Number			
				Regional Comparison		Countywide Comparison	
				Size vs % Developed	Size vs % Impervious	Size vs % Developed	Size vs % Impervious
PULGAS CREEK	2.02	92.0	42.5	2	2	2	2
RAVENSWOOD SLOUGH	7.47	64.1	30.5	4	4	4	4
REDWOOD CREEK	18.28	78.4	37.3	4	4	4	4
SAN BRUNO CREEK	3.83	89.1	58.7	2	2	3	3
San Francisquito Creek	40.57	32.7	6.8	4	4	4	4
SAN MATEO CREEK	33.49	20.9	6.8	4	4	4	4
SANCHEZ CREEK	5.12	90.2	31.9	2	1	3	4
SEAL CREEK	3.74	94.8	52.9	2	2	3	3
SEAL SLOUGH	1.77	86.3	56.3	2	2	1	2
STEINBERGER SLOUGH	4.41	2.2	0.9	1	1	4	4
SANTA CLARA COUNTY							
Agua Caliente Creek Watershed	2.85	90.2	68.9	2	2	2	2
Alamitos Creek Watershed	38.41	24.2	8.7	4	4	4	4
Barron Creek Watershed	3.11	98.9	36.9	2	1	2	2
Calabazas Creek Watershed	20.41	85.7	48.8	3	3	3	3
Canoas Creek Watershed	18.31	85.6	50.0	3	3	3	3
Coast Casey Forebay Watershed	1.39	99.5	67.4	2	2	2	2
Coyote Creek Watershed	45.71	56.4	32.6	4	4	4	4
Fisher Creek Watershed	14.20	20.8	7.5	4	4	4	4
Fisher/West little Llagas Creek Watershe	0.98	93.2	55.1	2	2	2	2
Fremont Airport Watershed	0.05	15.7	9.7	1	1	1	1
Guadalupe Creek Watershed	50.72	73.2	46.7	4	3	3	3
Juniper Serra Channel Watershed	1.51	99.3	63.1	2	2	2	2
Llagas Creek Watershed	14.46	3.1	0.4	4	4	4	4
Los Gatos Creek Watershed	54.99	32.1	14.5	4	4	4	4
Lower Penitencia Creek Watershed	28.85	59.6	35.8	4	4	4	3
Lower Silver Creek Watershed	43.36	61.2	31.6	4	4	4	4
Mallard Slough Watershed	2.60	21.5	12.4	1	1	1	1
Moffett Channel Watershed	7.20	97.6	61.7	3	3	2	2
Moffett Field Watershed	1.06	90.2	57.3	2	2	2	2
Permanente Creek Watershed	17.51	56.7	21.7	4	4	4	4
Ross Creek Watershed	9.65	84.7	38.0	3	4	2	2
San Tomas Aquino Creek Watershed	26.90	90.4	46.7	3	3	3	3
Saratoga Creek	17.16	48.4	22.2	4	4	4	4
Sunnyvale East Channel Watershed	5.66	98.0	62.2	2	2	2	2
Treatment Plant Watershed	0.24	21.7	12.4	1	1	1	1
Unnamed Watershed	1.72	31.1	18.5	1	1	1	1
Upper Penitencia Creek Watershed	23.43	10.4	4.5	4	4	4	4
Upper Silver Creek Watershed	5.54	43.6	21.4	1	1	1	1
West Little Llagas Creek Watershed	5.03	72.6	33.1	1	1	2	1

Notes:

1 The shading shows relative magnitude of the corresponding watershed attributes (size, percent developed, or percent impervious) within the applicable county. The color scale transforms from white to yellow to green, where the larger values are shown in darker green and smaller values are shown in light yellow/white. For example, small, medium, and large sized watersheds are shaded white, yellow, and green, respectively.

