Annual Status Report

BASMAA
Regional Monitoring Strategy

FY 97/98

Final Draft

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Prepared by BASMAA Monitoring Committee

Executive Summary

The purpose of the Annual Status Report is to compile and report information on implementation of the BASMAA Regional Monitoring Strategy (BRMS). The BRMS was developed by BASMAA in cooperation with the Regional Board to increase the efficiency and usefulness of monitoring being conducted by individual storm water programs. The BRMS provides a foundation for a coordinated Bay Area storm water monitoring effort by defining guiding principles, strategic objectives, and administrative procedures.

Starting in early 1997, the BASMAA Board and key Monitoring Committee members worked to develop a regional storm water monitoring strategy. A series of monthly meetings was held in which issues were raised and defined, goals and objectives were established, an outline for the strategy was developed, and then specific sections were drafted. At the end of this process, the BASMAA Board decided that it would be most helpful to their programs to embody the strategy in two documents—a support document and the strategy (BRMS). Although the support document was approved as a final document by the BASMAA Board, it was not formally adopted. The BRMS was formally adopted by the BASMAA Board in February 1998.

The BRMS Strategic Objectives are intended to provide a manageable number of issues on which to focus storm water monitoring resources. The current objectives are:

1. Evaluate BMP effectiveness
2. Assess relative contribution of metals to San Francisco Bay from urban versus non-urban sources
3. Investigate the extent and causes of storm water toxicity in the region
4. Design and initiate a survey of impacts of storm water on beneficial uses

The support document includes detailed information gathered over the course of the monthly strategy development meetings described above. The document discusses:

- the structure and origin of the Strategic Objectives
- monitoring design principles
- processes to facilitate achieving the Strategic Objectives
- management issues that typically arise in multi-agency, regional programs

This report includes an overview of the BRMS, status reports on each of the Strategic Objectives in the BRMS and the studies being conducted to meet those objectives, and recommendations. As a first year report on an emerging program, this document can not provide much interpretation of the overall significance of the studies conducted this past year. The studies

described herein were not part of a master plan so it is difficult to draw significant inferences beyond those related to the immediate scope of the studies.

However, BASMAA expects this situation to change as implementation of the BRMS evolves. With that evolution, the Annual Status Report will evolve from a series of snapshots of individual and somewhat disparate studies into a clearer representation of the "big picture." That representation will include linkages between strategic objectives, individual study designs, study results, management decisions, and feedback loops to inform the next round of studies.

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1. Introduction

The purpose of the Annual Status Report is to compile and report information on implementation of the BASMAA Regional Monitoring Strategy (BRMS) (Appendix A). The BRMS was developed by BASMAA in cooperation with the Regional Board to increase the efficiency and usefulness of monitoring being conducted by individual storm water programs. The BRMS provides a foundation for a coordinated Bay Area storm water monitoring effort by defining guiding principles, strategic objectives, and administrative procedures.

This report includes an overview of the BRMS, status reports on each of the strategic objectives in the BRMS and the studies being conducted to meet those objectives, and recommendations.

2. Overview—BASMAA Regional Monitoring Strategy

2.1 Development

Development of the BASMAA Regional Monitoring Strategy was prompted by a mutual decision in 1996 by Regional Board staff and storm water program representatives to review and modify storm water monitoring programs. At that time, several storm water programs had been conducting large-scale storm water characterization studies for a number of years. These characterization studies can be logistically difficult and expensive. It was the collective judgement of Regional Board and storm water program staff that these studies had generated a substantial database on levels of pollutants in storm water, and that additional monitoring, conducted in the same way, was not likely to add significantly to the robustness of the database. There was also a strong desire to review the connection between monitoring and management decisions, and to revise this connection to ensure the closest possible linkage.

Given these factors, the Regional Board formally requested storm water programs to cease fixed-station, wet weather monitoring and to develop a monitoring strategy. In making their request, the Regional Board made the following points:

- the strategy should establish the process that will be followed to ensure the connection between monitoring and management
- the process should lay out next steps and include ongoing or periodic review and evaluation of monitoring programs
- activities that should be considered within the strategy include:
    - characterization of drainage areas (watershed monitoring) including land use
    - consideration of physical and biological, as well as chemical indicators
    - use of community-based (volunteer) monitoring

    - a mechanism or process for effective use of special or pilot studies
    - a plan for future use of fixed-station, wet weather monitoring
- individual storm water programs will work through BASMAA to develop a consistent strategy

Starting in early 1997, the BASMAA Board and key Monitoring Committee members worked with Brock Bernstein (EcoAnalysis) and Michael Drennan Associates to develop a regional storm water monitoring strategy. A series of monthly meetings was held in which issues were raised and defined, goals and objectives were established, an outline for the strategy was developed, and then specific sections were drafted. At the end of this process, the BASMAA Board decided that it would be most helpful to their programs to embody the strategy in two documents—a support document (Appendix B), and the strategy. Although the support document was approved as a final document by the BASMAA Board, it was not formally adopted. The BRMS was formally adopted by the BASMAA Board in February 1998.

