Urban Creeks Monitoring Report

Water Quality Monitoring

Water Year 2016 (October 2015 – September 2016)

Submitted in Compliance with
NPDES Permit No. CAS612008 (Order No. R2-2015-0049),
Provision C.8.h.iii

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program

A Program of the City/County Association of Governments

March 31, 2017

CREDITS

This report is submitted by the participating agencies in the

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Preface

In early 2010, several members of the Bay Area Stormwater Agencies Association (BASMAA) joined together to form the Regional Monitoring Coalition (RMC), to coordinate and oversee water quality monitoring required by the Municipal Regional National Pollutant Discharge Elimination System (NPDES) Stormwater Permit (in this document the permit is referred to as the MRP)[1]. The RMC includes the following participants:

- Alameda Countywide Clean Water Program (ACCWP)
- Contra Costa Clean Water Program (CCCWP)
- San Mateo Countywide Water Pollution Prevention Program (SMCWPPP)
- Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)
- Fairfield-Suisun Urban Runoff Management Program (FSURMP)
- City of Vallejo and Vallejo Sanitation and Flood Control District (Vallejo)

This Urban Creeks Monitoring Report complies with MRP provision C.8.h.iii for reporting of all data in Water Year 2016 (October 1, 2015 through September 30, 2016). Data were collected pursuant to provision C.8 of the MRP. Data presented in this report were produced under the direction of the RMC and the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) using probabilistic and targeted monitoring designs as described herein.

Consistent with the BASMAA RMC Multi-Year Work Plan (Work Plan; BASMAA 2011) and the Creek Status and Long-Term Trends Monitoring Plan (BASMAA 2012), monitoring data were collected in accordance with the BASMAA RMC Quality Assurance Program Plan (QAPP; BASMAA, 2016a) and the BASMAA RMC Standard Operating Procedures (SOPs; BASMAA, 2016b). Where applicable, monitoring data were derived using methods comparable with methods specified by the California Surface Water Ambient Monitoring Program (SWAMP) QAPP[2]. Data presented in this report were also submitted in electronic SWAMP-comparable formats by SMCWPPP to the Regional Water Board on behalf of SMCWPPP Permittees and pursuant to provision C.8.h.ii of the MRP.

[1] The San Francisco Bay Regional Water Quality Control Board (SFRWQCB or Regional Water Board) issued the MRP to 76 cities, counties, and flood control districts (i.e., Permittees) in the Bay Area on October 14, 2009 (SFRWQCB 2009). On November 19, 2015, the Regional Water Board updated and reissued the MRP (SFRWQCB 2015). The BASMAA programs supporting MRP Regional Projects include all MRP Permittees as well as the cities of Antioch, Brentwood, and Oakley, which are not named as Permittees under the MRP but have voluntarily elected to participate in MRP-related regional activities.

[2] The current SWAMP QAPP is available at:
http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf

List of Acronyms

ACCWP	Alameda County Clean Water Program
ASBS	Area of Special Biological Significance
BASMAA	Bay Area Stormwater Management Agency Association
BMI	Benthic Macroinvertebrate
BMP	Best Management Practice
C/CAG	San Mateo City/County Association of Governments
CCCWP	Contra Costa Clean Water Program
CDO	Cease and Desist Order
CEC	Chemicals of Emerging Concern
CEDEN	California Environmental Data Exchange Network
CFWG	Contaminate Fate Work Group
CRAM	California Rapid Assessment Method
CSCI	California Stream Condition Index
CW4CB	Clean Watersheds for a Clean Bay
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
FIB	Fecal Indicator Bacteria
FSURMP	Fairfield Suisun Urban Runoff Management Program
GIS	Geographic Information system
IBI	Benthic Macroinvertebrate Index of Biological Integrity
IPM	Integrated Pest Management
LID	Low Impact Development
MBNMS	Monterey Bay National Marine Sanctuary
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Water Sewer System
MST	Microbial Source Tracking
MWAT	Maximum Weekly Average Temperature
MYP	Multi-Year Plan
NPDES	National Pollution Discharge Elimination System
PAHs	Polycyclic Aromatic Hydrocarbons
PBDEs	Polybrominated Diphenyl Ethers

PCBs	Polychlorinated Biphenyls
PEC	Probable Effect Concentration
PFAS	Perfluoroalkyl Sulfonates
PFOS	Perfluorooctane Sulfonates
PHAB	Physical Habitat
POC	Pollutant of Concern
QAPP	Quality Assurance Project Plan
RMC	Regional Monitoring Coalition
RMP	Regional Monitoring Program
RWSM	Regional Watershed Spreadsheet Model
S&T	Status and Trends
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFRWQCB	San Francisco Regional Water Quality Control Board
SMCRCD	San Mateo County Resource Conservation District
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedures
SPLWG	Sources, Pathways, and Loadings Work Group
SPoT	Statewide Stream Pollutant Trend Monitoring
SSID	Stressor/Source Identification
STLS	Small Tributaries Loading Strategy
SWAMP	Surface Water Ambient Monitoring Program
TEC	Threshold Effect Concentration
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRC	Technical Review Committee
TU	Toxic Unit (equivalent)
UCMR	Urban Creeks Monitoring Report
USEPA	US Environmental Protection Agency
USGS	US Geological Survey
WLA	Waste Load Allocation
WMA	Watershed Management Areas
WQO	Water Quality Objective

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Table E.1. Water Year 2016 Creek Status Monitoring Stations

In compliance with Provision C.8.h.iii.(1), this table of all Creek Status Monitoring stations sampled in Water Year 2016 is provided immediately following the Table of Contents. See Section 3.0 for additional information on Creek Status Monitoring.

Map ID	Station Number	Bayside or Coastside	Watershed	Creek Name	Land Use	Latitude	Longitude	Probabilistic	Targeted				
								Bioassessment, Nutrients, General WQ	Chlorine	Toxicity, Sediment Chemistry	Temp	Cont. WQ	Pathogen Indicators
488	202R00488	Coastside	Tunitas Creek	Tunitas Creek	NU	37.38001	-122.37482	X	X				
506	202R00506	Coastside	Pescadero Creek	Peters Creek	NU	37.28940	-122.17619	X	X				
2332	202R02332	Coastside	Pilarcitos Creek	Pilarcitos Creek	U	37.47000	-122.44116	X	X				
2228	204R02228	Bayside	San Mateo Creek	San Mateo Creek	U	37.56114	-122.33698	X	X				
2504	204R02504	Bayside	San Mateo Creek	Polhemus Creek	U	37.53015	-122.34871	X	X				
2548	204R02548	Bayside	Cordilleras Creek	Cordilleras Creek	U	37.49544	-122.24336	X	X				
2408	205R02408	Bayside	San Francisquito Cr	Bull Run Creek	U	37.38400	-122.23499	X	X				
2728	205R02728	Bayside	San Francisquito Cr	Dry Creek	U	37.42452	-122.24954	X	X				
2920	205R02920	Bayside	San Francisquito Cr	Bear Creek	U	37.42376	-122.25112	X	X				
3032	205R03032	Bayside	San Francisquito Cr	West Union	U	37.43720	-122.28319	X	X				
10	204LAU010	Bayside	Laurel Creek	Laurel Creek	U	37.53556	122.29750			X			
60	204SMA060	Bayside	San Mateo Creek	San Mateo Creek	U	37.56244	-122.32828						X
80	204SMA080	Bayside	San Mateo Creek	San Mateo Creek	U	37.55731	-122.34204						X
100	204SMA100	Bayside	San Mateo Creek	San Mateo Creek	U	37.53719	-122.35001						X
119	204SMA119	Bayside	San Mateo Creek	San Mateo Creek	U	37.52959	-122.35836						X
110	204SMA110	Bayside	San Mateo Creek	Polhemus Creek	U	37.53235	-122.3508						X
68	205ALA015	Bayside	San Francisquito Cr	Alambique Creek	U	37.40443	-122.25430				X		
71	205BCR010	Bayside	San Francisquito Cr	Bear Creek	U	37.41179	-122.24106				X	X	
69	205BCR050	Bayside	San Francisquito Cr	Bear Creek	U	37.42702	-122.25378				X		
72	205BCR060	Bayside	San Francisquito Cr	Bear Creek	U	37.42550	-122.26243				X		
70	205WUN150	Bayside	San Francisquito Cr	West Union Creek	U	37.431117	-122.27622				X	X	

U = urban, NU = non-urban

1.0 Introduction

This Urban Creeks Monitoring Report (UCMR), was prepared by the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), on behalf of its 22 member agencies (20 cities/towns, the County of San Mateo, and the San Mateo County Flood Control 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 first adopted by the San Francisco Regional Water Quality Control Board (SFRWQCB or Regional Water Board) on October 14, 2009 as Order R2-2009-0074 (SFRWQCB 2009). On November 19, 2015, the SFRWQCB updated and reissued the MRP as Order R2-2015-0049 (SFRWQCB 2015). This report fulfills the requirements of Provision C.8.h.iii of the MRP for comprehensively interpreting and reporting all monitoring data collected during the foregoing October 1 – September 30 (i.e., Water Year 2016). Data were collected pursuant to water quality monitoring requirements in provision C.8 of the MRP. Monitoring data presented in this report were submitted electronically to the Regional Water Board by SMCWPPP and, if collected from a receiving water, may be obtained via the San Francisco Bay Area Regional Data Center of the California Environmental Data Exchange Network (CEDEN).[3]

Chapters in this report are organized according to the following topics and MRP provisions. Some topics are summarized briefly in this report but described more fully in appendices.

1.0 Introduction

2.0 San Francisco Estuary Receiving Water Monitoring (MRP Provision C.8.c)

3.0 Creek Status Monitoring (MRP Provision C.8.d) and Pesticides and Toxicity Monitoring (MRP Provision C.8.g) (**Appendix A**)

4.0 Stressor/Source Identification (SSID) Projects (MRP Provision C.8.e) (**Appendix B**)

5.0 Pollutants of Concern (POC) Monitoring (MRP Provision C.8.f) (**Appendices C and D**)

6.0 Recommendations and Next Steps

Figure 1.1 maps locations of monitoring stations associated with Provision C.8 compliance in Water Year 2016 (WY 2016), including Creek Status Monitoring, Pesticides and Toxicity Monitoring, and POC Monitoring conducted by SMCWPPP, the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), and the Clean Watersheds for a Clean Bay (CW4CB) program. This figure illustrates the geographic extent of monitoring conducted in San Mateo County in WY 2016.

