

BASMAA Regional Monitoring Coalition

Multi-Year Work Plan *FY 2009-10 through FY 2014-15*



February 1, 2011

PREFACE AND ACKNOWLEDGEMENTS

This BASMAA Regional Monitoring Coalition (RMC) multi-year work plan is intended to provide a road map for monitoring activities conducted toward compliance with Provision C.8 (Water Quality Monitoring) of the Municipal Regional Permit (MRP) adopted by the San Francisco Bay Regional Water Quality Control Board on October 14, 2009. The content of the work plan was developed over the course multiple years leading up to the adoption of the MRP. A work plan technical committee that assisted in the development of this work plan consisted of:

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BASMAA REGIONAL MONITORING COALITION MULTI-YEAR WORK PLAN

TABLE OF CONTENTS

1.0 INTRODUCTION.....	5
1.1 RATIONALE AND PURPOSE	5
1.2 RELATIONSHIP TO MUNICIPAL REGIONAL STORMWATER NPDES PERMIT.....	5
1.3 THE BASMAA REGIONAL MONITORING COALITION	6
2.0 MONITORING TASKS AND MANAGEMENT QUESTIONS.....	10
2.1 MRP COMPLIANCE OPTIONS (C.8.A)	10
2.2 SAN FRANCISCO BAY ESTUARY MONITORING (C.8.B).....	10
<i>Project 2a: RMP Committee and Workgroup Representation</i>	<i>11</i>
2.3 CREEK STATUS (C.8.c) AND LONG-TERM TRENDS MONITORING (C.8.E)	11
<i>Project 3a: Regional Creek Status and Long-Term Trends Monitoring Design.....</i>	<i>12</i>
<i>Project 3b: Standard Operating and Data Quality Assurance Procedures</i>	<i>13</i>
<i>Project 3c: Creek Status Monitoring Coordination.....</i>	<i>14</i>
<i>Project 3d: Creek Status Monitoring Field Work and Laboratory Analyses.....</i>	<i>14</i>
<i>Project 3e: Creek Status and Trends Information Management System Development</i>	<i>14</i>
<i>Project 3f: Laboratory Contract Language and Reporting Formats.....</i>	<i>15</i>
<i>Project 3g: Creek Status and Trends Information Management and Quality Control</i>	<i>15</i>
2.4 MONITORING PROJECTS (C.8.D)	16
<i>Project 4a – Stressor/Source Identification Guidance</i>	<i>16</i>
<i>Project 4b – Stressor/Source Identification Studies.....</i>	<i>16</i>
<i>Project 4c – BMP Effectiveness Investigation.....</i>	<i>16</i>
<i>Project 4d – Geomorphic Project.....</i>	<i>16</i>
2.5 POLLUTANTS OF CONCERN (LOADS) MONITORING (C.8.E)	17
<i>Project 5a – Multi-Year Pollutants of Concern Sampling Plan</i>	<i>17</i>
<i>Project 5b – Standard Operating and Quality Assurance Procedures</i>	<i>18</i>
<i>Project 5c – Laboratory Standard Contract Language and Reporting Formats</i>	<i>18</i>
<i>Project 5d – POC Monitoring Information Management System Development</i>	<i>18</i>
<i>Project 5e: POC Monitoring Station Setup, Equipment Purchasing, Field Work and Laboratory Analyses.....</i>	<i>19</i>
<i>Project 5f – POC Information Management and Quality Control.....</i>	<i>20</i>
2.6 CITIZEN MONITORING AND PARTICIPATION (C.8F).....	20
<i>Project 6a – Encouragement of Citizen Monitoring</i>	<i>20</i>
2.7 DATA ANALYSIS AND REPORTING (C.8G).....	20
<i>Project 7a: Water Quality Standard Exceedance Reporting.....</i>	<i>20</i>
<i>Project 7b: Creek Status Electronic Reporting Template.....</i>	<i>21</i>
<i>Project 7c: Electronic Submittal of Creek Status and Long-Term Trends Data.....</i>	<i>21</i>
<i>Project 7d: Annual Monitoring Reports.....</i>	<i>21</i>
<i>Project 7d-1: Regional Urban Creeks Monitoring Report.....</i>	<i>21</i>
<i>Project 7d-2: Program-specific Urban Creeks Monitoring Report.....</i>	<i>22</i>
<i>Project 7d-3: Regional POC (Loads) Monitoring Report.....</i>	<i>22</i>
<i>Project 7e: Integrated Monitoring Report.....</i>	<i>22</i>
<i>Project 7e-1: Integrated Monitoring Report Outline and Template.....</i>	<i>22</i>
<i>Project 7e-2: Integrated Monitoring Report</i>	<i>22</i>
3.0 SUMMARY OF RMC PROJECTS, SCHEDULE AND FUNDING.....	23
4.0 REFERENCES.....	26

LIST OF TABLES, FIGURES AND APPENDICES

TABLE 1. SAN FRANCISCO BAY AREA STORMWATER PROGRAMS AND ASSOCIATED MRP PERMITTEES PARTICIPATING IN THE BASMAA REGIONAL MONITORING COALITION (RMC)..... 7

TABLE 2. CREEK STATUS MONITORING PARAMETERS REQUIRED BY THE MRP AND RECOMMENDED SPATIAL SCALE OF ASSESSMENT(S).12

TABLE 3. CREEK LONG-TERM MONITORING PARAMETERS REQUIRED BY THE MRP AND RECOMMENDED SPATIAL SCALE OF ASSESSMENT...12

TABLE 4. RMC MONITORING PROJECTS AND ASSOCIATED FISCAL YEAR OF IMPLEMENTATION..... 24

FIGURE 1. BASMAA REGIONAL MONITORING COALITION (RMC) IMPLEMENTATION AREA..... 8

FIGURE 2. PERCENTAGES OF PROJECT COST-SHARES FOR RMC PARTICIPANT PROGRAMS BASED ON 2010 CALIFORNIA DEPARTMENT OF FINANCE (DOF) POPULATION ESTIMATES..... 23

APPENDIX A - WATER BOARD ACKNOWLEDGEMENT OF REGIONAL MONITORING COLLABORATIVE AND PURSUIT OF ALTERNATIVE SAMPLING DESIGN FOR POLLUTANTS OF CONCERN AND LONG-TERM TRENDS MONITORING

APPENDIX B - MUNICIPAL REGIONAL NPDES PERMIT FOR STORMWATER DISCHARGES PROVISION C.8 WATER QUALITY MONITORING

1.0 INTRODUCTION

1.1 Rationale and Purpose

To comply with requirements in National Pollutant Discharge Elimination System (NPDES) permits, municipalities (i.e., Permittees) in the San Francisco Bay (Bay) Area have conducted a variety of receiving waters (e.g., creeks and the Bay) monitoring and assessment activities over the last two decades. During this time, creek monitoring has generally been coordinated by Countywide Municipal Stormwater Programs (Stormwater Programs) on behalf of applicable Permittees. In general, each Stormwater Program individually designed their creek monitoring program to meet NPDES permit requirements and monitoring objectives specific to the needs of their Permittees. As a result, creek monitoring conducted by programs in the Bay Area often focused on different monitoring questions, approached the same question in different ways, sampled different sets of parameters, and used a range of field and laboratory methods to collect and analyze samples. This inconsistency has made it difficult, if not impossible, to address management questions on a broader spatial scale (i.e., regional), compare creek monitoring results across Stormwater Programs, and improve efficiencies by taking advantage of opportunities for exchanging data and coordinating monitoring responsibilities at regional scales.

In addition to creek monitoring conducted by Stormwater Programs, the *Regional Monitoring Program for Water Quality in the San Francisco Bay Estuary (RMP)* monitors the Bay and contributions (i.e., loadings) of pollutants of concern (POCs) to the Bay from small tributaries. These monitoring activities are currently conducted through contributions to the RMP from Permittees and other RMP participants.¹ Staff from Stormwater Programs represents Permittees on RMP committees and workgroups to assist in the coordination of monitoring activities between the RMP and Stormwater Programs. Although this coordination has been successful in past, the need for additional collaboration between Stormwater Programs and RMP-led monitoring activities has been elevated now that Permittee monitoring requirements have substantially increased with the adoption of the MRP.

In response to the set of circumstances described above, Permittees² have agreed to develop a *Regional Monitoring Coalition (RMC)* among those Bay Area Stormwater Management Agencies Association (BASMAA) participants subject to monitoring requirements in the MRP. This multi-year work plan is designed to provide a road map for successful implementation of the RMC. It reflects the collaborative work to-date of Stormwater Programs and describes RMC tasks to be implemented from FY 2009-10 through FY 2014-15. The work plan is intended to provide a general overview of RMC tasks that will be further described in subsequent project profiles and scopes of work on a project-by-project basis.

1.2 Relationship to Municipal Regional Stormwater NPDES Permit

The MRP was issued to 76 cities, counties and flood control districts by the San Francisco Regional Water Quality Control Board (Water Board) on October 14, 2009. In addition to requirements to implement best management practices for the control of stormwater pollutants and non-stormwater discharges to receiving waters, the MRP also requires Permittees to

¹ RMP participants include municipal stormwater and wastewater agencies, industrial dischargers, and dredgers.

² Permittees in this regard refers to those cities, counties and flood control districts subject to the Municipal Regional Stormwater NPDES Permit (CAS612008) issued by the San Francisco Regional Water Quality Control Board on October 14, 2009.

conduct a variety of water quality monitoring activities. These activities are described in MRP provision C.8 and include:

- Compliance Options (C.8.a)
- San Francisco Estuary Receiving Water Monitoring (C.8.b)
- Creek Status Monitoring (C.8.c)
- Monitoring Projects (C.8.d)
- Pollutants of Concern and Long-Term Trends Monitoring (C.8.e)
- Citizen Monitoring and Participation (C.8.f)
- Reporting (C.8.g)
- Monitoring Protocols and Data Quality (C.8.h)

The MRP provisions listed above serve as the impetus for the RMC activities and tasks described in this multi-year work plan. All monitoring requirements in provision C.8 will be coordinated through the RMC.

1.3 The BASMAA Regional Monitoring Coalition

1.3.1 Goals and Participants

The RMC is collaboration among MRP Permittees in the San Francisco Bay Area that is focused on effectively and efficiently developing and implementing a regionally coordinated water quality monitoring program that will improve stormwater management in the region. The overarching goals of the RMC are to:

- Develop and implement regionally consistent creek monitoring approaches and designs in the Bay Area, through the improved coordination among RMC participants and other agencies (e.g., Water Board) that share common goals; and,
- Stabilize the costs of creek monitoring by reducing duplication of effort and streamlining reporting.

BASMAA Regional Monitoring Coalition (RMC)

The RMC is collaboration among municipal stormwater programs in the San Francisco Bay Area that is focused on effectively and efficiently developing and implementing a regionally coordinated water quality monitoring program that will improve stormwater management in the region.

Through its implementation, the RMC will allow Permittees and the Water Board to effectively modify their existing creek monitoring programs, which will improve their ability to collectively answer core management questions in a cost effective and scientifically rigorous way.

All MRP Permittees are participants of the RMC. Permittee representation to the RMC is generally coordinated through Stormwater Programs (or equivalent), however, Permittees subject to MRP monitoring requirements are also encouraged to actively participate in RMC projects and meetings. RMC participants and associated Stormwater Programs are listed in Table 1 and a map of the RMC geographical area of interest is presented in Figure 1.

Table 1. San Francisco Bay Area stormwater programs and associated MRP Permittees participating in the BASMAA Regional Monitoring Coalition (RMC).

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
Clean Water Program of Alameda County	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)³	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 County Wide 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

³ The Cities of Antioch, Brentwood and Oakley, and portions of Unincorporated Contra Costa County are subject to an NDPS Permit issued by the Central Valley Regional Water Quality Control Board (as opposed to the MRP). Monitoring requirements in this Permit are similar to those in the MRP and therefore these Permittees have agreed to participate in the RMC.

