Contra Costa Clean Water Program

Pollutants of Concern Report: Accomplishments in Water Year 2019 and Allocation of Effort for Water Year 2020

Submitted to the San Francisco Bay Regional Water Quality Control Board

In Compliance with NPDES Permit Provision C.8.h.iv Municipal Regional Stormwater Permit (Order R2-2015-0049)

October 2019

CONTRA COSTA CLEAN WATER PROGRAM

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In Compliance with NPDES Permit Provision C.8.h.iv
Municipal Regional Stormwater Permit 2.0 (Order R2-2015-0049)
and the Central Valley Regional Water Quality Control Board

Prepared for

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- Cities of: Antioch, Brentwood, Clayton, Concord, Danville (Town), El Cerrito, Hercules, Lafayette, Martinez, Moraga (Town), Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek
- Contra Costa County
- Contra Costa County Flood Control & Water Conservation District

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Acronyms and Abbreviations

BASMAA	Bay Area Stormwater Management Agencies Association
Bay	San Francisco Bay
Bay Area	San Francisco Bay Area
BMP	best management practice
CCCWP	Contra Costa Clean Water Program
CV	Central Valley
Delta	Sacramento-San Joaquin River Delta
EPA	United States Environmental Protection Agency
HDS	hydrodynamic separator
LID	low impact development
MeHg	methylmercury
MPC	Monitoring and Pollutants of Concern
MRP	municipal regional stormwater permit
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
PCBs	polychlorinated biphenyl congeners
POC	pollutants of concern
PSD	particle size distribution
RAA	reasonable assurance analysis
RMP	Regional Monitoring Program for Water Quality in San Francisco Bay
RWQCB	Regional Water Quality Control Board
SSC	suspended sediment concentration
SSID	stressors/sources identification
SWRCB	State Water Resources Control Board
TMDL	total maximum daily load
TOC	total organic carbon
TOM	total organic matter
WWTP	wastewater treatment plant
WY	water year

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1 BACKGROUND

This report summarizes pollutants of concern (POC) monitoring conducted by Contra Costa Clean Water Program (CCCWP) during water year 2019 (October 1, 2018 through September 30, 2019), and describes POC monitoring to be completed in the coming water year (October 1, 2019 through September 30, 2020). This report fulfills Provision C.8.h.iv of the Municipal Regional Stormwater Permit (MRP 2.0, Order R2-2015-0049) issued in 2015 by the San Francisco Bay Regional Water Quality Control Board (SFRWQCB, 2015). The following subsections describe monitoring goals (Section 1.1), CCCWP's new approach to managing the dual jurisdiction between the San Francisco Bay and the Central Valley regional water quality control boards (Section 1.2), and concludes with lessons learned from the past several years of permit implementation (Section 1.3). Section 2 describes monitoring completed in water year 2019, and Section 3 describes monitoring to be completed in water year 2020. The report concludes with Section 4, a summary of monitoring performed by third parties reported elsewhere.

1.1 Monitoring Goals

CCCWP Permittees prioritize monitoring POCs with the goal of identifying reasonable and foreseeable means of achieving load reductions of pollutants required by total maximum daily loads (TMDLs). TMDLs are watershed plans to attain water quality goals developed and established by the San Francisco Bay Regional Water Quality Control Board (SFRWQCB). The two most prominent TMDLs driving stormwater monitoring, source control, and treatment projects under MRP 2.0 are the mercury TMDL and the polychlorinated biphenyl congeners (PCBs) TMDL. In the interest of protecting the beneficial uses of the surface waters for people and wildlife dependent on San Francisco Bay (the Bay) for food, these regulatory plans are intended to reduce concentrations of mercury and PCBs in fish within the Bay.

Mercury and PCBs tend to bind to sediments. The principal means of transport from urbanized watersheds is via sediments washed into the Municipal Separate Storm Sewer System (MS4); therefore, an important focus of POC monitoring is identifying the most significant sources of contaminated sediments to the MS4. An additional focus is quantifying the effectiveness of control measures. The highest POC monitoring priorities for Permittees are answering these two basic TMDL implementation questions: where are the most significant POC sources, and what can be done to control them?

The SFBRWQCB framed those two priority management information needs, along with three others, in the MRP as follows:

1. ***Source Identification*** Identify which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff.

2.	***Contributions to Bay Impairment***	Identify 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***	Provide support for planning future management actions or evaluating the effectiveness or impacts of existing management actions.
4.	***Loads and Status***	Provide information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges.
5.	***Trends***	Evaluate trends in POC loading to San Francisco Bay and POC concentrations in urban stormwater discharges or local tributaries over time.

Provision C.8.f of the MRP does not specify monitoring details; rather, it requires a total number of samples for different pollutant types to be monitored over the permit term, along with yearly minimum numbers of samples for each POC. The effort is to be applied to the five management information needs listed above.

The monitoring approach differs by management question because of the processes and timescales relevant to each question. Source identification and management action effectiveness (questions 1 and 3) are ongoing activities; however, evaluating and improving management action effectiveness is a continuous improvement process, whereas source identification presumably would diminish as significant sources are identified and abated over time.

In contrast, management questions 2, 4, and 5 address relatively long timescale processes. Loads analysis (Question 4) involves monitoring over many years to capture the full range of hydrologic conditions. Monitoring plans also need to target the full range of storm event sizes encountered, rather than a “minimum number of storms” approach that biases actions towards more frequent, smaller storm events. The time scale for trends in response to management actions (Question 5) is decades, rather than years, and so monitoring timescales should be implemented accordingly – i.e. five to ten year recurrences, rather than annual monitoring approaches. Contributions to Bay impairment is a broad question that involves coordination with receiving water assessments led by the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP).