[3] http://www.ceden.org/

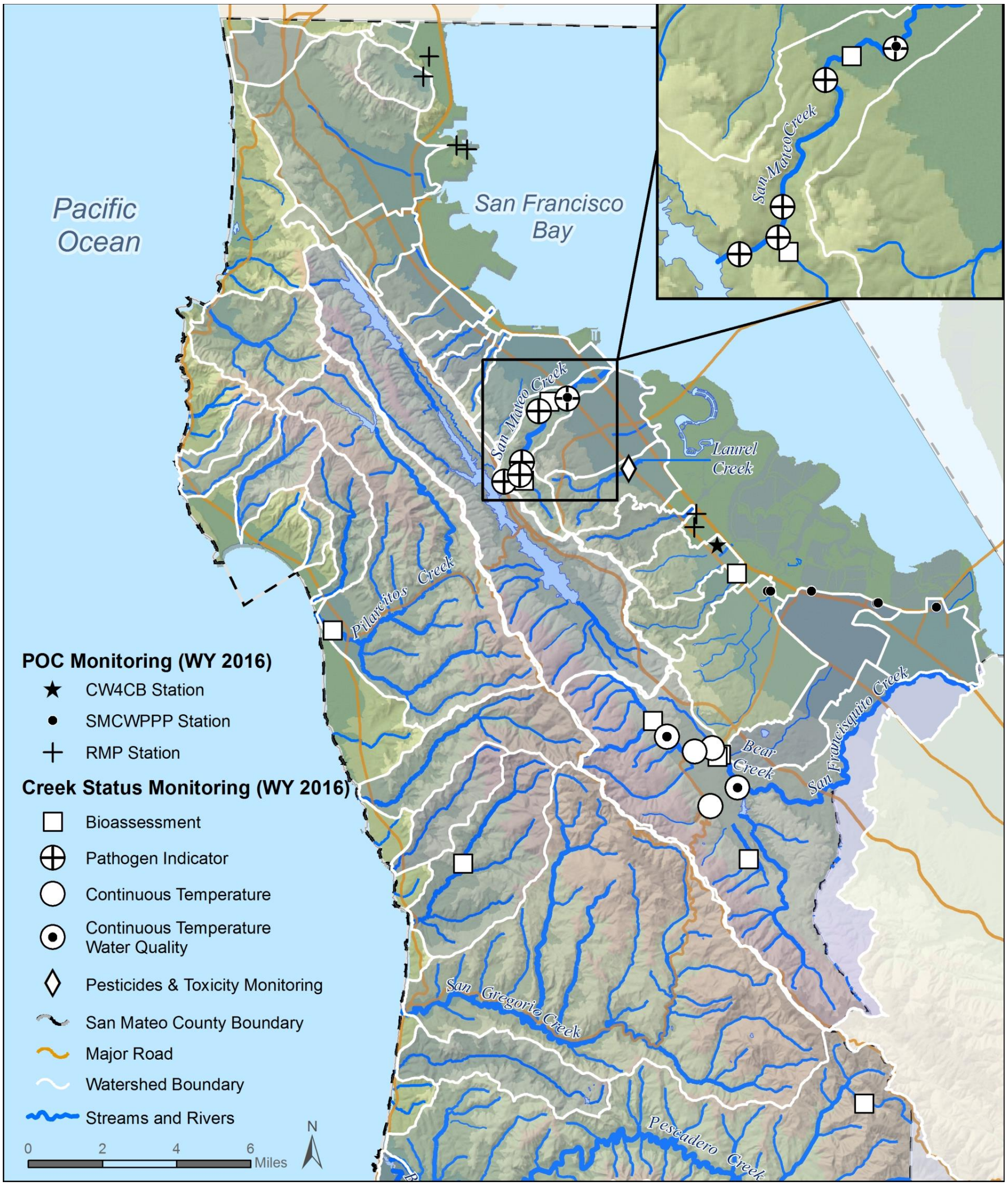

Figure. 1.1. San Mateo County MRP Provision C.8 monitoring locations: Creek Status Monitoring, Pesticides and Toxicity Monitoring, and POC Monitoring, WY 2016.

1.1 RMC Overview

Provision C.8.a (Compliance Options) of the MRP allows Permittees to address monitoring requirements through a "regional collaborative effort," their countywide stormwater program, and/or individually. In June 2010, Permittees notified the Regional Water Board in writing of their agreement to participate in a regional monitoring collaborative to address requirements in Provision C.8. The regional monitoring collaborative is referred to as the Bay Area Stormwater Management Agency Association (BASMAA) Regional Monitoring Coalition (RMC). In a November 2, 2010 letter to the Permittees, the Regional Water Board's Assistant Executive Officer (Dr. Thomas Mumley) acknowledged that all Permittees have opted to conduct monitoring required by the MRP through a regional monitoring collaborative, the BASMAA RMC. Participants in the RMC are listed in Table 1.1.

In February 2011, the RMC developed a Multi-Year Work Plan (RMC Work Plan; BASMAA 2011) to provide a framework for implementing regional monitoring and assessment activities required under Provision C.8 of the 2009 MRP. The RMC Work Plan summarizes RMC projects planned for implementation between Fiscal Years 2009-10 and 2014-15 (BASMAA 2011). Projects were collectively developed by RMC representatives to the BASMAA Monitoring and Pollutants of Concern Committee (MPC), and were conceptually agreed to by the BASMAA Board of Directors (BASMAA BOD). Although there are no plans to update the Multi-Year Work Plan, several regional projects have already been identified and will be conducted in compliance with the 2015 MRP.

Regionally implemented activities in the RMC Work Plan are conducted under the auspices of BASMAA, a 501(c)(3) non-profit organization comprised of the municipal stormwater programs in the San Francisco Bay Area. Scopes, budgets, and contracting or in-kind project implementation mechanisms for BASMAA regional projects follow BASMAA's Operational Policies and Procedures and are approved by the BASMAA BOD. MRP Permittees, through their stormwater program representatives on the BOD and its subcommittees, collaboratively authorize and participate in BASMAA regional projects or tasks. Regional project costs are shared by either all BASMAA members or among those Phase I municipal stormwater programs that are subject to the MRP.

Table 1.1 Regional Monitoring Coalition (RMC) participants.

Stormwater Programs	RMC Participants
Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)	Cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, Sunnyvale, Los Altos Hills, and Los Gatos; Santa Clara Valley Water District; and, Santa Clara County
Alameda Countywide Clean Water Program (ACCWP)	Cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City; Alameda County; Alameda County Flood Control and Water Conservation District; and, Zone 7
Contra Costa Clean Water Program (CCCWP)	Cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, Walnut Creek, Danville, and Moraga; Contra Costa County; and, Contra Costa County Flood Control and Water Conservation District
San Mateo Countywide Water Pollution Prevention Program (SMCWPPP)	Cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, South San Francisco, Atherton, Colma, Hillsborough, Portola Valley, and Woodside; San Mateo County Flood Control District; and, San Mateo County
Fairfield-Suisun Urban Runoff Management Program (FSURMP)	Cities of Fairfield and Suisun City
Vallejo Permittees	City of Vallejo and Vallejo Sanitation and Flood Control District

1.2 Coordination with Third-party Monitoring Programs

SMCWPPP 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.

In WY 2016, SMCWPPP continued to coordinate with water quality monitoring programs conducted by third parties that supplement Bay Area stormwater monitoring conducted via the MRP. These programs include the RMP's Small Tributaries Loading Strategy (STLS), and the Stream Pollutant Trends (SPoT) monitoring conducted by the State of California's Surface Water Ambient Monitoring Program (SWAMP), and the CW4CB program that is funded by a United States Environmental Protection Agency (USEPA) grant. Water quality data from these programs are reported in this document and were utilized to comply with or supplement MRP Provision C.8 monitoring, consistent with Provision C.8.a.iii.[4][5] Data are specifically referenced in Sections 5.0 (POC Monitoring) of this report.

[4] Data reported by these programs are summarized in this report, however were not included in the SMCWPPP electronic data submittal.

[5] In most years, the SPoT Program monitors one station in San Mateo Creek for constituents required by Provision C.8.f of the MRP. In WY 2016, the SPoT station was not sampled for those constituents.

2.0 San Francisco Estuary Receiving Water Monitoring (C.8.c)

As described in provision C.8.c of the MRP, Permittees are required to provide financial contributions towards implementing an Estuary receiving water monitoring program on an annual basis that at a minimum is equivalent to the Regional Monitoring Program for Water Quality in the San Francisco Estuary (RMP). Since the adoption of the 2009 MRP, SMCWPPP has complied with this provision by making financial contributions to the RMP. Additionally, SMCWPPP staff actively participates in RMP committees, workgroups, and strategy teams as described in the following sections, which also provide a brief description of the RMP and associated monitoring activities conducted during WY 2016.

Now in its 24th year, the RMP is a long-term discharger-funded monitoring program that shares direction and participation by regulatory agencies and the regulated community with the goal of assessing water quality in the San Francisco Bay. The regulated community includes municipal stormwater (MS4s), publicly owned treatment works (POTWs), dredger, and industrial dischargers. The San Francisco Estuary Institute (SFEI) is the implementing entity for the RMP and the fiduciary agent for RMP stakeholder funds. SFEI does not provide direct oversight of the RMP, but does help identify stakeholder information needs, develops workplans that address these needs, and implements the workplans.

The RMP is intended to answer the following core management questions:

1. Are chemical concentrations in the Estuary potentially at levels of concern and are associated impacts likely?
2. What are the concentrations and masses of contaminants in the Estuary and its segments?
3. What are the sources, pathways, loadings, and processes leading to contaminant related impacts in the Estuary?
4. Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased?
5. What are the projected concentrations, masses, and associated impacts of contaminants in the Estuary?

The RMP budget is generally broken into two major program elements: Status and Trends and Pilot/Special Studies. The following sections provide a brief overview of these programs. The *RMP 2016 Detailed Workplan and Budget*[6] provides more details and establishes deliverables for each component of the RMP budget. The RMP publishes annual summary reports. In odd years, the *Pulse of the Estuary Report* focuses on Bay water quality and summarizes information from all sources. In even years, the *RMP Update Report* has a narrower and specific focus. The *2016 RMP Update*[7] provides a concise overview of recent RMP activities and findings, and a look ahead to significant products anticipated in the next two years.

[6] http://www.sfei.org/sites/default/files/biblio_files/2016%20RMP%20Detailed%20Workplan%20and%20Budget%20FINAL.pdf
[7] http://www.sfei.org/sites/default/files/biblio_files/Update%202016_FINAL%20for%20web%20with%20covers.pdf

2.1 RMP Status and Trends Monitoring Program

The Status and Trends Monitoring Program (S&T Program)[8] is the long-term contaminant-monitoring component of the RMP. The S&T Program was initiated as a pilot study in 1989, implemented thereafter, and was redesigned in 2007 based on a more rigorous statistical design that enables the detection of trends. The Technical Review Committee (TRC), in which the BASMAA RMC participates, continues to assess the efficacy and value of the various elements of the S&T Program and to recommend modifications to S&T Program activities based on ongoing findings. The current S&T sampling schedule is listed in Table 2.1.

Table 2.1. RMP Status and Trends Monitoring Schedule.

Program Element	Schedule	2016 Sampling
Water	Every two years	No
Bird Eggs	Every three years	Yes
Sediment	Every four years	No
Sport Fish	Every five years	No
Bivalves	Every two years	Yes
Support to the USGS for suspended sediment and nutrient monitoring	Every year	Yes

2.2 RMP Pilot and Special Studies

The RMP also conducts Pilot and Special Studies[9] on an annual basis. Studies are typically designed to investigate and develop new monitoring measures related to anthropogenic contamination or contaminant effects on biota in the Estuary. 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 TRC and the Steering Committee.

In 2016, Pilot and Special Studies focused on the following topics:

- Nutrients Management Strategy
    - Continuous monitoring of nutrients, phytoplankton biomass, and dissolved oxygen at moored sensors
    - Continuous monitoring of dissolved oxygen in shallow margin habitats
    - Nutrients monitoring program development
- Small Tributary Loadings Strategy (see below and Section 5.0 for more details)

[8] Additional information on the S&T Program and associated monitoring data are available for download via the RMP website at http://www.sfei.org/content/status-trends-monitoring.
[9] Results and summaries of the most pertinent Pilot and Special Studies can be found on the RMP website (http://www.sfei.org/rmp/rmp_pilot_specstudies).