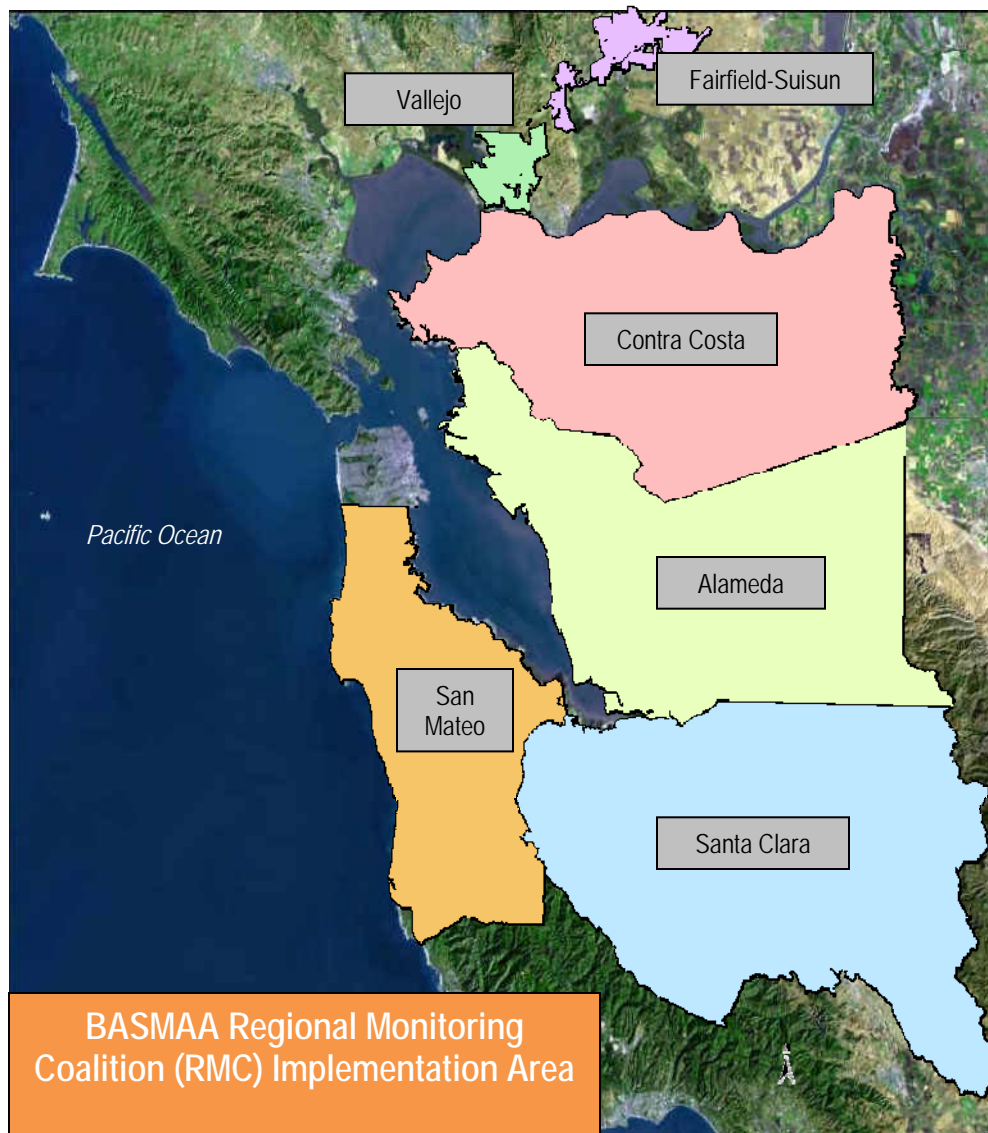


Figure 1. BASMAA Regional Monitoring Coalition (RMC) implementation area.

1.3.2 RMC Oversight, Decision Making and Project Management

This multi-year work plan summarizes RMC projects planned for implementation between Fiscal Years 2009-10 and 2014-15. 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 (BOD). The BOD serves as the overall oversight committee to the RMC, and the MPC has the responsibility of directly managing and implementing projects summarized in this work plan. As RMC projects are further defined, project profiles (i.e., project descriptions, tasks, budgets and deliverables) are developed by the MPC and consensus-based recommendations for approval and funding will be made to the

BOD. Through participation in the MPC, each Permittee (via MPC representatives) have the opportunity to provide input and direction on RMC projects.

Once an RMC project has been approved by the BOD, an MPC member is assigned to serve as the Project Officer. The Project Officer's duties include coordinating directly with the contractor or Stormwater Program staff conducting the project to ensure that it is completed on time and budget. Additionally, the Project Officer provides monthly updates to MPC on the status of the task, including any foreseen challenges or issues that may arise. For additional information on the project approval process, please see BASMAA policy and procedures.

2.0 MONITORING TASKS AND MANAGEMENT QUESTIONS

The RMC participants have identified 27 projects based on the requirements described in provision C.8 of the MRP. All projects described in this work plan and associated with provision C.8 of the MRP will be coordinated through the RMC. Projects described in this section are organized by sub-provision of C.8 (e.g., C.8.a). As appropriate, management questions applicable to each project or set of projects are presented. These management questions create a common foundation for monitoring design and stormwater management in the Bay Area. In many cases, management questions presented are not strictly independent, but logically linked where the answer to one question establishes the context for addressing the next.

2.1 MRP Compliance Options (C.8.a)

Provision C.8.a (Compliance Options) of the MRP allows Permittees to address monitoring requirements through a “regional collaborative effort” (e.g., RMC), its’ Stormwater Program, and/or individually. The regional collaborative option is, however, only available to Permittees if a majority of Permittees agree to participate. If the regional monitoring collaborative option is selected, data collection must commence by October 2011. If the Stormwater Program or Permittee option is selected, data collection must commence by October 2010. This one-year extension for the regional collaboration option is due to the time and resources needed to develop a regional monitoring collaborative.

As required by the MRP, each RMC participant submitted documentation to the Water Board by July 1, 2010 confirming participation in the RMC. The Water Board responded with a letter confirming that Permittees are participating in the RMC (see Appendix A).

2.2 San Francisco Bay Estuary Monitoring (C.8.b)

The Regional Monitoring Program (RMP) for Water Quality in the San Francisco Estuary is a long-term monitoring program that has active participation by regulatory agencies and the regulated community with the goal of assessing water quality in the Bay. The RMP is funded by the regulated community, including MRP Permittees, publicly owned treatment works (POTWs), dredgers and industrial dischargers. The RMP is intended to answer the following core management questions:

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

As described in MRP Provision C.8b, Permittees are required to contribute their fair-share financially on an annual basis towards implementing an Estuary receiving water monitoring program that at a minimum is equivalent to the RMP. This contribution is not an RMC task,

rather Permittees or Stormwater Programs make financial contributions to the RMP directly. Additionally, Stormwater Programs actively participate in RMP committees and workgroups to represent Permittee interests in the RMP.

Project 2a: RMP Committee and Workgroup Representation

To assist Permittees and Stormwater Programs in continuing participation in the RMP, the RMC will coordinate representation on the appropriate committees and workgroups, including the following:

- 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
- Toxicity Workgroup
- Strategy Workgroups (e.g., Mercury, Modeling, PCBs, Dioxins)

Committee and workgroup representation on behalf of BASMAA will be provided by Stormwater Program staff or designees that are agreeable to the MPC. Representatives will provide timely summaries and updates to the MPC and BOD as needed.

2.3 Creek Status (C.8.c) and Long-Term Trends Monitoring (C.8.e)

Provision C.8.c 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, river and tributaries?*
2. *Are conditions in local receiving waters supportive of or like supportive of beneficial uses?*

Creek status monitoring parameters, methods, occurrences, durations and minimum number of sampling sites per county are prescribed in MRP (Table 8.1 see Appendix B). Monitoring parameters required by the MRP can provide information to RMC participants at different spatial scales. All parameters required by the MRP provide site/reach-specific information. However, based on the experience of the MPC, some parameters are not conducive to answering management questions on the regional scale due to the site-specific nature of the parameter or the limited number of sampling sites prescribed in the MRP. Therefore, the recommended scales of assessment for status monitoring parameters required by the MRP are provided in Table 2.

In addition to creek status monitoring, Provision C.8.e requires Permittees to conduct long-term trends monitoring to evaluate if stormwater discharges are causing or contributing to toxic impacts on aquatic life. Required long-term monitoring parameters, methods, intervals and occurrences (see MRP Table 8.4) and prescribed long-term monitoring locations (see MRP Table 8.3) are included in the MRP (see Appendix B). Similar to status monitoring, long-term trends can be assessed at different spatial scales. Recommended scales of assessment for long-term monitoring parameters required by the MRP are provided in Table 3.

Table 2. Creek status monitoring parameters required by the MRP and recommended spatial scale of assessment(s).

Status Monitoring Parameter	Recommended Scale of Assessment	
	Site/Reach/Watershed	Regional
Biological Assessment (BMI & Algae)	X	X
Nutrients	X	X
Chlorine	X	X
Toxicity – Water Column	X	X
Toxicity – Bedded Sediment	X	X
Pollutants – Bedded Sediment	X	X
Temperature	X	
General Water Quality	X	
Pathogen Indicators	X	
Stream Survey	X	

Table 3. Creek long-term monitoring parameters required by the MRP and recommended spatial scale of assessment(s).

Status Monitoring Parameter	Recommended Scale of Assessment	
	Site/Reach/Watershed	Regional
Toxicity – Bedded Sediment	X	X
Pollutants – Bedded Sediment	X	X

Project 3a: Regional Creek Status and Long-Term Trends Monitoring Design

Bay Area Stormwater Programs currently implement monitoring designs that target creek reaches of interest. Many Programs have been successful in these approaches, however, because the representativeness of the data are currently unknown, the condition of all creek reaches in the Bay Area also remain unknown. The objective of this task is to address this issue by creating a comprehensive regional creek status monitoring design that integrates many elements of the individualized monitoring programs that currently exist within the region. The creek status monitoring design will allow each individual Stormwater Program to assess conditions within its own water bodies, while contributing data to answering regional questions about water quality and beneficial use condition in Bay Area creeks.

For those parameters that will be used to assess creek condition at the regional scale, the monitoring design will be based on a probabilistic monitoring design. Probabilistic designs provide a useful and cost-effective method for getting an unbiased, broad geographic snapshot of water quality and beneficial use condition throughout the region. Additionally, this type of design will meld nicely with the State Water Resource Control Board's Perennial Stream

Assessment (PSA) that is currently being implemented through the Surface Water Ambient Monitoring Program (SWAMP).

As part of the probabilistic creek design, the concept of a “Master Sample” (see text box on right) will also be considered to allow previously collected data based on a targeted sampling design to be integrated into regional condition assessments across the Bay Area. A similar organization to the RMC, the *Southern California Stormwater Monitoring Coalition (SMC)*, has recently developed both a regional probabilistic monitoring design and a Master Sample for Stormwater Programs in four coastal counties in Southern California and is currently implementing both (SCCWRP 2007). Leveraging information and lessons learned from the SMC will likely provide a successful model to base the RMC creek status monitoring design.

Master Sample

Initially developed by Larsen, et al. (2008), a Master Sample relies on a dense probabilistic design in which sample sites are listed in an order where each subsequent sample maintains spatial balance with the previously chosen sample or set of samples. Individual agencies can draw sub-samples from the ordered master sample as appropriate to their monitoring objectives, while still retaining the ability to incorporate the results of their projects into a broader design.

With regard to long-term trends monitoring required by provision C.8.e, SWAMP has scheduled the collection of data to fulfill this requirement, which is allowed by the MRP. However, if SWAMP were to not fulfill this requirement, Permittees would be required to comply with this provision through their own monitoring requirements. Therefore, as the status monitoring design task is being conducted, a long-term trend design should also be incorporated. As presented in Table 3, there are two parameters that will be used answer the question about trends: sediment chemistry and toxicity. Based on the development of SWAMP’s *Statewide Stream Contaminant Trend Monitoring Program* (Water Board 2008) and the SMC’s experience in Southern California (SCCWRP 2007), the Long-Term Trends component will likely be based on a targeted monitoring design.

