



SECTION 4

MONITORING ACTIVITIES

4. MONITORING ACTIVITIES

INTRODUCTION

During FY 06-07, a considerable amount of water quality data and information were gathered and/or assessed by the Program through the direct implementation of and active participation in monitoring-related activities in the San Francisco Bay Area. The Program's monitoring resources were primarily spent preparing permit-required submittals, continuing to implement the Program's Revised Multi-Year Receiving Waters Monitoring Plan (Revised Multi-Year Plan), participating in regional monitoring-related programs, conducting special studies and implementing pollutant-specific control programs.

This section provides a brief background of the Program's monitoring and assessment program and summarizes significant monitoring-related activities conducted during FY 06-07. The activities described in this section are consistent with Provisions C.7 and C.9 of the Program's NPDES Permit. Each summary includes the following information, to the extent possible:

- 1) A description of the relationship to NPDES Permit requirement(s) and management question(s) the study was designed to address;
- 2) A brief description of subtasks and status of project/activity;
- 3) A brief description of the results;
- 4) A summary of findings to-date and recommendations (where feasible); and
- 5) A description of lessons learned and planned/recommended follow-up activities.

In addition, summaries of management activities conducted through the implementation of the Program's Pollutant of Concern (POC) Control Plans are provided for those POCs that do not have separate Annual Report sections (e.g., PCBs, Copper/Nickel and Dioxins). An effectiveness assessment of current monitoring activities is also provided at the end of the chapter.

The findings of many technical reports are briefly described within this section. To ensure public access to completed reports, work products and environmental data, the Program has placed the majority of its reports and work products on its website (www.scvurppp.org). The website is continually updated to include the latest reports and work products, data inventory sets and other pertinent Program information. When viewing the website, a large majority of the reports and work products are linked to downloadable documents. Reports and work products not available through the website may be obtained by submitting a web-based request form to Program staff.

BACKGROUND

Multi-Year Receiving Waters Monitoring Plan

Consistent with Provision C.7.b and C.9 of the Permit, the Program developed (and submitted to the Water Board), a Multi-Year Receiving Waters Monitoring Plan (Multi-Year Plan) on March 1, 2002 that identifies Program monitoring activities in Santa Clara Basin Watersheds over an eight-year period. As new monitoring priorities were established, the Multi-Year Plan was revised in FY 03-04 (Revised Multi-Year Plan). This Revised Multi-Year Plan can be found

under the Environmental Monitoring and Assessment Measures link on the Program's website (www.scvurppp.org).

The Revised Multi-Year Plan contains the following information: watershed location (prioritized based on SCBWMI and Program assessment priorities), data type (chemical, biological and physical), number and frequency of sampling events, fiscal years (eight years starting with FY 02-03 through FY09-10), rationale and lead agency. The information on data type uses a tiered monitoring approach discussed by the Water Board staff in its Regional Monitoring and Assessment Strategy (RMAS) memo (Draft Monitoring Design in Water Board-lead Pilot Watersheds, spring 2001) dated February 8, 2001. The following monitoring categories were included within the memorandum: screening level, detailed investigation, and status and trends.

The field and analytical methods used in the Revised Multi-Year Plan are described in the Program's Draft Quality Assurance Project Plan (QAPP), which is consistent with the Water Board's Surface Waters Ambient Monitoring Program (SWAMP) Quality Assurance Project Plan.

The Revised Multi-Year Plan incorporates specific data needs that have been identified in Program activities relevant to watershed assessment and monitoring. For example, the Revised Multi-Year Plan incorporates future monitoring activities that will be implemented for sediment-related studies in Stevens and Upper Penitencia Creek watersheds. Tasks associated with these monitoring activities are identified in the Program's Work Plan entitled *Workplan for Conducting Watershed Analysis and Management Practice Assessment in Other Creeks Potentially Impaired by Sediment from Anthropogenic Activities* (dated August 30, 2002). A clear identification of the specific monitoring activities planned for each year is included as part of the Program's Annual Monitoring Plan submitted to the Water Board every March 1.