Thus, although the MRP does not prioritize POC monitoring questions, the relevant processes and time scales lead to different levels of monitoring effort for each management question on a year-to-year basis. Lessons learned that will be documented in the Integrated Monitoring Report for submittal in March 2020 will included a discussion of the recommended approach, timescales, and resulting monitoring priorities for management questions. That technical analysis will inform the collaborative development of monitoring strategies for MRP 3.0.

Thinking more broadly about management questions helps address multiple questions with the same effort. For example, by identifying specific source areas through management information need 1, the concept emerged that old industrial areas contribute relatively greater amounts of PCBs per unit area. That information is responsive to management information need 2 (areas which contribute the most to impairment). Over time, source area information is aggregated into load estimates, which inform management information need 4 (loads and status). As progress is made on abating source areas and implementing green infrastructure projects, load reduction information is developed responsive to management information need 5 (trends). The loads and status aspect (management information need 4) involves watershed modeling using monitoring data to estimate current loads of POCs and potential long-term load reductions which may be achieved through source control and stormwater treatment. This addresses long-term planning to understand how implementation of stormwater treatment through green infrastructure[1] leads to attainment of POC load reduction goals.

CCCWP has developed a model to forecast attainment of load reduction goals through a reasonable assurance analysis (RAA) in fulfillment of Provisions C.11.d.i and C.12.d.i. The RAA model completed thus far establishes the relationship between areal extent of green infrastructure implementation and POC reductions, estimates the amount and characteristics of land area to be treated through green infrastructure in future years, and estimates the amount of POC reductions which will result from green infrastructure implementation by specific future years. In FY 2019-2020 this RAA model will be extended to include other control measures in addition to green infrastructure (i.e., source property referrals, enhanced street sweeping and other enhanced MS4 maintenance).

Permittees have developed or (in the Case of East County Permittees, are developing) green infrastructure plans as required by Provision C.3.j. The plans will describe how Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then into the receiving water, to green – a more resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.

CCCWP completed a stormwater resources plan in January 2019, which provides information about planned and potential future projects within Permittees' jurisdictions to inform green infrastructure plans. The RAA was performed on each Permittee's green infrastructure plan to quantify the expected volume and pollutant load reductions resulting from plan implementation. The RAA also identifies how much additional green infrastructure would be needed, above and beyond projects identified in green infrastructure plans, to attain TMDL allocations for POCs.

[1] American Rivers defines "green infrastructure" as an approach to water management which protects, restores, or mimics the natural water cycle. Green infrastructure is effective, economical, and enhances community safety and quality of life. It means planting trees and restoring wetlands, rather than building a costly new water treatment plant. Practically, in terms of stormwater management in Contra Costa County, this means requiring all new development and redevelopment projects include stormwater treatment via approved low impact development (LID) designs. These include rain gardens, bioswales, infiltration galleries, etc.

In addition to sediment-associated TMDL pollutants, such as mercury and PCBs, Provision C.8.f also requires monitoring of copper, nutrients, and emerging contaminants (the alternative flame retardants perfluorooctane sulfonates and perfluoroalkyl sulfonates). Copper and nutrients are directly monitored by CCCWP as described in Sections 2 and 3 below. Emerging contaminants are assessed through a regional collaboration with the Bay Area Stormwater Management Agencies Association (BASMAA) and the RMP and, therefore, are not discussed at length in this report.

1.2 Dual Regional Water Quality Control Board Jurisdictions

CCCWP is in a unique position among Bay Area stormwater programs, as the county is split between the jurisdiction of the San Francisco Bay and Central Valley Regional Water Quality Control Boards (SFRWQCB and CVRWQCB, respectively). Effective February 2019, "East County" permittees located in the CVRWQCB jurisdiction – the Cities of Brentwood, Oakley and Antioch, as well as portions of unincorporated Contra Costa County and the Contra Costa County Flood Control and Water Conservation District - are now covered under the MRP issued by the SFRWQCB (Order NO. R2-2019-0004). Special provisions naming responsibilities of East County Permittees related to CVRWQCB TMDLs and other policies are described in Provision C.16.5 of the MRP. Monitoring specific to CVRWQCB's methylmercury TMDL is described in Section 2.6 of this report. Activities planned for water year 2019 related to the CVRWQCB TMDLs for methylmercury and for pyrethroid pesticides are described in Section 3.7 of this report.

1.3 Lessons Learned from MRP 1.0 (Order R2-2009-0074) and Water Years 2016-2019

At the advent of MRP 1.0 in 2009 (SFRWQCB, 2009), CCCWP and other BASMAA member agencies had some working knowledge of the distribution of PCBs and mercury loads across the urban landscape. Monitoring studies conducted in the 2000-2002 time frame showed concentrations of PCBs are highest in older industrial areas where PCBs were previously used and released. Mercury is somewhat more evenly distributed across urban land use types (through aerial deposition), with exceptions where known legacy mining sources (e.g., New Almaden) exist upstream. Still, mercury concentrations also tend to be higher in older industrial urban areas, where industrial uses and disposal of mercury occurred in the past. In some places, these early assessments turned up evidence that PCBs in sediments collected from catch basins, curbs and gutters may be elevated because of release from nearby contaminated properties. Follow-up assessments solidified the evidence of specific source properties in the City of Richmond (within Contra Costa County). Other programs had similar findings of specific source properties. Along with other information, the early studies performed by CCCWP and other BASMAA member agencies were used to develop the mercury and PCBs TMDLs for the Bay.

Source identification work conducted during MRP 1.0 confirmed two private properties in the City of Richmond with consistently high concentrations of PCBs in sediments collected from adjacent curbs, gutters and catch basins. One of the properties is a metal recycler who previously accepted and recycled

used transformers; the other property was a forklift repair shop where hydraulic oil is prevalent[2]. Both properties were referred to the SFRWQCB for remediation and are discussed in the 2014 integrated monitoring report (CCCWP, 2014).