The status and long-term trends monitoring design project will include input and/or direct involvement from scientists and statisticians (i.e., subcontractors) heavily experienced in designing monitoring programs. Interim deliverables (e.g., presentations and meeting summaries) for this activity and the final deliverable (Sampling and Analysis Plan) are expected.

Project 3b: Standard Operating and Data Quality Assurance Procedures

The development and continued use of field and laboratory quality assurance procedures promotes data quality and allows RMC participants, the Water Board and other stakeholders to have confidence water quality data collected by Permittees, Stormwater Programs or the RMC. As required by MRP provision C.8.h, data collected by these entities, should be of a quality that is consistent with SWAMP standards, set forth in the SWAMP Quality Assurance Project Plan (QAPP). Adaptations to SWAMP’s QAPP can be made with Water Board Executive Officer approval.

This project will be conducted to address the MRP requirement on monitoring protocols and data quality (Provision C.8.h), with regard to creek status and long-term monitoring. The task will include the adaptation of existing field standard operating procedures (SOPs) developed by SWAMP and other agencies (e.g., SCCWRP and SFEI) or creation of new SOPs, as necessary, that document the field procedures necessary to maintain comparable and high quality data

region-wide. Additionally, the project will include the development of a RMC-specific QAPP through the adaptation of existing QAPPs.

Project 3c: Creek Status Monitoring Coordination

As the RMC continues to evolve, coordination among participants will likely need to increase. Therefore, there may be a need for additional regional monitoring coordination support to assist in coordination and communications to integrate efforts of various regional projects; assist in incorporation of regional projects into individual programs' sampling plans; coordinate or encourage individual programs to collaborate on training and resource sharing (e.g. laboratory contracts); and, scoping for future coordination needs. This project serves as a placeholder for this monitoring coordination.

Project 3d: Creek Status Monitoring Field Work and Laboratory Analyses

As agreed to among participants in the MPC, field work and laboratory analyses conducted to address MRP creek status and long-term trends monitoring will be coordinated regionally through the RMC, but conducted by individual Stormwater Programs and/or Permittees. SOPs developed in project 3b, and field calibration exercises (if needed) will allow consistency between field personnel from different Programs. Existing relationships between Stormwater Programs, volunteer monitors, and contractors will continue to allow cost effective field work to occur since field personnel for each Stormwater Program and volunteers/contractors are heavily familiar with creeks in applicable counties.

Similar to field work, laboratory analyses will also be coordinated by individual Stormwater Programs and/or Permittees, using the QAPP developed in project 3b to ensure comparability among RMC participants. For cost efficiencies, collaborations among Stormwater Programs on contracting with laboratories are recommended, although not required as participation in the RMC.

Project 3e: Creek Status and Trends Information Management System Development

As data are collected by RMC participants and received from analytical laboratories, they should be stored and managed in a cost effective manner that allows data users to easily access and query data and information. This project will develop an Information Management System (IMS) for the RMC that serves several purposes, the primary of which is to provide a mechanism for sharing data among participants. Data sharing is required if the RMC intends to produce an integrated regional assessment of Bay Area creeks. An additional impetus MRP Provision C.8.h, which requires Permittees to submit monitoring data to the Water Board in SWAMP comparable formats and make available through a regional information management center, Permittee, or Program websites.

SWAMP has developed an information management system (IMS) and associated database in Microsoft Access to manage their data. Additionally, SWAMP provides tools that are useful for maintaining SWAMP comparability (Excel spreadsheet data templates, website data checker and SWAMP advisor) without having to use the SWAMP IMS. In preparation for work plan development, the SWAMP IMS was reviewed for potential by RMC participants. Overall, the review concluded that the SWAMP IMS is too cumbersome and complex for use by the RMC. Staff at the SWAMP data management center (i.e., Moss Landing Marine Laboratory) confirmed these conclusions by indicating that most organizations choose to use the SWAMP data templates to submit SWAMP compatible data to the Regional Data Centers, but do not use the SWAMP database to store their own water quality data.

Based on anticipated RMC participant needs, MRP requirements and an evaluation of the SWAMP IMS, this project will focus on developing a relatively simple IMS and associated database to house creek status and long-term trends water quality data collected by RMC participants. This simpler database should be based directly on the SWAMP Excel template fields, using the appropriate look-up tables to correctly and easily format the data into the arrangement desired by SWAMP.

It is anticipated that IMS development task will include at minimum, the following four major subtasks:

- Development of an RMC Creek Status and Trends Information Management Plan that will guide the development and maintenance of the IMS and fully describe data flow, roles and responsibilities;
- Data submission and acquisition processes for participants submitting/acquiring data from the RMC Information Management Officer;
- Technical guidelines of how the data will be organized in the RMC creek status and trends database; and,
- A relatively simple database to store RMC creek status and trends data.

It is our understanding that SCCWRP has recently developed an IMS for the SMC in Southern California. As a first step to this task, it is recommended that SCCWRP be contacted to determine if the IMS developed for the SMC can be obtained and modified for use by the RMC. If so, this may reduce the overall costs of this task.

Project 3f: Laboratory Contract Language and Reporting Formats

To ensure that laboratories are following QAPP requirements and producing data in SWAMP comparable formats, the RMC will develop standard contract language for agreements with analytical laboratories. Additionally, standard reporting formats will be developed in this task to assist laboratories in submitting data to RMC participants in a standardized format that is easily uploaded into the RMC information management system.

Project 3g: Creek Status and Trends Information Management and Quality Control

For successful collaboration at a regional scale, information management needs to occur on several levels. Once the RMC creek status and trends IMS and associated database have been developed and monitoring begins, data will be available for quality control evaluation and inevitably uploading into the RMC database. This project is ongoing and includes three main subtasks: 1) evaluating the quality of data generated by analytical labs and field personnel by implementing quality assurance and control (QA/QC) procedures described in the QAPP; 2) updating the QAPP and SOP documentation as needed; and 3) managing, maintaining, and improving the RMC database to enable SWAMP comparability and data access to RMC participants.

It is assumed that QA/QC procedure implementation and the RMC database will be based on a centralized data evaluation and storage model. Under this model, RMC participants will provide raw data to a Creek Monitoring Quality Assurance and Information Management (Creek Monitoring QAIM) Officer for QA/QC evaluation and uploading into the RMC database. The Creek Monitoring QAIM Officer is responsible for flagging and reconciling data that do not meet data quality objectives outlined in the QAPP, and communicating and disseminating data to RMC participants in a to-be-determined manner. Dissemination could occur periodically or as

requested by RMC participants, in a variety of manners (e.g., the Creek Monitoring QAIM will provide RMC participants with copies of the RMC database to house at Program sites for data access, or data could be made available via an internal participant only website). Lastly, the Creek Monitoring QAIM Officer will have the responsibility of identifying creek status and trends results that exceed trigger values included in Table 8.1 of the MRP (see Appendix B). Identifying these data will allow RMC participants to decide how to move forward with stressor/source identification studies described below.

2.4 Monitoring Projects (C.8.d)

Three types of monitoring projects are required by provision C.8.d: 1) Stressor/Source Identification, 2) BMP Effectiveness Investigation, and 3) Geomorphic Project. The following paragraphs describe the roles of the RMC and Programs/Permittees in conducting these projects.

Project 4a – Stressor/Source Identification Guidance

The MRP requires Permittees to conduct stressor/source identification actions when creek status and trends results are above trigger levels described in Table 8.1 of the MRP (Appendix B). Stressor/source identification actions are outlined in a step-wise fashion in the MRP, beginning with conducting a study to identify and isolate the cause(s) that triggered the study. To assist RMC participants in conducting stressor/source identification studies in a consistent and coordinated manner, this project will produce a brief guidance document for use by the RMC. The guidance will discuss processes for determining what stressor/source identification studies are conducted and guidelines on what studies should entail. The goal of the guidance is to provide consistency in stressor/source identification studies individually conducted by RMC participants, on behalf of the RMC.

Project 4b – Stressor/Source Identification Studies

Regionally, a total of 10 studies are required during the permit term if coordinated through the RMC. Based on the agreed upon participation in the RMC, it is assumed that stressor/source identification studies required by the MRP will be conducted by Stormwater Programs and coordinated through the RMC. It is anticipated that RMC participants will discuss intentions to conduct studies with all RMC participants and provide discussions of work plans and results at MPC meetings.

Project 4c – BMP Effectiveness Investigation

The MRP requires that one BMP effectiveness study be conducted in each of Alameda, Contra Costa, San Mateo and Santa Clara counties. It is assumed that BMP effectiveness studies required by the MRP will be coordinated among RMC participants, but conducted individually by Stormwater Programs. It is anticipated that RMC participants will discuss intentions to conduct BMP effectiveness studies with RMC participants and provide discussions of work plans and results at MPC meetings.

Project 4d – Geomorphic Project

Similar to BMP effectiveness studies, it is assumed that geomorphic projects required by the MRP will be coordinated among RMC participants, but conducted individually by Stormwater Programs. One study is required in each of Alameda, Contra Costa, San Mateo and Santa Clara counties; and one is required collectively among Vallejo/Fairfield-Suisun Permittees. It is

anticipated that RMC participants will discuss intentions to conduct geomorphic projects with RMC participants and provide discussions of work plans and results at MPC meetings.

2.5 Pollutants of Concern (Loads) Monitoring (C.8.e)

Pollutants of concern (POC) monitoring is required by provision C.8.e of the MRP. POC monitoring is intended to assess inputs of POCs to the Bay from local tributaries and urban runoff, assess progress toward achieving wasteload allocations (WLAs) for TMDLs and help resolve uncertainties associated with loading estimates for these pollutants. In particular, there are four priority management questions that need to be addressed through POC monitoring:

1. *Which Bay tributaries (including stormwater conveyances) contribute most to Bay impairment from POCs;*
2. *What are the annual loads or concentrations of POCs from tributaries to the Bay;*
3. *What are the decadal-scale loading or concentration trends of POCs from small tributaries to the Bay; and,*
4. *What are the projected impacts of management actions (including control measures) on tributaries and where should these management actions be implemented to have the greatest beneficial impact.*

Permittees are required to implement POC monitoring components presented in Table 8.4 of the MRP. This includes conducting POC Monitoring at eight predefined stations, using methods described in the MRP. Alternatively, RMC participants may pursue an approach that addresses each of the aforementioned information needs, but uses different monitoring stations and sampling methodologies than described in the MRP. This alternative approach may be pursued provided that: either similar data types, data quality, data quantity are collected with an equivalent level of effort described; or an equivalent level of monitoring effort is employed to answer the management information needs.

To assist Permittees in effectively and efficiently conducting POC monitoring, the RMP (with the participation of Stormwater Program staff) developed a *Small Tributaries Loading Strategy (STLS)* in 2009. The goal of the STLS is to assist stakeholders in answer the management questions described above related to POC Monitoring. To effectively implement the STLS, three main studies are currently underway via the RMP. Two of these studies have direct applicability to developing the alternative approach to POC monitoring allowed by the MRP and described in the preceding paragraph. First, the STLS Team (including RMC participants) is currently conducting a categorization study which will assist RMC participants in determining which watersheds to conduct POC monitoring, and provide a basis for improving the cost effectiveness of developing loads information. Through the second study, the STLS Team is evaluating currently employed sampling methods at POC monitoring stations and providing recommendations on whether more cost effective methods can be employed, and still achieve POC monitoring objectives. Both studies will provide information to develop a Multi-Year Pollutant of Concern Sampling Plan, described below.

Project 5a – Multi-Year Pollutants of Concern Sampling Plan

RMC participants are moving towards the development of an alternative approach to conducting POC monitoring. A Multi-Year Pollutant of Concern Sampling Plan (POC Sampling Plan) is needed to document this approach, including the rationale for the choice of sampling locations and methods (number and type of samples, number of storms, and recurrence interval for

sampling). The objective of the POC Sampling Plan is to provide a detailed road map for implementing the STLS, while also serving as a blue print for complying with MRP Provision C.8e. The final version of the POC Sampling Plan will reflect the consensus obtained through ongoing discussions of the RMP's Sources Pathways and Loadings Workgroup (SPLWG) and STLS Team. As agreed to by the MPC and the BASMAA Board of Directors, the Final POC Sampling Plan will be submitted to the Water Board's Executive Officer for approval. Implementation of the POC Sampling Plan is described in the projects below.

