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October 15, 2018

Mr. Bruce H. Wolfe
Executive Officer
San Francisco Bay Region
Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

**Subject: SCVURPPP Pollutant of Concern Monitoring Report - Water Year 2018
Accomplishments & Water Year 2019 Planned Allocation of Effort**

Dear Bruce:

On behalf of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), I am pleased to submit SCVURPPP's *Pollutant of Concern (POC) Monitoring Report – Water Year (WY) 2018¹ Accomplishments and WY 2019² Planned Allocation of Effort*. The POC Monitoring Report is submitted on behalf of all SCVURPPP Permittees in compliance with Provision C.8.h.iv of NPDES Permit # CAS612008 (Order No. R2-2015-0049). The report describes the allocation of sampling effort for POC monitoring in WY 2019 and what was accomplished for POC monitoring in WY 2018. The POC monitoring locations for WY 2018 are included in the report, along with the number and types of samples, purpose of the sampling, and analytes measured in WY 2018 and anticipated monitoring in WY 2019. Exact POC monitoring locations for WY 2019 are under development based on SCVURPPP's on-going efforts to identify likely PCB and mercury source properties and high interest Watershed Management Areas (WMAs) for these pollutants.

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted, is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Very truly yours,

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

Submitted on behalf of the Santa Clara Valley Urban Runoff Pollution Prevention Program (per Management Committee direction)

CC: SCVURPPP Management Committee Members
Keith Lichten, Janet O'Hara, and Richard Looker, SF Bay Water Board
Chris Sommers, SCVURPPP Project Manager

Attachments: SCVURPPP POC Monitoring Report - WY 2018 Accomplishments & WY 2019 Planned Allocation of Effort

¹ Water Year 2018 is from October 1, 2017 through September 30, 2018

² Water Year 2019 is from October 1, 2018 through September 30, 2019

Pollutants of Concern Monitoring Report

Water Year 2018 Accomplishments & Water Year 2019 Planned Allocation of Effort

Submitted in compliance with Provision C.8.h.iv of NPDES Permit # CAS612008 (Order No. R2-2015-0049)

October 15, 2018

This report is submitted by the agencies participating in the



City of Campbell

City of Cupertino

City of Los Altos

Town of Los Altos Hills

Town of Los Gatos

City of Milpitas

City of Monte Sereno

City of Mountain View

City of Palo Alto

City of San Jose

City of Santa Clara

City of Saratoga

City of Sunnyvale

County of Santa Clara

Santa Clara Valley Water District

Prepared for:

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)

Prepared by:

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TABLE OF CONTENTS

TABLE OF CONTENTS	iii
LIST OF FIGURES.....	iii
LIST OF TABLES	iii
LIST OF ACRONYMS	iv
1.0 INTRODUCTION	1
1.1 POC Monitoring Requirements.....	1
1.2 Third-Party Data	2
2.0 POC MONITORING ACCOMPLISHMENTS (WY 2018) AND GOALS (WY 2019).....	4
2.1 PCBs and Mercury	8
2.1.1 SCVURPPP Accomplishments and Goals	8
2.1.2 BASMAA Accomplishments.....	9
2.1.3 Third-Party Accomplishments and Goals.....	10
2.2 Copper	10
2.3 Nutrients	11
2.4 Emerging Contaminants.....	11
3.0 REFERENCES	14

LIST OF FIGURES

Figure 1. SCVURPPP and Third-Party POC Monitoring Stations in WY 2018. (BASMAA regional project sample locations are not mapped.).....	6
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LIST OF TABLES

Table 1. Pollutant of Concern monitoring parameters, efforts and types required by the MRP.	3
Table 2. SCVURPPP and Third-Party POC Monitoring Accomplishments, WY 2016 – WY 2018.	5
Table 3. SCVURPPP and Third-Party POC Monitoring Stations in WY 2018. (BASMAA regional project samples are not included.).....	7
Table 4. Planned Allocation of SCVURPPP and Third-Party POC Monitoring Efforts in WY 2019.	13

LIST OF ACRONYMS

AFR	Alternative Flame Retardant
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practice
CEC	Contaminants of Emerging Concern
CEDEN	California Environmental Data Exchange Network
ECWG	Emerging Contaminants Work Group of the RMP
HDS	Hydrodynamic Separator
MRP	Municipal Regional Permit
NNE	Nutrient Numeric Endpoints
NPDES	National Pollution Discharge Elimination System
PBDEs	Polybrominated Diphenyl Ethers
PCBs	Polychlorinated Biphenyls
PFAS	Perfluoroalkyl Sulfonates
PFOS	Perfluorooctane Sulfonates
POC	Pollutant of Concern
RAA	Reasonable Assurance Analysis
RMP	Regional Monitoring Program
RWSM	Regional Watershed Spreadsheet Model
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SPoT	Statewide Stream Pollutant Trend Monitoring
SSC	Suspended Sediment Concentration
SSID	Stressor/Source Identification
STLS	Small Tributary Loading Strategy
TOC	Total Organic Carbon
UCMR	Urban Creeks Monitoring Report
WMA	Watershed Management Area
WY	Water Year

1.0 INTRODUCTION

This Pollutants of Concern (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 the Santa Clara Valley Water District) 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 issued by the San Francisco Regional Water Quality Control Board (Regional Water Board) on November 19, 2015 as Order R2-2015-0049. This report fulfills the requirements of Provision C.8.h.iv of the MRP for reporting:

- The allocation of sampling effort for POC monitoring planned for the forthcoming year (i.e., Water Year 2019), and
- What was accomplished for POC monitoring during the preceding water year (i.e., Water Year 2018).