Annual Monitoring and Watershed Management Measures Work Plans

During FY 05-06, the Program developed the *FY 06-07 Annual Monitoring and Watershed Management Measures Work Plan* (FY 06-07 Monitoring Plan), which was included in the Program's *FY 06-07 Draft Work Plan* (submitted March 1, 2006). The FY 06-07 Monitoring Plan identified monitoring and watershed assessment activities for six sites in the Permanente Creek watershed, nine sites in Stevens Creek watershed, and ten sites in the Coyote Creek (mainstem) watershed. The selection of these watersheds is consistent with the Program's *Watershed Management and Urban Runoff Management Integration Report* (dated June 29, 2001). The data type and sampling frequency were identified for each sampling site and accompanied by maps showing proposed sampling locations. The monitoring schedule is consistent with the sampling design presented in the Revised Multi-Year Plan (i.e., two sampling events per year representing different hydrological cycles). Information collected during implementation of the FY 06-07 Monitoring Plan is described in this Annual Report.

In preparation for Program-led receiving waters monitoring in FY 07-08, the Program developed the *FY 07-08 Annual Monitoring and Watershed Management Measures Work Plan* (FY 07-08 Monitoring Plan) in FY 06-07 and submitted it to the Water Board on March 1, 2007 as part of the Program's *FY 07-08 Draft Work Plan*. Similar to past annual monitoring plans, the FY 07-08 Monitoring Plan describes planned monitoring that will be conducted during FY 07-08 in Coyote Creek mainstem, Upper Penitencia Creek, Lower Silver/Thompson Creek, and Lower Penitencia Creek.

SUMMARIES OF FY 06-07 MONITORING AND ASSESSMENT ACTIVITIES

A summary of FY 06-07 monitoring and assessment activities is provided within Appendix C-1 and Table 4-1. Appendix C-1 provides a historical summary of all monitoring and assessment activities conducted by the Program. The following summaries highlight the objectives, results and conclusions of specific monitoring-related projects conducted during FY 06-07. Monitoring activities were generally aimed at developing and implementing programs/projects designed to assess the condition of water bodies using practical, implementable indicators and protocols. The implementation of these indicators and protocols are a necessary step toward establishing a sound regulatory basis for locally based watershed management.

Monitoring activities presented within this section, involve multiple tasks, subtasks, or coordinated activities that may take place over multiple years and at varying geographical scales (i.e., regional or sub-watershed). In addition, it is important to note that monitoring and assessment activities described within this section are not entirely independent from activities described in Section 5 – Watershed Management Measures. Information gained from conducting studies and implementing activities/measures described in both sections have been used (and will continue to be used) in concert to meet objectives outlined in Permit Provisions C.7, C.9, and C.10, which include; (1) characterizing watersheds and stormwater discharges; (2) assessing existing or potential adverse impacts to beneficial uses; (3) identifying potential sources of pollutants of concern; (4) aiding in developing and implementing strategies for controlling adverse impacts on beneficial uses; and (5) assessing the effectiveness of pollutant prevention/control measures.

SCVURPPP Receiving Waters Monitoring and Assessment

Santa Clara Basin Creek Monitoring (2002-2007)

In accordance with Provision C.10 (b), the Program developed a *Watershed Monitoring and Assessment Summary Report* (Summary Assessment Report) that summarizes the results and analyses of baseline data collected to-date during the implementation of the Program's Multi-Year Monitoring Plan (2002-2007). The Summary Assessment Report provides information on possible beneficial use impacts to the extent possible (based on the study design and available data) and suggests next steps for monitoring/assessments and developing strategies to control potential impacts. Data are summarized for the following watersheds:

- Permanente Creek;
- Stevens Creek;
- Matadero/Barron Creeks;
- Calabazas Creek;
- Sunnyvale East/West Channels;
- Lower Penitencia Creek;
- Lower Silver/Thompson Creek;
- Upper Penitencia Creek;
- Adobe Creek; and,
- San Tomas/Saratoga Creek.