Project 5b – Standard Operating and Quality Assurance Procedures

As described in the introduction, the RMP has implemented POC loads monitoring at small tributaries sites beginning in 2002. At all POC loads monitoring locations, a turbidity surrogate methodology was employed because it is one of the most appropriate and cost-effective methods for particulate loads calculation. Using this method has provided valuable data to RMC participants and stakeholders over the last eight years. However, since additional monitoring locations are now required by the MRP and POC loads monitoring management questions have been revised, currently employed sampling methods are now being evaluated and will likely be revised based on the result of these evaluations.

Once a final sampling methodology is agreed to by RMC participants (with input from SPLWG members) and incorporated into the POC Sampling Plan, standard operating procedures (SOPs) and quality control procedures will be developed by the RMC. The development and continued use of field and laboratory quality assurance procedures promotes data quality and allows RMC participants, the Water Board and other stakeholders to have confidence water quality data collected by Permittees, Stormwater Programs or the RMC.

This project will be conducted to address the MRP requirement on monitoring protocols and data quality (Provision C.8.h), with regard to POC Monitoring. The task will include the adaptation of an existing field standard operating procedure (SOP) developed by other agencies (e.g., SCCWRP, SFEI) or creation of a new SOP, as necessary, that documents field procedures necessary to maintain SWAMP comparable and high quality data region-wide. Additionally, the task will include the development of a POC Monitoring QAPP through the adaptation of existing QAPPs.

Project 5c – Laboratory Standard Contract Language and Reporting Formats

Similar to Task 3c, the purpose of this task is to ensure that laboratories are following QAPP requirements and producing data in SWAMP comparable formats, the RMC will develop standard contract language for agreements with analytical laboratories. Additionally, standard reporting formats will be developed in this task to assist laboratories in submitting data to RMC participants in a standardized format that is easily uploaded into the RMC information management system. SFEI has likely created standard contract language and reporting formats for POC data collected at loading stations. Reasonable efforts will be made to use existing information and formats/contracts applicable to the project.

Project 5d – POC Monitoring Information Management System Development

As data from POC monitoring are collected by RMC participants and the RMP and received from analytical laboratories, they should be stored and managed in a cost effective manner that allows data users to easily access and query data and information. This project will develop an Information Management System (IMS) for the RMC that serves several purposes, the primary of which is to provide a mechanism for sharing POC Monitoring data among participants and

interested parties (e.g., Water Board). Data sharing is required if the RMC intends to answer POC management questions described at the beginning of this section. An additional impetus is MRP Provision C.8.h, which requires Permittees to submit monitoring data to the Water Board in SWAMP comparable formats and make available through a regional information management center, Permittee, or Program websites.

Based on anticipated RMC participant needs related to POC Monitoring, this task will focus on developing an IMS and associated database to house POC Monitoring data collected by RMC participants. The POC Monitoring IMS development task will include at minimum, the following four major subtasks:

- Development of a POC Monitoring Information Management Plan that will guide the development and maintenance of the IMS and fully describe data flow, roles and responsibilities;
- Data submission and acquisition processes for participants submitting/acquiring data to/from the POC Monitoring Information Management Officer (POC-IM Officer);
- Technical guidelines of how the data will be organized in the RMC creek status and trends database; and,
- A relatively simple database to store POC Monitoring data and information.

It is our understanding that an information management system (IMS) and associated database have been developed by the RMP to maintain existing POC monitoring data that have been collected through small tributary loading studies funded by the RMP. Therefore, as a first step to this project, it is recommended that SFEI be contacted to determine if the IMS developed for the RMP can be obtained and modified for use by the RMC. If so, this may reduce the overall costs of this task.

Project 5e: POC Monitoring Station Setup, Equipment Purchasing, Field Work and Laboratory Analyses

The MRP requires POC monitoring at eight stations using predefined methods. However, as described in the introduction of this section, RMC participants are working through the RMP to develop an alternative approach, which will likely identify a different set of POC monitoring stations and methodologies. Station locations, sampling methodologies and equipment needs will be outlined in the POC Sampling Plan (Project 5a). Additional information will also be provided in the POC Monitoring SOP and QAPP (Project 5b).

The RMP has operated two POC monitoring stations in the recent past, and for the purpose of resource planning, it is assumed that this level of effort will continue for the term of the MRP⁴. The remaining POC monitoring stations that are identified in the POC Sampling Plan will be setup and maintained by Stormwater Program/Permittee staff (or designees) on behalf of RMC participants. Subtasks associated with these efforts include coordinating POC Monitoring station setup, equipment purchasing, associated field work (i.e, sampling) and laboratory analyses. Stormwater Program/Permittee staff will comply with field protocols described in the POC Monitoring SOP and data quality objectives outlined in the QAPP to ensure comparability among POC Monitoring stations. Programs will be responsible for contracting and coordinating with laboratories, and providing data to the POC Monitoring Information Management Officer in a timely manner using data submission processes developed through Project 5d. For cost

⁴ This level of effort is currently between \$250,000 and \$300,000 per year and may be allocated to more than two POC Monitoring stations depending on the costs of the sampling methodologies agreed to by RMC participants and the SPLWG.

efficiencies, collaborations among RMC participants on contracting with laboratories are recommended, although not required as participation in the RMC.

Project 5f – POC Information Management and Quality Control

For successful collaboration at a regional scale, information management should occur on several levels. Once the POC Monitoring IMS and associated database have been developed and monitoring begins, data will be available for quality control evaluation and inevitably uploading into the POC Monitoring database. This project is ongoing and includes three main subtasks: 1) evaluating the quality of data generated by analytical labs and field personnel by implementing quality assurance and control (QA/QC) procedures described in the POC Monitoring QAPP; 2) updating the QAPP and SOP documentation as needed; and 3) managing, maintaining, and improving the POC Monitoring database to enable SWAMP comparability and data access to RMC participants.

It is assumed that QA/QC procedure implementation and the POC Monitoring database will be based on a centralized data evaluation and storage model. Under this model, RMC participants will provide raw data to a POC Monitoring Quality Assurance and Information Management (POC Monitoring QAIM) Officer for QA/QC evaluation and uploading into the RMC database. The POC Monitoring QAIM Officer is responsible for flagging and reconciling data that do not meet data quality objectives outlined in the QAPP, and communicating and disseminating data to RMC participants in a to-be-determined manner. Dissemination could occur periodically or as requested by RMC participants, in a variety of manners (e.g., the POC Monitoring QAIM will provide RMC participants with copies of the RMC database to house at Program sites for data access, or data could be made available via an internal participant only website).

2.6 Citizen Monitoring and Participation (C.8f)

Project 6a – Encouragement of Citizen Monitoring

Bay Area Stormwater Programs, to varying degrees, coordinate with or support citizen monitors within their geographical areas. As a result, relationships have been developed between RMC participants and citizen monitors. Stormwater Programs and Permittees are encouraged to continue coordinating with citizen monitors on monitoring site selection, methods and data interpretation, field equipment, data management and analysis, presentation of results and conclusions, and designing follow-up studies. Information sharing on activities designed to encourage citizen monitoring will occur at MPC meetings.

2.7 Data Analysis and Reporting (C.8g)

Provision C.8.g of the MRP requires reporting (and associated data analyses) to occur annually. Both an electronic data submittal and comprehensive monitoring reports are required. The following projects describe how RMC participant will comply with these requirements.

Project 7a: Water Quality Standard Exceedance Reporting

When RMC participants determine that data collected through creek status and trends monitoring, monitoring projects, citizen monitoring, or POC monitoring indicate that urban runoff is causing or contributing to exceedances of water quality standards, Water Board notification is required. It is assumed that this determination will be made by the applicable Stormwater Program/Permittee and not regionally by the RMC. That said, it is anticipated that through the data quality evaluation process conducted by QAIM Officers, data that exceed established triggers will be reported to the applicable RMC participant in a timely manner for further

assessment. Additionally, communication among RMC participants is encouraged as triggers are exceeded to determine if results are localized or more regional in nature.

Project 7b: Creek Status Electronic Reporting Template

Permittees are required to submit electronic water quality monitoring data no later than January 15th of each applicable year. Electronic monitoring data must be submitted in a SWAMP comparable format compatible with the SWAMP database. Water Quality Objective exceedances must be highlighted in the submittal.

For some parameters, electronic data submittal templates have been developed by SWAMP (e.g., creek status contaminants and toxicity). For others (e.g., bioassessment and continuous water quality monitoring), templates have yet to be created. Depending on the outcome of the development of Information Management Systems (IMSs) for creek status (Project 3e) and POC monitoring (Project 5d), additional templates may need to be developed. Therefore, this project serves as a placeholder for template development.

Project 7c: Electronic Submittal of Creek Status and Long-Term Trends Data

As described in Project 7b, electronic water quality monitoring data must be submitted to the Water Board each year. Data could be submitted by a combination of individual Permittees, Stormwater Programs and the RMC. Decisions on the most appropriate agency(s) or organizations to submit different types of data will be made via the IMS development process. Therefore, roles and responsibilities of Permittees, Stormwater Programs and the RMC regarding the scope of this project will be better defined as the IMSs are developed.

Project 7d: Annual Monitoring Reports

As required by the MRP, an Urban Creeks Monitoring Report must be submitted to the Water Board by March 15th of each year (beginning in 2013). The Urban Creeks Report should report on all data collected during the foregoing October 1 through September 30 time period. Summaries of all data collected via the Creek Status, Trends and Long-Term Monitoring; Monitoring Projects; and POC Monitoring are required. Specific information on each type of monitoring that is required to be included in the Urban Creeks Report is described in provision C.8.g.iii (see Appendix B).

As described throughout this Work Plan, monitoring activities are conducted through the RMC, Programs/Permittees, or a combination of both. Most activities conducted through the RMC have regional designs (e.g., creek status and trends, POC Monitoring) and data managed through a centralized IMS. Those activities conducted by Programs are designed to answer management/monitoring questions specific to a Program, and data are appropriately managed by individual Programs outside of the centralized IMSs. Given this, the following data analysis and reporting subtasks are being implemented:

Project 7d-1: Regional Urban Creeks Monitoring Report

Creek status and long-term trends elements that will be designed at the regional level include: biological assessments (BMI & Algae), nutrients, and pollutants and toxicity in the water column and sediment (see Table 2). For these parameters, a Regional Urban Creeks Status and Long-Term Trends Monitoring Report will be developed annually by the RMC. This Regional Urban Creek Report will include applicable information required by MRP Provision C.g.iii and provide analysis of data on the regional level. As a first step, a detailed outline of the Regional Urban Creek Report will be approved by the

MPC, including intended data illustrations, presentation and proposed analyses. Data analyzed and reported within the Regional Urban Creek Report may also be analyzed and reported by individual Programs at more local scales (e.g., site, reach or watershed) in Program-specific reports described below.

Project 7d-2: Program-specific Urban Creeks Monitoring Report

In addition to the Regional Urban Creek Report described above, Programs/Permittees will develop one or more Program/Permittee-specific Urban Creeks Monitoring Report(s) annually. The Program-specific report will include summaries of information collected by the Programs to answer questions at the site, reach or watershed scale, including (at a minimum): general water quality, temperature, pathogen indicator, and stream survey data (see Table 2). Additionally, results from monitoring projects conducted by individual Programs, but coordinated through the RMC will also be reported in the Program-specific report(s).

Project 7d-3: Regional POC (Loads) Monitoring Report

POC Monitoring is designed to answer regional questions described in the STLS and the MRP, and implemented consistent with the POC Sampling Plan. As described in Task 5e, POC Monitoring will occur through a combination of RMP and RMC participant efforts, with coordination through the RMC and SPLWG. Therefore, a single Regional POC Monitoring Report will be developed annually through the RMC on behalf of all RMC participants. Only data available at the time of producing the report will be included. As a first step, a detailed outline of the report will be approved by the MPC, including intended data illustrations, presentation and proposed analyses.