In compliance with Provision C.8.h.iv, this report includes monitoring locations, number and types of samples collected, purpose of sampling (Management Questions addressed), and analytes measured. Data and interpretations will be provided in the Water Year 2018 Urban Creeks Monitoring Report (UCMR) which will be submitted to the Regional Water Board by March 31, 2019. Data collected in receiving waters (e.g., creeks) will be submitted to the San Francisco Bay Area Regional Data Center by March 31, 2019 for upload to the California Environmental Data Exchange Network (CEDEN). Similar POC Monitoring Reports were submitted on October 15, 2016 and 2017 for Water Years 2016 and 2017, respectively.

1.1 POC Monitoring Requirements

Provision C.8.f of the MRP requires monitoring of several POCs including polychlorinated biphenyls (PCBs), mercury, copper, emerging contaminants¹, and nutrients. POC monitoring is conducted on a Water Year (WY) basis, beginning on October 1 and concluding on September 30 of the named year. For example, WY 2018 began on October 1, 2017 and concludes on September 30, 2018. Provision C.8.f specifies yearly (i.e., WY) and total (i.e., permit term) minimum numbers of samples for each POC. In addition, POC monitoring must address the five priority management information needs (i.e., Management Questions) identified in C.8.f:

1. **Source Identification** – identifying 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** – providing support for planning future management actions or evaluating the effectiveness or impacts of existing management actions;
4. **Loads and Status** – providing information on POC loads, concentrations or presence in local tributaries or urban stormwater discharges; and
5. **Trends** – providing information on trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time.

¹ Emerging contaminant monitoring requirements will be met through participation in Regional Monitoring Program for Water Quality in the San Francisco Estuary (RMP) special studies. The special studies will account for relevant Contaminants of Emerging Concern (CECs) in stormwater and will address at least perfluorooctane sulfonates (PFOS), perfluoroalkyl sulfonates (PFAS), and alternative flame retardants being used to replace PBDEs. Bay Area Stormwater Management Agencies Association (BASMAA) representatives are working with the RMP to develop and implement the work plans.

The MRP specifies the minimum number of samples that must be collected and analyzed for each POC. For example, over the first five years of the permit, a minimum total of 80 PCBs samples must be collected and analyzed. On average 16 PCBs samples should be collected per year to meet the total requirement of 80 samples; however, the Permit requires a minimum of at least 8 PCB samples per year which gives flexibility to collect more samples some years and less other years. The MRP also specifies the minimum number of samples for each POC that must address each Management Question. For example, by the end of Year Four² of the permit term, each of the five Management Questions must be addressed with at least 8 PCB samples. It is possible that a single sample can address more than one Management Question. POC Monitoring requirements are summarized in Table 1. In addition to the required yearly and cumulative total number of samples, Table 1 lists the yearly average number of samples that would need to be analyzed to meet the total sample goal, a good benchmark to consider when planning annual sampling goals.

Other MRP provisions require studies or have information needs that could be addressed through Provision C.8.f (POC Monitoring) and for which related samples will count towards POC monitoring requirements. These other Permit provisions and their associated timelines are listed below.

- Provisions C.11.a and C.12.a require that Permittees develop and maintain a list of watersheds (i.e., Watershed Management Areas or WMAs) in which new mercury and PCBs control measures will be implemented during the permit term, as well as the monitoring data and other information used to select the watersheds. Progress toward developing the list was reported on April 1, 2016 and a more complete list with identified control measures is provided with each Annual Report, beginning with the 2016 Annual Report that was submitted on September 30, 2016. Provision C.8.f (POC Monitoring) is intended to support C.11/12 requirements by requiring monitoring directed toward source identification (i.e., identifying which sources or watershed source areas provide the greatest opportunities for implementing controls to reduce loads of POCs in urban stormwater runoff).
- Provision C.12.e requires that Permittees collect at least 20 composite samples (region-wide) of the caulks and sealants used in storm drains or roadway infrastructure in public rights-of-way. Results of the investigation must be reported with the 2018 Annual Report, due by September 30, 2018. To achieve compliance with Provision C.12.e, MRP Permittees agreed to collectively conduct this sampling via the Bay Area Stormwater Management Agencies Association (BASMAA).
- Provisions C.11.c and C.12.c require that Permittees submit a Reasonable Assurance Analysis to demonstrate quantitatively that mercury reductions of at least 10 kg/yr and PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects. Although these provisions will be met through modeling, POC monitoring focused on management action effectiveness may help inform the models. To learn more about the effectiveness of selected stormwater treatment controls, MRP Permittees are collectively conducting monitoring studies through BASMAA.