The metals recycler is an active business regulated under the Industrial General Permit (SWRCB, 2015). As a result of CCCWP's source property screening and referral process under MRP 1.0, the property owner is now prohibited from discharging stormwater into the municipal storm sewer system and has designed an on-site stormwater treatment system. Oversight by the City of Richmond and the SFRWQCB compelled the property owner to implement enhanced operations and maintenance control measures, such as containing stormwater on-site, installing rumble strips to remove dirt from truck tires prior to leaving the site, and conducting enhanced street sweeping with vacuum sweepers. As a follow-up investigation, CCCWP conducted stormwater monitoring in water year 2018 in the public right-of-way. The results help determine that this property is still tracking sediments contaminated with PCBs into the MS4 system. This property was re-referred to the SFRWQCB for enforcement in the annual report for FY 2017-18. The lesson learned from this property is that follow-up sampling is useful to ensure source control measures are mitigating pollutants as expected, especially at active businesses. By mitigating releases from this property, the distribution of pollutants by way of runoff, trackout, and windborne dispersion onto surrounding streets is expected to be diminished over time.

A data gap remaining in this area is whether the railroad parcels in the area contribute PCBs to the surrounding loads.

Other than some old clean-up properties draining directly to the Bay, there are very few additional large sites which may offer high opportunity for source control. Rather, when screening is complete, CCCWP Permittees would need to wait for high likelihood parcels to change ownership or offer other opportunity for redevelopment in order to gain modest load reductions. This kind of follow-up – to address the gap between cleanup levels directed by Department of Toxic Substances Control and PCB target levels driven by TMDLs – will be a continuous, adaptive process to gradually reduce the distribution of contaminated sediments around legacy cleanup sites and old industrial areas.

Further study of infiltration rates and actual vs. expected BMP volume reduction performance will help improve the understanding and ultimately the design of green infrastructure. Information about actual and assumed infiltration rates was included in CCCWP's hydromodification technical report (CCCWP, 2017). The technical report was provided to SFRWQCB staff for their consideration, with the goal of supporting reasonable sizing factors for facilities to attain hydromodification management criteria. An added benefit of the information is that modeling of green infrastructure can be based on measured instead of assumed infiltration rates. The CCCWP RAA modeling methodology for quantifying the pollutant loads reduced by green infrastructure projects incorporates these findings. CCCWP anticipates including some monitoring effort addressing volume reduction performance during MRP 3.0.

[2] Transformer oil and hydraulic oil are known historic products containing PCBs.

2 MONITORING ACCOMPLISHED IN WATER YEAR 2019

During water year 2019, monitoring activities were performed with respect to goals established at the conclusion of the previous water year, as outlined in the POCs monitoring report for water year 2018 (CCCWP, 2018a). For each activity, the associated management information need is identified from among the following:

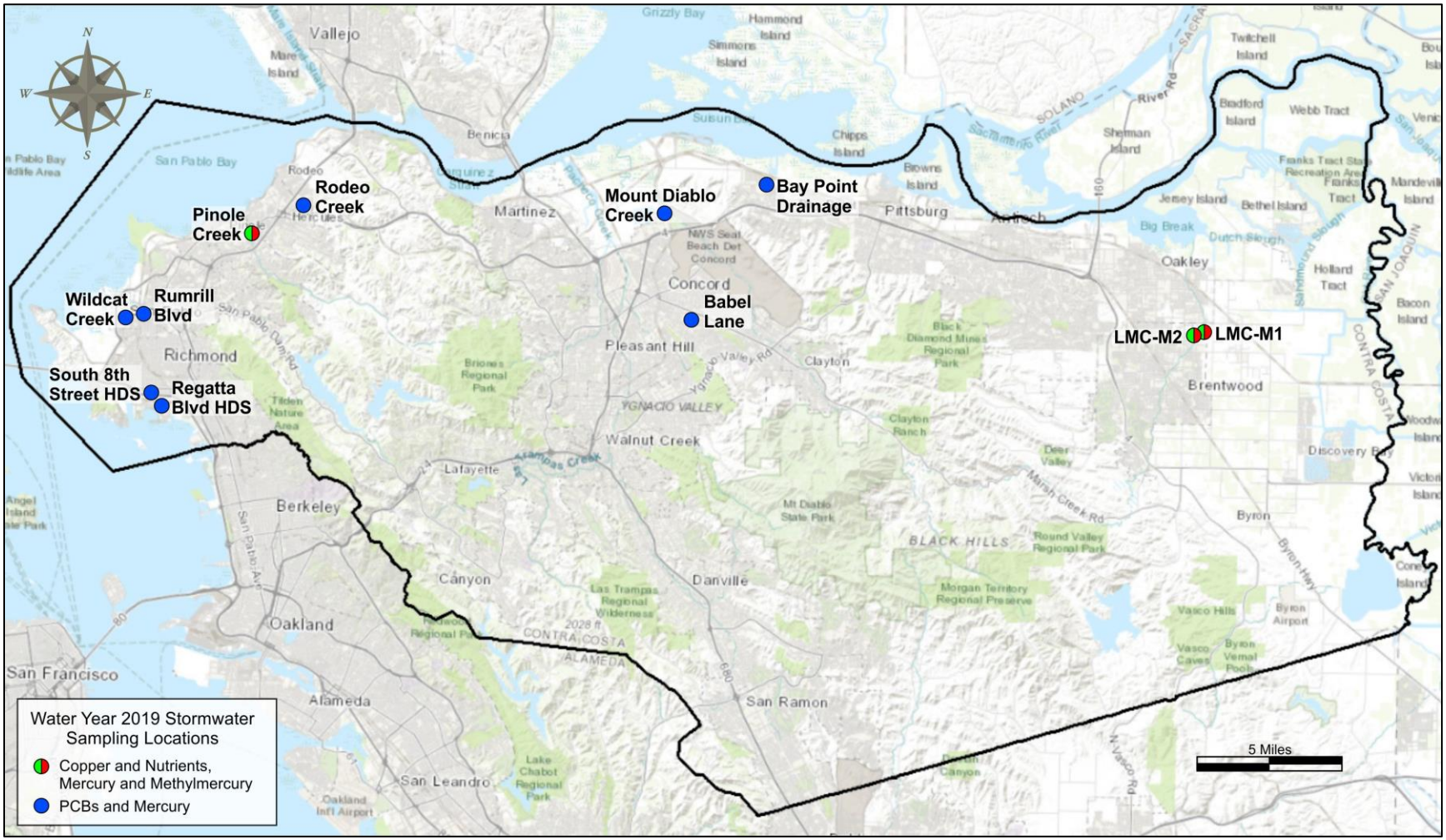
1. Source identification
2. Contributions to Bay impairment
3. Management action effectiveness
4. Loads and status
5. Trends