Project 7e: Integrated Monitoring Report

No later than March 15, 2014, Permittees are required to prepare and submit an Integrated Monitoring Report that includes a comprehensive analysis of all data collected pursuant to Provision C.8. The following projects will be conducted to satisfy this requirement.

Project 7e-1: Integrated Monitoring Report Outline and Template

Similar to the electronic data submittal discussed in Project 7c, the integrated monitoring report could be submitted by Stormwater Programs, the RMC, or a combination of both. Through the development of an integrated report outline, this project will assist RMC participants in making decisions on whether the integrated report (or sections of the report) is developed regionally or by individual Stormwater Programs. Once agreement on the outline and roles and responsibilities are established, a template(s) can be created via this project.

Project 7e-2: Integrated Monitoring Report

The format of the integrated monitoring report will be determined through the outline and template(s) developed through Project 7e-1. Roles and responsibilities associated with the development of the report or sections of the report will also be developed through this task. The report is due March 15, 2014.

3.0 Summary of RMC Projects, Schedule and Funding

As described in Section 2.0, a total of 27 monitoring projects related to Provision C.8 (Water Quality Monitoring) have been identified by the RMC. All monitoring projects described in this work plan will be coordinated through the RMC and conducted by Stormwater Programs, Permittees and/or the RMC. Table 4 provides a summary of RMC projects described in this multi-year work plan with its associated fiscal year of implementation.

Funding for these projects is provided by RMC participants via Stormwater Programs. Projects are collectively funded by RMC participants using population as the cost-share determinant. Population estimates for Bay Area Stormwater Programs based on 2008 California Department of Finance (DOF) are provided in Figure 2.

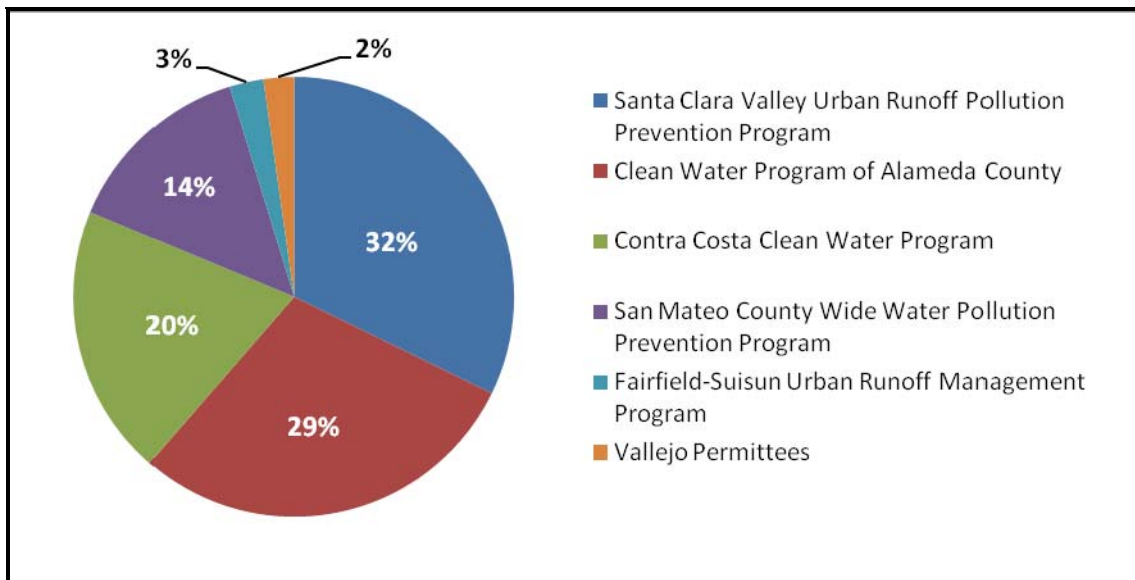


Figure 2. Percentages of project cost-shares for RMC participant programs based on 2010 California Department of Finance (DOF) population estimates.

Table 4. RMC monitoring projects and associated fiscal year of implementation.

#	Project Name	Fiscal Year of Implementation					
		2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
2	San Francisco Bay Estuary Monitoring						
2a	RMP Committee and Workgroup Representation	X	X	X	X	X	X
3	Creek Status and Long-Term Trends Monitoring						
3a	Creek Status and Long-Term Trends Monitoring Design		X	X			
3b	Standard Operating and Data Quality Assurance Procedures		X	X			
3c	Creek Status Monitoring Coordination		X	X	X	X	X
3d	Creek Status Monitoring Field Work and Laboratory Analyses			X	X		
3e	Creek Status and Trends Information Management System Development		X	X	X		
3f	Laboratory Contract Language and Reporting Formats		X	X			
3g	Creek Status and Trends Information Management and Quality Control			X	X	X	X
4	Monitoring Projects						
4a	Stressor/Source Identification Guidance			X			
4b	Stressor/Source Identification Studies				X	X	X
4c	BMP Effectiveness Investigation				X	X	X
4d	Geomorphic Project				X	X	X
5	Pollutants of Concern (Loads) Monitoring						
5a	Multi-Year Pollutants of Concern Sampling Plan	X	X				
5b	Standard Operating and Quality Assurance Procedures	X	X				
5c	Laboratory Standard Contract Language and Reporting Formats	X	X				
5d	POC Monitoring Information Management System Development		X				
5e	POC Monitoring Station Setup, Equipment Purchasing, Field Work and Laboratory Analyses		X	X	X	X	X
5f	POC Information Management and Quality Control			X	X	X	X
6	Citizen Monitoring and Participation						
6a	Encouragement of Citizen Monitoring	X	X	X	X	X	X

#	Project Name	Fiscal Year of Implementation					
		2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
7	Data Analysis and Reporting						
7a	Water Quality Standard Exceedance Reporting				X		
7b	Creek Status and Electronic Report Template			X			
7c	Electronic Creeks Data Submittal				X		
7d	Annual Monitoring Reports						
7d-1	<i>Regional Urban Creeks Monitoring Report</i>			X	X		
7d-2	<i>Program-specific Urban Creek Monitoring Report</i>			X	X		X
7d-3	<i>Regional POC (Loads) Monitoring Report</i>			X	X		X
7e	Integrated Monitoring Report						
7e-1	<i>Integrated Monitoring Report Outline and Reporting Template</i>			X	X		
7e-2	<i>Integrated Monitoring Report</i>					X	

4.0 References

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Appendix A

Water Board Acknowledgement of Regional Monitoring Collaborative and Pursuit of Alternative Sampling Design for Pollutants of Concern and Long-Term Trends Monitoring



California Regional Water Quality Control Board

San Francisco Bay Region



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Arnold Schwarzenegger
Governor

November 2, 2010

To: Municipal Regional Stormwater NPDES Permit (Order R2-2009-0074) Permittees

From: Thomas Mumley
Assistant Executive Officer

Subject: **Acknowledgement of Regional Monitoring Collaborative and Pursuit of Alternative Sampling Design for Pollutants of Concern and Long-Term Trends Monitoring**

Via this letter, we acknowledge all Permittees have opted to conduct monitoring required by the Municipal Regional Stormwater NPDES Permit through a regional monitoring collaborative, the Bay Area Stormwater Management Agencies (BASMAA) Regional Monitoring Coalition. We also acknowledge Permittees are developing an alternative sampling design for Provision C.8.e, Pollutants of Concern and Long-Term Trends Monitoring.

Provision C.8.a.ii Permittee Participation in a Regional Monitoring Collaborative

The permit requires each Permittee to provide written documentation to the Water Board stating whether or not the Permittee will conduct monitoring individually or through a regional monitoring collaborative. The individual countywide programs, on behalf of their member Permittees, and the cities of Fairfield, Suisun City, and Vallejo have all submitted letters certifying that all Permittees will conduct monitoring through participation in the BASMAA Regional Monitoring Coalition. As such, section C.8.a.ii allows Permittees to commence data collection by October 2011 instead of October 2010 if monitoring was to be conducted individually.

We are aware that BASMAA and Permittee representatives are working on the scope and details of the collaborative monitoring program and are developing a multiyear workplan for the Regional Monitoring Coalition. Since the first annual collaborative monitoring report is not required until March 15, 2013, we ask that you provide us with a status report on the collaborative monitoring program on March 15 and September 15 of 2011 and 2012.

Provision C.8.a Regional Collaboration and Provision C.8.e - Pollutants of Concern and Long-Term Trends Monitoring – Development of Alternative Sampling Design

Provision C.8.a allows Permittees to develop an alternative sampling design via a regional monitoring collaborative. We acknowledge that the BASMAA Regional Monitoring Coalition is pursuing alternative sampling design(s)¹ for Pollutants of Concern and Long-Term Trends Monitoring, in part via support for and participation in the Regional Monitoring Program for Water Quality in the San Francisco Estuary - Small Tributary Loading Strategy. To ensure adequate time for review and approval, we ask that you submit to us, no later than March 15, 2011, a status report and proposed schedule for completing the alternative sampling design(s) and associated multi-year monitoring plan(s) that satisfy permit requirements.

¹ The alternative sampling design for Long-Term Trends Monitoring may or may not be the same as that for Pollutants of Concern Monitoring.

Appendix B
Municipal Regional NPDES Permit for Stormwater Discharges
Provision C.8 Water Quality Monitoring

C.8. Water Quality Monitoring

C.8.a. Compliance Options

- i. **Regional Collaboration** – All Permittees shall comply with the monitoring requirements in C.8, however, Permittees may choose to comply with any requirement of this Provision through a collaborative effort to conduct or cause to be conducted the required monitoring in their jurisdictions. Where all or a majority of the Permittees collaborate to conduct water quality monitoring, this shall be considered a regional monitoring collaborative.

Where an existing collaborative body has initiated plans, before the adoption of this Permit, to conduct monitoring that would fulfill a requirement(s) of this Provision, but the monitoring would not meet this Provision's due date(s) by a year or less, the Permittees may request the Executive Officer adjust the due date(s) to synchronize with such efforts.

The types, quantities, and quality of data required within Provision C.8 establish the minimum level-of-effort that a regional monitoring collaborative must achieve. Provided these data types, quantities, and quality are obtained, a regional monitoring collaborative may develop its own sampling design. For Pollutants of Concern and Long-Term monitoring required under C.8.e, an alternative approach may be pursued by Permittees provided that: either similar data types, data quality, data quantity are collected with an equivalent level of effort described under C.8.e; or an equivalent level of monitoring effort is employed to answer the management information needs stated under C.8.e.

- ii. **Implementation Schedule** – Monitoring conducted through a regional monitoring collaborative shall commence data collection by October 2011. All other Permittee monitoring efforts shall commence data collection by October 2010. By July 1, 2010, each Permittee shall provide documentation to the Water Board, such as a written agreement, letter, or similar document that confirms whether the Permittee will conduct monitoring individually or through a regional monitoring collaborative.¹⁹
- iii. **Permittee Responsibilities** – A Permittee may comply with the requirements in Provision C.8 by performing the following:
 - (1) Contributing to its stormwater countywide program, as determined appropriate by the Permittee members, so that the stormwater countywide Program conducts monitoring on behalf of its members;
 - (2) Contributing to a regional collaborative effort;

¹⁹ This documentation will allow the Water Board to know when monitoring will commence for each Permittee. Permittees who commit to monitoring individually may join the regional monitoring collaborative at any time. Any Permittee who discontinues monitoring through the regional collaborative must commence complying with all requirements of Provision C.8 immediately.

- (3) Fulfilling monitoring requirements within its own jurisdictional boundaries; or
- (4) A combination of the previous options, so that all requirements are fulfilled.

iv. Third-party Monitoring – Permittees may choose to fulfill requirements of Provision C.8 using data collected by citizen monitors or other third-party organizations, provided the data are demonstrated to meet the data quality objectives described in Provision C.8.h. Where an existing third-party organization has initiated plans to conduct monitoring that would fulfill a requirement(s) of this Provision, but the monitoring would not meet this Provision's due date(s) by a year or less, the Permittees may request that the Executive Officer adjust the due date(s) to synchronize with such efforts.