1.2 Third-Party Data

SCVURPPP strives to work collaboratively with our water quality monitoring partners to find 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 BASMAA, the Regional Monitoring Program for Water Quality in the San Francisco Estuary (RMP) and the

² Note that the minimum sampling requirements addressing information needs must be completed by the end of year four of the permit; whereas, the minimum number of total samples does not need to be met until the end of year five of the permit.

State's Stream Pollution Trends (SPoT) Monitoring Program may supplement the Program's efforts towards achieving Provision C.8.f monitoring requirements. Third party monitoring conducted or planned by the RMP and SPoT are briefly summarized in this report.

Table 1. Pollutant of Concern monitoring parameters, efforts and types required by the MRP.

Pollutant of Concern	Media	Total Samples ^d	Yearly Minimum	Yearly Average	Minimum # of Samples that Must be Collected for Each Information Need by the End of Year Four				
					Source Identification	Contributions to Bay Impairment	Management Action Effectiveness	Loads and Status	Trends
PCBs	Water or sediment	80	8	16	8	8	8	8	8
Total Mercury	Water or sediment	80	8	16	8	8	8	8	8
Total & Dissolved Copper	Water	20	2	4	--	--	--	4	4
Nutrients ^a	Water	20	2	4	--	--	--	20	--
Emerging Contaminants ^b	--	--	--	--	--	--	--	--	--
Ancillary Parameters ^c	--	--	--	--	--	--	--	--	--

^a. Ammonium³, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, total phosphorus (analyzed concurrently in each nutrient sample).

^b. Must include perfluorooctane sulfonates (PFOS, in sediment), perfluoroalkyl sulfonates (PFAS, in sediment), alternative flame retardants. The Permittee shall conduct or cause to be conducted a special study that addresses relevant management information needs for emerging contaminants. The special study must account for relevant Contaminants of Emerging Concern (CECs) in stormwater and would address at least PFOS, PFAS, and alternative flame retardants being used to replace PBDEs.

^c. 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.

^d. Total samples that must be collected over the five-year Permit term.

³ There are several challenges to collecting samples for "ammonium" analysis. Therefore, samples will be analyzed for total ammonia which is the sum of un-ionized ammonia (NH₃) and ionized ammonia (ammonium, NH₄⁺). Ammonium concentrations will be calculated by subtracting the calculated concentration of un-ionized ammonia from the measured concentration of total ammonia. Un-ionized ammonia concentrations will be calculated using a formula provided by the American Fisheries Society that includes field pH, field temperature, and specific conductance. This approach was approved by Regional Water Board staff in an email dated June 21, 2016.

2.0 POC MONITORING ACCOMPLISHMENTS (WY 2018) AND GOALS (WY 2019)

In compliance with Provision C.8.f of the MRP, the Program conducted POC monitoring in WY 2018 for PCBs, mercury, copper, and nutrients. The MRP-required yearly minimum number of samples was met or exceeded for all POCs in WY 2018. The total number of samples collected for each POC in WY 2018, the agency conducting the monitoring, and the Management Questions addressed are listed in Table 2. Table 2 also includes this information for WYs 2016 and 2017 and shows cumulative progress towards the MRP minimum sample requirements. Specific monitoring stations (if applicable) are listed in Table 3 and illustrated in Figure 1. The sections below describe details of the monitoring accomplished in WY 2018 and the planned allocation of effort for WY 2019. A summary of the planned allocation of effort for WY 2019 is presented in Table 4.

Table 2. SCVURPPP and Third-Party POC Monitoring Accomplishments, WY 2016 – WY 2018.