Monitoring activities in water year 2019 are summarized below and discussed in greater detail in the following subsections:

- PCBs and mercury screening - street dirt sampling adjacent to a natural gas transmission support station in the City of San Pablo (management information needs 1, 2 and 3).
- PCBs and mercury screening - street dirt sampling adjacent to an electrical transformer spill site in the City of Concord (management information needs 1, 2 and 3).
- BMP effectiveness - sediment sampling of hydrodynamic separator (HDS) sumps in the City of Richmond (management information needs 1, 2, 3 and 4).
- PCBs and mercury screening – stormwater reconnaissance sampling by the RMP at four locations countywide. (management information needs 1, 2, 4 and 5).
- Copper and nutrients water sampling in lower Marsh Creek and Pinole Creek (management information needs 1, 2, 4 and 5).
- Mercury and methylmercury water sampling in lower Marsh Creek (management information needs 1, 2, 4 and 5, specific to East County Permittees).

Refer to Figure 1 for the location of each monitoring activity.

Figure 1. Location of WY 2019 Monitoring Activities – County Overview



2.1 PCBs and Mercury Screening - Street Dirt Sampling the City of San Pablo

A natural gas transmission support station located at 2000 Rumrill Boulevard in the City of San Pablo may have released mercury and/or other POCs as a result of historic operations (PG&E, 2014). The exact date of any potential mercury release at this facility is unknown, however PG&E estimates that if it did occur, it would have happened prior to 1991.

One composite sample of street dirt in the public right of way is scheduled for collection in September 2019. Refer to Table 1 for test methods and reporting limits and Table 2 for position coordinates of the general sampling location.

2.2 PCBs Screening - Street Dirt Sampling in the City of Concord

An electrical transformer oil spill occurred near 1354 Babel Lane in a residential neighborhood in the City of Concord on March 6, 2016. The spill volume was estimated to be 30 gallons and PCBs were confirmed to be present in the transformer oil, alternately reported at concentration of 31 ppm and 1,000 ppm (CCCWP, 2018b). Information regarding the cleanup level of effort and follow up testing were not available.

One composite sample of street dirt in the public right of way adjacent to the spill site is scheduled for collection in September 2019. Refer to Table 1 for test methods and reporting limits and Table 2 for position coordinates of the general sampling location.

Table 1. Sediment Screening Analytical Tests, Methods, Reporting Limits, and Holding Times

Sediment Analytical Test	Method	Target Reporting Limit	Holding Time
Total PCBs (RMP 40 congeners)[1]	EPA 8082A	0.5 µg/kg	1 year
Total Mercury	EPA 7471B	5 µg/kg	1 year
Total Organic Carbon	ASTM D4129-05M	0.05%	28 days
Particle Size Distribution[2]	ASTM D422M	0.01%	28 days

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

2 Particle size distribution by the Wentworth scale; percent fines (slit and clay) are less than 62.5 microns.

Table 2. Sediment Screening Monitoring Results (WY 2019)

Site ID	Rumrill Blvd	Babel Lane
Date Sampled	NA	NA
Latitude (decimal deg.)	37.96217	37.96558
Longitude (decimal deg.)	-122.35567	-122.00853
Total PCBs (µg/kg)	NA	NA
Total Hg (µg/kg)	NA	NA
TOC (%)	NA	NA
Percent Fines (%)	NA	NA

NA Not yet available

2.3 BMP Effectiveness - Sediment Sampling of HDS Units in the City of Richmond

To help quantify loads of PCBs and mercury retained in HDS sumps, sampling was conducted within the City of Richmond in areas known to have high concentrations of PCBs and/or mercury in urban runoff. Since HDS sumps are periodically cleaned out by City maintenance staff using vacuum trucks, determination of sediment volume in the sumps, PCB and mercury concentrations of the material, cleaning frequency, and the treated drainage area should provide some measure of BMP treatment effectiveness and pollutant loads removed from the MS4.

This work builds on a recent BASMAA study conducted in WY 2018 in which 8 HDS units in the Bay Area were sampled (BASMAA, 2019). This present work incorporates similar sampling and testing methods as the BASMAA study.

Refer to Table 3 for test methods and reporting limits, and Table 4 for position coordinates of the general sampling location. Results from water year 2019 monitoring are not yet available.