- Chemicals of emerging concern (CEC) monitoring (perfluorochemicals, fipronil, and microplastics)
- Development of conceptual PCB models for prioritized Bay margin units
- Selenium in fish tissue monitoring
- Evaluation of toxicity testing protocols for marine sediments

In WY 2016, a considerable amount of RMP and stormwater program staff time was spent overseeing and implementing Special Studies associated with the RMP's Small Tributary Loading Strategy (STLS). Pilot and Special Studies associated with the STLS are intended to fill data gaps associated with loadings of Pollutants of Concern (POC) from relatively small tributaries to the San Francisco Bay. Additional information on STLS-related studies is included in Section 5.0 (POC Loads Monitoring) of this report.

2.3 Participation in Committees, Workgroups and Strategy Teams

In WY 2016, BASMAA and/or SMCWPPP staff actively participated in the following RMP Committees and workgroups:

- Steering Committee (SC)
- Technical Review Committee (TRC)
- Sources, Pathways and Loadings Workgroup (SPLWG)
- Contaminant Fate Workgroup (CFWG)
- Exposure and Effects Workgroup (EEWG)
- Emerging Contaminant Workgroup (ECWG)
- Sport Fish Monitoring Workgroup
- Nutrient Technical Workgroup
- Strategy Teams (e.g., PCBs, Mercury, Dioxins, Small Tributaries, Nutrients)

Committee and workgroup representation was provided by Permittee, stormwater program (including SMCWPPP) staff and/or individuals designated by RMC participants and the BASMAA BOD. Representation typically includes participating in meetings, reviewing technical reports and work products, co-authoring or reviewing articles included in *2016 RMP Update*, and providing general program direction to RMP staff. Representatives of the RMC also provided timely summaries and updates to, and received input from Stormwater Program representatives (on behalf of Permittees) during BASMAA Monitoring and Pollutants of Concern Committee (MPC) and/or BASMAA BOD meetings to ensure Permittees' interests were represented.

3.0 Creek Status Monitoring (C.8.d) and Pesticides and Toxicity Monitoring (C.8.g)

This section summarizes the results of creek status monitoring and pesticides and toxicity monitoring required by Provisions C.8.d and C.8.g of the MRP, respectively. Detailed methods and results are provided in Appendix A.

Creek Status Monitoring (C.8.d)

Provision C.8.d of the MRP requires Permittees to conduct creek status monitoring that is intended to answer the following management questions:

1. *Are water quality objectives, both numeric and narrative, being met in local receiving waters, including creeks, rivers and tributaries?*
2. *Are conditions in local receiving waters supportive of or likely supportive of beneficial uses?*

Creek status monitoring parameters, methods, occurrences, durations and minimum number of sampling sites for each stormwater program are described in Provision C.8.d of the MRP. The RMC's regional monitoring strategy for complying with creek status monitoring requirements is described in the RMC Creek Status and Long-Term Trends Monitoring Plan (BASMAA 2012). The strategy includes a regional ambient/probabilistic monitoring component and a component based on local "targeted" monitoring. The combination of these monitoring designs allows each individual RMC participating program to assess the status of beneficial uses in local creeks within its Program (jurisdictional) area, while also contributing data to answer management questions at the regional scale (e.g., differences between aquatic life condition in urban and non-urban creeks). Implementation began in WY 2012.

Creek status monitoring data from WY 2016 were submitted to the Regional Water Board by SMCWPPP. The analyses of results from creek status monitoring conducted by SMCWPPP in WY 2016 are summarized below and presented in detail in Appendix A (Creek Status Monitoring Report, WY 2016). The WY 2016 report includes stressor analysis of the five-year (i.e., WY 2012 – WY 2016) SMCWPPP dataset. Analysis of the five-year regional RMC dataset is anticipated in Fiscal Year 2017/18.

The probabilistic monitoring design was developed to remove bias from site selection such that ecosystem conditions can be objectively assessed on local (i.e., SMCWPPP) and regional (i.e., RMC) scales. Probabilistic parameters consist of bioassessments, nutrients, and conventional analytes conducted according to methods described in the SWAMP SOP (Ode et al. 2016). Free chlorine and total chlorine residual were also measured at probabilistic sites. Ten probabilistic sites were sampled by SMCWPPP in WY 2016.

The targeted monitoring design focuses on sites selected based on the presence of significant fish and wildlife resources as well as historical and/or recent indications of water quality concerns. Targeted monitoring parameters consist of water temperature, general water quality, and pathogen indicators using methods, sampling frequencies, and number of stations required in provision C.8.d of the MRP. Hourly water temperature measurements were recorded during the dry season at five sites using HOBO® temperature data loggers in the San Francisquito Creek watershed. General water quality monitoring (temperature, dissolved oxygen, pH and specific conductivity) was conducted using YSI® continuous water quality equipment (sondes) for two 2-week periods (spring and late summer) at two sites in the same watershed. Water

samples for analysis of pathogen indicators (*E. coli* and enterococcus) were collected at five sites located in the San Mateo Creek watershed.

Pesticides and Toxicity Monitoring (C.8.g)

Provision C.8.g of the MRP requires Permittees to conduct wet weather and dry weather pesticides and toxicity monitoring. Test methods, sampling frequencies, and number of stations required are described in the MRP. In WY 2016, SMCWPPP conducted dry weather pesticides and toxicity monitoring at one bottom-of-the-watershed station. Consistent with Provision C.8.g.iii, wet weather pesticides and toxicity monitoring will be conducted on a regional basis and will begin in WY 2018.

Creek Status and Pesticides and Toxicity monitoring stations are listed in Table E-1 and illustrated in Figure 3.1.

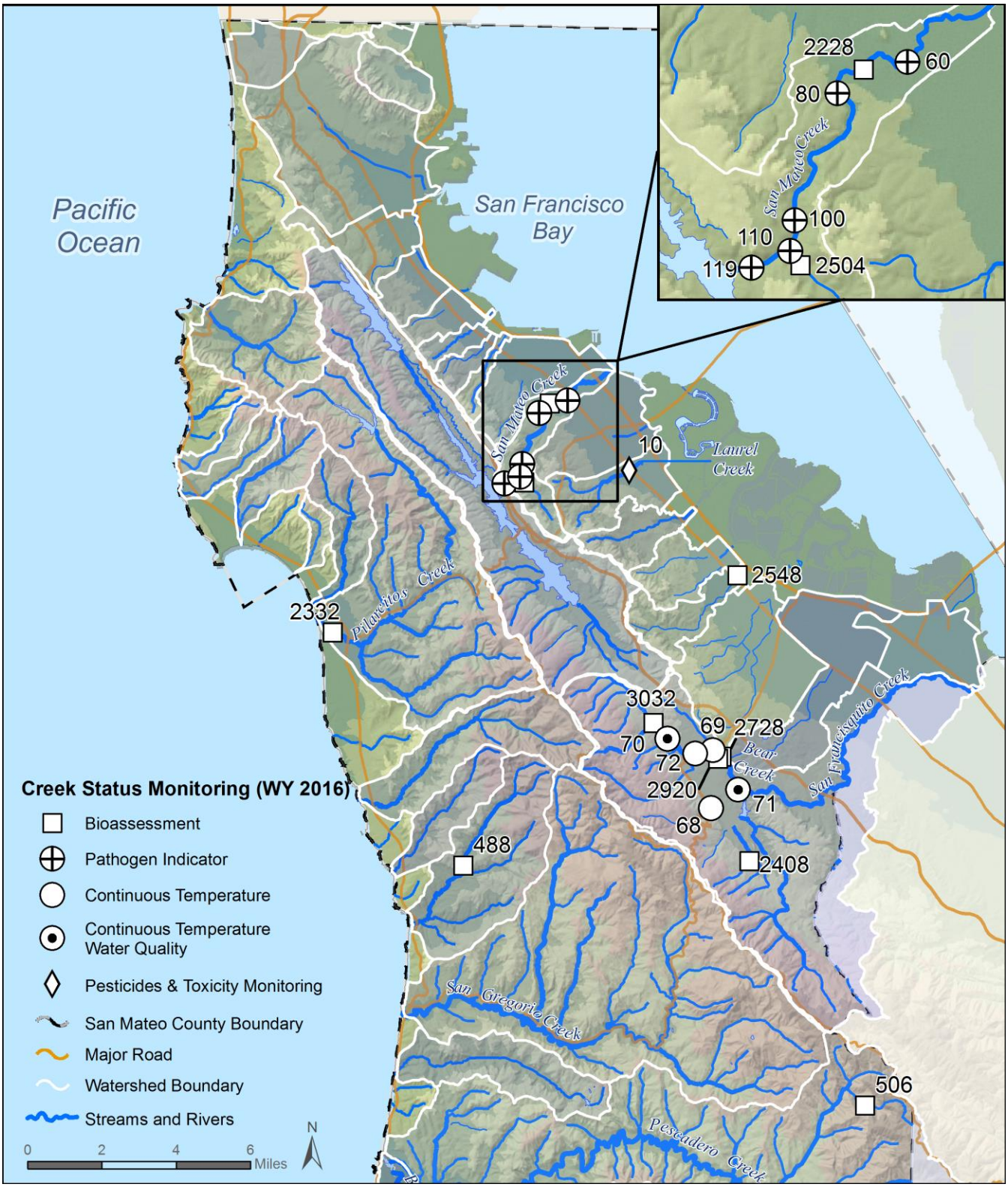

Figure 3.1. Map of major creeks and SMCWPPP stations monitored in WY 2016 in compliance with MRP Provision C.8.c.

3.1 Approach to Management Questions

The first MRP creek status management question (*Are water quality objectives, both numeric and narrative, being met in local receiving waters, including creeks, rivers and tributaries?*) is addressed primarily through the evaluation of probabilistic and targeted monitoring data with respect to the triggers defined in the MRP. The MRP also defines triggers for pesticides and toxicity monitoring data. A summary of trigger exceedances observed for each site is presented below in Table 3.1. Sites where triggers are exceeded may indicate potential impacts to aquatic life or other beneficial uses and are considered for future stressor/source identification (SSID) projects (see Section 4.0 for a discussion of SSID projects).

The second MRP creek status management question (*Are conditions in local receiving waters supportive of or likely supportive of beneficial uses?*) is addressed primarily by assessing indicators of aquatic biological health using benthic macroinvertebrate (BMI) and algae data collected at probabilistic sites. Biological condition scores for the five-year (i.e., WY 2012 – WY 2016) SMCWPPP dataset were compared to physical habitat (PHAB) and water quality data collected synoptically with bioassessments to evaluate whether correlations exist that may explain the variation in biological condition scores.

3.2 Monitoring Results and Conclusions

3.2.1 Bioassessment Monitoring Results/Conclusions

Bioassessment monitoring in WY 2016 was conducted in compliance with Provision C.8.d.i of the MRP. Ten sites were sampled for benthic macro-invertebrates, benthic algae, physical habitat observations, and nutrients. Stations were randomly selected using a probabilistic monitoring design.