2.1.1 Strategy

The strategy (Appendix A) includes the following elements:

Guiding Principles – There are four guiding principles

1. Monitoring should produce information with the potential for changing or confirming management practices. Monitoring activities without such potential should not be conducted.
2. Monitoring activities should focus upon accomplishing the Strategic Objectives.
3. Monitoring activities should produce data that has regional applicability whenever possible.
4. BASMAA's monitoring will be coordinated with other monitoring initiatives.

Strategic Objectives – The Strategic Objectives are intended to provide a manageable number of issues on which to focus storm water monitoring resources. The current objectives are:

5. Evaluate BMP effectiveness
6. Assess relative contribution of metals to San Francisco Bay from urban vs. non-urban sources
7. Investigate the extent and causes of storm water toxicity in the region
8. Design and initiate a survey of impacts of storm water on beneficial uses

Study Design – Study Design Plans will be used to assist with the development and review of monitoring studies. The strategy includes instructions on the development and content of study design plans including the need to state <u>both</u> the technical and management objectives of the study.

Funds – The strategy states funding level expectations.

Revisions – BASMAA expects the strategy to evolve over time. This Annual Status Report is viewed as the repository for those changes. This section of the strategy also defines the minimum content of the Annual Status Report.

Schedule – The strategy includes a schedule designed to facilitate decision-making in concert with individual storm water program and BASMAA budget cycles.

The BASMAA Board approved the BASMAA Regional Monitoring Strategy in February 1998.

2.1.2 Support Document

The support document (Appendix B) includes detailed information gathered over the course of the monthly strategy development meetings described above. The document discusses:

- the structure and origin of the Strategic Objectives
- monitoring design principles
- processes to facilitate achieving the Strategic Objectives
- management issues that typically arise in multi-agency, regional programs

Besides acting as a repository of information from BASMAA's discussions about the strategy, the support document provides process and decision-making tools that may help implement the strategy. Although the support document was approved as a final document by the BASMAA Board, it was not formally adopted.

2.2 Implementation

Implementation of the BRMS is achieved through development of an annual work plan, and submittal and review of study design plans.

2.2.1 Annual Work Plan

The purpose of the annual work plan is to outline the tasks necessary for pursuing the Strategic Objectives. Appendix C shows the draft work plan used for FY97/98. Although this work plan was not formally adopted, it was used initially to discuss studies that were already underway in FY97/98, or planned for FY98/99.

The basic process for developing the work plan is as follows for each Strategic Objective:

- state basic management and monitoring questions
- rank questions by priority
- review available information
- identify key gaps

- develop more detailed study designs

For each Strategic Objective, there may be more specific steps to be taken in between or in parallel to these basic steps.

2.2.2 Study Review

The other process critical to implementation of the BRMS is the review of study design plans. BASMAA established this review process to provide feedback and guidance for special studies, to ensure maximum support of established objectives, address priority issues, and maximize application of findings region wide. The review process is as follows:

1. Storm water program representatives will voluntarily submit draft study designs for peer review as part of the BRMS. Study designs should state both the technical and management objectives of the study.

2. Committee members will provide any comments on a draft study plan directly to the proposer in writing, and copy comments to BASMAA.

3. Proposers will respond in writing to all comments and revise plans.

4. Issues that the proposer would like help in resolving can be agendized at a regular committee meeting.

5. Proposers will revise plans and submit Final Study Designs to the Monitoring Committee for record keeping and inclusion in the Annual Status Report.

3. Strategic Objectives - Report

The purpose of this section is to provide a progress report on work plan tasks for each Strategic Objective, including summarizing tasks accomplished, summarizing comments received on study designs during committee review, reporting any results to-date, and commenting on implication of results for storm water program implementation. Besides general Monitoring Committee work on the BRMS, five studies were completed that are consistent with the BRMS.

3.1 Objective 1: Evaluate BMP effectiveness

3.1.1 Work Plan

The first task in the FY97/98 Work Plan for this objective was to develop a list of BMPs. To-date, a draft list of BMPs has been developed (Appendix D), and it undergoing peer review among storm water program representatives and others knowledgeable about the state of BMPs. The list presents information on the "readiness" of BMPs for full implementation, and

notes questions that need additional study. The list focuses on those BMPs that relate to performance standards contained in storm water management plans for member agencies. The Committee plans to use the list to help develop priorities for BMP effectiveness studies.