Table 3. HDS Sediment Analytical Tests, Methods, Reporting Limits, and Holding Times
Table 4. Sediment Screening Monitoring Results (WY 2019)

Sediment Analytical Test	Method	Target Reporting Limit	Holding Time
Site ID	Regatta Blvd HDS		South 8th Street HDS
Date Sampled	8/6/2019		9/5/2019
Latitude (decimal deg.)	37.91580		37.92434
Longitude (decimal deg.)	-122.34247		-122.36203
Total PCBs (µg/kg)	NA	NA	NA
Total Hg (µg/kg)	NA	NA	NA
TOC (%)	NA	NA	NA
Percent Fines (%)	NA	NA	NA
Total Solids	NA	NA	NA
Total Organic Matter	NA	NA	NA
Bulk Density	NA	NA	NA
Total Sump Storage Capacity	NA	NA	NA
Volume of Sediment Removed	NA	NA	NA
Clean Out Frequency	NA	NA	NA
Drainage Area Treated	NA	NA	NA

	EPA 8082A	0.5 µg/kg	1 year
	EPA 7471B	5 µg/kg	1 year
	ASTM D4129-05M	0.05%	28 days
	ASTM D4327M	0.01%	28 days
	EPA 160.3	%	7 days
	EPA 160.4	%	28 days
	ASTM E1109-86	g/cm^3	7 days

ude PCB-8, 18, 28, 31, 33, 44, 49, 52, 56, 60, 66, 70, 74, 87, 95, 97, 99, 101, 105, 110, 118, 128, 132, 138, 141, 149, 87, 194, 195, 201, and 203.

ale; percent fines (slit and clay) are less than 62.5 microns.

NA Results not yet available

2.4 RMP Reconnaissance Stormwater Sampling for PCBs and Mercury

MRP Provision C.8.f. requires Permittees to assess inputs of POCs to the Bay from local tributaries and urban runoff, provide information to support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving waste load allocations for TMDLs, and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants. In particular, monitoring required by this provision must be directed toward addressing the five priority

POC management information needs. In support of these information needs, the RMP continued to perform reconnaissance monitoring for PCBs and mercury in water year 2019.

Reconnaissance monitoring by the RMP was conducted to identify drainages with potentially elevated concentrations of PCBs and/or mercury. The intention of reconnaissance monitoring by the RMP is to guide upstream source investigations. With input from CCCWP, locations were selected to provide coverage in areas where data gaps existed. Of nine locations monitored by the RMP in the Bay Area in water year 2019, four locations were located in Contra Costa County (SFEI, 2019):

- Rodeo Creek
- Bay Point Drainage
- Mount Diablo Creek
- Wildcat Creek

Refer to Table 5 for test methods and reporting limits, and Table 6 for position coordinates of the general sampling location. Results from water year 2019 monitoring are not yet available.

Table 5. Stormwater Analytical Tests, Methods, Reporting Limits, and Holding Times

Sediment Analytical Test	Method	Target Reporting Limit	Holding Time
Total PCBs (RMP 40 congeners)[1]	EPA 1668C	0.1 µg/kg	1 year
Total Mercury	EPA 1631E	0.5 ng/L	90 days
Suspended Sediment Concentration	ASTM D 3977-97	1.5 mg/L	7 days
Total Organic Carbon	EPA 9060	0.50 mg/L	28 days

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

2 Particle size distribution by the Wentworth scale; percent fines (slit and clay) are less than 62.5 microns.

Table 6. Stormwater Monitoring Results – RMP Reconnaissance Effort (WY 2019)

Site ID	Rodeo Creek	Bay Point Drainage	Mount Diablo Creek	Wildcat Creek
Date Sampled	01/06/2019	01/15/2019	01/15/2019	01/30/2019
Latitude (decimal deg.)	38.018472	38.034075	38.018756	37.960329
Longitude (decimal deg.)	-122.256647	-121.962504	-122.026878	-122.366840
Total PCBs [1] (pg/L)	NA	NA	NA	NA
Total Hg (ug/L)	NA	NA	NA	NA
SSC (mg/L)	NA	NA	NA	NA
TOC (mg/L)	NA	NA	NA	NA
PCBs/SSC Ratio (ppb) [2]	NA	NA	NA	NA

NA Results not yet available

2.5 Copper and Nutrients Monitoring

Sampling for copper and nutrients was conducted in lower Marsh Creek and in lower Pinole Creek during dry weather. Two locations on Marsh Creek were sampled: Station M1 which is just downstream of the Brentwood WWTP outfall, and Station M2 which is 0.2 miles upstream of the Brentwood WWTP

outfall and immediately upstream of a fish ladder. Pinole Creek served as an urban comparator to Marsh Creek to help understand if Marsh Creek has elevated concentrations of nutrients that might promote the production of abundant aquatic vegetation which is known to grow in Marsh Creek during the summer.

The first round of samples were collected on August 22 during a low flow period on Marsh Creek when warm, summer conditions can lead to the production of aquatic vegetation. The second round of sampling is scheduled for late September to coincide with an elevated period of non-storm flows coming from one or more of the main tributaries to lower Marsh Creek. Intermittent non-storm flows are commonly observed in Sand Creek and Deer Creek throughout the year.

For each day of sampling on Marsh Creek, there was an early morning collection before the WWTP begins discharging morning flow, and a late morning collection when discharge is at or near its daily maximum. For the second round of sampling in late September, additional collection will take place on one of the tributaries to capture non-storm flow near its source.

The determination of nutrient concentrations in Marsh Creek, and those in Pinole Creek for comparison, may help to inform conclusions of a stressors/sources identification (SSID) study that CCCWP is currently undertaking on Marsh Creek related to reoccurring fish kills. A key hypothesis of the SSID study is that overnight decomposition of aquatic vegetation suppresses dissolved oxygen to lethal levels (CCCWP, 2018c). If nutrient concentrations are present in elevated amounts, it might help explain the presence of overly abundant aquatic vegetation which is typically observed during late spring and summer in portions of Marsh Creek.