The following paragraphs provide a brief synopsis of the information found within the Summary Assessment Report that is included in its entirety within Appendix C-2.

In years 2002 and 2003, water samples were collected during three seasonal time periods, including dry season (June-October) hydrological cycle, wet season (January-March) hydrological cycle, and spring/decreasing hydrograph season (April-May). During the subsequent four years of monitoring, water samples were collected only during the dry and wet season. Water samples were analyzed for physio-chemical, chemical (i.e., metals, nutrients and anions, and organophosphate pesticides), acute and chronic toxicity and pathogen indicators.

Sediment samples were collected during the first two monitoring years in the dry season and were analyzed for metals, organochlorine pesticides, PCBs and PAHs. Benthic macroinvertebrate (BMI) bioassessments and physical habitat assessments (PHAB) were conducted during the spring/decreasing hydrograph season (April/May). Fish bioassessments were conducted during the dry season (October). Watersheds were generally monitored for two consecutive years. Bioassessments were generally conducted at all sampling locations, with the exception of water bodies with highly modified channels and low elevation sites with concrete-lined channels.

The results of the water quality sampling were compared to the Water Quality Objectives identified in the San Francisco Bay Regional Water Quality Control Board 1995 Basin Plan (Basin Plan) and the California Toxics Rule (CTR), which identifies numeric criteria for priority pollutants in the State of California. Nutrient concentrations were evaluated using Recommended USEPA criteria. Diazinon concentrations were evaluated using TMDL targets for San Francisco Bay urban creeks. BMI bioassessments results were evaluated using a preliminary Benthic Index for Biological Integrity (B-IBI) for creeks in Santa Clara County. Ranges of B-IBI scores were assigned to five condition categories: very good, good, fair, marginal and poor.

Results were analyzed and interpreted on a countywide and watershed basis. Based on preliminary Benthic Index of Biotic Integrity (B-IBI) scores, benthic macroinvertebrate (BMI) assemblages indicate that aquatic life in sites located in the upper reaches of Stevens, Permanente and Adobe Creek watersheds and Upper Penitencia Creek and Saratoga Creek subwatersheds are in fair to very good condition, compared to all sites assessed in the Santa Clara Basin. These sites generally had optimal physical habitat assessment (PHAB) scores and received drainage from undeveloped or minimally developed lands within County or City Parks and Open Space Districts. Many of creek these reaches also support a cold water fish community (i.e., rainbow trout/steelhead). Of all watersheds sampled, Saratoga Creek had the greatest number of sites rated in the fair to very good condition category (n=5), and two of these sites were located in urbanized areas.

B-IBI scores generally decreased with elevation, suggesting that the effects of urbanization have likely impacted BMI communities overtime. Poor physical habitat condition and greater human disturbance to riparian corridor characterizes sites in the lower and middle reaches that occur along the Santa Clara Valley floor. Despite low B-IBI scores in some creek reaches, however, warm water fish communities were observed in some watersheds (e.g., Stevens, Saratoga, Adobe and Matadero Creeks).

Natural variation in B-IBI scores was observed in two ways. First, B-IBI scores were lowest at sites located in smaller-sized watersheds characterized as having intermittent stream flow (e.g., Adobe, Calabazas, Matadero and Thompson Creeks), with the exception of uppermost site on Adobe Creek. This finding suggests that intermittent creeks may naturally have lower B-IBI scores, and thus may not be comparable to sites with perennial flow. Secondly, B-IBI scores varied from year to year at individual sites, likely indicating natural biological responses to variations in precipitation, hydrology and temperature. Average B-IBI scores were used to estimate site condition over a two year period, however, additional year(s) of monitoring will likely increase the accuracy of B-IBI scoring.