3.1.2 Special Studies

Study: Pollutant Concentrations in Catch Basin and Street Sweeping Sediments in Contra Costa County, 1993-1996 (CCCWP) (Special studies list project C.2.3)

Status – This study was completed in FY97/98 and covers data collected from 1993 through 1996.

Purpose – To review municipal catch basin and street sweeping sediment data to gauge variability, relate to land use, compare catch basin cleaning to street sweeping, compare with other Bay Area counties, and attempt to develop a typical concentration value (TCV) for sediments in catch basins and streets.

Summary of committee review – The study design was not reviewed by BASMAA because the study pre-dated the BASMAA Regional Monitoring Strategy.

Preliminary/interim/final results – The data were highly variable. Preliminary analyses did not indicate a significant difference between sediments from different land uses. In general, Contra Costa County sediments had similar or lower pollutant concentrations than those found in other Bay Area locations. Typical concentration values were developed for each pollutant.

Implication of study results on storm water management program implementation – Annually since this study was completed, the Contra Costa Clean Water Program uses laboratory analytical data from catch basin and street sweeping sediments to calculate threshold concentration values that municipalities may use to determine the mass of specific pollutants removed from their maintenance activities. Compared to average TCVs calculated in 1996, the concentrations of some constituents in subsequent years have increased slightly, while others have decreased slightly or remained unchanged. The TCV appears to be a good indicator of increased or decreased concentrations. However, due to the limited time-series data collected, it is premature to make any estimates about the effectiveness of the Program's activities based on TCVs.

Study: Alternative Vegetation Management Study – Final Progress Report (CCCWP) (Special studies list project D.7)

Status - This study was completed in FY97/98 and covers data collected over three years.

Purpose – To evaluate alternative methods of controlling roadside weeds located within protected watersheds and above dams. Revegetation using locally native plants was evaluated as an alternative to pesticide (herbicide) sprays and bare soil. Mechanical means were tested as alternative means of weed control. These included:

- green flaming (local burning of green weeds),
- native grass mulching,
- manual weed removal,
- use of a soap based (less toxic), and
- mowing.

Alternative means used to reduce erosion included:

- revegetation,
- silt fences,
- jute netting,
- straw wattles,
- erosion control blankets,
- diversion ditch trenching,
- manual and hydroseeding of plants, and
- straw blowing.

Summary of committee review - The study design was not reviewed by BASMAA because the study pre-dated the BASMAA Regional Monitoring Strategy.

Preliminary/interim/final results – Plants installed had varying rates of survival, erosion control ability, and weed competitiveness. Since each site was extremely different from every other, results differed with the same plant on different sites. The report lists successful and unsuccessful plantings for downslope and upslope locations. The report also provides information on successful deer and gopher damage prevention techniques, weed control methods, and data on pesticide residues, soil microbial populations, and soil fertility. Some of the key findings are listed below:

1. Alternative vegetation management practices needed to be evaluated on a site-specific basis.
2. Alternative vegetation management practices worked when applied correctly.
3. Many alternative vegetation management practices are labor intensive.
4. Native weeds are extremely dominant and resilient.

Implication of study results on storm water management program implementation – Storm water managers and maintenance departments can use the study results to evaluate the use of alternative vegetation management practices within their jurisdictions. The use of alternative vegetation management practices has the potential to radically reduce storm water pollutants

from reaching surface waters. However, the results can only be measured over several years. In addition to the study results, "how to" manuals were developed for establishing, maintaining, and evaluating a revegetation project. Although the demonstration project focused on roadside applications at a steep hilly site, the manuals provide a systematic means for agencies to test alternative vegetation management practices in their jurisdictions.

Study: Evaluation of Storm Water Runoff from Parking Lots in San Mateo County 1996 – 1998 (STOPPP) (Special studies list project C.2.2)

Status - This study was completed in FY97/98 and covers data collected over two years.

Purpose – To supplement existing data on the quality of parking lot runoff, attempt to help clarify the question regarding whether or not settling/filtration-type best management practices are effective in treating parking lot runoff, to assess temporal changes in trace metal composition in parking lot runoff, and to compare storm water runoff quality from two parking lots swept at substantially different frequencies.

Summary of committee review - The study design was not reviewed by BASMAA because the study pre-dated the BASMAA Regional Monitoring Strategy.