Samples were filtered in the field within 15 minutes of collection for dissolved copper, ammonia, nitrate, nitrite, and orthophosphate. Refer to Table 7 for test methods and reporting limits and Table 8 for position coordinates and a summary of analytical results.

Table 7. Copper and Nutrients in Water - Analytical Tests, Methods and Reporting Limits

Analytical Test	Method	Target Reporting Limit
Suspended Sediment Concentration (SSC)	ASTM D 3977-97B	3 mg/L
Copper, total recoverable and dissolved	EPA 200.8	0.5 µg/L
Hardness	SM 2340C (titration)	5 mg/L
Ammonia as N	SM 4500-NH3 C v20	0.1 mg/L
Nitrate	EPA 300.0	0.05 mg/L
Nitrite	EPA 300.0	0.05 mg/L
Total Kjeldahl Nitrogen	SM 4500 NH3-C	0.1 mg/L
Dissolved Orthophosphate	SM 4500P-E	0.01 mg/L
Total Phosphorus	SM 4500P-E	0.01 mg/L

Table 8. Copper and Nutrients in Water Monitoring Results (WY 2019)

Site ID	Marsh Creek (M1)				Marsh Creek (M2)				TBD		Pinole Creek	
Latitude (degrees)	37.96390				37.96267				NA		38.00408	
Longitude (degrees)	-121.68375				-122.68783				NA		-122.28843	
Sample Date	8/22/2019		TBD		8/22/2019		TBD		NA		8/22/2019	TBD
Sample Time	0600	0830	TBD	TBD	0620	0845	TBD	TBD	NA	NA	1030	TBD
Copper, Diss. (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Total (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hardness (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ammonia as N (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TKN (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diss. Ortho P (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TBD To be determined
NA Results not yet available

2.6 Mercury and Methylmercury Water Sampling in Lower Marsh Creek – Central Valley Requirement

Mercury and methylmercury sampling was conducted concurrent with copper and nutrient sampling on Marsh Creek and Pinole Creek during dry weather. This work builds on results of the Methylmercury Control Study Final Report (CCCWP, 2018d), and should help to better understand mercury concentrations and methylation occurrences within lower Marsh Creek. This monitoring effort satisfies Central Valley requirements of the newly promulgated MRP Amendment Provision C.16.5.g for eight samples within lower Marsh Creek each year (SFRWQCB, 2019). Refer to Table 7 for test methods and reporting limits and Table 8 for position coordinates and a summary of analytical results.

Table 9. Mercury and Methylmercury in Water - Analytical Tests, Methods, Reporting Limits, and Holding Times

Sediment Analytical Test	Method	Target Reporting Limit	Holding Time
Total Mercury	EPA 1631E	0.5 ng/L	90 days
Total Methylmercury	EPA 1631	0.05 ng/L	90 days
Suspended Sediment Concentration	ASTM D 3977-97	1.5 mg/L	7 days

Table 10. Mercury and Methylmercury in Water Monitoring Results (WY 2019)

Site ID	Marsh Creek (M1)				Marsh Creek (M2)			TBD	Pinole Creek	
Latitude (degrees)	37.96390				37.96267			NA	38.00408	
Longitude (degrees)	-121.68375				-122.68783			NA	-122.28843	
Sample Date	8/22/2019		TBD		8/22/2019	TBD		NA	8/22/2019	TBD
Sample Time	0600	0830	TBD	TBD	0620	TBD	TBD	NA	1030	TBD
SSC (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (ng/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylmercury (ng/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MeHg to Hg Ratio (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TBD To be determined
NA Results not yet available
MeHg Methylmercury
Hg Mercury

2.7 Summary of Monitoring Completed in Water Year 2019

Water year 2019 monitoring is summarized in Tables 11 and 12. The tables list the total number of tests completed for each pollutant class and analyte, the corresponding management information needs addressed, and the target number of tests outlined in the MRP. The tables also identify monitoring completed by third parties used to help CCCWP meet the numeric monitoring targets identified in the MRP. Third-party monitoring completed in water year 2018 is discussed in Section 4.

The number of samples collected and analyzed in water year 2019 met or exceeded the minimum annual requirements of the MRP in all pollutant categories, with the exception of emerging contaminants which will be sampled and analyzed in one special study before the end of the five-year permit term.

The results of water year 2019 monitoring will be reported in the Integrated Monitoring Report due on March 31, 2020, and will help inform water year 2020 sampling efforts.

Table 11. Summary of Monitoring Completed in WY 2019 by Pollutant Class, Analyte, Management Information Need, and MRP Targets

Pollutant Class / Type of Monitoring	Analyte									Management Information Need					Agency or Organization Performing the Monitoring	Number of Samples Collected and Analyzed in WY 2019	Cumulative Number of Samples Collected and Analyzed In WYs 2016 through 2019	Total Number of Samples Required By the MRP for 5-Year Term
	PCBs	Mercury	Methylmercury	SSC	PSD	TOC	Copper [1]	Hardness	Nutrients [2]	Source ID	Bay Impairment	Management Action	Loads & Status	Trends				
PCBs - water	✓			✓		✓				X	X		X	X	RMP	4[a]	85	80
PCBs - sediment	✓				✓	✓				X	X	X			CCCWP	2[b]		
PCBs - sediment	✓				✓	✓				X	X	X	X		CCCWP	2[c]		
Mercury & MeHg - water		✓	✓	✓						X	X	X	X	X	CCCWP	10[d]	121	80
Mercury - water		✓		✓						X	X		X	X	RMP	4[a]		
Mercury - sediment		✓			✓					X	X	X			CCCWP	2[b]		
Mercury - sediment		✓			✓					X	X	X	X		CCCWP	2[c]		
Copper - water							✓	✓		X	X		X	X	CCCWP	12	18	20
Nutrients - water									✓	X	X		X	X	CCCWP	12	18	20
Emerging Contaminants[3]															-	0	0	3