Water quality data results indicate that numeric water quality objectives (WQOs), criteria and TMDL targets for metals and organic compounds were generally met in all creeks sampled. Specifically, over 90% of samples met WQOs/criteria for metals and there were no

exceedences of TMDL targets for diazinon. For physio-chemical measurements, 93% of all sampling events met WQOs for dissolved oxygen concentrations for cold water habitat and 82% of all sampling events met WQOs for pH. Acute toxicity of water flea and/or minnow only occurred in 2% and 10% of sampling events, respectively. Water and sediment quality results to-date do not show significant correlations with B-IBI scores.

Sediment Quality Pilot Study

In addition to water quality monitoring conducted in receiving waters, the Program conducted a pilot study in FY 06-07 to assess the utility and challenges of implementing a sediment quality triad approach in Santa Clara Valley creeks. The following paragraphs provide a brief summary of the information found within the *Pilot Sediment Quality Triad (SQT)* report that is included in its entirety within Appendix C-3.

In an effort to increase its ability to understand the condition of aquatic life in creeks, the Santa Clara Valley Urban Runoff Program conducted a pilot test of the Sediment Quality Triad (SQT) in Coyote Creek. The SQT combines multiple lines of evidence: stressor exposure variables (sediment chemistry), measures of toxicity (laboratory bioassay experiments), and studies of biological response of the resident communities (assessments of resident biological communities). Benthic macroinvertebrate (BMI) communities were collected from 10 sites in Coyote Creek in May 2007 using the updated rapid bioassessment protocol for wadeable streams developed for the California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP). Physical habitat (PHAB) quality was assessed at each BMI monitoring site using the U.S. Environmental Protection Agency (EPA) Rapid Bioassessment Protocol. Sediment toxicity was evaluated at six sites in Coyote Creek by exposing the amphipod, *Hyalella azteca*, to collected sediments in a standard ten day survival test. Sediment chemistry, including metals and pyrethroid pesticides were collected in Fall 2006 and Spring 2007 from eight sites. The measured sediment chemistry values were compared to existing consensus-based Sediment Quality Guidelines. The Sediment Quality Guideline values were used to develop a mean Probable Effect Concentration Quotient (the measured value divided by the Sediment Quality Guideline concentration above which one would expect to observe toxic response, averaged across all contaminants).

Total B-IBI scores for sites in Coyote Creek ranged from 2 – 19 (resulting in a “poor” or “marginal” category), while PHAB scores for Coyote Creek sites ranged from 13 – 47 (out of a total possible 60). Both B-IBI and PHAB generally decreased in a downstream direction. Total recoverable metals in sediment collected in May and September were above reporting limits in the vast majority of sites sampled. Additionally, concentrations sediment contaminants exhibited a seasonal pattern. Specifically, the concentrations of contaminants in sediment samples were generally lower than the corresponding PECs, with the exception of nickel, chromium and Permethrin in samples collected in May 2007, and no samples collected in September exceeded PECs. This resulted in mean sediment quality guideline quotients below 1.0 for all sites in September 2006 and in five of eight sites in May 2007. Pyrethroid pesticides were generally not detected above laboratory reporting limits in spring or fall samples, with the exception of Permethrin, which was detected above the published LC50 in nearly all samples collected in May 2007. In contrast, significant toxicity was observed in five of six fall season samples, and only one sample in the spring. This suggests that the relationship between contaminants in sediment and toxicity are not well understood.

When pooled together into the SQT, the lines of evidence indicate a dichotomous pattern where downstream, low elevation sites had poor B-IBI scores, marginal to fair PHAB scores, good to

fair sediment chemistry and some indications of toxicity. While upstream sites had higher B-IBI and PHAB scores, similar toxicity, and higher concentrations of contaminants. The results of the SQT indicate that sampling toxicity and sediment chemistry at a greater frequency during the wet weather season may help inform the selection of future sampling timeframes and evaluate the ability of bedded sediment to detect change overtime.