Pollutant of Concern/ Agency	Number of Samples	Management Question Addressed ^a					Sample Type and Comments
		1. Source Identification	2. Contributions to Bay Impairment	3. Management Action Effectiveness	4. Loads and Status	5. Trends	
PCBs & Mercury							
(WY 2018)							
SCVURPPP (Mercury & PCBs)	8	8	8	--	8	8	Stormwater runoff samples to characterize high interest catchments
SCVURPPP via BASMAA (Mercury & PCBs)	8	--	--	8	--	--	Regional HDS unit & biochar effectiveness study (1/4 of total number of study samples)
SCVURPPP via BASMAA (Mercury & PCBs)	5	5	--	--	--	--	Regional public infrastructure caulk/sealant samples (1/4 of total number of study samples)
RMP STLS (Mercury & PCBs)	2	2	2	--	2	2	Stormwater runoff samples to characterize high interest catchments
SPoT (Mercury) ^d	2	--	--	--	--	2	Sediment samples to assess trends at long-term monitoring station
(WY 2017)							
SCVURPPP (Mercury & PCBs)	17	17	17	--	17	17	Stormwater runoff samples to characterize high interest catchments
SCVURPPP (Mercury & PCBs)	76	76	--	--	--	--	Upland sediment samples to identify source properties
RMP STLS (Mercury & PCBs)	2	2	2	--	2	2	Stormwater runoff samples to characterize high interest catchments
RMP STLS (PCBs)	1	--	1	--	1	1	High flow sample collected in Guadalupe River
RMP STLS (Mercury)	14	--	14	14	14	14	High flow sample collected in Guadalupe River
SPoT (Mercury & PCBs) ^c	2	--	--	--	--	2	Sediment samples to assess trends (only 1 analyzed for mercury)
(WY 2016)							
SCVURPPP (Mercury & PCBs)	9	9	9	--	9	9	Stormwater runoff samples to characterize high interest catchments
RMP STLS (Mercury & PCBs)	6	6	6	--	6	9	Stormwater runoff samples to characterize high interest catchments
Mercury - Total / MRP Minimum ^b	151/80	125/8	58/8	22/8	58/8	64/8	
PCBs - Total / MRP Minimum ^b	136/80	125/8	45/8	8/8	45/8	50/8	
Copper							
(WY 2018)							
SCVURPPP	6	NA	NA	NA	6	6	Creek samples collected during storm event and following dry weather
SPoT	2	NA	NA	NA	--	2	Sediment samples to assess trends at long-term monitoring station
(WY 2017)							
SCVURPPP	2	NA	NA	NA	2	2	Copper analyzed on a subset of PCBs/Hg stormwater runoff samples
SCVURPPP	3	NA	NA	NA	3	3	Creek water samples collected during storm event
SPoT	1	NA	NA	NA	--	1	Sediment sample to assess trends at long-term monitoring station
(WY 2016)							
SCVURPPP	4	NA	NA	NA	4	4	Copper analyzed on a subset of PCBs/Hg stormwater runoff samples
Copper - Total / MRP Minimum ^b	18/20	NA	NA	NA	15/4	18/4	
Nutrients							
(WY 2018)							
SCVURPPP	6	NA	NA	NA	6	NA	Creek samples collected during storm event and following dry weather
(WY 2017)							
SCVURPPP	5	NA	NA	NA	5	NA	Samples collected during storm event and following dry weather
(WY 2016)							
SCVURPPP	2	NA	NA	NA	2	NA	Water samples collected from Stressor Source Identification (SSID) study stations
Nutrients - Total / MRP Minimum ^b	13/20	NA	NA	NA	13/20	NA	

a. Individual samples can address more than one Management Question.
b. The MRP overall minimum number of samples must be met by the end of the five-year permit term (i.e., 2020). The MRP minimum number of samples for each Management Question must be met by the end of year four of the permit li.e., 2019).
c. Only one of the two SPoT samples was analyzed for mercury in WY 2017.
d. The SPoT program did not analyze samples for PCBs in WY 2018.