Conclusions and recommendations from bioassessment monitoring conducted during WY 2016 in San Mateo County are organized below according to the following detailed management questions that build off the management questions listed above. See Appendix A for detailed explanations of the findings.

1. *What is the condition of aquatic life in creeks in the RMC area; are water quality objectives met and are beneficial uses supported?*
    i. *What is the condition of aquatic life in the urbanized portion of the RMC area; are water quality objectives met and are beneficial uses supported?*
    ii. *What is the condition of aquatic life in RMC participant counties; are water quality objectives met and are beneficial uses supported?*
    iii. *To what extent does the condition of aquatic life in urban and non-urban creeks differ in the RMC area?*
    iv. *To what extent does the condition of aquatic life in urban and non-urban creeks differ in each of the RMC participating counties?*
2. *What are major stressors to aquatic life in the RMC area?*
    i. *What are major stressors to aquatic life in the urbanized portion of the RMC area?*
3. *What are the long-term trends in water quality in creeks over time?*

Probabilistic Survey Design

- Site evaluations were conducted at a total of 36 potential probabilistic sites in San Mateo County during WY 2016. Of these sites, ten were sampled in WY 2016 (rejection rate of 72%). Two of the ten sites (20%) were classified as non-urban land use.

- Between WY 2012 and WY 2016, a total of 60 probabilistic sites were sampled by SMCWPPP (n=50) and SWAMP (n=10) in San Mateo County, including 41 urban and 19 non-urban sites. Based on a power analysis conducted during the design of the probabilistic monitoring program, a sample size of at least 30 is needed to evaluate the condition of aquatic life within known estimates of precision. There is now a sufficient number of samples from probabilistic sites to develop estimates of ambient biological condition and stressor assessment for urban streams in San Mateo County.

- Additional samples are needed to estimate biological condition at more local scales (e.g., watershed and jurisdictional areas) and to increase the confidence of estimates at sites in non-urban areas.

Condition of Aquatic Life in Creeks/Biological Condition Assessment (WY 2016)

- The California Stream Condition Index (CSCI)[10] tool was used to assess biological condition. The CSCI translates benthic macroinvertebrate data into an overall measure of stream health. Of the ten sites monitored in WY 2016, two sites were rated in good condition (CSCI score $\geq$ 0.795), three sites rated as likely altered conditions (CSCI score 0.635 – 0.795), and five sites rated as very likely altered condition (CSCI score $\leq$ 0.635) (Figure 3.2).
- The eight sites with CSCI scores less than the trigger threshold of 0.795 will be added to the list of candidate SSID projects.
- Benthic algae were collected synoptically with BMIs at all probabilistic sites. Diatom taxa (n=120) were well represented, but few soft algae taxa (n=12) were identified in the ten samples. As a result, the majority of sites had low biological condition based on algae indices that incorporate soft algae (S2 and H20). Two sites were ranked in good biological condition based on diatom (D18) IBI scores.
- Total PHAB scores were better correlated with CSCI scores than they were with D18 scores, suggesting that physical habitat (e.g., substrate quality, channel alteration) has a greater influence on the BMI community than the diatoms assemblage.

Condition of Aquatic Life in Creeks/Biological Condition Assessment (WY 2012 – WY 2016)

- CSCI scores were calculated for the five-year San Mateo County probabilistic data set (n=60). Good biological condition scores (CSCI score > 0.795) occurred at 17% of the urban sites and 74% of non-urban sites (Figure 3.2).
- The median CSCI scores were higher at non-perennial sites (0.74) compared to perennial (0.55) sites. A similar pattern was observed with all three algae IBI scores. Non-perennial sites were typically located in non-urban areas in the upper reaches of

[10] Information on how the CSCI was developed can be found at: http://www.waterboards.ca.gov/water_issues/programs/swamp/bioassessment/data_tools.shtml

watersheds draining into Pacific Ocean or tributaries to San Francisquito Creek (draining into the San Francisco Bay), which may explain the higher scores.

- CSCI scores generally decrease in response to increasing urbanization (calculated as percent impervious area).

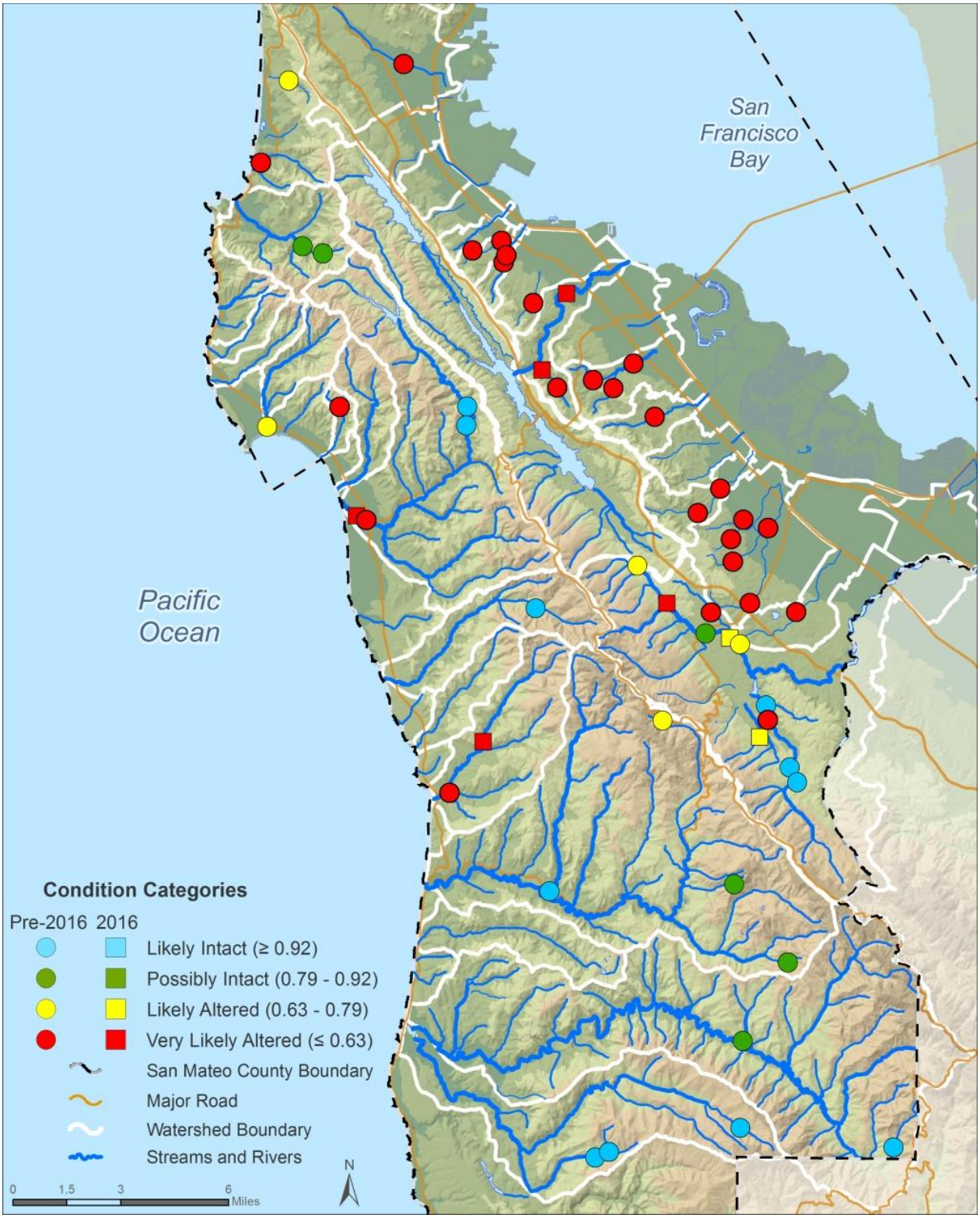

Figure 3.2. Biological condition based on CSCI scores for 60 sites sampled by SMCWPPP and SWAMP in San Mateo County between WY 2012 and WY 2016.

Major Stressors to Aquatic Life

- Potential stressors such as nutrients, physical habitat, algal biomass indicators, and other conventional analytes were measured during bioassessments or analyzed in samples collected concurrently with bioassessments. Some potential stressors, such as urbanization indicators (e.g., percent impervious area in watershed), were calculated using GIS.
- CSCI scores have a significant negative correlation with land use variables (percent impervious and urban), total nitrogen, algal cover, canopy cover, human disturbance index (HDI) and DOC and a positive correlation with two PHAB parameters (epifaunal substrate score and channel alteration score).
- Concentrations of unionized ammonia, nitrate, and chloride were compared to water quality objectives (WQOs). No WQOs were exceeded.

Long-Term Trends Assessment

- Trend analysis for the RMC probabilistic survey will require more than four years of data collection. Preliminary long-term trend analysis of biological condition may be possible for some stream reaches using a combination of historical targeted data with the probabilistic data.
- Targeted re-sampling at probabilistic sites could provide additional data to evaluate longer term trends at selected locations and will be considered in future years.

3.2.2 Targeted Monitoring Results/Conclusions

Targeted monitoring in WY 2016 was conducted in compliance with Provisions C.8.d.iii – v of the MRP. Hourly temperature measurements were recorded at five sites in the Bear Creek subwatershed of the San Francisquito Creek watershed from April through September. Continuous (15-minute) general water quality measurements (pH, dissolved oxygen, specific conductance, temperature) were recorded at two of the temperature sites during two 2-week periods in May (Event 1) and September (Event 2). Pathogen indicator grab samples were collected during a single sampling event in June at five sites in the San Mateo Creek watershed. Stations were deliberately selected using the directed monitoring design principle.

Conclusions and recommendations from targeted monitoring in WY 2016 are listed below. The sections below are organized on the basis of three management questions. See Appendix A for detailed explanations of the findings.

1. *What is the spatial and temporal variability in water quality conditions during the spring and summer season?*
2. *Do general water quality measurements indicate potential impacts to aquatic life?*
3. *What are the pathogen indicator concentrations at creek sites where there is potential for water contact recreation to occur?*

Spatial and Temporal Variability of Water Quality Conditions

- There was minimal spatial variability in water temperature across the four stations in the Bear Creek branch of the San Francisquito Creek watershed. Temperature was slightly lower at the station in Alambique Creek.

- The same stations were monitored for temperature in WYs 2014 and 2015. Temperature monitoring results in WY 2016 were similar to results from prior years.

- Dissolved oxygen concentrations were reduced during Event 2 compared to Event 1 at both sites. Changes in dissolved oxygen (DO) are likely caused by decreasing flow in the late summer and water quality conditions associated with isolated pools.

Potential Impacts to Aquatic Life

- Potential impacts to aquatic life were assessed through analysis of continuous temperature data collected at five stations and continuous general water quality data (pH, dissolved oxygen, specific conductance, and temperature) collected at two stations.
- Two temperature stations in Bear Creek exceeded the MRP trigger threshold of having two or more weeks where the maximum weekly average temperature (MWAT) exceeded 17°C. None of the stations exceeded the maximum instantaneous trigger threshold of 24°C.
- All stations with MWAT trigger exceedances will be added to the list of candidate SSID projects; however, review of the monitoring data in the context of the ongoing drought and locally-derived temperature thresholds developed by National Marine Fisheries Service suggests that temperature is not likely a limiting factor for salmonid habitat (i.e., summer rearing juveniles) in the study reaches.
- The water quality objective (WQO) for DO in waters designated as having cold freshwater habitat beneficial uses (i.e., 7.0 mg/L) was frequently exceeded at both water quality stations during Event 2. The water quality conditions were associated with isolated pools during low or no flow conditions. Both sites will be added to the list of potential SSID projects.
- Values for pH measured at one site in WY 2016 (205BCR010 - Bear Creek Sandhill Road) did not meet the lower WQO for pH during Event 2. This site will be added to the list of potential SSID projects. The pH excursion was likely related to low/no flow conditions resulting in an isolated pool at the monitoring station.
- Specific conductance concentrations recorded at the two stations in WY 2016 were below the MRP trigger threshold of 2000 us/cm.