Appendix B

Letter Describing Approach to Emerging Contaminant Monitoring

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Campbell • Cupertino • Los Altos • Los Altos Hills • Los Gatos • Milpitas • Monte Sereno • Mountain View • Palo Alto
San Jose • Santa Clara • Saratoga • Sunnyvale • Santa Clara County • Santa Clara Valley Water District

March XX, 2023

Ms. Eileen White
Executive Officer
San Francisco Bay Region
Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: Regional Stormwater Monitoring Strategy for Emerging Contaminants

Dear Ms. White:

This letter transmits the regional stormwater monitoring strategy for emerging contaminants in compliance with provision C.8.f.ii of the Municipal Regional Permit for Stormwater (MRP 3.0), NPDES Permit No. CAS612008 (Order No. R2-2022-0018), on behalf of Permittees that participate in the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP or Program). Provision C.8.f.ii (Table 8.2, footnote c) of the MRP states that:

> *Permittees, collectively, shall produce or cause to be produced a stormwater monitoring strategy for emerging contaminants (ECs) by April 1, 2023 that prioritizes ECs for stormwater monitoring listed in this table and possibly others and establishes an approach for sampling stormwater ECs based on specific or likely physico-chemical properties, sources, transport pathways, and fate of prioritized ECs. Permittees must conduct or cause to be conducted ECs stormwater monitoring to execute the ECs stormwater monitoring strategy at a level of effort indicated in the table. This level of effort can be satisfied either through sampling and analysis of the number of samples indicated in this table or through augmentation of the San Francisco Bay Regional Monitoring Program Emerging Contaminants Monitoring Strategy in the amount of $100,000 per year for all Permittees combined.*

As approved by the Program's Management Committee, SCVURPPP Permittees have agreed to satisfy this MRP 3.0 requirement by annually contributing their equitable share of $100,000 to augment the San Francisco Bay Regional Monitoring Program (RMP) EC Monitoring Strategy[1] (see Table 1). For Permittees in Santa Clara County, annual contributions will be made through SCVURPPP.

Table 1. Contributions that MRP Permittees have agreed to make annually to augment the RMP's Emerging Contaminant Monitoring Strategy during the term of the permit.

Permittee Group	Annual Contribution	Relative Percentage[2]
Alameda County Permittees	$30,923	30.92%
Contra Costa County Permittees	$21,649	21.65%
Santa Clara County Permittees	$33,489	33.49%
San Mateo County Permittees	$13,939	13.94%
Total	**$100,000**	**100%**

[1] https://www.sfei.org/sites/default/files/biblio_files/CEC%20Strategy%20-%202020%20Update%20-%20Final_92320.pdf
[2] Relative percentages are based on the populations within the MRP-associated portions of each county at the start of MRP 3.0 (Department of Finance, January 2022).

The stormwater portion of the RMP's EC Monitoring Strategy is currently under development and builds upon a stormwater EC screening study conducted from 2018 through 2023 and ongoing watershed hydrology, sediment, and pollutant loads modeling. The stormwater portion of the RMP's EC Monitoring Strategy is scheduled for completion in late 2023 and will be implemented during the term of MRP 3.0 through the RMP. This portion of the RMP's EC Monitoring Strategy includes both watershed/stormwater modeling and monitoring tasks to address high priority management questions established collaboratively through the RMP and consistent with those included in MRP 3.0.

SCVURPPP Permittees look forward to continuing to participate in the RMP and the development and implementation of the stormwater portion of the EC Monitoring Strategy. Please contact me or Program staff (Chris Sommers - csommers@eoainc.com) if you have any comments or questions.

Very truly yours,

Adam W. Olivieri, Dr. P.H., P.E.
Program Manager

cc: SCVURPPP Management Committee Members
Dr. Thomas Mumley, Assistant Executive Officer, SF Bay Regional Water Board
Dr. Jay Davis, SF Bay RMP Lead Scientist, San Francisco Estuary Institute

Appendix C

QA/QC Report

Pollutants of Concern Monitoring Quality Assurance/Quality Control Report, WY 2023