City of Palo Alto Creek Monitoring

San Francisquito Creek Long Term Monitoring and Assessment Plan (LTMAP)

In addition to environmental monitoring conducted by the Program, the City of Palo Alto operates a sampling station at Newell Road on San Francisquito Creek as part of the LTMAP. The Newell Road sampling station captures nearly all of the water flowing from the San Francisquito watershed, including most of the urbanized portion of the watershed. At the Newell Road location, flows are intermittent, with flow beginning in the rainy season and tapering off in the late spring or early summer. During each water year, five to six rainfall events are sampled.

Samples are analyzed for metals (including low level mercury, dissolved mercury, and methylmercury), nutrients, pesticides (organochlorine, organophosphate, and pyrethroids), and suspended solids. One sample each year is analyzed for dioxins. Stanford University, Stanford Linear Accelerator Center, and Jasper Ridge Biological Preserve operate three additional LTMAP sampling stations in the upper watershed. Additional information on the LTMAP and data can be found at www.city.palo-alto.ca.us/cleanbay/creeks/index.html.

Volunteer Creek Monitoring Program

The City of Palo Alto's volunteer creek monitoring program was developed after a fish die-off that occurred in November 2002 within the Palo Alto Flood Control Basin. Since April 2003, approximately six volunteers and Regional Water Quality Control Plant (RWQCP) staff monitor 21 sites on Adobe, Barron, and Matadero Creeks, as well as the Palo Alto Flood Control Basin, twice each month. A YSI multi-meter probe is used to take measurements of temperature, conductivity, dissolved oxygen, and pH. The volunteer program has collected three years of data that allow evaluation of trends in water quality within the creeks and the flood basin. This data is useful in making policy decisions with respect to managing the Flood Control Basin to maintain adequate dissolved oxygen levels.

Matadero Creek Metals/Cyanide Monitoring

The City of Palo Alto's NPDES permit for wastewater discharge requires monthly monitoring of Matadero Creek for metals and cyanide. These samples are collected as grab samples at Greer Road and Oregon Expressway. The Renzel Marsh Pond, a freshwater pond enhancement initiated and managed by Palo Alto, discharges to Matadero Creek downstream of the sampling location.

Regional Collaborative Monitoring Activities

Regional Monitoring Program for Water Quality (RMP)

The Regional Monitoring Program for Water Quality in the San Francisco Estuary (RMP) is a collaborative effort between the San Francisco Estuary Institute (SFEI), the Water Board and the regulated discharger community (including SCVURPPP). The RMP's goal is to collect scientifically valid information that allows movement towards understanding contaminant impacts on beneficial uses of the Bay. The RMP focuses on determining spatial patterns and

long term trends through sampling of water, sediment, bivalves, and fish; effects on sensitive organisms; and chemical loading to the Bay. To provide the most complete assessment possible of chemical contamination in the Bay, the RMP seeks to synthesize RMP data with data from other sources.

The RMP is based on management questions and program objectives that are updated by the Water Board, RMP staff, RMP Technical Review Committee (TRC) and RMP Steering Committee (SC) every five years. The RMP recently updated its management questions and objectives in January 2005 (www.sfei.org/rmp/RMPproginfo.htm). The current RMP objectives are:

1. Describe the distribution and trends of pollutant concentrations in the Estuary;
2. Project future contaminant status and trends using best understanding of ecosystem processes and human activities;
3. Describe sources, pathways, and loading of pollutants entering the Estuary;
4. Measure pollution exposure and effects on selected parts of the Estuary ecosystem (including humans);
5. Compare monitoring information to relevant benchmarks, such as TMDL targets, tissue screening levels, water quality objectives, and sediment quality objectives; and,
6. Effectively communicate information from a range of sources to present a more complete picture of the sources, distribution, fate, and effects of pollutants and beneficial use attainment or impairment in the Estuary ecosystem.