Preliminary/interim/final results – When comparing runoff data from this study with runoff data from other parking lot studies, median concentrations of total recoverable copper, lead, and zinc are generally similar among parking lots that are geographically and environmentally diverse. However, dissolved concentrations of copper, lead, and zinc were substantially lower in runoff measured in this study than runoff from other studies. On the other hand, concentrations of suspended solids in parking lot runoff from this study were in the upper ranges of values reported for other studies, although this result may be explained by site-specific conditions that produced higher sediment loads in two of the four sites in this study.

When the data from several parking lot runoff studies was combined, it appeared that the percentages of copper, lead, and zinc in the dissolved form were very comparable to values reported for residential/commercial land uses in Santa Clara Valley. The percentage of metals in the dissolved form ranged from 7 (lead) to 32 percent (copper). Since 70 percent or more of the metals were in particulate form, parking lots with higher sediment loads could be expected to benefit from implementation of settling/filtration BMPs.

Data on one site (without a control site) receiving frequent sweeping with regenerative air sweepers appeared to show consistently reduced suspended solids concentrations but did not result in substantially lower concentrations of particulate or dissolved metals.

The median concentrations of cadmium, copper, and zinc in parking lot runoff from this study were approximately 50 percent of median concentrations in residential/commercial runoff in Santa Clara Valley.

Implication of study results on storm water management program implementation – Given the relatively low concentrations of pollutants found in parking lot runoff from this study compared to residential/commercial runoff, it is uncertain whether treating runoff from parking lots is the most cost-effective BMP in San Mateo County. If the Regional Board makes a determination that treatment is needed for parking lot runoff, treatment methods that are appropriate for settling and/or filtering out particulate associated pollutants will be effective. Based on very limited information, the study also implies that sweeping will not be an effective method for removing metals from parking lots. Lastly, the study also implies, based on information from one parking lot, that asphalt parking lot surfaces should be maintained to prevent the transport of pavement particles containing lead into storm water runoff.

3.2 Objective 2: Assess relative contribution of metals to San Francisco Bay from urban vs. non-urban sources

3.2.1 Work Plan

This issue may be addressed through the Santa Clara Valley Basin Watershed Management Initiative. For now, BASMAA will implement this objective by tracking this initiative to avoid duplication of effort.

3.2.2 Special Studies

No special studies were completed in FY97/98 that addressed this Strategic Objective.

3.3 Objective 3: Investigate the extent and causes of storm water toxicity in the region

3.3.1 Work Plan

Although no major BRMS tasks were completed on this objective in FY97/98, fiscal year 1996/97 saw the completion of several multi-year studies that addressed this objective. Primarily, these studies focused on pesticide-related toxicity in runoff as evidenced by the two studies described below.

Diazinon in Surface Waters in the San Francisco Bay Area: Occurrence and Potential Impact (June 1997) - This report provides a compilation and review of water quality and aquatic toxicity data in urban creeks and storm water discharges, focusing on diazinon in the San Francisco Bay Area. Selected data related to other locations and other pesticides is also presented to provide a wider context, and the reader is referred to the original reports for

comprehensive information. The review includes a discussion of potential adverse impact of diazinon on aquatic ecosystems in waters receiving urban runoff, based on runoff toxicity, toxicity identification evaluation results, diazinon concentrations in environmental samples, and toxic values of diazinon in laboratory tests. Other approaches to determine ecological significance are also discussed.

Characterization of the Presence and Sources of Diazinon in the Castro Valley Creek Watershed (June 1997) - The main purpose of this study was to characterize the temporal and spatial patterns of occurrence of diazinon in the Castro Valley Creek watershed (Alameda County, California). Previous toxicity studies showed that storm runoff in Castro Valley Creek was frequently toxic to the aquatic test organism *Ceriodaphnia dubia*, and that diazinon was the most likely cause of this toxicity. The watershed is primarily residential (50%), with some open space (35%) and commercial development (15%). Runoff at the discharge point for the entire watershed was sampled during multiple storm events to record both seasonal and within-event variations in diazinon concentration.

3.3.2 Special Studies

No special studies were completed in FY97/98 that addressed this Strategic Objective.

3.4 Objective 4: Design and initiate a survey of impacts of storm water on beneficial uses

3.4.1 Work Plan

Although no major BRMS tasks were completed on this objective in FY97/98, two studies were completed that addressed this objective (see below). Primarily, these studies focused on starting watershed assessments by estimating impervious coverage for selected watersheds.

3.4.2 Special Studies

Study: Pilot Study Evaluating Watershed Management Tools for the Lower San Mateo Creek Watershed (STOPPP) (Special studies list project F.5.1)

Status - This study was completed in FY97/98.