1.0 Introduction

The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) conducted Pollutants of Concern (POC) monitoring in Water Year (WY) 2023 to comply with Provision C.8.f (Pollutants of Concern Monitoring) of the National Pollutant Discharge Elimination System Program (NPDES) Municipal Regional Permit for the San Francisco Bay Area (i.e., MRP 3.0; Permit No. CAS612008, Order No. R2-2022-0018). In WY 2023, sediment and stormwater monitoring included analysis for polychlorinated biphenyls (PCBs)[1], and total mercury. Kinnetic Environmental, Inc. (KEI) of Santa Cruz, California collected the samples. Caltest Analytical Laboratory (Caltest) of Napa, California, SGS AXYS Analytical Services Ltd. (AXYS) of Sidney, British Columbia, Canada, and Eurofins Calscience (Eurofins) of Tustin, California performed the analyses described in Table 1.

Table 1. Pollutant of concern monitoring analyses conducted in WY 2023.

Laboratory	Analysis	Matrix	Method Reference
Caltest Analytical Laboratory	Total Mercury	Stormwater	EPA 1631E
	Suspended Sediments		ASTM D3977-97
SGS AXYS Analytical Services	Total PCB Congeners		EPA 1668C
Eurofins Calscience	Total Mercury	Sediment	EPA 7471A
	Total PCBs		SW846 8270C SIM CON
	Total Solids		SM 2540

This report summarizes the Quality Assurance/Quality Control (QA/QC) procedures and results for this monitoring effort for the analyses performed by Caltest in report numbers X120182, X120296, Y070661;

[1] The total PCB congeners analyzed are the RMP-40 which consist of the following individual PCB congeners: PCB 8, PCB 18, PCB 28, PCB 31, PCB 33, PCB 44, PCB 49, PCB 52, PCB 56, PCB 60, PCB 66, PCB 70, PCB 74, PCB 87, PCB 95, PCB 97, PCB 99, PCB 101, PCB 105, PCB 110, PCB 118, PCB 128, PCB 132, PCB 138, PCB 141, PCB 149, PCB 151, PCB 153, PCB 156, PCB 158, PCB 170, PCB 174, PCB 177, PCB 180, PCB 183, PCB 187, PCB 194, PCB 195, PCB 201, and PCB 203. While more congeners may be reported by the laboratory, this QA/QC Report only validates the RMP-40 requested by the RWQCB. Non RMP-40 PCB congeners that were not validated were flagged VNRNV-Parameter reported by laboratory but not requested, not validated by QAO, flagged by QAO.

AXYS in report number WG86251; and Eurofins in report numbers 570-153664-1 and 570-150895-1 for the samples listed in Table 2.

Table 2. Pollutant of concern monitoring samples analyzed in WY 2023.

Caltest Report X120182	Caltest Report X120296	AXYS Report WG86521	Eurofins Report 570-150895-1	Eurofins Report 570-153664-1
049STA500A-1222	083LGC525A-1222	083LGC525A-1222	MV-XXX-0823-01	SC-SNV-0923-01
049SRA600A-1222	066GAC152A-1222	049STA500A-1222	MV-XXX-0823-02	
049STA800A-1212		049STA600A-1222	MV-XXX-0823-03	
		049STA800A-1222	MV-XXX-0823-04	
		066GAC152A-1222	MV-XXX-0823-05	
			MV-XXX-0823-06	
			MV-XXX-0823-07	
			MV-XXX-0823-08	
			SN-SVE-0823-01	
			SN-SVE-0823-02	
			SN-SVW-0823-01	
			SN-SVW-0823-02	
			SN-SVW-0823-03	
			SN-SVW-0823-04	
			SN-SVW-0823-05	
			SN-SVW-0823-06	
			SN-SVW-0823-07	

SCVURPPP utilizes the Clean Watersheds for Clean Bay Project (CW4CB) Quality Assurance Project Plan (QAPP; BASMAA 2013) as a basis for QA/QC procedures. Data were assessed for seven data quality attributes: (1) Representativeness, (2) Comparability, (3) Completeness, (4) Sensitivity, (5) Contamination, (6) Accuracy, and (7) Precision. These eight attributes are compared to Data Quality Objectives (DQOs), which were established to ensure that data collected are of adequate quality and sufficient for the intended uses. DQOs address both quantitative and qualitative assessment of the acceptability of data – representativeness and comparability are qualitative while completeness, sensitivity, precision, accuracy, and contamination are quantitative assessments. Specific DQOs are based on Measurement Quality Objectives (MQOs) for each analyte. The MQOs for each analyte are summarized in Table 3.