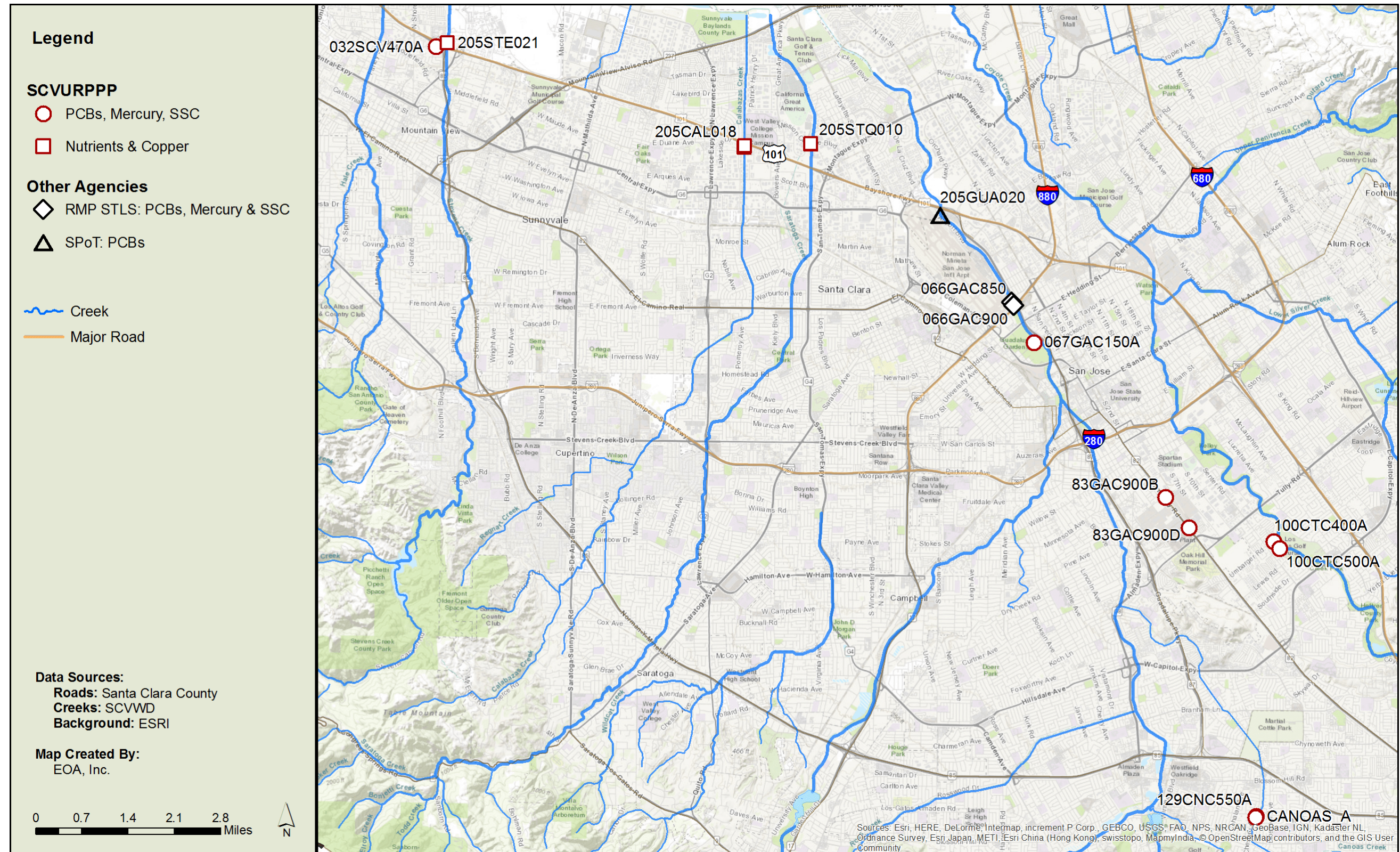


Figure 1. SCVURPPP and Third-Party POC Monitoring Stations in WY 2018. (BASMAA regional project sample locations are not mapped.)

Table 3. SCVURPPP and Third-Party POC Monitoring Stations in WY 2018. (BASMAA regional project samples are not included.)

Agency	Station Code	Sample Date	Latitude	Longitude	Matrix	PCBs	Mercury	Suspended Sediment Concentration	Total Copper	Dissolved Copper	Hardness as CaCO ₃	Nutrients ^b
SCVURPPP	032SCV470A	11/16/2017	37.40855	-122.07205	water	x	x	x				
SCVURPPP	100CTC400A	11/16/2017	37.30304	-121.83985	water	x	x	x				
SCVURPPP	100CTC500A	11/16/2017	37.30149	-121.83815	water	x	x	x				
SCVURPPP	129CNC550A	1/8/2018	37.24280	-121.84350	water	x	x	x				
SCVURPPP	CANOAS_A	1/8/2018	37.24250	-121.84370	water	x	x	x				
SCVURPPP	067GAC150A	4/6/2018	37.34586	-121.90647	water	x	x	x				
SCVURPPP	83GAC900B	4/6/2018	37.31239	-121.86973	water	x	x	x				
SCVURPPP	83GAC900D	4/6/2018	37.30583	-121.86319	water	x	x	x				
SCVURPPP	205STE021	1/8/2018	37.40950	-122.06900	water				x	x	x	x
SCVURPPP	205STQ010	1/8/2018	37.38850	-121.96860	water				x	x	x	x
SCVURPPP	205CAL018	1/8/2018	37.38760	-121.98690	water				x	x	x	x
SCVURPPP	205STE021	5/21/2018	37.40944	-122.06904	water				x	x	x	x
SCVURPPP	205STQ010	5/21/2018	37.38868	-121.96870	water				x	x	x	x
SCVURPPP	205CAL018	5/21/2018	37.38796	-121.98683	water				x	x	x	x
RMP STLS	066GAC850	April 2018 ^a	37.35469	-121.91279	water	x	x	x				
RMP STLS	066GAC900	April 2018 ^a	37.35392	-121.91223	water	x	x	x				
SPoT	205GUA020	June 2018 ^a	37.3734	-121.9328	sediment		x		x			
SPoT	205COY060	June 2018 ^a	37.3954	-121.9148	sediment		x		x			

a. Specific sample dates have not yet been provided by the RMP STLS and the SPoT program.

b. Ammonia (for ammonium), nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus are analyzed concurrently in each nutrient sample.

2.1 PCBs and Mercury

During WY 2018 the Program collected 8 stormwater runoff samples and analyzed each for PCBs and mercury. Two additional stormwater runoff samples were collected in Santa Clara County through the RMPs Small Tributary Loading Strategy (STLS) and analyzed for mercury and PCBs. These combined SCVURPPP and STLS samples address Management Questions #1 (Source Identification), #2 (Contributions to Bay Impairment) and provide baseline information for assessing trends (i.e., Management Question #5). Data may also be used by the RMP STLS to improve calibration of models used to estimate the overall POC loads from small tributaries to San Francisco Bay (i.e., Management Question #4 – Loads and Status).

SCVURPPP also participated in BASMAA monitoring studies that analyzed samples for PCBs and mercury. The BASMAA studies included: 20 composite caulk and sealant samples to address Management Question #1 (Source Identification), 8 sediment and/or leaf samples from hydrodynamic separator (HDS) units to address Management Question #3 (Management Action Effectiveness), and 25 influent/effluent samples from columns filled with different bioretention soil media mixes to address Management Question #3 (Management Action Effectiveness).