Purpose – To evaluate the use of impervious cover as a tool for urban watershed management. The work was performed as a pilot study so that the methodology, difficulties involved, and costs could be assessed before attempting to perform similar evaluations for other urban watersheds.

Summary of committee review - The study design was not reviewed by BASMAA because the study pre-dated the BASMAA Regional Monitoring Strategy.

Preliminary/interim/final results – The following conclusions were reached in the pilot study:

- impervious cover can be estimated at a reasonable cost
- creek conditions are loosely related to impervious cover
- population density is loosely related to impervious cover

Implication of study results on storm water management program implementation - The following recommendations were made as a result of the pilot study:

- measure impervious cover in other urban watersheds
- assess creek conditions in these watersheds using parameters recommended by the BRMS
- determine how well impervious cover and creek conditions data correlate with data from other studies of these same urban watersheds in order to evaluate the relationship in San Mateo County between impervious cover and creek quality

Study: Impervious Cover as a Watershed Management Tool for San Mateo County Watersheds (STOPPP) (Special studies list project F.5.2)

Status - This study was completed in FY97/98.

Purpose – To estimate impervious cover in five watersheds representative of different types of urban watersheds, and demonstrate the use of impervious cover as a tool for urban watershed management.

Summary of committee review - The study design was not reviewed by BASMAA because the study pre-dated the BASMAA Regional Monitoring Strategy.

Preliminary/interim/final results – The five watersheds were divided into different land uses and the percent impervious cover for each land use was estimated using aerial photographic prints or digitized aerial photographs and a desktop GIS application. Based on these results, distinct land areas in each watershed were classified into one of eight categories of imperviousness: 0%, 30%, 45%, 60%, 65%, 70%, 95%, and 100%.

Implication of study results on storm water management program implementation – All other things being equal, creek classifications help municipalities and planners focus their watershed protection efforts. Watersheds with relatively low amounts of impervious cover present the most cost-effective opportunity to plan for creek protection by implementing measures to prevent future increases in impervious cover.

The Center for Watershed Protection has established the following creek classifications based on data from around the country:

Sensitive creeks	0 to 10% impervious cover
Impacted creeks	11 to 25% impervious cover
Non-supporting creeks	26 to 100% impervious cover

However, these thresholds have not been verified in the San Francisco Bay Area. Since the threshold in creek classification between "sensitive" and "impacted" may be around 10% imperviousness, it seems appropriate in measuring impervious cover to concentrate measurements around this threshold to give the most precise data possible regarding a watershed that may be approaching this point (i.e., at-risk). Similarly, since creeks in areas above 25% imperviousness may be considered non-supporting, it may be most cost-effective to concentrate measurements on areas facing this threshold as well.

In addition to establishing (digital) thresholds for Bay Area creeks, it is important to realize that degradation is likely an analog process that continues gradually as imperviousness increases. At lower levels of imperviousness, runoff quantity is the primary determinant to creek quality. The initial impacts on creeks are physical changes to the habitat, followed by impacts to the biological community. As imperviousness increases, water quality becomes increasingly important resulting in chemical impacts from pollutants. Therefore, it is important to establish: 1) the position of a given watershed in this degradation continuum, 2) the primary determinants to creek quality, 3) the impacts, and 4) the appropriate BMPs to be implementing.

4. Strategic Objectives - Plan

As for FY98/99, studies submitted by a lead agency to the BASMAA Monitoring Committee for peer review as part of the BRMS in FY98/99 are listed in Table 1 and provided in Appendix E (Final and Draft Study Design Plans). Lead agencies may also be conducting other studies consistent with the BRMS (Appendix F - Monitoring Plans of Storm Water Programs) that are not part of the formal peer review process.

5. Summary & Recommendations

5.1 Overall Implications

The overall implications of the completed study results and other factors on achieving the four BRMS objectives is listed below.

Table 1. BRMS Study Design Plan List

The studies listed in this table have been or are planned to be submitted by the lead agency to the BASMAA Monitoring Committee for peer review as part of the BASMAA Regional Monitoring Strategy (BRMS). Lead agencies may be conducting other studies consistent with the BRMS. See the BRMS Annual Status Report for a complete set of Monitoring Plans for Bay Area storm water programs.