C.8.b. San Francisco Estuary Receiving Water Monitoring

With limited exceptions, urban runoff from the Permittees' jurisdictions ultimately discharges to the San Francisco Estuary. Monitoring of the Estuary is intended to answer questions²⁰ such as:

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

Permittees shall participate in implementing an Estuary receiving water monitoring program, at a minimum equivalent to the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP), by contributing their fair-share financially on an annual basis.

C.8.c. Status Monitoring/Rotating Watersheds

- i.** Status Monitoring is intended to answer these questions: Are water quality objectives, both numeric and narrative, being met in local receiving waters,

²⁰ These are the management questions approved by the Regional Monitoring Program's Steering Committee on May 9, 2008, and stated at http://www.sfei/rmp/rmp_steering_meetings/rmp_steering_meeting_5_09_08/Item%2010a%20Attachment%201%20%20Draft%20RMP%20Management%20Questions%2005-02-08%20Annotated.pdf. While the stated objectives may change over time, the intent of this provision is for Permittees to continue contributing financially and as stakeholders in such a program as the RMP, which monitors the quality of San Francisco Bay.

including creeks, rivers and tributaries? Are conditions in local receiving waters supportive of or likely to be supportive of beneficial uses?

- ii. Parameters and Methods** – Permittees shall conduct Status Monitoring using the parameters, methods, occurrences, durations, and minimum number of sampling sites as described in Table 8.1. Spring sampling shall be conducted during the April - June timeframe; dry weather sampling shall be conducted during the July - September timeframe. Minor variations of the parameters and methods may be allowed with Executive Officer concurrence.
- iii. Frequency** – Permittees shall complete the Status Monitoring in Table 8.1 at the following frequencies:
 - Alameda Permittees – annually
 - Contra Costa Permittees – annually
 - Fairfield-Suisun Permittees – twice during the Permit term
 - San Mateo Permittees – annually
 - Santa Clara Permittees – annually
 - Vallejo Permittees – once during the Permit term

Table 8.1 Status Monitoring Elements

Status Monitoring Parameter	Sampling and/or Analytical Method ²¹	Minimum Sampling Occurrence ²²	Duration of Sampling	Minimum # Sample Sites to Monitor/Yr ²³ Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.
Biological Assessment ²⁴ (Includes Physical Habitat Assessment and General Water Quality Parameters ²⁵) Nutrients (total phosphorus, dissolved orthophosphate, total nitrogen, nitrate, ammonia, silica, chloride,	SWAMP Std Operating Procedure ^{26,27, 28} for Biological Assessments & PHab; SWAMP	1/yr (Spring Sampling)	Grab sample	Spring 20 / 10 / 4	BMI metrics that indicate substantially degraded community as per Attachment H, Table H-1 For Nutrients: 20% of results in one waterbody exceed one or more water quality standard

²¹ Refers to field protocol, instrumentation and/or laboratory protocol.

²² Refers to the number of sampling events at a specific site in a given year.

²³ The number of sampling sites shown is based on the relative population in each Regional Stormwater Countywide Program and is listed in this order: Santa Clara & Alameda Countywide / Contra Costa & San Mateo Countywide / Vallejo & Fairfield-Suisun Programs.

²⁴ The same general location must be used to collect benthic community, sediment chemistry, and sediment toxicity samples. General Water Quality Parameters need not be collected twice, where it is collected by a multi-parameter probe at a subset of these sample sites (see next row of Table 8.1).

²⁵ Includes dissolved oxygen, temperature, conductivity, and pH.

²⁶ Ode, P.R. 2007. Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California, California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP), as subsequently revised (http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/phab_sopr6.pdf). Permittees may coordinate with Water Board staff to modify their sampling procedures if these referenced procedures change during the Permit term.

²⁷ Biological assessments shall include benthic macroinvertebrates and algae. Bioassessment sampling method shall be multihabitat reach-wide. Macroinvertebrates shall be identified according to the Standard Taxonomic Effort Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists, using the most current SWAMP approved method. Current methods are documented in (1) SWAMP Standard Operating Procedure (SOP) and Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode, 5-21-07, and (2) Amendment to SWAMP Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode, 9-17-08. For algae, include mass (ash-free dry weight), chlorophyll a, diatom and soft algae taxonomy, and reachwide algal percent cover. Physical Habitat (PHab) Assessment shall include the SWAMP basic method plus 1) depth and pebble count + CPOM, 2) cobble embeddedness, 3) discharge measurements, and 4) in-stream habitat. Permittees may coordinate with Water Board staff to modify these sampling procedures if SWAMP procedures change during the Permit term.

²⁸ Algae shall be collected in a consistent timeframe as Regional SWAMP. For guidance on algae sampling and evaluation: Fetscher, A. and K. McLaughlin, May 16, 2008. Incorporating Bioassessment Using Freshwater Algae into California's Surface Water Ambient Monitoring Program (SWAMP). Technical Report 563 and current SWAMP-approved updates to Standard Operating Procedures therein. Available at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/563_periphyton_bioassessment.pdf.

Status Monitoring Parameter	Sampling and/or Analytical Method ²¹	Minimum Sampling Occurrence ²²	Duration of Sampling	Minimum # Sample Sites to Monitor/Yr ²³ Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.
dissolved organic carbon, suspended sediment concentration)	comparable methods for Nutrients				or established threshold
General Water Quality ²⁹	Multi-Parameter Probe	2/yr (Concurrent with bioassessment & during the Aug. - Sept. timeframe)	15-minute intervals for 1-2 weeks	3 / 2 / 1	20% of results in one waterbody exceed one or more water quality standard or established threshold
Chlorine (Free and Total)	USEPA Std. Method 4500 Cl F ³⁰	2/yr Spring & Dry Seasons	Grab sample	Spring 20 / 10 / 2 Dry 3 / 2 / 1	After immediate resampling, concentrations remain > 0.08 mg/L
Temperature	Digital Temperature Logger	60-minute intervals	60-minute intervals April through Sept.	8 / 4 / 1	20% of results in one waterbody exceed applicable temperature threshold ³¹
Toxicity – Water Column ³²	Applicable SWAMP Comparable Method	2/yr (1/Dry Season & 1 Storm Event)	Grab or composite sample	3 / 2 / 1	If toxicity results < 50% of control results, repeat sample. If 2nd sample yields < 50% of control results, proceed to C.8.d.i.

²⁹ Includes dissolved oxygen, temperature, conductivity, and pH.

³⁰ The method of analysis shall achieve a method detection limit at least as low as that achieved by the Amperometric Titration Method (4500-Cl from *Standard Methods for Examination of Water and Wastewater*, Edition 20).

³¹ If temperatures exceed applicable threshold (e.g., Maximum Weekly Average Temperature, Sullivan K., Martin, D.J., Cardwell, R.D., Toll, J.E., Duke, S. 2000. *An Analysis of the Effects of Temperature on Salmonids of the Pacific Northwest with Implications for Selecting Temperature Criteria, Sustainable Ecosystem Institute*) or spike with no obvious natural explanation observed.

³² US EPA three species toxicity tests: *Selenastrum* growth and *Ceriodaphnia* and *Pimephales* with lethal and sublethal endpoints. Also *Hyalella azteca* with lethal endpoint.

Status Monitoring Parameter	Sampling and/or Analytical Method ²¹	Minimum Sampling Occurrence ²²	Duration of Sampling	Minimum # Sample Sites to Monitor/Yr ²³ Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.
Toxicity– Bedded Sediment, Fine-grained ³³	Applicable SWAMP Comparable Method	1/yr	Grab sample	3 / 2 / 1 At fine-grained depositional area at bottom of watershed	See Attachment H, Table H-1
Pollutants – Bedded Sediment, ³⁴ fine- grained	Applicable SWAMP Comparable Method inc. grain size	1/yr	Grab sample	3 / 2 / 1 At fine-grained depositional area at bottom of watershed	See Attachment H, Table H-1
Pathogen Indicators ³⁵	U.S. EPA protocol ³⁶	1/yr (During Summer)	Follow U.S. EPA protocol	5 / 5 / * *Fairfield-Suisun & Vallejo Permittees: 3 sites twice in permit term	Exceedance of USEPA criteria
Stream Survey (stream walk & mapping) ³⁷	USA ³⁸ or equivalent	1 waterbody/yr	N/A	9 / 6 / 3 stream miles/year	N/A

³³ Bedded sediments should be fine-grain from depositional areas. Grain size and TOC must be reported. Coordinate with TMDL Provision requirements as applicable.

³⁴ Bedded sediments should be fine-grain from depositional areas. Grain size and TOC must be reported. Analytes shall include all of those reported in MacDonald et al. 2000 (including copper, nickel, mercury, PCBs, DDT, chlordane, dieldrin) as well as pyrethroids (see Table 8.4 for list of pyrethroids). Coordinate with TMDL Provision requirements as applicable. MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31.

³⁵ Includes fecal coliform and *E. Coli*.

³⁶ Rather than collecting samples over five separate days, Permittees may use Example #2, pg. 54, of USEPA's *Implementation Guidance for Ambient Water Quality Criteria for Bacteria*, March 2004 Final.

³⁷ The Stream Surveys need not be repeated on a watershed if a Stream Survey was completed on that waterbody within the previous five years. The number of stream miles to be surveyed in any given year may be less than that shown in Table 8-1 in order to avoid repeating surveys at areas surveyed during the previous five years.

³⁸ Center for Watershed Protection, Manual 10: *Unified Stream Assessment: A User's Manual*, February 2005.

- iv. **Locations** – For each sampling year (per C.8.c.iii.), Permittees shall select at least one waterbody to sample from the applicable list below. Locations shall be selected so that sampling is sufficient to characterize segments of the waterbody(s). For example, Permittees required to collect a larger number of samples should sample two or more waterbodies, so that each sampling effort represents a reasonable segment length and/or type. Samples shall be collected in reaches that receive urban stormwater discharges, except in possible infrequent instances where non-urban-impacted stream samples are needed for comparison³⁹. Waterbody selection shall be based on factors such as watershed area, land use, likelihood of urban runoff impacts, and existing monitoring data.

Table 8.2 Status Monitoring Locations – Waterbodies

SCVURPPP	ACCWP	CCCWP	SMCWPPP	FSUMRP	VALLEJO
Coyote Creek and tributaries	Arroyo Valle (below Livermore or lower)	Kirker Creek	San Pedro Creek and tributaries	Laurel Creek	Chabot Creek
Guadalupe River and tributaries	Arroyo Mocho	Mt. Diablo Creek	Pilarcitos Creek	Ledgewood Creek	Austin Creek & tributaries
San Tomas Creek and tributaries	Tassajara Creek	Walnut Creek and tributaries	Colma Creek		
Calabazas Creek	Alamo Creek	Rodeo Creek	San Bruno Creek and tributaries		
Permanente Creek and tributaries	Arroyo de la Laguna	Pinole Creek	Millbrae Creek and tributaries		
Stevens Creek and tributaries	Alameda Creek (at Fremont or below)	San Pablo Creek	Mills Creek and tributaries		
Matadero Creek and tributaries	San Lorenzo Creek & tribs	Alhambra Creek	Easton Creek and tributaries		
Adobe Creek	San Leandro Creek & tribs	Wildcat Creek	Sanchez Creek and tributaries		
Lower Penitencia Creek and tributaries	Oakland, Berkeley, or Albany Creeks		Burlingame Creek and tributaries		
Barron Creek			San Mateo Creek (below dam only)		
San Francisquito Creek & tributaries			Borel Creek & tributaries		
			Laurel Creek & tribs		
			Belmont Creek & tribs		
			Pulgas Creek & tribs		
			Cordilleras & tributaries		
			Redwood Creek & tribs		
			Atherton Creek & tribs		
			San Francisquito Creek and tributaries		

³⁹ Sampling efforts shall focus on stream reaches with urban stormwater system discharges. Sampling upstream of urban outfalls is not precluded where needed to meet sampling plan objectives.