In addition, two sediment samples collected in Santa Clara County by the SPoT program were analyzed for mercury (and copper) to address Management Question #5 (Trends).

2.1.1 SCVURPPP Accomplishments and Goals

WY 2018 Accomplishments

The primary goal of the Program's WY 2018 PCBs and mercury monitoring was to identify WMAs where control measures could be implemented to comply with MRP PCBs and mercury load reduction requirements. This is the same goal that the Program has worked toward since WY 2015. In WY 2018, the Program collected 8 composite water samples from the stormwater conveyance system in WMAs containing high interest parcels. WMAs were identified and prioritized for sampling by evaluating several types of data, including: PCBs and mercury concentrations from prior sediment and water sampling efforts, land use data, municipal storm drain data showing pipelines and access points (e.g., manholes, outfalls, pump stations), catchment areas delineated from municipal storm drain data, and logistical/safety consideration. Station identification and sample collection was consistent with the *Water Year 2016 Pollutant of Concern Monitoring - Sampling and Analysis Plan* (SCVURPPP 2015b). Composite samples consisting of six to eight aliquots collected during the rising limb and peak of the storm hydrograph (as determined through field observations) were analyzed for the "RMP 40" PCB congeners⁴ (method EPA 1668C), total mercury (method EPA 1631E), and SSC (method ASTM D3977-97).

WY 2019 Goals

As stated above, the Program's WY 2018 PCBs and mercury monitoring focused on addressing Management Questions #1 (Source Identification) and #2 (Contributions to Bay Impairment), while contributing to the regional dataset being used to address Management Questions #3 (Loads and Status) and #5 (Trends). A similar focus is planned for WY 2019. The Program intends to collect roughly 5 storm composite samples from WMAs, primarily to continue informing classification of WMAs. In some cases, WMAs previously targeted may be resampled to confirm unexpected results and develop a more robust dataset. An additional 20 to 60 sediment samples will be collected within WMAs, primarily to identify specific source properties for referral to the Regional Water Board or another appropriate regulatory agency with investigation and cleanup authority. The specific coordinates for the WY 2019 samples are

⁴ The "RMP 40" congeners include: 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, PCB-203.

not yet known, and will be influenced by logistical field considerations such as tidal conditions during storm events (for storm samples), the presence of sampleable sediment within the storm drain system and right-of-way (for sediment samples), and ongoing review of the WY 2015 to WY 2018 dataset.

2.1.2 BASMAA Accomplishments

In WY 2018, SCVURPPP participated in the BASMAA “POC Monitoring Project for Source Identification and Management Action Effectiveness.” This regional project includes two somewhat independent monitoring studies designed during WY 2017 and implemented during WY 2018. As one of four Countywide Programs subject to Provision C.8.f POC Monitoring requirements, SCVURPPP’s POC monitoring accomplishments include 1/4 of the total number of samples collected through this regional project (Table 2). BASMAA is not currently planning additional POC monitoring in WY 2019.

- The PCBs in Infrastructure Caulk Study was developed to satisfy the Provision C.12.e requirement to collect 20 composite caulk/sealant samples throughout the MRP permit area and evaluate (at a screening level) whether PCBs are present in right-of-way infrastructure caulk and sealants in the Bay Area. This study also addresses Management Question #1 (Source Identification). In WY 2018, the BASMAA project team collected 54 samples of caulk/sealant materials from ten types of roadway and storm drain infrastructure. The individual samples were grouped by structure type and sample appearance (color and texture) into 20 composites and analyzed for the RMP 40 PCB congeners using a modified method EPA 8270C. The final project report was included with the Program’s Fiscal Year 2017/18 Annual Report, submitted to the Regional Water Board on September 30, 2018.
- The Best Management Practices (BMP) Effectiveness Study was developed to satisfy Provision C.8.f requirements to collect at least 8 PCBs and mercury samples that address Management Question #3 (Management Action Effectiveness). A major consideration of the study was collection of data in support of conducting the Reasonable Assurance Analysis (RAA) that is required by Provision C.12.c.iii.(3) which must be submitted with the 2020 Annual Report (September 30, 2020). In WY 2018 the BASMAA project team collected a total of 34 samples. Results of the study will be summarized in a report that will be submitted by March 31, 2019 with the Program’s WY 2018 Urban Creeks Monitoring Report.
 - Eight of the samples consisted of sediment and leaf debris collected from hydrodynamic separator (HDS) unit sumps during regularly scheduled cleanouts to evaluate the PCBs and mercury load reduction effectiveness of these units. The HDS unit samples were analyzed for the RMP 40 PCB congeners (method EPA 1668C), total mercury (method EPA 1631E), and total solids⁵ (method EPA 160.4M).
 - Twenty-six of the samples consisted of influent/effluent pairs from column tests of biochar-enhanced bioretention soil media (BSM). Stormwater from two sites during two storm events was run through six columns with five different biochar-enhanced BSM mixes and one standard BSM as a control to evaluate which mix was most effective at removing PCBs and mercury. Dilutions were run on two columns to assess removal efficiencies with decreasing influent pollutant concentrations. Samples were analyzed for the RMP 40 PCB congeners (method EPA 1668C), total mercury (method EPA 1631E), SSC (method ASTM D3977-97), and total organic carbon (method EPA 9060).