Title	Lead Agency	Participating Agencies	BRMS Objective	Cost $	FY$ & time frame	Draft Subm	Draft Rev'd	Final Plan Subm	Study Start Date	Est Compl Date
Objective 1: Evaluate BMP effectiveness										
Pool and Spa Discharge	CCCWP		1	$75,000	FY98/99 1 yr	x	5/98		7/98	7/99
Application of Water Quality Engineering Fundamentals to the Assessment of Stormwater Treatment Devices	SCVURPPP		1	$20,000	FY 97/98 7 mo	x	8/98		2/99	7/99
Catch Basin Retrofit Feasibility	SCVURPPP	Co-permittees	1	$20,000	FY 97/98 3-4 mo	x	8/98		9/98	7/99
Protocols for Implementing BMPs at Parking Lots	SCVURPPP	Co-permittees	1	$40,000	FY98/99 6 mo	x	8/98			
Effectiveness Monitoring of Tule Pond (Wetland Treatment)	ACCWP	ACFC&WCD	1, 3	$60,000	FY98/99 1 yr	x	10/98		3/99	5/00
Objective 2: Assess relative contribution of metals to San Francisco Bay from urban vs. non-urban sources										
Estimate of Urban Metals Enrichment by Soils	FSURMP		2		FY98/99	x	8/98			
Bay Monitoring and Modeling (TMDL/Fate & transport model)	SCVURPPP	SCBWMI	2			x	8/98			
Objective 3: Investigate the extent and causes of storm water toxicity in the region										
OPs in Runoff	FSURMP		3		FY98/99	x	8/98			
OP Insecticides in Urban Creek Dry Weather Flows	FSURMP		3		FY98/99 3 mo	x	8/98			
OPs in South San Francisco Bay	ACCWP		3	$28,000	FY98/99	x	8/98	8/98	11/98	7/99
Title	**Lead Agency**	**Participating Agencies**	**BRMS Objective**	**Cost $**	**FY$ & time frame**	**Draft Subm**	**Draft Rev'd**	**Final Plan Subm**	**Study Start Date**	**Est Compl Date**

Objective 4: Design and initiate a survey of impacts of storm water on beneficial uses										
Definition of Beneficial Uses	FSURMP		4		FY98/99	x	8/98			
Miller Creek Assessment	MCSTOPPP		4	$50,000	FY98/99	x	8/98		7/98	7/99
Microbial Indicators and Effects on Beneficial Uses	SCVURPPP	U.C. Berkeley	4	$80,000	FY98/99 1 yr	x	8/98		2/99	6/99
Impervious Surface Assessment	SCVURPPP	SCBWMI	4	$50,000	FY 97/98 complete by 12/99	x	8/98		12/98	6/99
Impervious Cover Estimation and Creek Observations	STOPPP		4	$57,000	FY98/99	x	10/98		8/98	6/99
Evaluation of Potential Chloramine Impacts	ACCWP		4	$18,000	FY98/99	x	8/98	8/98	9/98	9/99
Flow-through Toxicity Tests	ACCWP		4	$23,000	FY98/99				11/98	8/99
Road Map, Big Picture & Search Engine for BASMAA Special Studies	ACCWP			$17,000	FY97/98 140 hrs	x	11/98	11/98	12/98	5/99
Pending* Studies										
Aquatic and Riparian Health Index for SF Bay Area Bay and Tributary Streams	Pleasant Hill		4	$77,000	3 yr, 9 mo	x				
Saw Cut BMP Evaluation	ACCWP		1	$17,000	FY 97/98	x	4/98			
Urban & Non-urban Metals Loads Estimates	Consultants		2	$60,000	FY98/99 7 mo	x				

Related studies

Estuary interface pilot study	SCVURPPP	San Jose/SFEI	2	$14,000 + SJ $	FY96-					
Episodic toxicity study	NPDES Permittees	SFEI	3	$98,000	FY96-					

* Pending Studies are those that either: 1) were considered as part of the BRMS and have been canceled, or 2) do not have a financial sponsor.

5.1.1 Objective 1: Evaluate BMP effectiveness

The completed studies on catch basin and street sweeping sediment concentrations and parking lot runoff have specific implications for control of heavy metals while the alternative vegetation management study could lead to controls that reduce pesticide use. Overall, since there are many BMPs that could be studied, BASMAA needs to develop priorities and encourage priority studies to be completed first. The FY97/98 Work Plan includes possible criteria—these should be revisited and set for studies conducted as part of the BRMS.

5.1.2 Objective 2: Assess relative contribution of metals to San Francisco Bay from urban vs. non-urban sources

Although there were no studies completed this past year focusing on this objective and storm water programs are instead tracking the efforts of the Santa Clara Valley Basin Watershed Management Initiative, other factors may drive storm water programs to gather and review data on metals in order to determine the relative contribution of urban runoff.