The Program actively participated and contributed approximately \$168,480 to SFEI for FY 06-07 expenditures on the RMP. This funding to SFEI is in addition to funding provided by the three south Bay public owned treatment works (POTWs), which are also Co-permittees. In addition, Program staff actively participated on a variety of RMP committees and work groups that included the RMP Steering Committee; Technical Review Committee; Sources, Pathways and Loadings Work Group (SPLWG); and, Contaminant Fate Workgroup. In addition, a City of San Jose staff member currently serves as the chair of the RMP TRC. In FY 07-08, the Program will continue to provide financial support for the RMP and actively participate in committees and workgroups.

The RMP budget is generally broken into two monitoring programs: Status and Trends; and Special and Pilot Studies. The following paragraphs provide a brief overview of these programs.

Status and Trends Monitoring Program

The Status and Trends Monitoring Program is the long-term contaminant-monitoring component of the RMP that was initiated as a pilot study in 1989. The Status and Trends Monitoring Program is comprised of four program elements that collect data to address the RMP objectives:

1. The *Status and Trends Monitoring Program* consists of long-term contaminant monitoring to characterize the status and trends for contaminants in water, sediment and biota (bivalves) in the Estuary (Objectives 1,3, and 4);
2. The *Sport Fish Contamination Study* is a triennial screening of fish tissue for contaminants of concern to human health (Objectives 1,3, and 4);
3. The *Episodic Toxicity Monitoring* component investigates potential toxic effects in Estuary tributaries (Objectives 1 and 2); and,

4. The USGS conducts two long-term monitoring efforts partially funded by the RMP, including monthly water quality measurements in the deep channels of the Estuary (from the Lower South Bay to the confluence of the Sacramento and San Joaquin Rivers), and sediment transport monitoring and modeling in the northern Estuary.

The RMP summaries provided within this section focus on the latest information available from the Status and Trends Monitoring Program (i.e., 2005). The 2005 information was the fourth year that the Status and Trends Monitoring Program collected water and sediment samples using EPA's Environmental Monitoring Program (EMAP) Generalized Random Tessellation Stratified (GRTS) sample design. This type of design is appropriate for addressing the RMP objective (Objective 1) to describe the spatial and temporal patterns of contamination in the Estuary. Monitoring data are available for downloading via the RMP website using the *Status and Trends Monitoring Data Access Tool* at www.sfei.org/rmp/data.htm.

Pilot and Special Studies

The RMP also conducts Pilot and Special Studies. Pilot Studies usually are designed to investigate and develop new monitoring measures related to anthropogenic contamination or contaminant effects on biota in the Estuary. Special Studies address specific scientific issues that the TRC, SC, or Water Board identify for further study. These additional studies are developed through an open application process, which starts with an applicant submitting a study idea to the RMP Program Manager for discussion at a TRC quarterly meeting.

Summaries of the most pertinent Pilot and Special Studies conducted in FY 06-07 are provided under each summary of pollutant-specific monitoring activities within this section. A summary of past Pilot and Special Studies conducted by the RMP is available on the RMP website (www.sfei.org/rmp/). In addition to providing funding for these studies, Program and Co-permittee staff provided in-kind support on the development, analysis of results and conclusions of each study summarized.

Clean Estuary Partnership

On August 6, 2001, a Memorandum of Understanding (MOU) regarding development of: 1) a Water Quality Attainment Strategy for San Francisco Bay-Delta and Tributaries; and 2) TMDLs for 303(d) pollutants (including mercury) was entered into by the Water Board, Bay Area Clean Water Agencies (BACWA) and Bay Area Stormwater Management Agencies Association (BASMAA). This group is referred to as the Clean Estuary Partnership (CEP).

The mission of the Clean Estuary Partnership (CEP) is to use sound science, adaptive management, and public collaboration to develop and implement technically valid and cost-effective strategies (including TMDLs) that result in identifiable, sustainable water quality improvements for San Francisco Bay. In addition, Program staff participated in CEP Executive Management Board (EMB) meetings, CEP Technical Committee (TC) meetings, pollutant-specific workgroup meetings and CEP Risk Reduction Work Group meetings. A City of San Jose staff member also serves as chair of the CEP TC.