- v. Status Monitoring Results – When Status Monitoring produces results such as those described in the final column of Table 8.1, Permittees shall conduct Monitoring Project(s) as described in C.8.d.i.

C.8.d. Monitoring Projects – Permittees shall conduct the Monitoring Projects listed below.

- i. **Stressor/Source Identification** – When Status results trigger a follow-up action as indicated in Table 8.1, Permittees shall take the following actions, as also required by Provision C.1. If the trigger stressor or source is already known, proceed directly to step 2. The first follow-up action shall be initiated as soon as possible, and no later than the second fiscal year after the sampling event that triggered the Monitoring Project.
 - (1) Conduct a site specific study (or non-site specific if the problem is widespread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source. This study should follow guidance for Toxicity Reduction Evaluations (TRE)⁴⁰ or Toxicity Identification Evaluations (TIE).⁴¹ A TRE, as adapted for urban stormwater data, allows Permittees to use other sources of information (such as industrial facility stormwater monitoring reports) in attempting to determine the trigger cause, potentially eliminating the need for a TIE. If a TRE does not result in identification of the stressor/source, Permittees shall conduct a TIE.
 - (2) Identify and evaluate the effectiveness of options for controlling the cause(s) of the trigger stressor/source.
 - (3) Implement one or more controls.
 - (4) Confirm the reduction of the cause(s) of trigger stressor/source.
 - (5) Stressor/Source Identification Project Cap: Permittees who conduct this monitoring through a regional collaborative shall be required to initiate no more than ten Stressor/Source Identification projects during the Permit term in total, and at least two must be toxicity follow-ups, unless monitoring results do not indicate the presence of toxicity. If conducted through a stormwater countywide program, the Santa Clara and Alameda

⁴⁰ USEPA. August 1999. *Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants*. EPA/833B-99/002. Office of Wastewater Management, Washington, D.C.

⁴¹ Select TIE methods from the following references after conferring with SWAMP personnel: For sediment: (1) Ho KT, Burgess R., Mount D, Norberg-King T, Hockett, RS. 2007. *Sediment toxicity identification evaluation: interstitial and whole methods for freshwater and marine sediments*. USEPA, Atlantic Ecology Division/Mid-Continental Ecology Division, Office of Research and Development, Narragansett, RI, or (2) Anderson, BS, Hunt, JW, Phillips, BM, Tjeerdema, RS. 2007. *Navigating the TMDL Process: Sediment Toxicity*. Final Report- 02-WSM-2. Water Environment Research Federation. 181 pp. For water column: (1) USEPA. 1991. *Methods for aquatic toxicity identification evaluations. Phase I Toxicity Characterization Procedures*. EPA 600/6-91/003. Office of Research and Development, Washington, DC., (2) USEPA. 1993. *Methods for aquatic toxicity identification evaluations. Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity*. EPA 600/R-92/080. Office of Research and Development, Washington, DC., or (3) USEPA. 1996. *Marine Toxicity Identification Evaluation (TIE), Phase I Guidance Document*. EPA/600/R-95/054. Office of Research and Development, Washington, DC.

Permittees each shall be required to initiate no more than five (two for toxicity); the Contra Costa and San Mateo Permittees each shall be required to initiate no more than three (one for toxicity); and the Fairfield-Suisun and Vallejo Permittees each shall be required to initiate no more than one Stressor/Source Identification project(s) during the Permit term.

(6) As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed to do so by the Water Board.

ii. BMP Effectiveness Investigation – Investigate the effectiveness of one BMP for stormwater treatment or hydrograph modification control. Permittees who do this project through a regional collaborative are required to initiate no more than one BMP Effectiveness Investigation during the Permit term. If conducted through a stormwater countywide program, the Santa Clara, Alameda, Contra Costa, and San Mateo Permittees shall be required to initiate one BMP Effectiveness Investigation each, and the Fairfield-Suisun and Vallejo Permittees shall be exempt from this requirement. The BMP(s) used to fulfill requirements of C.3.b.iii., C.11.e. and C.12.e. may be used to fulfill this requirement, provided the BMP Effectiveness Investigation includes the range of pollutants generally found in urban runoff. The BMP Effectiveness Investigation will not trigger a Stressor/Source Identification Project. Data from this Monitoring Project need not be SWAMP-comparable.

iii. Geomorphic Project – This monitoring is intended to answer the questions: How and where can our creeks be restored or protected to cost-effectively reduce the impacts of pollutants, increased flow rates, and increased flow durations of urban runoff?

Permittees shall select a waterbody/reach, preferably one that contains significant fish and wildlife resources, and conduct one of the following projects within each county, except that only one such project must be completed within the collective Fairfield-Suisun and Vallejo Permittees' jurisdictions:

- (1) Gather geomorphic data to support the efforts of a local watershed partnership⁴² to improve creek conditions; or
- (2) Inventory locations for potential retrofit projects in which decentralized, landscape-based stormwater retention units can be installed; or
- (3) Conduct a geomorphic study which will help in development of regional curves which help estimate equilibrium channel conditions for different-sized drainages. Select a waterbody/reach that is not undergoing changing land use. Collect and report the following data:
 - Formally surveyed channel dimensions (profile), planform, and cross-sections. Cross-sections shall include the topmost floodplain terrace and

⁴² A list of local watershed partnerships may be obtained from Water Board staff.

be marked by a permanent, protruding (not flush with ground) monument.

- Contributing drainage area.
- Best available information on bankfull discharges and width and depth of channel formed by bankfull discharges.
- Best available information on average annual rainfall in the study area.

Permittees shall complete the selected geomorphic project so that project results are reported in the Integrated Monitoring Report (see Provision C.8.g.v).

C.8.e. Pollutants of Concern and Long-Term Trends Monitoring

Pollutants of Concern (POC) monitoring is intended to assess inputs of Pollutants of Concern to the Bay from local tributaries and urban runoff, assess progress toward achieving wasteload allocations (WLAs) for TMDLs and help resolve uncertainties associated with loading estimates for these pollutants. In particular, there are four priority management information needs toward which POC monitoring must be directed: 1) identifying which Bay tributaries (including stormwater conveyances) contribute most to Bay impairment from pollutants of concern; 2) quantifying annual loads or concentrations of pollutants of concern from tributaries to the Bay; 3) quantifying the decadal-scale loading or concentration trends of pollutants of concern from small tributaries to the Bay; and 4) quantifying the projected impacts of management actions (including control measures) on tributaries and identifying where these management actions should be implemented to have the greatest beneficial impact.

Permittees shall implement the following POC monitoring components or pursue an alternative approach that addresses each of the aforementioned management information needs. An alternative approach may be pursued by Permittees provided that: either similar data types, data quality, data quantity are collected with an equivalent level of effort described; or an equivalent level of monitoring effort is employed to answer the management information needs.

Long-Term monitoring is intended to assess long-term trends in pollutant concentrations and toxicity in receiving waters and sediment, in order to evaluate if stormwater discharges are causing or contributing to toxic impacts on aquatic life. Permittees shall implement the following Long-Term monitoring components or, following approval by the Executive Officer, an equivalent monitoring program.

- i. Pollutants of Concern Loads Monitoring Locations** – Permittees shall conduct Pollutants of Concern monitoring at stations listed below. Permittees may install these stations in two phases providing at least half of the stations are monitored in the water year beginning October 2010, and all the stations are monitored in the water year beginning October 2012. Upon approval by the Executive Officer, Permittees may use alternate POC monitoring locations.

- (1) Castro Valley Creek S3 at USGS gauging station in Castro Valley
- (2) Guadalupe River
- (3) Zone 4 Line A at Chabot Road in Hayward
- (4) Rheem Creek at Giant Road in Richmond
- (5) Walnut Creek at a downstream location
- (6) Calabazas Creek at Lakeside Drive in Sunnyvale, at border with Santa Clara
- (7) San Mateo Creek at downstream location
- (8) Laurel Creek at Laurie Meadows park, off Casanova Drive in City of San Mateo.

ii. Long-Term Monitoring Locations – Permittees shall conduct Long-Term monitoring at stations listed below. After conferring with the Regional SWAMP program, and upon approval by the Executive Officer, Permittees may use alternate Long-Term monitoring locations.

Table 8.3. Long-Term Monitoring Locations

Stormwater Countywide Program	Waterbody	Suggested Location
Alameda Permittees	Alameda Creek OR	East of Alvarado Blvd*
	Lower San Leandro Creek	Empire Road*
Contra Costa Permittees	Kirker Creek OR	Floodway*
	Walnut Creek	Concord Avenue*
Santa Clara Permittees	Guadalupe River OR	USGS Gaging Station 11169025*
	Coyote Creek	Montague*
San Mateo Permittees	San Mateo Creek	Gateway Park*

* SWAMP is scheduled to collect sediment toxicity and sediment chemistry samples annually at these stations during the month of June.

iii. Parameters and Frequencies – Permittees shall conduct Pollutants of Concern sampling pursuant to Table 8.4, Categories 1 and 2. In Table 8.4, Category 1 pollutants are those for which the Water Board has active water quality attainment strategies (WQAS), such as TMDL or site-specific objective projects. Category 2 pollutants are those for which WQAS are in development. The lower monitoring frequency for Category 2 pollutants is sufficient to develop preliminary loading estimates for these pollutants.

Permittees shall conduct Long-Term monitoring pursuant to Table 8.4, Category 3. SWAMP has scheduled collection of Category 3 data at the Long-Term monitoring locations stated in C.8.e.ii. As stated in Provision C.8.a.iv., Permittees may use SWAMP data to fulfill Category 3 sampling requirements.

iv. Protocols – At a minimum, sampling and analysis protocols shall be consistent with 40 CFR 122.21(g)(7)(ii).

- v. **Methods** – Methyl mercury samples shall be grab samples collected during storm events that produce rainfall of at least 0.10 inch, shall be frozen immediately upon collection, and shall be kept frozen during transport to the laboratory. All other Category 1 and 2 samples shall be wet weather flow-weighted composite samples, collected during storm events that produce rainfall of at least 0.10 inch. Sampled storms should be separated by 21 days of dry weather, but, at a minimum, sampled storms must have 72 hours of antecedent dry weather. Samples must include the first rise in the hydrograph. Category 3 monitoring data shall be SWAMP-comparable.

Table 8.4 Pollutants of Concern Loads & Long-Term Monitoring Elements

Category/Parameter	Sampling Years	Minimum Sampling Occurrence	Sampling Interval
Category 1 <ul style="list-style-type: none"> • Total and Dissolved Copper • Total Mercury⁴³ • Methyl Mercury • Total PCBs⁴⁴ • Suspended Sediments (SSC) • Total Organic Carbon • Toxicity – Water Column • Nitrate as N • Hardness 	Annually	Average of 4 wet weather events per year For methyl mercury only: average of 2 wet & 2 dry weather events per year	Flow-weighted composite For methyl mercury only: grab samples collected during the first rise in the hydrograph of a storm event.
Category 2 <ul style="list-style-type: none"> • Total and Dissolved Selenium • Total PBDEs (Polybrominated Diphenyl Ethers) • Total PAHs (Poly-Aromatic Hydrocarbons) • Chlordane • DDTs (Dichloro-Diphenyl-Trichloroethane) • Dieldrin • Nitrate as N • Pyrethroids - bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin • Carbaryl and fipronil • Total and Dissolved Phosphorus 	Oct. 2010 - 2011 water year and Oct. 2012 - 2013 water year	2 times per year	Flow-weighted composite
Category 3 Toxicity – Bedded Sediment, fine-grained ⁴⁵	Biennially, Coordinate	Once per year, during April-June,	Grab sample

⁴³ The monitoring type and frequency shown for mercury is not sufficient to determine progress toward achieving TMDL load allocations. Progress toward achieving load allocations will be accomplished by assessing loads avoided resulting from treatment, source control, and pollution prevention actions.