First, the Regional Board's proposed regulatory policy and program for mercury suggests that more definitive data is needed for mercury in storm water runoff in order to complete a relatively accurate mercury budget for San Francisco Bay. Gathering these data would require using ultra-clean sampling techniques and low detection limits to generate the improved loadings characterization the Regional Board is seeking. The Regional Board's Draft Staff Report: *Defining the mercury problem in the northern reaches of San Francisco Bay and designing appropriate regulatory approaches* (June 1998) estimates that "discharge through storm drains may be comparable to the riverine and deep sediment inputs." which the report states are the largest inputs to the Bay. However, Regional Board staff, as well as others familiar with the previously collected samples, presume the urban runoff estimates to be high because measured concentrations were equated with detection limits (which were high) for the frequent "non-detects" and samples were subject to contamination because ultra-clean sampling techniques were not used. Given this belief, the purpose of collecting additional urban runoff samples is unclear.

Recommendation: The Regional Board should articulate the management and monitoring questions that need additional mercury data to be answered.

Recommendation: Storm water programs should help the Regional Board develop better urban runoff estimates through submission of existing data, and <u>any</u> collection of new <u>mercury</u> data <u>should be done</u> using the latest techniques.

Second, the Brake Pad Partnership has developed a Draft Partnership Concept that includes a Voluntary Industry Program of actions. Manufacturers' feedback has been positive so far. The

question for storm water programs and water quality regulators is: Is the approach taken in the Draft Partnership Concept strong enough to help comply with the 303(d) listing?

The long-term target is a 50% reduction in copper usage in brake friction materials for all on-highway vehicles by model year 2008 (fall 2007). Unfortunately, the use of copper in brakes is likely to go up before it goes down. New safety standards set to take effect in the fall of 1999 will likely result in more copper usage by model year 2001 vehicles (fall 2000). With an expected population increase of 30-40% by 2020, and with sediments tending to attenuate the impact by absorbing copper, will a reduction be measurable?

There may be several ways to measure the changes. Urban runoff monitoring could be set up to track the expected increase in copper levels until 2001 and then, hopefully, the decrease as a result of the Partnership Concept. Other indicators may be clams in urban runoff dominated waters, or air deposition data. The South Bay TMDL effort to assess copper circulation in the Bay may also provide some insight.

However, any effort to evaluate BMP effectiveness is complicated by several factors that must be addressed:

- In this case, there is a fair amount of uncertainty about the actual contribution of copper to runoff from brake pads. The current data provides a "ballpark" baseline but is this sufficient to answer management and monitoring questions?
- The efficacy and accuracy of evaluating BMP effectiveness is indirectly proportional to the physical distance between the point of action of the BMP and the measuring point.

The first step in dealing with these factors can be to do a "thought experiment" in which the expected state and any trend is defined, the impact of control measures (BMPs) is quantified, and the resulting change is predicted. Based on this thought experiment, power analysis and other techniques can be used to predict the statistical and economic requirements to effectively monitor the situation.

Recommendation: Storm water programs should work with the Brake Pad Partnership to develop ways to determine the effectiveness of its efforts.

5.1.3 Objective 3: Investigate the extent and causes of storm water toxicity in the region

Although no major BRMS tasks were completed on this objective in the past year, there has been increasing attention paid to pesticide-related toxicity as a result of:

- previous studies conducted by BASMAA member programs (e.g., *Identification and Control of Toxicity in Storm Water Discharges to Urban Creeks* (1994); *Diazinon in Surface Waters in the San Francisco Bay Area: Occurrence and Potential Impact* (1997); *Characterization of the Presence and Sources of Diazinon in the Castro Valley Creek Watershed* (1997);

- the work of the Urban Pesticide Committee whose mission in the last year has changed from: providing a forum for information exchange, coordination, and collaboration to: identifying and promoting the implementation of a pesticide toxicity control strategy;
- RMP Episodic Toxicity Study data (1996); and
- the likely 303(d) listing by USEPA of many urban creeks in the San Francisco Bay Area as impaired due to nonpoint sources of the common household pesticide diazinon.

There are several reasons to consider setting up and conducting a regional creek characterization effort focused on pesticides, particularly diazinon and chlorpyrifos.

- to confirm and expand the database from the Coordinated Survey of Urban Creeks, Runoff and Rain conducted by the CVRWQCB and SFBRWQCB during the winter and spring of 1994-95
- to compare with POTW influent and effluent monitoring surveys being conducted on a regular basis
- to provide general characterization data against which to compare the need for and success of the BASMAA-sponsored projects like the IPM Partnership and the Regional Advertising Campaign, although as discussed previously, determining BMP effectiveness via general characterization data is very difficult

The UPC has also listed at least two key questions that lend themselves to focused studies. First, can pesticide use according to label instructions cause water quality toxicity? Second, are specific formulations (e.g., granules/flakes that float) or application sites (e.g., pavement) problematic?