Potential Impacts to Water Contact Recreation

- In WY 2016, pathogen indicator sites were located in the San Mateo Creek watershed where a bacteria SSID study was previously conducted. Pathogen indicator triggers for enterococcus were exceeded at two of the five sites. Triggers for *E. coli* were not exceeded.

- It is important to recognize that pathogen indicator thresholds are based on human recreation at beaches receiving bacteriological contamination from human wastewater,

and may not be applicable to conditions found in urban creeks. As a result, the comparison of pathogen indicator results to body contact recreation (REC-1) WQOs may not be appropriate and should be interpreted cautiously. Furthermore, the State Board is in the process of updating pathogen indicator WQOs to reflect recent USEPA criteria.[11]

- Municipalities in the lower San Mateo Creek watershed are currently implementing prescribed actions to reduce or eliminate conditions in the sanitary sewer collection system that cause or contribute to sanitary system overflows. The County of San Mateo also has a public outreach program targeting pet waste and other sources of bacteria. Actions include webpage[12] and Facebook postings and dog bag dispenser giveaways.

3.2.3 Chlorine Monitoring Results/Conclusions

Monitoring of total and free chlorine residual at probabilistic stations was conducted in compliance with Provision C.8.d.ii of the MRP. If the chlorine concentration is greater than 0.1 mg/L, the station is immediately resampled and the second value is compared to the trigger criterion of 0.1 mg/L.

While chlorine residual is generally not a concern in San Mateo County creeks, WY 2016 and prior monitoring results suggest there are occasional free chlorine and total chlorine exceedances in the County. Free chlorine concentrations at three of the ten sites exceeded the trigger criterion of 0.1 mg/L. The exceedances, all of which were free chlorine, ranged from 0.11 to 0.24 mg/L. The values are flagged for possible QA problems because the corresponding total chlorine residual values were at or below the 0.1 mg/L threshold. Nevertheless, in compliance with Provision C.8.d.ii(4), the monitoring results were reported to local illicit discharge staff. Exceedances may be the result of one-time potable water discharges and it is generally very difficult to determine the source of elevated chlorine from such episodic discharges. The Program will continue to monitor chlorine in compliance with the MRP and will follow-up with illicit discharge staff as needed.

3.2.4 Pesticides and Toxicity Monitoring Results/Conclusions

In WY 2016, SMCWPPP conducted dry weather pesticides and toxicity monitoring at one station (Laurel Creek) in compliance with Provision C.8.g of the MRP.

Statistically significant toxicity to *C. dubia, C. dilutus,* and/or *H. azteca* was observed in both water and sediment samples collected during the dry season. However, the magnitude of the toxic effects in the samples compared to laboratory controls were not great and did not exceed MRP trigger criteria of 50 Percent Effect.

Threshold Effect Concentration (TEC) and Probable Effect Concentration (PEC) quotients were calculated for all metals and PAHs measured in sediment samples according to methods described in MacDonald et al. (2000). Two TEC and one PEC quotients exceeded 1.0. In compliance with the MRP, Laurel Creek will therefore be placed on the list of candidate SSID projects. Decisions about which SSID projects to pursue should be informed by the fact that the TEC and PEC quotient exceedances may be related to naturally occurring chromium and nickel due to the area's serpentine geology.

[11] See http://www.waterboards.ca.gov/bacterialobjectives/ for more information.

[12] http://www.flowstobay.org/petwaste

SMCWPPP will continue to sample one station per year for dry weather pesticides and toxicity throughout the permit term. In WY 2018, SMCWPPP anticipates working with the BASMAA RMC partners on a regional approach to wet weather pesticides and toxicity monitoring.

3.3 Trigger Assessment

The MRP requires analysis of the monitoring data to identify candidate sites for SSID projects. Trigger thresholds against which to compare the data are provided for most monitoring parameters in the MRP and are described in the foregoing sections of this report. Stream condition was determined based on CSCI scores that were calculated using BMI data. Water and sediment chemistry and toxicity data were evaluated using numeric trigger thresholds specified in the MRP. Nutrient data were evaluated using applicable water quality standards from the Basin Plan (SFRWQCB, 2013). In compliance with Provision C.8.e.i of the MRP, all monitoring results exceeding trigger thresholds are added to a list of candidate SSID projects maintained throughout the permit term. Follow-up SSID projects will be selected from this list. Table 3.1 lists candidate SSID projects based on WY 2016 Creek Status and Pesticides/Toxicity monitoring data.

Additional analysis of the data is provided in the foregoing sections of this report and should be considered prior to selecting and defining SSID projects. The analyses include review of physical habitat and water chemistry data to identify potential stressors that may be contributing to degraded or diminished biological conditions. Analyses in this report also include historical and spatial perspectives that help provide context and deeper understanding of the trigger exceedances.

Table 3.1. Summary of SMCWPPP MRP trigger threshold exceedance analysis, WY 2016. "No" indicates samples were collected but did not exceed the MRP trigger; "Yes" indicates an exceedance of the MRP trigger.

Station Number	Creek Name	Bioassessment [1]	Nutrients [2]	Chlorine [3]	Water Toxicity [4]	Sediment Toxicity [4]	Sediment Chemistry [5]	Continuous Temperature [6]	Dissolved Oxygen [7]	pH [8]	Specific Conductance [9]	Pathogen Indicators [10]
202R00488	Tunitas Creek	Yes	No	Yes	--	--	--	--	--	--	--	--
202R00506	Peters Creek	No	No	No	--	--	--	--	--	--	--	--
202R02332	Pilarcitos Creek	Yes	No	Yes	--	--	--	--	--	--	--	--
204R02228	San Mateo Creek	Yes	No	No	--	--	--	--	--	--	--	--
204R02504	Polhemus Creek	Yes	No	No	--	--	--	--	--	--	--	--
204R02548	Cordilleras Creek	Yes	No	No	--	--	--	--	--	--	--	--
205R02408	Bull Run Creek	Yes	No	Yes	--	--	--	--	--	--	--	--
205R02728	Dry Creek	Yes	No	No	--	--	--	--	--	--	--	--
205R02920	Bear Creek	Yes	No	No	--	--	--	--	--	--	--	--
205R03032	West Union	Yes	No	No	--	--	--	--	--	--	--	--
204LAU010	Laurel Creek	--	--	--	No	No	Yes	--	--	--	--	--
204SMA060	San Mateo Creek	--	--	--	--	--	--	--	--	--	--	Yes
204SMA080	San Mateo Creek	--	--	--	--	--	--	--	--	--	--	Yes
204SMA100	San Mateo Creek	--	--	--	--	--	--	--	--	--	--	No
204SMA119	San Mateo Creek	--	--	--	--	--	--	--	--	--	--	No
204SMA110	Polhemus Creek	--	--	--	--	--	--	--	--	--	--	No
205ALA015	Alambique Creek	--	--	--	--	--	--	No	--	--	--	--
205BCR010	Bear Creek	--	--	--	--	--	--	Yes	Yes	No	No	--
205BCR050	Bear Creek	--	--	--	--	--	--	Yes	--	--	--	--
205BCR060	Bear Creek	--	--	--	--	--	--	No	--	--	--	--
205WUN150	West Union Creek	--	--	--	--	--	--	No	Yes	Yes	No	--

Notes:

1. CSCI score ≤ 0.795.
2. Unionized ammonia (as N) ≥ 0.025 mg/L, nitrate (as N) ≥ 10 mg/L, chloride > 250 mg/L.
3. Free chlorine or total chlorine residual ≥ 0.1 mg/L.
4. Test of Significant Toxicity = Fail and Percent Effect ≥ 50 %.
5. TEC or PEC quotient ≥ 1.0 for any constituent.
6. Two or more MWAT ≥ 17.0°C or 20% of results ≥ 24°C.
7. DO < 7.0 mg/L in COLD streams or DO < 5.0 mg/L in WARM streams.
8. pH < 6.5 or pH > 8.5.
9. Specific conductance > 2000 uS.
10. Enterococcus ≥ 130 cfu/100ml or E. coli ≥ 410 cfu/100ml.

3.4 Management Implications

The Program's Creek Status and Pesticides and Toxicity Monitoring programs (consistent with MRP provisions C.8.c and C.8.g, respectively) focus on assessing the water quality condition of urban creeks in San Mateo County and identifying stressors and sources of impacts observed. Although the sample size from WY 2016 (overall n=10; urban n=8) is not sufficient to develop statistically representative conclusions regarding the overall condition of all creeks, it builds on data collected in WY 2012 through WY 2015 and is analyzed with the full five-year dataset (n=60). Most urban streams have likely or very likely altered populations of aquatic life indicators (e.g., aquatic macroinvertebrates). These conditions are likely the result of long-term changes in stream hydrology, channel geomorphology, in-stream habitat complexity, and other modifications to the watershed and riparian areas associated with the urban development that has occurred over the past 50 plus years. Furthermore, episodic or site specific increases in temperature may not be optimal for aquatic life in local creeks.

SMCWPPP Permittees are actively implementing many stormwater management programs to address these and other stressors and associated sources of water quality conditions observed in local creeks, with the goal of protecting these natural resources. For example:

- In compliance with MRP Provision C.3, new and redevelopment projects in the Bay Area are now designed to more effectively reduce water quality and hydromodification impacts associated with urban development. Low impact development (LID) methods, such as rainwater harvesting and use, infiltration and biotreatment are required as part of development and redevelopment projects. In addition, Green Infrastructure planning is now part of all municipal projects. These LID measures are expected to reduce the impacts of urban runoff and associated impervious surfaces on stream health.
- In compliance with MRP Provision C.9, Permittees are implementing pesticide toxicity control programs that focus on source control and pollution prevention measures. The control measures include the implementation of integrated pest management (IPM) policies/ordinances, public education and outreach programs, pesticide disposal programs, the adoption of formal State pesticide registration procedures, and sustainable landscaping requirements for new and redevelopment projects. Through these efforts, it is estimated that the amount of pyrethroids observed in urban stormwater runoff will decrease by 80-90% over time, and in turn significantly reduce the magnitude and extent of toxicity in local creeks.
- Trash loadings to local creeks have been reduced through implementation of new control measures in compliance with MRP Provision C.10 and other efforts by Permittees to reduce the impacts of illegal dumping directly into waterways. These actions include the installation and maintenance of trash capture systems, the adoption of ordinances to reduce the impacts of litter prone items, enhanced institutional controls such as street sweeping, and the on-going removal and control of direct dumping. The MRP establishes a mandatory trash load reduction schedule, minimum areas to be treated by full trash capture systems, and requires development of receiving water monitoring programs for trash.
- In compliance with MRP Provisions C.2 (Municipal Operations), C.4 (Industrial and Commercial Site Controls), C.5 (Illicit Discharge Detection and Elimination), and C.6 (Construction Site Controls) Permittees continue to implement Best Management Practices that are designed to prevent non-stormwater discharges during dry weather

and reduce the exposure of contaminants to stormwater and sediment in runoff during rainfall events.