1 Total and dissolved fractions of copper
2 Nutrients include: ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate and total phosphorus
3 Emerging contaminants (alternative flame retardants) need only be tested during one special study over the 5-year term of the permit
a The RMP collected stormwater samples at Bay Point, Mount Diablo Creek, Wildcat Creek, and Rodeo Creek
b Sediment screening adjacent to 1) a natural gas distribution service facility and 2) a site of a PCB transformer oil spill
c HDS sediment sampling in the City of Richmond
d Mercury and methylmercury co-sampled with copper and nutrients on Marsh Creek and Pinole Creek
SSC suspended sediment concentration
PSD particle size distribution
TOC total organic carbon
MeHg total methylmercury

Table 12. Summary of Monitoring Completed in WYs 2016 through 2019 toward MRP Targets

Pollutant Class by Water Year	Number of Samples Collected and Analyzed per Management Information Need					Annual Number of Samples Collected and Analyzed	
	Type 1: Source ID	Type 2: Bay Impairment	Type 3: Management Action	Type 4: Loads & Status	Type 5: Trends	Actual	Required by MRP
WY 2016							
PCBs	28	28	14	6	6	28	8
Mercury	37	37	32	15	15	46	8
Copper[1]	0	0	0	0	0	0	2
Nutrients	0	0	0	0	0	0	2
WY 2017							
PCBs	27	27	27	14	14	27	8
Mercury	26	26	18	18	18	26	8
Copper[1]	4	4	0	4	4	4	2
Nutrients	4	4	0	4	4	4	2
WY 2018							
PCBs	16	11	13	9	9	22	8
Mercury	25	25	27	17	17	31	8
Copper[1]	2	2	0	2	2	2	2
Nutrients	2	2	0	2	2	2	2
WY 2019							
PCBs	8	8	4	6	4	8	8
Mercury	16	16	12	14	12	16	8
Copper[1]	12	12	0	12	12	12	2
Nutrients	12	12	0	12	12	12	2
WY 2016 – 2019 Totals / Required Number by end of WY 2020						**WY 2016 – 2019 Totals**	**Requirement for 5-Year Permit Term**
PCBs	71 / 8	66 / 8	54 / 8	29 / 8	29 / 8	85	80
Mercury	90 / 8	90 / 8	79 / 8	52 / 8	52 / 8	121	80
Copper[1]	18 / NA	18 / NA	0 / NA	18 /4	18 / 4	18	20
Nutrients	18 / NA	18 / NA	0 / NA	18 / 20	18 / NA	18	20

1 Total and dissolved fractions of copper

NA = Not applicable; there is no permit requirement

3 MONITORING PLAN FOR WATER YEAR 2020

Monitoring in water year 2020 is expected to include the following activities:

1. New and/or follow-up sediment screening for PCBs and mercury in streets, drop inlets and/or public rights-of-way adjacent to suspected source properties which may offer a high opportunity for PCBs/mercury controls; this activity may also target sediment potentially impacted by electrical transformer spills
2. Sediment sampling of retained material in HDS sumps within the City of Richmond for PCBs and mercury
3. Watershed characterization monitoring for copper and nutrients
4. Methylmercury monitoring in Marsh Creek
5. Stormwater and/or sediment trap monitoring for PCBs and mercury countywide; performed by the RMP

The following subsections provide background information on monitoring goals and descriptions of planned activities, as well as overall numeric goals (number of samples to be collected) during water year 2020.

3.1 Sediment Screening

Continuation of street dirt and drop inlet sediment sampling for PCBs and mercury may take place at locations identified through ongoing desktop research and field surveys, and at locations identified by CCCWP Permittees. Sites which may be added to the sampling list include locations of interest due to historic or present-day land use, lack of adequate source control by property owners, reoccurring accumulation of sediment, recent electrical transformer spills, etc.

Based on lessons learned during water years 2015-2019, it is apparent that high opportunity areas for PCBs and mercury controls do not always co-locate with known or suspected contaminated source properties. High concentrations of PCBs do not always occur where expected and, in some cases, are found in relatively high concentrations in areas of only moderate interest. For this reason, monitoring efforts may be expanded to include larger geographical regions around locations of interest to investigate for the presence of PCBs in areas which might have otherwise been overlooked.

Up to four sediment screening samples may be collected in water year 2020.

3.2 Sediment Sampling of HDS Units in the City of Richmond

To help quantify loads of PCBs and mercury retained in HDS sumps, sampling will continue within the City of Richmond in areas known to have high concentrations of PCBs and/or mercury in urban runoff. Since HDS sumps are periodically cleaned out by City maintenance staff using vacuum trucks, determination of sediment volume in the sumps and PCB and mercury concentrations of the material should provide some measure of BMP treatment effectiveness. Up to two HDS units may be targeted for sampling.

3.3 Watershed Characterization for Copper and Nutrients

Sampling for copper and nutrients in water year 2020 is planned for lower Marsh Creek and/or its tributaries. The determination of nutrient concentrations in Marsh Creek may help to inform conclusions of a stressors/sources identification (SSID) study that CCCWP is currently undertaking on Marsh Creek related to reoccurring fish kills. A key hypothesis of the SSID study is that recurrent night-time metabolic shifts of aquatic vegetation from photosynthesis to respiration suppress dissolved oxygen down to potentially lethal levels (CCCWP, 2018c). If nutrient concentrations are present in elevated levels, it might help explain the presence of overly abundant aquatic vegetation which is typically observed during late spring and summer in portions of Marsh Creek. To be clear – excessive nutrients are not necessary to explain the abundance of aquatic vegetation where it is noted. The presence of standing water in the creek alone may explain the vegetation observe. The purpose of nutrient monitoring is to gain a preliminary understanding of whether or not nutrients also play a role.