Table 3. Measurement quality objectives for analytes from CW4CB QAPP (BASMAA, 2013).

Sample	Sediment			Water		
	Total Solids	Mercury	PCBs	Suspended Sediment	Mercury	PCBs
Laboratory Blank (Method Blank, Field Filter Blank, Equipment Rinsate Blank, Trip Blank))	< RL	< RL	< RL	< RL	< RL	< RL
Reference Material Recovery (Laboratory Control Sample)	N/A	75-125%	50-150%	N/A	75-125%	50-150%
Matrix Spike Recovery	N/A	75-125%	50-150%	N/A	75-125%	50-150%
Duplicates [1] (Matrix Spike, Field, and Laboratory)	RPD < 25%	RPD < 25%	RPD < 25%[2]	RPD < 25%	RPD < 25%	RPD < 25%
Reporting Limit	0.1%[3]	30 µg/kg	0.2 µg/kg	0.5 mg/L:	0.0002 µg/L	0.002 µg/L (2,000 pg/L)

RL = Reporting Limit
RPD = Relative Percent Difference
[1] N/A if native concentration for either sample is less than the reporting limit
[2] Only applicable for matrix spike duplicates. Method specific for field and laboratory duplicates
[3] RL for total solids in water

Overall, the results of the QA/QC review suggest that the data generated during WY 2023 POC monitoring were of sufficient quality for the purposes of this program. While some data were flagged in the project database based on the MQOs and DQOs identified in the QAPP, none of the data were rejected. Further details regarding the QA/QC review are provided in the sections below.

2.0 Representativeness

Data representativeness assesses whether the data were collected in a manner that represents actual conditions at each monitoring location. For this project, all samples were assumed to be representative if they were collected and analyzed according to protocols specified in the CW4CB QAPP. Field and laboratory personnel received and reviewed the QAPPs and followed prescribed protocols including laboratory methods, holding times, preservation, and storage.

2.1. Hold Times

Extractions and analyses were performed within the recommended holding time criteria and no additional data flags were assigned by the QA officer.

2.2. Preservation and Sample Storage

The samples were preserved and stored appropriately as ascribed by the respective methods and no additional data flags were assigned by the QA officer.

3.0 Comparability

The QA/QC officer ensures that the data may be reasonably compared to data from other programs producing similar types of data. For POC monitoring, individual stormwater programs strive to maintain comparability within the Bay Area Municipal Stormwater Collaborative (BAMSC) Regional Monitoring Coalition (RMC). The key measure of comparability for all RMC data is the California Surface Water Ambient Monitoring Program (SWAMP).

Electronic data deliverables (EDDs) were submitted to the San Francisco Bay Regional Water Quality Control Board (SFRWQCB) in Microsoft Excel templates developed by the California Environmental Data Exchange Network (CEDEN) which are comparable to SWAMP. In addition, data entry followed SWAMP documentation specific to each data type, including the exclusion of qualitative values that do not appear on CEDEN's look up lists[2]. Completed templates were reviewed using CEDEN's online data checker[3], further ensuring SWAMP-comparability. There were no POC monitoring data collected in WY 2023 that was required to be reported to CEDEN via the CEDEN data portal as no data were collected in receiving waters.[4]

All WY 2023 data were considered comparable to SWAMP data and other RMC data.

4.0 Completeness

Completeness is the degree to which all data were produced as planned; this covers both sample collection and analysis. An overall completeness of greater than 90% is considered acceptable for RMC chemical data and field measurements.