- In compliance with MRP Provision C.13, copper in stormwater runoff is reduced through implementation of controls such as architectural and site design requirements, prohibition of discharges from water features treated with copper, and industrial facility inspections.
- Mercury and polychlorinated biphenyls (PCBs) in stormwater runoff are being reduced through implementation of the respective Total Maximum Daily Load water quality restoration plans. It should be noted that impacts associated with these pollutants have primarily been observed in San Francisco Bay and there is little information regarding whether or not there are impacts to Bay Area creeks. In compliance with MRP Provisions C.11 (mercury) and C.12 (PCBs), the Program will continue to identify sources of these pollutants and will implement control actions designed to achieve new minimum load reduction goals. Monitoring activities conducted in WY 2016 that specifically targets mercury and PCBs are described in the Pollutants of Concern Monitoring Data Report that is included as Appendix C to this WY 2016 UCMR.

In addition to the Program and Co-permittee controls implemented in compliance with the MRP, numerous other efforts and programs designed to improve the biological, physical and chemical condition of local creeks are underway. For example, C/CAG recently developed the Draft San Mateo Countywide Stormwater Resource Plan (SRP) to satisfy state requirements and guidelines to ensure C/CAG and SMCWPPP member agencies are eligible to compete for future voter-approved bond funds for stormwater or dry weather capture projects. The SRP identifies and prioritizes opportunities to better utilize stormwater as a resource in San Mateo County through a detailed analysis of watershed processes, surface and groundwater resources, input from stakeholders and the public, and analysis of multiple benefits that can be achieved through strategically planned stormwater management projects. These projects aim to capture and manage stormwater more sustainably, reduce flooding and pollution associated with runoff, improve biological functioning of plants, soils, and other natural infrastructure, and provide many community benefits, including cleaner air and water and enhanced aesthetic value of local streets and neighborhoods.

Through the continued implementation of MRP-associated and other watershed stewardship programs, SMCWPPP anticipates that stream conditions and water quality in local creeks will improve over time. In the near term, toxicity observed in creeks should decrease as pesticide regulations better incorporate water quality concerns during the pesticide registration process. In the longer term, control measures implemented to “green” the “grey” infrastructure and disconnect impervious areas constructed over the course of the past 50 plus years will take time to implement. Consequently, it may take several decades to observe the outcomes of these important, large-scale improvements to our watersheds in our local creeks. Long-term creek status monitoring programs designed to detect these changes over time are therefore beneficial to our collective understanding of the condition and health of our local waterways.

4.0 Stressor/Source Identification Projects (C.8.e)

Provision C.8.e of the MRP requires that Permittees evaluate creek status (provision C.8.d) and pesticides and toxicity (provision C.8.g) monitoring data with respect to triggers defined in the MRP and maintain a list of all results exceeding trigger thresholds. Table 3.1 lists the results of the trigger evaluation for WY 2016 data. Sites where triggers are exceeded may indicate potential impacts to aquatic life or other beneficial uses and are considered as candidates for future SSID projects. SSID projects are selected from the list of trigger exceedances based on criteria such as magnitude of threshold exceedance, parameter, and likelihood that stormwater management action(s) could address the exceedance. The MRP requires that Permittees initiate a minimum number of SSID projects during the permit term. SMCWPPP and its RMC partners must collectively initiate a region-wide minimum of eight new SSID Projects during the permit term. All SSID project reports must be presented in a unified, regional-level report. No SSID projects have been initiated yet in compliance with the current MRP. However, the status of all SSID projects initiated under the 2009 MRP is provided in Appendix B. Although the two SSID projects initiated by SMCWPPP under the 2009 MRP are complete, some projects conducted by the RMC partners are still in progress.

SSID projects must identify and isolate potential sources and/or stressors associated with observed water quality impacts. They are intended to be oriented to taking action(s) to alleviate stressors and reduce sources of pollutants. The MRP describes the stepwise process for conducting SSID projects:

- Step 1: Develop a work plan for each SSID project that defines the problem to the extent known, describes the SSID project objectives, considers the problem within a watershed context, lists candidate causes of the problem, and establishes a schedule for investigating the cause(s) of the trigger exceedance. The MRP recommends study approaches for specific triggers. For example, toxicity studies should follow guidance for Toxicity Reduction Evaluations (TRE) or Toxicity Identification Evaluations (TIE), physical habitat and conventional parameter (e.g., dissolved oxygen, temperature) studies should generally follow Step 5 (Identify Probable Causes) of the Causal Analysis/Diagnosis Decision Information System (CADDIS), and pathogen indicator studies should generally follow the California Microbial Source Identification Manual (SCCWRP 2013).
- Step 2: Conduct SSID investigation according to the schedule in the SSID work plan and report on the status of SSID investigations annually in the UCMR.
- Step 3: Conduct follow-up actions based on SSID investigation findings. These may include development of an implementation schedule for new or improved best management practices (BMPs). If a Permittee determines that MS4 discharges are not contributing to an exceedance of a water quality standard, the Permittee may end the SSID project upon written concurrence of the Executive Officer. If the SSID investigation is inconclusive, the Permittee may request that the Executive Officer consider the SSID project complete.

SMCWPPP intends to initiate one SSID project in 2017 following collaboration with RMC partners.

5.0 Pollutants of Concern Monitoring (C.8.f)

Pollutants of Concern (POC) monitoring is required by Provision C.8.f of the MRP. POC monitoring is intended to assess inputs of POCs to the Bay from local tributaries and urban runoff, provide information to support implementation of total maximum daily load action plans (TMDLs) and other pollutant control strategies, assess progress toward achieving wasteload allocations (WLAs) for TMDLs, and help resolve uncertainties associated with loading estimates for these pollutants. The MRP identifies five priority POC management information needs that need to be addressed though POC monitoring:

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, and presence in local tributaries or urban stormwater discharges; and
5. **Trends** – evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time.

Provision C.8.f of the MRP requires POC monitoring of polychlorinated biphenyls (PCBs), mercury, copper, emerging contaminants, and nutrients.[13] The MRP defines yearly and total (i.e., permit term) minimum number of samples for each POC and specifies the minimum number of samples for each POC that must address each information need. POC monitoring in WY 2016 was conducted in accordance with the WY 2016 POC Monitoring Plan (SMCWPPP 2016a) which describes monitoring goals, methods, and quality assurance/quality control (QA/QC) procedures. Progress toward POC monitoring requirements accomplished in WY 2016 and the planned allocation of effort for WY 2017 is described in the SMCWPPP POC Monitoring Report (SMCWPPP 2016b) that was submitted to the Regional Water Board on October 13, 2016 in compliance with Provision C.8.h.iv of the MRP.

In WY 2016, SMCWPPP complied with Provision C.8.f of the MRP through the following activities:

- Implementation of a catchment-scale storm sampling program for PCBs, mercury, and copper analysis;
- Collection of dry weather samples for nutrients analysis; and
- Continued participation in the RMP Small Tributaries Loading Strategy Team[14].

[13] Emerging contaminant monitoring requirements will be met through participation in RMP special studies. The special study will account for relevant constituents of emerging concern (CECs) in stormwater and will address at least PFOS, PFAS, and alternative flame retardants being used to replace PBDEs.

[14] SMCWPPP 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. Samples collected in San Mateo County through the RMP and CW4CB program are used to supplement the Program's efforts towards achieving Provision C.8.f monitoring requirements.

POC monitoring in WY 2016 focused primarily on identification of source areas of PCBs and mercury to the MS4 and San Francisco Bay. Both SMCWPPP and the STLS implemented a process to identify and prioritize watershed management areas (WMAs) which is generally consistent with other RMC partner efforts as coordinated through BASMAA. WMAs are all catchments with high interest parcels and/or existing or planned pollutant controls. The POC monitoring described in the next section helps to prioritize WMAs by identifying which WMAs have source areas and provide the greatest opportunities for implementing controls to reduce loads of POCs in urban stormwater runoff..

A report describing the results of all POC monitoring conducted by SMCWPPP is included as Appendix C. A report describing the results of POC monitoring conducted by the STLS is included as Appendix D.

5.1 SMCWPPP POC Monitoring

In compliance with Provision C.8.f of the MRP, the Program conducted POC monitoring in WY 2016 for PCBs, mercury, copper, and nutrients. The MRP-required yearly minimum number of samples was met or exceeded for all POCs. Results are summarized in the sections below and detailed in Appendix C.

5.1.1 PCBs and Mercury Opportunity Area Analysis

The primary goal of PCB and mercury monitoring by the Program in WY 2016, as described in the Monitoring Plan (SMCWPPP 2016a), was to provide information to prioritize WMAs where control measures could be implemented to comply with MRP requirements for load reductions of PCBs and mercury. WY 2016 PCBs and mercury monitoring was focused on collection of storm composite samples from WMAs that may contain PCB and/or mercury source properties. Catchment areas were delineated from municipal storm drain data. WMAs were prioritized for sampling by evaluating several types of data, including: PCBs and mercury concentrations from prior sediment and water sampling efforts, and land use data showing old industrial parcels. Specific sampling stations were identified using municipal storm drain data showing pipelines and access points (e.g., manholes, outfalls, pump stations), taking into account logistical/safety considerations (SMCWPPP 2016a).

During WY 2016, the Program collected eight stormwater runoff samples for PCBs and mercury analysis. 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 congeners (method EPA 1668C), total mercury (method EPA 1631E), and suspended sediment concentration (SSC; method ASTM D3977-97).

Total PCB concentrations, calculated as the sum of the “RMP 40” congeners, ranged from 0.592 ng/L to 13.0 ng/L. PCB particle ratios, calculated by dividing total PCB concentrations by SSC, ranged from 39.8 ng/g to 182 ng/g. Mercury concentrations ranged from 6.8 ng/L to 18 ng/L and mercury particle ratios ranged from 149 ng/g to 712 ng/g. Results of the samples collected by SMCWPPP were relatively low compared to other samples collected throughout the region. However, some of the samples collected by the RMP STLS in WY 2015 and WY 2016 had

elevated PCBs. Figure 5.1 shows the status of San Mateo County WMAs based on sediment and stormwater runoff data collected through WY 2016.[15] See Appendix D for more details.

SMCWPPP plans to continue working with other Bay Area countywide stormwater programs (through the BASMAA MPC Committee) and the RMP STLS to evaluate the results of the ongoing efforts in the Bay Area to identify PCBs and mercury sources and monitor additional WMAs. Source properties will be remediated and/or referred to the Regional Water Board for follow-up action.