⁴⁴ The monitoring type and frequency shown for PCBs is not sufficient to determine progress toward achieving TMDL load allocations. Progress toward achieving load allocations will be accomplished by assessing loads avoided resulting from treatment, source control, and pollution prevention actions.

Category/Parameter	Sampling Years	Minimum Sampling Occurrence	Sampling Interval
Pollutants – Bedded Sediment, fine-grained	with SWAMP	coordinate with SWAMP	

- vi. **Sediment Delivery Estimate/Budget** – The objective of this monitoring is to develop a strong estimate of the amount of sediment entering the Bay from local tributaries and urban drainages. By July 1, 2011, Permittees shall develop a design for a robust sediment delivery estimate/sediment budget in local tributaries and urban drainages. Permittees shall implement the study by July 1, 2012.
- vii. **Emerging Pollutants** – Permittees shall develop a work plan and schedule for initial loading estimates and source analyses for emerging pollutants: endocrine-disrupting compounds, PFOS/PFAS (Perfluorooctane Sulfonates (PFOS), Perfluoroalkyl sulfonates (PFAS); these perfluorocompounds are related to Teflon products), and NP/NPEs (nonylphenols/nonylphenol esters —estrogen-like compounds). This work plan, which is to be implemented in the next Permit term, shall be submitted with the Integrated Monitoring Report (see Provision C.8.g.).

C.8.f. Citizen Monitoring and Participation

- i. Permittees shall encourage Citizen Monitoring.
- ii. In developing Monitoring Projects and evaluating Status & Trends data, Permittees shall make reasonable efforts to seek out citizen and stakeholder information and comment regarding waterbody function and quality.
- iii. Permittees shall demonstrate annually that they have encouraged citizen and stakeholder observations and reporting of waterbody conditions. Permittees shall report on these outreach efforts in the annual Urban Creeks Monitoring Report.

C.8.g. Reporting

- i. **Water Quality Standard Exceedance** – When data collected pursuant to C.8.a.-C.8.f. indicate that stormwater runoff or dry weather discharges are or may be causing or contributing to exceedance(s) of applicable water quality standards, including narrative standards, a discussion of possible pollutant sources shall be included in the Urban Creeks Monitoring Report. When data collected pursuant to C.8.a.-C.8.f. indicate that discharges are causing or contributing to an exceedance of an applicable water quality standard, Permittees shall notify the Water Board within no more than 30 days of such a determination and submit a follow-up report in accordance with Provision C.1 requirements. The preceding reporting requirements shall not apply to

⁴⁵ If Ceriodaphnia, Hyalella azteca, or Pimephales survival or Selenastrum growth is < 50% of control results, repeat wet weather sample. If 2nd sample yields < 50% of control results, proceed to C.8.d.i.

continuing or recurring exceedances of water quality standards previously reported to the Water Board or to exceedances of pollutants that are to be addressed pursuant to Provisions C.8 through C.14 of this Order in accordance with Provision C.1.

- ii. **Status Monitoring Electronic Reporting** – Permittees shall submit an Electronic Status Monitoring Data Report no later than January 15 of each year, reporting on all data collected during the foregoing October 1–September 30 period. Electronic Status Monitoring Data Reports shall be in a format compatible with the SWAMP database.⁴⁶ Water Quality Objective exceedances shall be highlighted in the Report.
- iii. **Urban Creeks Monitoring Report** – Permittees shall submit a comprehensive Urban Creeks Monitoring Report no later than March 15 of each year, reporting on all data collected during the foregoing October 1–September 30 period, with the initial report due March 15, 2012, unless the Permittees choose to monitor through a regional collaborative, in which case the due date is March 15, 2013. Each Urban Creeks Monitoring Report shall contain summaries of Status, Long-Term, Monitoring Projects, and Pollutants of Concern Monitoring including, as appropriate, the following:
 - (1) Maps and descriptions of all monitoring locations;
 - (2) Data tables and graphical data summaries; Constituents that exceed applicable water quality standards shall be highlighted;
 - (3) For all data, a statement of the data quality;
 - (4) An analysis of the data, which shall include the following:
 - Calculations of biological metrics and physical habitat endpoints.
 - Comparison of biological metrics to:
 - Each other
 - Any applicable, available reference site(s)
 - Any applicable, available index of biotic integrity
 - Physical habitat endpoints.
 - Identification and analysis of any long-term trends in stormwater or receiving water quality.
 - (5) A discussion of the data for each monitoring program component, which shall:
 - Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, the Ocean Plan, or the California Toxics Rule or other applicable water quality control plans.

⁴⁶ See <http://mpsl.mlml.calstate.edu/swdataformats.htm>. Permittees shall maintain an information management system that will support electronic transfer of data to the Regional Data Center of the *California Environmental Data Exchange Network (CEDEN)*, located within the San Francisco Estuary Institute.

- Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness.
 - Identify and prioritize water quality problems.
 - Identify potential sources of water quality problems.
 - Describe follow-up actions.
 - Evaluate the effectiveness of existing control measures.
 - Identify management actions needed to address water quality problems.
- iv. Monitoring Project Reports** – Permittees shall report on the status of each ongoing Monitoring Project in each annual Urban Creeks Monitoring Report. In addition, Permittees shall submit stand-alone summary reports within six months of completing BMP Effectiveness and Geomorphic Projects; these reports shall include: a description of the project; map(s) of project locations; data tables and summaries; and discussion of results.
- v. Integrated Monitoring Report** – No later than March 15, 2014, Permittees shall prepare and submit an Integrated Monitoring Report through the regional collaborative monitoring effort on behalf of all participating Permittees, or on a countywide basis on behalf of participating Permittees, so that all monitoring conducted during the Permit term is reported.⁴⁷ This report shall be in lieu of the Annual Urban Creeks Monitoring Report due on March 15, 2014.

The report shall include, but not be limited to, a comprehensive analysis of all data collected pursuant to Provision C.8., and may include other pertinent studies. For Pollutants of Concern, the report shall include methods, data, calculations, load estimates, and source estimates for each Pollutant of Concern Monitoring parameter. The report shall include a budget summary for each monitoring requirement and recommendations for future monitoring. This report will be part of the next Report of Waste Discharge for the reissuance of this Permit.

- vi. Standard Report Content** –All monitoring reports shall include the following:
- The purpose of the monitoring and briefly describe the study design rationale.
 - Quality Assurance/Quality Control summaries for sample collection and analytical methods, including a discussion of any limitations of the data.
 - Brief descriptions of sampling protocols and analytical methods.
 - Sample location description, including waterbody name and segment and latitude and longitude coordinates.
 - Sample ID, collection date (and time if relevant), media (e.g., water, filtered water, bed sediment, tissue).
 - Concentrations detected, measurement units, and detection limits.

⁴⁷ Permittees who do not participate in the Regional Monitoring Group or in a stormwater countywide program must submit an individual Integrated Receiving Water Impacts Report.

- Assessment, analysis, and interpretation of the data for each monitoring program component.
- Pollutant load and concentration at each mass emissions station.
- A listing of volunteer and other non-Permittee entities whose data are included in the report.
- Assessment of compliance with applicable water quality standards.
- A signed certification statement.

vii. Data Accessibility – Permittees shall make electronic reports available through a regional data center, and optionally through their web sites. Permittees shall notify stakeholders and members of the general public about the availability of electronic and paper monitoring reports through notices distributed through appropriate means, such as an electronic mailing list.

C.8.h. Monitoring Protocols and Data Quality

Where applicable, monitoring data must be SWAMP comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Project Plan (QAPP)⁴⁸ for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent Standard Operating Procedures. A Regional Monitoring Collaborative may adapt the SWAMP QAPP for use in conducting monitoring in the San Francisco Bay Region, and may use such QAPP if acceptable to the Executive Officer.

⁴⁸ The current SWAMP QAPP at the time of Permit issuance is dated September 1, 2008, and is available at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf.

ATTACHMENT H

Provision C.8. Status and Long-Term Monitoring Follow-up Analysis and Actions

Status and Long-Term Monitoring Follow-up Analysis and Actions for Biological Assessment, Bedded Sediment Toxicity, and Bedded Sediment Pollutants

When results from Biological Assessment, Bedded Sediment Toxicity, and/or Bedded Sediment Pollutants monitoring indicate impacts at a monitoring location, Permittees shall evaluate the extent and cause(s) of impacts to determine the potential role of urban runoff as indicated in Table H-1.

Table H-1. Sediment Triad Approach to Determining Follow-Up Actions

Chemistry Results ¹⁶¹	Toxicity Results ¹⁶²	Bioassessment Results ¹⁶³	Action
No chemicals exceed Threshold Effect Concentrations (TEC), mean Probable Effects Concentrations (PEC) quotient < 0.5 and pyrethroids < 1.0 Toxicity Unit (TU) ¹⁶⁴	No Toxicity	No indications of alterations	No action necessary
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids < 1.0 TU	Toxicity	No indications of alterations	<ul style="list-style-type: none"> (1) Take confirmatory sample for toxicity. (2) If toxicity repeated, attempt to identify cause and spatial extent. (3) Where impacts are under Permittee's control, take management actions to minimize upstream sources causing toxicity; initiate no later than the second fiscal year following the sampling event.

¹⁶¹ TEC and PEC are found in MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20-31.

¹⁶² Toxicity is exhibited when *Hyallela* survival statistically different than and < 20 percent of control.

¹⁶³ Alterations are exhibited if metrics indicate substantially degraded community.

¹⁶⁴ Toxicity Units (TU) are calculated as follows: TU = Actual concentration (organic carbon normalized) ÷ Reported *H. azteca* LC₅₀ concentration (organic concentration normalized). Weston, D.P., R.W. Holmes, J. You, and M.J. Lydy, 2005. Aquatic Toxicity Due to Residential Use of Pyrethroid Insecticides. *Environ. Science and Technology* 39(24):9778-9784.

Chemistry Results¹⁶¹	Toxicity Results¹⁶²	Bioassessment Results¹⁶³	Action
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids < 1.0 TU	No Toxicity	Indications of alterations	Identify the most probable cause(s) of the alterations in biological community. Where impacts are under Permittee's control, take management actions to minimize the impacts causing physical habitat disturbance; initiate no later than the second fiscal year following the sampling event.
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids < 1.0 TU	Toxicity	Indications of alterations	(1) Identify cause(s) of impacts and spatial extent. (2) Where impacts are under Permittee's control, take management actions to minimize impacts; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	No Toxicity	Indications of alterations	(1) Identify cause of impacts. (2) Where impacts are under Permittee's control, take management actions to minimize the impacts caused by urban runoff; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	Toxicity	No indications of alterations	(1) Take confirmatory sample for toxicity. (2) If toxicity repeated, attempt to identify cause and spatial extent. (3) Where impacts are under Permittee's control, take management actions to minimize upstream sources; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	No Toxicity	No Indications of alterations	If PEC exceedance is Hg or PCBs, address under TMDLs
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	Toxicity	Indications of alterations	(1) Identify cause(s) of impacts and spatial extent. (2) Where impacts are under Permittee's control, take management actions to address impacts.

ATTACHMENT I

Provision C.8. Standard Monitoring Provisions

All monitoring activities shall meet the following requirements:

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR 122.41(j)(1)]
2. Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, and copies of all reports required by this Order for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Water Board or USEPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]
3. Records of monitoring information shall include [40 CFR 122.41(j)(3)]:
 - a. The date, exact place, and time of sampling or measurements;
 - b. The individual(s) who performed the sampling or measurements;
 - c. The date(s) analyses were performed;
 - d. The individual(s) who performed the analyses;
 - e. The analytical techniques or methods used; and,
 - f. The results of such analyses.
4. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]
5. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the monitoring Provisions. [40 CFR 122.41(l)(4)(iii)]
6. All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.
7. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Permittees shall instruct its laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Permittee must submit documentation from the laboratory to the Water Board for approval prior to raising the ML for any priority toxic pollutant.
8. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-

compliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six months per violation, or by both. [40 CFR 122.41(k)(2)]

9. If the discharger monitors any pollutant more frequently than required by the Permit, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the Water Board. [40 CFR 122.41(l)(4)(ii)]