During WY 2023, SCVURPPP collected and analyzed 100% of the planned chemical analytes and field measurements.

5.0 Sensitivity

Sensitivity analysis determines whether the methods can identify and/or quantify results at low enough levels. This data quality attribute is evaluated via the assessment of reporting limits (RLs).

The RLs for many of the RMP-40 PCB congeners in most of the sediment samples exceeded the target RL of 0.2 µg/kg specified in the QAPP. However, most of the PCB concentrations in analytical samples were detected well above the RL. Additionally, the reporting limits were still orders of magnitude lower than the 0.2 mg/kg total PCB congener sediment screening level value[5] (SLV) established by the BAMSC RMC for known or suspected source areas or evidence of moderate to high PCBs soil concentrations, the data was deemed acceptable by the QA officer with no changes.

The RLs for mercury in most of the sediment samples exceeded the target RL of 30 µg/kg. However, most of the reporting limits were still an order of magnitude lower than the 0.3 mg/kg (300 ug/kg) mercury SLV established by the BAMSC RMC for known or suspected source areas or evidence of moderate to high mercury soil concentrations. Two instances where this wasn't the case were for samples MV-XXX-0823-07

[2] Look up lists available online at https://swamp.waterboards.ca.gov/swamp_checker/LookUpLists.aspx
[3] Convertor available at: http://www.ceden.org/docs/2015_templates/swamp_to_ceden_converter_042115.xlsm
[4] Convertor available at: http://www.ceden.org/docs/2015_templates/swamp_to_ceden_converter_042115.xlsm
[5] The total PCB congener SLV in this instance refers to the sum of the RMP-40 congeners.

and MV-XXX-0823-09. However, in these two instances the MDL was below the 0.3 mg/kg mercury sediment SLV and the results were both below the MDL (non-detect). The data was deemed acceptable by the QA officer with no changes.

The RLs were met for all of the RMP-40 PCB congeners in water. The RLs for mercury and suspended sediment in water were elevated for all samples, however, detected concentrations were all well above the reporting limits for both analytes. The data with elevated RLs were accepted by the QA Officer with no other changes.

6.0 Contamination

For chemical data, contamination is assessed as the presence of analytical constituents in blank samples. Laboratory method blank analyses were performed at the required frequencies specified by the QAPP (a minimum of one laboratory blank must prepared and analyzed in every analytical batch). For purposes of data qualification, the laboratory method blanks were associated with all samples prepared in the analytical batch.

All laboratory method blank results were non-detect to the MDLs for all target analytes in sediment, indicating that there was no contamination present.

Method blank results were above the MDL but below the RL for most of the RMP-40 PCB congeners in water for blank sample WG86251-101 (Batch WG86251-AXYS). This blank sample is associated with the lab batch that contained the following five samples: 083LGC525A-1222, 049STA500A-1222, 049STA600A-1222, 049STA800A-1222, and 066GAC152A-1222. The data was flagged by the laboratory and accepted by the QA officer with no other changes. There were no other detections in laboratory method blanks.

7.0 Accuracy

Accuracy is assessed as the percent recovery of samples spiked with a known amount of a specific chemical constituent. The analytical laboratory evaluated and reported the Percent Recovery of Laboratory Control Samples (LCS; in lieu of reference materials) and Matrix Spikes (MS), which were reported by the laboratory as well as recalculated by the QAO and compared to the target ranges in the CW4CB QAPP. If a QA sample did not meet MQOs, all samples in that batch for that analyte were flagged.

All mercury and PCB congener LCS and MS samples met their corresponding MQOs and frequency (one LCS and matrix spike per 20 samples or per analytical batch, whichever is more frequent per analyte) and the data were deemed acceptable by the QA officer with no changes.[6]

8.0 Precision

Precision is the repeatability of a measurement and is quantified by the Relative Percent Difference (RPD) of two duplicate samples. Three measures of precision were used for this project, laboratory duplicates (LCSDs), MSDs, and field duplicates (FDs). The MQO for RPD specified by the CW4CB QAPP is <25%.