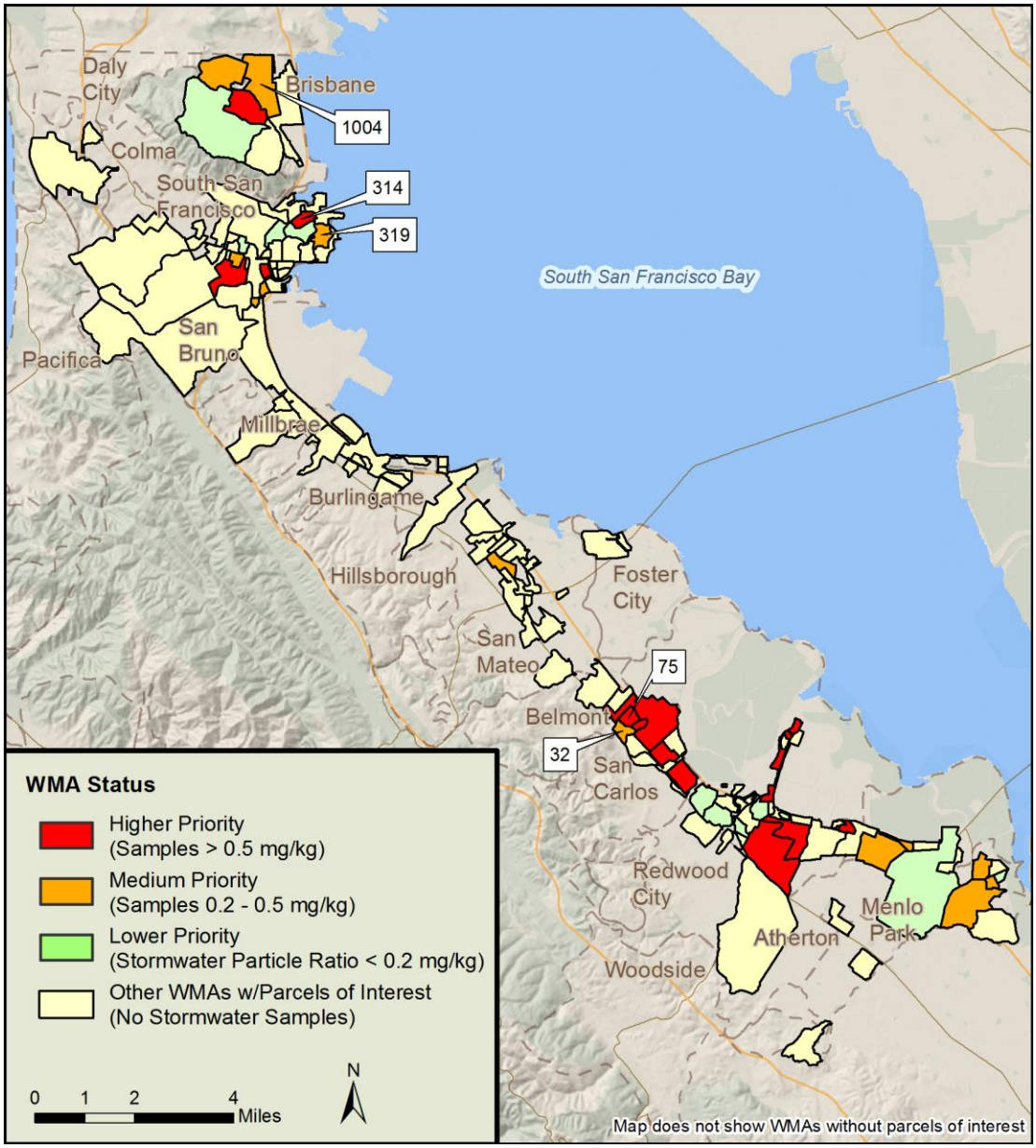

Figure 5.1. San Mateo County PCBs WMA status based on sediment and stormwater runoff data collected through WY 2016.

[15] Where sediment and stormwater runoff particle ratio analysis results conflict, the higher result was conservatively applied.

5.1.2 Copper

A subset (three of eight) of the wet weather samples collected by SMCWPPP in WY 2016 were analyzed for total and dissolved copper and hardness to characterize copper concentrations in stormwater runoff from highly urban catchments. Dissolved copper results were compared to hardness-dependent acute water quality objectives (WQOs). Although two of the samples collected from manholes exceeded the objective, it was noted that the WQOs only apply to receiving water. Dilution of the MS4 discharge would occur in the receiving water, and it is therefore unknown whether the discharge would result in an exceedance of the copper WQO in the receiving water.

5.1.3 Nutrients

Two samples were collected during the dry season and analyzed for the suite of nutrients required in the MRP (i.e., ammonium[16], nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, and total phosphorus). No applicable WQOs were exceeded.

5.1.4 Recommendations for WY 2017 POC Monitoring

As described in Appendix C, the Program identified the following recommendations for POC monitoring in WY 2017 and beyond:

- SMCWPPP and the RMP's STLS will continue to conduct PCB and mercury monitoring with the goal of identifying specific source properties and prioritizing WMAs for control measure implementation.

- At least eight samples that address POC Management Question #3 (Management Action Effectiveness) must be collected by the end of year four of the permit. SMCWPPP is currently working with BASMAA to develop a regional project to design a Monitoring Plan for POC Management Action Effectiveness. The goal is to finalize the Monitoring Plan/study design in WY 2017 and implement the plan in WY 2018. A major consideration for the regional Management Action Effectiveness Monitoring Plan and other future monitoring efforts will be collection of data in support of conducting the Reasonable Assurance Analysis (RAA) that is required by Provision C.12.c.iii.(3) of the MRP and which must be submitted with the 2020 Annual Report (September 30, 2020).

- At least eight samples that address POC Management Question #5 (Trends) must be collected by the end of year four of the permit. SMCWPPP will continue to participate in the STLS Trends Strategy Team to meet this requirement. 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 includes 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. The variability of PCB concentrations in stormwater runoff will predict the number and frequency of samples needed to depict given load reductions over given periods of time. STLS Trends Strategy monitoring could

[16] Ammonium was calculated as the difference between ammonia and un-ionized ammonia. Un-ionized ammonia was calculated using the formula provided by the American Fisheries Society Online Resources (http://fishculture.fisheries.org/resources/fish-hatchery-management-calculators/).

begin as early as WY 2017 and will likely continue through the Permit term; however, the monitoring design is still being developed.

- SMCWPPP will continue to work with the SPoT Program to address POC 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. The goal of the SPoT Program is to investigate long-term trends in water quality. Sites are targeted in bottom-of-the-watershed locations with slow water flow and appropriate micromorphology to allow deposition and accumulation of sediments, including one station in San Mateo Creek. In most years, sediments are analyzed for PCBs, mercury, toxicity, pesticides, and organic pollutants (Phillips et al. 2014). In WY 2016, SPoT monitoring in San Mateo County did not include PCBs or mercury; however, sampling of those constituents is anticipated for WY 2017.

- A subset of the wet weather PCB and mercury samples collected from catchments with old industrial land uses will continue to be analyzed for total and dissolved copper.

- Nutrient samples will be collected from mixed land use watersheds. Nutrient monitoring efforts should be increased above the minimum number of yearly samples in order to make more progress towards the total of 50 samples required by the end of year five of the MRP. If feasible, samples for nutrient analysis should be collected during or shortly after storm events when nutrient discharges are more likely.

- SMCWPPP will continue to participate in the RMP and the RMP's CEC Strategy.

5.2 Small Tributaries Loading Strategy

The RMP Small Tributaries Loading Strategy was developed in 2009 by the STLS Team, which included representatives from BASMAA, Regional Water Board staff, RMP staff, and technical advisors and is overseen by the Sources, Pathways, and Loadings Workgroup (SPLWG). The objective of the STLS is to develop a comprehensive planning framework to coordinate POC monitoring/modeling between the RMP and RMC participants. In 2011, with concurrence of participating Regional Water Board staff, a framework (i.e., the STLS Multi-Year Plan) was developed presenting an alternative approach to the POC loads monitoring requirements described in provision C.8.e.i of the 2009 MRP, as allowed by provision C.8.e. The most recent published version (Version 2013a) of the STLS Multi-Year Plan (MYP) was submitted with the Regional Urban Creeks Monitoring Report in March 2013 (BASMAA 2013). The STLS MYP is integrated with other RMP-funded activities (see Section 2.0) and is a major component of the RMP MYP. Version 2013a of the STLS MYP includes two main elements that collectively address the four priority management questions for POC monitoring described in the 2009 MRP:

- Development and improvement of the Regional Watershed Spreadsheet Model (RWSM) as a tool for estimating regional loads of POCs to the Bay, and
- Watershed monitoring at six fixed stations.

Based on the lessons learned through the implementation of the STLS MYP in WY 2012, WY 2013, and WY 2014, and the reprioritization of management information needs in the 2015 MRP, SMCWPPP and its RMC partners implemented a revised approach to POC Loads

monitoring in WY 2015[17]. The revised monitoring approach was discussed at numerous STLS workgroup meetings during WY2014[18] and was agreed upon by STLS members, including Water Board staff, as the best approach to addressing near-term high priority information needs regarding PCB and mercury sources and loadings. The revised alternative approach initiated in WY 2015 discontinues most POC loads monitoring stations sampled in previous Water Years, adds wet weather characterization monitoring, and maintains support of the RWSM. The sections below describe the tasks implemented by the RMP STLS in WY 2016.

5.2.1 Wet Weather Characterization

With a goal of identifying watershed sources of PCBs and mercury, STLS field monitoring in WY 2016 continued to focus on collection of storm composite samples in the downstream reaches of catchments located throughout the region. In WY 2016, 17 catchments ranging in size from 0.23 km^2 to 17.47 km^2 and representing engineered MS4 drainage areas were sampled during storm events. The storm composite water samples were analyzed for concentrations of PCBs, total mercury, other metals (arsenic, cadmium, lead, copper, zinc), total organic carbon, dissolved organic carbon, suspended sediment concentration, and grain size distribution. In addition, a pilot study was continued at a subset of locations to collect fine sediments using specialized settling chambers. A full description of the methods and results from WY 2015 and WY 2016 monitoring is included in Appendix D (Pollutants of concern reconnaissance monitoring final progress report, water years 2015 and 2016).

In WY 2016 seven catchments were targeted in San Mateo County based on recommendations by Program staff after evaluating land uses in the County that have the highest likelihood of generating PCBs in stormwater runoff. All of the seven San Mateo County sampling stations were located at manholes accessing the MS4 or MS4 outlets to receiving waters.

Wet weather characterization monitoring by the RMP STLS is planned to continue in WY 2017.

Preliminary Findings

The RMP STLS now has a growing database of 62 stations that have been sampled during wet weather for PCBs, mercury, and SSC since 2003. (Some stations have also been sampled for a larger suite of constituents.) Prior to WY 2015, most of the stations were located in natural creeks, whereas WY 2015 and WY 2016 stations were primarily located in small catchments draining primarily old industrial land uses. Acknowledging that dynamic climatic conditions and individual storm characteristics may affect data interpretation, the following conclusions have been identified:

- While PCB particle ratios appear to positively correlate with impervious cover and old industrial land use, they inversely correlate with watershed area and other trace metals analyzed (As, Cu, Cd, Pb, and Zn).

[17] The BASMAA Phase I stormwater managers discussed the approach with the Assistant Executive Officer of the SF Bay Regional Water Quality Control Board at the August 28, 2014 monthly meeting and amended the RMC to reflect the modification.

[18] Discussions about revised POC loads monitoring approaches for FY 13-14 (Water Year 2015) were discussed and ultimately agreed upon by Water Board staff and other STLS and RMC partners at the following STLS meetings: October 13, 2013; March 19, 2014; April 1, 2014; April 16, 2014; May 15, 2014; and June 9, 2014.