Recommendation: As the first measures of BMP effectiveness, storm water programs should perform evaluations as close to the point of action by the BMP as possible through such tools as public surveys and sales data.

5.1.4 Objective 4: Design and initiate a survey of impacts of storm water on beneficial uses

The completed studies measuring impervious cover imply that this kind of measurement can be done throughout the Bay Area. Studies from other parts of the country show that this measurement is an important indicator of general creek health. However, significant work remains to be started that links measurements like these directly with beneficial use impacts. The Study Design Plan List (Table 1) includes studies that will start this process in the Bay Area.

5.2 Recommended Changes to Strategic Objectives

Emerging questions like: What are typical concentrations and loadings of pollutants like mercury, urban pesticides, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and pathogens in urban runoff? may require BASMAA to consider a change to the Strategic Objectives. In addition to determining typical concentrations and loadings of emerging pollutants, there may be other interesting emerging questions or issues such as: What is the impact or threat of impact to a beneficial use of these pollutants? Some pollutants like mercury (objective 2) and urban pesticides (objective 3) can be addressed by existing Strategic Objectives. While for others like PCBs, PAHs, and pathogens, it is not clear which objective can address these pollutants.

Recommendation: Implementation of Strategic Objective 4 (watershed assessment/beneficial use impacts) could be the mechanism for addressing these emerging issues.

5.3 Recommended Changes to Work Plan

To address the overall implications of the completed study results and other factors on the BRMS, it is recommended that the Monitoring Committee conduct an extensive review of its FY97/98 Work Plan in developing work plans for FY98/99 and FY99/00.

Appendix A

BASMAA Regional Monitoring Strategy

Appendix B

Support Document for Development of the Regional Stormwater Monitoring Strategy

Appendix C

FY97/98 Draft Work Plan

Appendix D

BMP List

Appendix E

Final and Draft Study Design Plans

Objective 1: Evaluate BMP Effectiveness

Final and Draft Study Design Plans

Objective 2: Assess relative contribution of metals to San Francisco Bay from urban vs. non-urban sources

Final and Draft Study Design Plans

Objective 3: Investigate the extent and causes of storm water toxicity in the region

Final and Draft Study Design Plans

Objective 4: Design and initiate a survey of impacts of storm water on beneficial uses

Final and Draft Study Design Plans

Appendix F

Monitoring Plans of Storm Water Programs

Alameda Countywide Clean Water Program

Monitoring Plans of Storm Water Programs

Fairfield-Suisun Urban Runoff Management Program

Monitoring Plans of Storm Water Programs

Santa Clara Valley Urban Runoff Pollution Prevention Program

Monitoring Plans of Storm Water Programs

Appendix G

Monitoring Requirements in Storm Water Program Permits

Excerpt from Alameda Countywide Clean Water Program NPDES Permit CAS0029831, RWQCB Order 97-030, February 24, 1997:

C. PROVISIONS

4. Monitoring Program

The Dischargers shall submit by August 1 of each year, an Annual Monitoring Program Plan acceptable to the Executive Officer, that supports the development and implementation and assesses the effectiveness of the Plan. The Monitoring Program Plans shall be designed to achieve the following objectives and objectives presented in the Storm Water Management Plan, (however, every objective may not need to be addressed every year):

- Characterization of representative drainage areas and storm water discharges, including land use characteristics, pollutant concentrations, and mass loadings;

- Assessment of existing or potential adverse impacts on beneficial uses caused by pollutants of concern in storm water discharges, including an evaluation of representative receiving waters;

- Identification of potential sources of pollutants of concern found in storm water discharges; and

- Evaluation of the effectiveness of representative storm water pollution prevention or control measures.

The Monitoring Program shall include the following:

a. Provisions for conducting and reporting the results of special studies conducted by the Program or Dischargers which are designed to determine the effectiveness of best management practices or control measures, define a Performance Standard in accordance with Provision C.2, or assess the adverse impact of a pollutant or pollutants on beneficial uses.

b. Provisions for conducting watershed monitoring activities including; identification of major sources of pollutants of concern; evaluation of the effectiveness of control measures and best management practices; and use of physical, chemical, and biological parameters and indicators as appropriate; and

c. Identification and justification of representative sampling locations, frequencies and methods, suite of pollutants to be analyzed, analytical methods, and quality assurance procedures. Alternative monitoring methods in place of these (e.g., special projects, financial participation in regional, state, or national special projects or research, literature review, visual observations, use of indicator parameters, recognition and reliance on special studies conducted by other programs, etc.) may be proposed with justification. Such proposed alternative monitoring methods shall be included as a component of the Workplans as required in Provision C.3.