[6] A MS/MSD was not collected and analyzed for EPA Method 1668C as this method does not require a MS/MSD. Method 1668C has specific requirements for method blanks that must be met before sample data can be reported (USEPA, 2010).

All mercury and PCB congener LCSD and MSD samples met their corresponding MQO RPDs (RPD<25% [n/a if native concentration of either sample<RL]) when compared with their respective paired LCS and MS samples as well as frequency (One LCSD and MSD per 20 samples or per analytical batch, whichever is more frequent) except for MSD sample 570-150895-1-MSD (parent sample MV-XXX-0823-01) for mercury. The RPD was above the 25% limit specified in the QAPP. The sample was flagged by the laboratory DB- QA results outside of acceptance limits due to matrix effects and IL - RPD exceeds laboratory control limit. Because the result in the parent analytical sample was above the MRL, the data was also flagged by the QAO (VQCP- QA/QC protocols were not met for precision, flagged by QAO) but ultimately deemed acceptable by the QA officer with no other changes.

Four FDs were analyzed for mercury, the RMP-40 PCB congeners, and solids (suspended solids in water and total solids in sediment) which exceeded the number required by the QAPP (10% of samples or one per day, whichever is less). Sample / field duplicate pair 066GAC152A/066GAC152A-1222-FD in AXYS Report WG86521 was shared with SMCWPPP's POC monitoring.

The field duplicates met the RPD MQO for mercury, solids (<25%; N/A if native concentration for either sample is less than the reporting limit) and most PCBs. The PCB congeners that exceeded the MQO are shown in Table 4. For RMP-40 PCB congeners in the batch that exceeded the RPD for the analytical sample / field duplicate pair, the QAO assigned the VFDP (field duplicate RPD above QC limit) flag and the data were deemed acceptable with no other changes.

Table 4. Summary of qualifiers assigned as a result of field duplicates exceeding the measurement quality objective for relative percent difference.

Sample ID	Duplicate Sample ID	Analyte	Units	Sample Result	Duplicate Result	Relative Percent Difference
066GAC152A-1222	066GAC152A-1222-FD	PCB-028	pg/L	13.6	10.4	26.7
		PCB-031		9.84	6.38	42.7
		PCB-033		5.67	4.36	26.1
		PCB-044		33.5	23.4	35.5
		PCB-049		12.4	9.37	27.8
		PCB-056		12.8	7.69	49.9
		PCB-060		5	2.9	53.2
		PCB-066		19.8	12.8	42.9
		PCB-070		49.4	32.9	40.1
		PCB-149		122	83.3	37.7
		PCB-151		44.6	33.9	27.3
		PCB-170 S		103	69.7	38.6
		PCB-174		40.5	28.8	33.8
		PCB-177		22.8	16.9	29.7
		PCB-180		115	86.6	28.2
		PCB-180 S		101	69	37.6
		PCB-187		55.8	40.1	32.7
		PCB-195		12.9	8.94	36.3
		PCB-201		6.16	3.89	45.2
SN-SVE-0823-02	SN-SVE-0823-03	PCB-149	µg/kg	0.86	0.6	30.2

9.0 References

Bay Area Stormwater Management Agency Association (BASMAA). 2013. Quality Assurance Project Plan. Clean Watersheds for a Clean Bay – Implementing the San Francisco Bay's PCB and Mercury TMDL with a Focus on Urban Runoff. Revision Number 1. EPA San Francisco Bay Water Quality Improvement Fund Grant # CFDA 66.202. Prepared for Bay Area Stormwater Management Agencies Association (BASMAA) by Applied Marine Sciences (AMS). August.

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Surface Water Ambient Monitoring Program (SWAMP). 2022. Surface Water Ambient Monitoring Program Quality Assurance Program Plan. Version 2.0. January. 152 pp.

United States Environmental Protection Agency (USEPA). 2010. Method 1668C Chlorinated Biphenyl Congeners in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS. EPA-820-R-10-005. April.