⁵ Samples were analyzed for total solids so that dry weight calculations could be made.

2.1.3 Third-Party Accomplishments and Goals

RMP STLS

The RMP's STLS Team typically conducts annual monitoring for POCs region-wide. SCVURPPP is an active participant in the STLS and works with other Bay Area municipal stormwater programs to identify opportunities to direct RMP funds and monitoring activities towards supplementing monitoring required by the MRP. POC monitoring activities conducted by the STLS in recent years have focused on wet weather characterization monitoring in catchments of interest (WY 2015 – present). In WY 2018, the STLS Team continued wet weather characterization sampling using a similar approach to the PCBs and mercury sampling that was implemented by the Program. The RMP's STLS collected one storm composite PCBs/mercury sample from each of two catchments in Santa Clara County in WY 2018.

RMP STLS monitoring in WY 2019 will continue to focus on wet weather characterization. The number of stations in Santa Clara County targeted by the STLS Team will likely be limited to one or two stations previously sampled with unexpectedly low PCBs results. Two to four additional stations will likely be monitored using un-manned “remote” samplers that capture suspended sediment from the water column throughout the duration of their deployment which is typically during one storm event. The STLS Team has been pilot testing these devices since WY 2015 and recently concluded that they generate data adequate for evaluating whether a WMA should be prioritized for source property investigations. In future years, RMP STLS monitoring is expected to shift towards Management Question #5 (Trends). The STLS Trends Strategy Team, initiated in WY 2015, is currently developing a regional monitoring program to assess trends in POC loading to San Francisco Bay from small tributaries. The STLS Trends Strategy will initially focus on PCBs and mercury, but will not be limited to those POCs. The preliminary design concept included additional monitoring at one or two of the region-wide loadings stations to gain a better understanding of the variability in PCBs concentrations/loadings in the existing dataset. However, uncertainties about the utility of developing a trends monitoring program targeting just one or two watersheds coupled with unknowns about how to extrapolate findings regionally has prompted the Trends Strategy Team to delay monitoring and focus instead on identifying practical modeling approaches. STLS Trends monitoring is not anticipated to commence before WY 2020.

SPoT Monitoring Program

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 investigate long-term trends in water quality (Management Question #5 – Trends). 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 and the Guadalupe River. In most years, sediments are analyzed for PCBs, mercury, metals, toxicity, pesticides, and organic pollutants (Phillips et al. 2014). In WY 2018, the Coyote and Guadalupe stations were only monitored for mercury, copper, pesticides, organic pollutants, and toxicity. It is unlikely that the SPoT program will include any of the POCs identified in the MRP in WY 2019 (K. Siegler personal communication, August 2018). The most recent technical report prepared by SPoT program staff was published in 2016 and describes seven-year trends from the initiation of the program in 2008 through 2014 (Phillips et al. 2016). An update to the report is anticipated in late 2018.

2.2 Copper

In WY 2018, SCVURPPP collected one sample at each of three bottom-of-the-watershed stations (Stevens Creek, San Tomas Aquino Creek, and Calabazas Creek) during a large storm event, concurrent with nutrient monitoring and Provision C.8.g.iii Wet Weather Pesticides and Toxicity Monitoring. The three sites were sampled again during spring baseflows. The goal of this approach is to address Management Question #5 (Trends) by comparing copper concentrations during different flow events. Management Question #4 (Loads and Status) is also addressed by characterizing copper concentrations

in mixed-use watersheds. These data are supplemented by the two SPoT samples collected in Coyote Creek and Guadalupe Creek that were analyzed for copper to assess long-term trends (Management Question #5).

In WY 2019, the Program is planning to collect a minimum of two copper samples. These will likely be collected concurrently with PCBs and mercury storm composite samples which target WMAs containing industrial land uses.

2.3 Nutrients

Nutrient monitoring addresses Management Question #4 (Loads and Status). Nutrients were included in the POC monitoring requirements to support Regional Water Board efforts to develop nutrient numeric endpoints (NNE) for the San Francisco Bay Estuary. The “Nutrient Management Strategy for San Francisco Bay” is part of a statewide initiative to address nutrient over-enrichment in State waters (Regional Water Board 2012). The suite of nutrients required in the MRP (i.e., ammonium, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus) closely reflects the list of analytes measured by the RMP and BASMAA partners at the six regional loading stations (including Santa Clara County stations on Guadalupe River and Sunnyvale East Channel) monitored in WY 2012 and WY 2013. The prior data were used by the Nutrient Strategy Technical Team to develop and calibrate nutrient loading models.