- Mercury concentrations have a positive but weaker relationship with impervious cover and old industrial land use. This is consistent with the understanding that atmospheric deposition plays a role in mercury source areas.

- Many areas of interest in terms of identifying PCBs and mercury source areas are located within close proximity to the Bay, in tidal zones that are often very difficult to sample due to lack of public right-of-way.

- The PCB and mercury TMDL load allocations of 2 kg and 80 kg respectively translate to mean annual concentrations of 1.33 ng/L (PCBs) and 53 ng/L (mercury) and mean annual particle ratios of 1.4 ng/g (PCBs) and 0.058 ug/g (mercury) (assuming certain annual average flow and suspended sediment loads). Although TMDL compliance is not based on these estimates, all of 62 stations sampled to date (including those in natural creeks) exceed these calculated concentrations and particle ratios.

5.2.1.1 Compliance with Applicable Water Quality Standards

MRP Provision C.8.g.iii requires RMC participants to assess all data collected pursuant to provision C.8 for compliance with applicable water quality standards. In compliance with this requirement, comparisons of data collected at the wet weather characterization monitoring stations in WY 2016 to applicable numeric WQO is provided below.

When conducting a comparison to applicable WQOs/criteria, certain considerations should be taken into account to avoid the mischaracterization of water quality data:

Discharge vs. Receiving Water – WQOs apply to receiving waters, not discharges. WQOs are designed to represent the maximum amount of pollutants that can remain in the water column without causing any adverse effect on organisms using the aquatic system as habitat, on people consuming those organisms or water, and on other current or potential beneficial uses. POC monitoring data were not collected in receiving waters; instead, they were collected within the engineered storm drain network. Dilution is likely to occur when the MS4 discharges urban stormwater (and non-stormwater) runoff into the local receiving water. Therefore, while results that are below WQOs can be assumed to not result in exceedances of receiving water WQOs, it is unknown whether results that exceed WQOs will in turn result in exceedances in the receiving water, where there is the potential for exposure by aquatic life.

Freshwater vs. Saltwater - POC monitoring data were collected in freshwater, above tidal influence and therefore comparisons were made to freshwater WQOs/criteria.

Aquatic Life vs. Human Health - Comparisons were primarily made to objectives/criteria for the protection of aquatic life, not objectives/criteria for the protection of human health to support the consumption of water or organisms. This decision was based on the assumption that water and organisms are not likely being consumed from the stations monitored.

Acute vs. Chronic Objectives/Criteria - Monitoring was conducted during episodic storm events and results do not likely represent long-term (chronic) concentrations of monitored constituents. POC monitoring data were therefore compared to “acute” WQOs/criteria for aquatic life that represent the highest concentrations of an analyte to which an aquatic community can be exposed briefly (e.g., 1-hour) without resulting in an unacceptable effect.

Of the analytes monitored at POC stations in WY 2016, WQOs or criteria have only been promulgated for total mercury and total cadmium. WQOs for other metals analyzed are

expressed in terms of the dissolved fraction of the metal in the water column for which data are not available. Furthermore, the WQO for cadmium is based on hardness which was not measured in the WY 2016 samples. Therefore, the comparison of data collected in WY 2016 to applicable numeric WQOs or criteria adopted by the Regional Water Board is limited to total mercury.

All of the samples collected in San Mateo County in WY 2016 were well below the freshwater acute objective for mercury of 2.4 µg/L. See Appendix D for a list of RMP STLS sampling results.

5.2.2 Regional Watershed Spreadsheet Model

The STLS Team and SPLWG continued to provide oversight in WY 2016 to the development and refinement of the Regional Watershed Spreadsheet Model (RWSM), which is a land use based planning tool for estimation of overall POC loads from small tributaries to San Francisco Bay at a regional scale. The RWSM is being developed by SFEI on behalf of the RMP, with funding from both the RMP and BASMAA regional projects.

The RWSM is based on the idea that to accurately assess total contaminant loads entering San Francisco Bay, it is necessary to estimate loads from local watersheds. “Spreadsheet models” of stormwater quality provide a useful and relatively cheap tool for estimating regional scale watershed loads. Spreadsheet models have advantages over mechanistic models because the data for many of the input parameters required by mechanistic models may not currently exist, and also require large calibration datasets which require significant resources to generate.

Development of a spreadsheet model to estimate POC loads from small tributaries to the Bay has been underway since 2010 when a water-based copper model was completed. Because PCBs and mercury are more closely related to sediments, a draft model for suspended sediments was developed. However, resulting loads estimates for PCBs and mercury appeared to be too high, leading to the conclusion that accuracy and precision at small (e.g., watershed) scales is challenged by the regional nature of the calibration process and the simplicity of the model. In WY 2016, the water-based model for PCBs and mercury was improved with new approaches to calibration which reflect the growing wet weather characterization dataset and the greater understanding of regional hydrology. The improved RWSM can be used for estimating regional scale annual average loads, and could be useful for comparing relative loading between sub-regions and more polluted versus less polluted watersheds.

During WY 2016, SMCWPPP reviewed and provided input on documents describing the RWSM and/or its loadings estimates. SMCWPPP also participated in the SPLWG which is the main venue for soliciting input from interested parties and technical advisors.

In WY 2017, the RWSM calibration will continue to be improved with data from the WY 2016 wet weather characterization monitoring and BASMAA studies. Improvements to the land use GIS layer will also help refine the model. As the modeling team at SFEI becomes more proficient with alternative water-based platforms (i.e., SWMM[19], HEC-RAS[20]) through development of the

[19] https://www.epa.gov/water-research/storm-water-management-model-swmm
[20] http://www.hec.usace.army.mil/software/hec-ras/

Green Plan-IT tool[21], a more sophisticated basis may be adopted in future years. Decisions will be made in consultation with the STLS and the SPLWG.

5.2.3 STLS Trends Strategy

In WY 2016, the STLS Trends Strategy team continued to meet. The STLS Trends Strategy was developed based on recommendations from the SPLWG to define where and how trends may be most effectively measured in relation to management effort so that data collection methods deployed over the next several years will support this management information need. Initially comprised of SFEI staff, RMC participants, and Regional Water Board staff, the STLS Trends Strategy team expanded in WY 2016 to include additional interested parties (e.g., USEPA) and technical advisors (e.g., USGS).

In WY 2016, the STLS Trends Strategy team drafted the Trends Strategy document and Technical Appendix. The main document summarizes the background, management questions, and guiding principles of the Trends Strategy. It also describes coordination between the RMP and BASMAA within the context of the MRP, proposed tasks to answer the management questions, anticipated deliverables, and the overall timeline. The current priority POCs are PCBs and mercury. Trend indicators under consideration (i.e., PCB concentrations and particle-ratios) were identified within the context of existing datasets (e.g., POC loading stations) and TMDL timelines. However, the Strategy recognizes that priorities can change in the future. The Technical Appendix presents an evaluation of variability and statistical power for detecting trends based on POC loading station PCBs data. It recommends the sample size and revisit frequency needed to detect declining trends in PCBs in 25 years with > 80% statistical power. Results of the statistical analyses were presented to USGS technical advisors with expertise in trends analysis of water data.

In WY 2017, the Trends Strategy team will continue to explore POC loading station data in an effort to model PCB concentrations and loads. Results of the analysis will inform the design of the long-term monitoring program for trends. It is likely that additional data will be collected from two POC loading stations (e.g., Guadalupe River in Santa Clara County and Zone 4 Line 7 in Alameda County) to fill data gaps in the baseline dataset and increase understanding of variability.

5.2.4 Guadalupe River Loading Station Contingency Monitoring

POC loads monitoring activities have been conducted for nearly a decade on the Guadalupe River near the Highway 101 overpass. These efforts have occurred via a combination of RMP, SCVURPPP and Santa Clara Valley Water District (SCVWD) funding and were generally aimed at developing robust estimates of annual mercury and other POC loading to the Bay from the watershed. One key information gap that remains is the concentrations and loading associated with high intensity storm events that necessitate the release of water from reservoirs located in the upper watershed. These events rarely occur and did not occur in WY 2016, but the Program was prepared to institute contingency monitoring in WY 2016 to sample water at the Highway 101 station in the event of a qualifying storm. This same approach will be followed in WY 2017.

[21] http://greenplanit.sfei.org/

6.0 Next Steps

Water quality monitoring required by Provision C.8 of the MRP is intended to assess the condition of water quality in the Bay area receiving waters (creeks and the Bay); identify and prioritize stormwater associated impacts, stressors, sources, and loads; identify appropriate management actions; and detect trends in water quality over time and the effects of stormwater control measure implementation. On behalf of San Mateo County Permittees, SMCWPPP conducts creek water quality monitoring and monitoring projects in San Mateo County in collaboration with the Regional Monitoring Coalition, and actively participates in the San Francisco Bay Regional Monitoring Program, which focuses on assessing Bay water quality and associated impacts.

In WY 2017, SMCWPPP will continue to comply with water quality monitoring requirements of the MRP. The following list of next steps will be implemented in WY 2017:

- SMCWPPP will continue to collaborate with the RMC (MRP Provision C.8.a).
- Where applicable, monitoring data collected and reported by SMCWPPP will be compatible with SWAMP (MRP Provision C.8.b).
- SMCWPPP will continue to provide financial contributions towards the RMP and to assist BASMAA to actively participate in the RMP committees and work groups described in Sections 2.0 and 5.0 (MRP Provision C.8.c).
- SMCWPPP will continue to conduct probabilistic and targeted Creek Status Monitoring consistent with the specific requirements of MRP Provision C.8.d.
- SMCWPPP will develop and begin implementation of a dry and wet weather Pesticides and Toxicity Monitoring program consistent with MRP Provision C.8.g.
- SMCWPPP will continue to review monitoring results and maintain a list of all results exceeding trigger thresholds (MRP Provision C.8.e.i). SMCWPPP will coordinate with the RMC to initiate a region wide goal of four new SSID projects by the third year of the permit (MRP Provision C.8.e.iii).
- SMCWPPP will continue to participate in the STLS and SPLWG which address MRP Provision C.8.f POC management information needs and monitoring requirements through wet weather characterization monitoring, refinement of the RWSM, and development and implementation of the STLS Trends Strategy.
- SMCWPPP will continue implementing a POC monitoring framework to comply with Provision C.8.f of the MRP. The monitoring framework addresses the annual and total minimum number of samples required for each POC (i.e., PCBs, mercury, copper, emerging contaminants, nutrients) and each management information need (i.e., Source Identification, Contributions to Bay Impairment, Management Action Effectiveness, Loads and Status, Trends). WY 2017 monitoring will include collection of wet weather composite water samples from catchments and collection of dry weather sediment samples from the public right-of-way to identify areas where PCB and mercury control measures may be implemented. WY 2017 monitoring will also include sampling for nutrients and copper.
- WY 2017 POC monitoring accomplishments and allocation of sampling efforts for POC monitoring in WY 2018 will be submitted in the Pollutants of Concern Monitoring Report that is due to the Water Board by October 15, 2017 (MRP Provision C.8.h.iv).

- Results of WY 2017 monitoring will be described in the Programs WY 2017 Urban Creeks Monitoring Report that is due to the Water Board by March 31, 2018 (MRP Provision C.8.h.iii).

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