Two samples for copper and nutrients will be collected in water year 2020.

3.4 Methylmercury Monitoring in Marsh Creek

Mercury and methylmercury monitoring in Marsh Creek (and its tributaries) will be used to further CCCWP's understanding of methylmercury distribution (spatially and temporally) within the Marsh Creek system. This sampling will satisfy the annual requirement of the newly promulgated MRP amendment (SFRWQCB, 2019).

A total of eight samples for mercury and methylmercury will be collected in water year 2020.

3.5 Stormwater and Sediment Trap Monitoring for PCBs and Mercury by the RMP

As a contributing member to the RMP through its affiliation with BASMAA, CCCWP participates in a Bay Area-wide characterization study of PCBs and mercury in stormwater runoff in areas of interest. For water year 2020, two stormwater or sediment trap samples are targeted for collection within Contra Costa County at locations to be identified in a joint effort by the RMP and representatives of CCCWP.

3.6 Summary of Monitoring Planned for Water Year 2020

Based on the planned activities described in the sections above, sampling by CCCWP for water year 2020 is summarized in Table 13.

Table 13. CCCWP Monitoring Planned for WY 2019 by Pollutant Class and MRP Targets

Pollutant Class / Type of Monitoring	Management Information Need					Number of Samples Planned for WY 2020 by CCCWP (and through the RMP)	Cumulative Number of Samples Collected and Analyzed in WYs 2016 through 2019	Annual Minimum Number of Samples Required by the MRP	Total Number of Samples Required By the MRP Over 5-Year Term
	Source ID	Bay Impairment	Management Action	Loads & Status	Trends				
PCBs – water	X	X	X	X	X	2[a]	85	8	80
PCBs – sediment	X	X	X		X	4[b] + 2[c]			
Mercury & MeHg - water	X	X	X	X	X	8[d]	121	8	80
Mercury – water	X	X		X	X	2[a]			
Mercury - sediment	X	X	X			4[b] + 2[c]			
Copper[1] – water	X	X		X	X	2[e]	18	2	20
Nutrients[2] – water	X	X		X	X	2[e]	18	2	20
Emerging Contaminants[3]							0	0	3

MeHg methylmercury
1 Total and dissolved copper
2 Ammonium, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate and total phosphorus
3 Emerging contaminants (alternative flame retardants) need only be tested during one special study over the 5-year term of the permit
a Stormwater samples targeted for collection by the RMP in Contra Costa County
b Sediment screening from streets, drop inlets and/or public rights-of-way
c HDS sump sediment samples
d Mercury and methylmercury monitoring in Marsh Creek per Central Valley requirements
e Characterization monitoring in Marsh Creek

3.7 Summary of Planned Activities Related to CVRWQCB TMDLs

The CVRWQCB has established TMDLs for methylmercury and for pyrethroid pesticides that include implementation requirements for East County Permittees. As noted in Section 3.4, methylmercury monitoring in Marsh Creek will continue, with a focus on upper watershed flows and potential areas with slow moving or stagnant water. CCCWP will consider technical peer review comments on the Methylmercury Control Study Report that were provided by the Delta Stewardship Council on behalf of the CVRWQCB. Responses to comments as they inform monitoring strategies will appear in an appendix to the Integrated Monitoring Report to be submitted on March 31, 2020. That dialogue will inform mercury monitoring for MRP 3.0 that is responsive to the Delta Methylmercury TMDL requirements.

In Water year 2019 East County Permittees will review implementation requirements of the CVRWQCB Pyrethroids TMDL and incorporate them into future monitoring strategies. An initial review indicates that current program activities are fully responsive to anticipated requirements for MS4 programs.

4 SUMMARY OF WATER YEAR 2019 POLLUTANT MONITORING REPORTED ELSEWHERE

This section describes monitoring activities conducted by others which were funded in part by CCCWP. In addition to directly managing monitoring programs, CCCWP participates in the RMP by direct financial contributions and participation in RMP subcommittees responsible for planning and directing monitoring projects. The RMP Sources, Pathways and Loadings Workgroup, and the associated Small Tributaries Loading Strategy subgroup, are the main points of contact between CCCWP and the RMP. CCCWP also collaborates on projects with BASMAA and supports Permittees in implementing projects at the local level.

4.1 MRP Provision C.8.f. – Pollutants of Concern Monitoring: RMP Ongoing Reconnaissance Sampling for PCBs and Mercury

MRP Provision C.8.f. requires Permittees to assess inputs of POCs to the Bay from local tributaries and urban runoff, provide information to support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving waste load allocations for TMDLs, and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants. In particular, monitoring required by this provision must be directed toward addressing the five priority POC management information needs. In support of these information needs, the RMP continued to perform reconnaissance monitoring for PCBs and mercury in water year 2019.

In water year 2019, the RMP performed reconnaissance monitoring to identify drainages with potentially elevated concentrations of PCBs and/or mercury. The intention of reconnaissance monitoring by the RMP is to guide upstream source investigations. With input from CCCWP, locations were selected to provide coverage in areas where data gaps existed. Of nine locations monitored by the RMP in the Bay Area in water year 2019, four locations were located in Contra Costa County (SFEI, 2019):

- Rodeo Creek in Rodeo
- Bay Point Drainage in Bay Point
- Mount Diablo Creek in the City of Concord
- Wildcat Creek in the City of Richmond

[Sampling results are not available for this report draft; it is likely that results will be included in the final version of this document]

In summary, work performed by the RMP in water year 2019 provided four stormwater samples each for mercury and PCBs which were directly responsive to management information needs 1 (sources), 2 (contributions to Bay impairment), and 4 (loads and status), and indirectly supportive of progress on management information needs 3 (effectiveness) and 5 (trends).

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