In WY 2018, POC monitoring for nutrients in Santa Clara County was conducted during a large storm event at three bottom-of-the-watershed stations on Stevens Creek, San Tomas Aquino Creek, and Calabazas Creek, concurrent with copper monitoring and Provision C.8.g.iii Wet Weather Pesticides and Toxicity Monitoring. Follow up monitoring at all three stations was conducted during the dry season concurrent with spring bioassessment monitoring. All sampling results will be assessed in the POC interpretive report to be submitted with the WY 2018 Urban Creeks Monitoring Report by March 31, 2019.

In WY 2019, the Program is planning to collect a minimum of two nutrient samples. These will likely be collected at bottom-of-the-watershed locations in mixed land-use watersheds during spring baseflow. The specific watersheds have not yet been identified. The process for identifying watersheds will include land use analysis and logistical considerations related to stream access and field crew safety.

2.4 Emerging Contaminants

Emerging contaminant monitoring is being addressed through the Program’s participation in the RMP. The RMP has investigated Contaminants of Emerging Concern (CECs) since 2001 and established the RMP Emerging Contaminants Work Group (ECWG) in 2006. The purpose of the ECWG is to identify CECs that might impact beneficial uses in the Bay and to develop cost-effective strategies to identify, monitor, and minimize impacts. The RMP published a CEC Strategy “living” document in 2013 and completed a full revision in 2017 (Sutton et al. 2013; Sutton and Sedlak 2015; Sutton et al. 2017). The CEC Strategy document guides RMP special studies on CECs using a tiered risk and management action framework.

Provision C.8.f of the MRP identifies three emerging contaminants that must be addressed through POC monitoring: Perfluorooctane Sulfonate Substances (PFOS), Perfluoroalkyl Sulfonate Substances (PFAS), and Alternative Flame Retardants (AFRs). PFOSs are identified in the CEC Strategy as “moderate” concern due to Bay occurrence data suggesting a high probability of a low-level effect on Bay wildlife. PFASs and alternative flame retardants (AFRs) are identified as “possible” concern due to uncertainties in measured or predicted Bay concentrations or in toxicity thresholds. RMP staff recently published reports summarizing PFOS and PFAS monitoring results (Houtz et al. 2016; Sedlak et al. 2017; Sedlak et al. 2018).

AFRs came into use following state bans and nationwide phase-outs of polybrominated diphenyl ether (PBDE) flame retardants in the early 2000's. They include many categories of compounds, including organophosphate esters. In 2018 the RMP⁶ STLS and ECWG worked together to conduct a special study to inform ECWG's planning activities related to AFRs. The special study compiled and reviewed available data and previously developed conceptual models for PBDE to support a stormwater-related AFR conceptual model being developed by the ECWG. Organophosphate esters were prioritized for further investigation due to their increasing use, persistent character, and ubiquitous detections at concentrations exceeding PBDE concentrations in the Bay. Limited stormwater data from two watersheds in Richmond and Sunnyvale suggest that urban runoff may be an important source of these compounds. Additional monitoring and modeling was recommended. Results of the AFR special study will be published in a Technical Report that will be finalized by the RMP in late 2018.

In 2018, the RMP's ECWG also developed a special study proposal to analyze stormwater samples collected from urban watersheds for a large suite of CECs. The list of CECs to be analyzed is based on recent work conducted in Puget Sound streams and is intended to target urban runoff constituents rather than those found in wastewater (e.g., pharmaceuticals). The list includes PFOSs, PFASs, and AFRs. Pilot sampling will begin in WY 2019 in close coordination with the STLS.

These RMP special studies satisfy the POC monitoring requirement for CECs within provision C.8.f.

⁶ The Emerging Contaminants Workgroup is also conducting monitoring on a number of other emerging contaminants that are not identified in the MRP. These include microplastics and perfluorinated chemicals.

Table 4. Planned Allocation of SCVURPPP and Third-Party POC Monitoring Efforts in WY 2019.

Pollutant of Concern/ Agency	Planned Number of Samples (WY 2019)	Yearly Minimum	Management Question Addressed ^a					Sample Type and Comments
			1. Source Identification	2. Contributions to Bay Impairment	3. Management Action Effectiveness	4. Loads and Status	5. Trends	
PCBs & Mercury								
SCVURPPP	~5	8	X	X	--	X	X	Stormwater runoff samples to classify WMAs
SCVURPPP	20 to 60		X	--	--	--	--	Urban street/storm drain/surface sediment samples in priority WMAs to identify source properties
RMP STLS	up to 2		X	X	--	X	X	Stormwater runoff samples to classify WMAs
SPoT	2 (mercury only)		--	--	--	--	X	Long-term trends monitoring program (sediment samples from creek bed)
Copper								
SCVURPPP	4	2	--	--	--	X	--	Copper analyzed on a subset of PCBs/mercury stormwater runoff samples
Nutrients								
SCVURPPP	4	2	--	--	--	X	--	Water samples collected from bottom-of-watershed stations during spring base flow

^a. Individual samples can address more than one Management Question simultaneously.

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