FY 06-07 accomplishments included (but were not limited to) the development of a variety of technical reports and projects. Summaries of information collected during these studies are included under each summary of pollutant-specific monitoring activities provided below. In addition to the SCVURPPP providing funding for these studies, Program and Co-permittee staff provided in-kind support on the design, analysis of results and development of conclusions for each study summarized.

Program participation is tentative for FY 07-08, as the CEP is currently undergoing review and redesign.

BASMAA Monitoring Committee

The purpose of the BASMAA Monitoring Committee (MC) is to discuss and coordinate monitoring activities conducted by the Bay area urban runoff management programs. In FY 06-07, the main emphasis for BASMAA MC representatives, including Program and Co-permittee staff, was to participate in development of the monitoring and pollutant of concern-related sections of the Municipal Regional Permit (MRP). The MRP is anticipated to replace the Program's NPDES permit and other Bay Area Phase I municipal stormwater permits. During FY 07-08, the Program will continue to actively participate in the BASMAA MC.

Mercury Monitoring Activities (Provision C.9.c)

Permit Provision C.9.c. requires the Program to develop and implement a mercury pollution prevention plan. In response, the Program developed a Mercury Pollution Prevention Plan (Mercury Plan) consistent with the Provision. The Mercury Plan was submitted to the Water Board on March 1, 2002 as part of the Program's *FY 02-03 Work Plan*. The Mercury Plan identifies actions that will be implemented at the Program level, municipality level, or both; and provides the schedule for initiation and/or completion of Program-level actions. The details of municipality actions and schedules are included in the individual Co-permittee Work Plans and/or Annual Reports, as appropriate.

During FY 06-07, a variety of mercury-related monitoring activities occurred including sampling and analysis of total and methylmercury in water, sediment, and biota in the Estuary and the Zone 4-Line A (Hayward) watershed; and water quality monitoring conducted by the Program in accordance with the Revised Multi-Year Plan. In addition, a Biosentinel Fish Study began through the RMP. The following summaries briefly describe the results and conclusions of these efforts. A more detailed description of FY 06-07 accomplishments and the prominent mercury pollution prevention activities planned for FY 07-08 are provided within Section 7 - Mercury Pollution Prevention Activities.

Santa Clara Valley Creek Monitoring

In FY 06-07, the Program continued to analyze water samples collected in Santa Clara creeks through the implementation of its Revised Multi-Year Plan. Water samples were collected as screening level indicators of water quality at a variety of creek sites draining urban and rural land use areas. As described in the Program's Revised Multi-Year Plan, grab samples were collected during two seasons (wet and dry).

Mercury concentrations detected in Santa Clara creeks in FY 06-07 ranged between 3.2 ng/L and 14.0 ng/L, below the four-day average mercury water quality objective (25 ng/L) for freshwater bodies in the San Francisco Bay region. A full description of methods, results and conclusions are presented in the Summary Assessment Report (see Appendix C-2).

Regional Stormwater Monitoring and Urban BMP Evaluation (Proposition 13)

As a direct result of the TMDLs for Mercury (Hg) and PCBs, significant load reductions (>50%) are required of Bay Area urban runoff programs. This is a difficult prospect for given there is limited quantitative information on where high concentrations of Hg and PCBs occur in urban

areas. In addition there is little knowledge or experience on how source and treatment control BMPs or maintenance activities that have been designed and are routinely implemented to control other substances may or may not work for Hg and PCBs. In recognition of these information needs, with support from Water Board and BASMAA, SFEI applied for and received a grant from the Proposition 13 Coastal Non-point-Source Pollution Control Program and work began in 2005. The purpose of the grant is to assist BASMAA and the Water Board to implement the Hg and PCB TMDLs through the development of a science-driven consensus on where and how to apply limited resources to meet the TMDL goals.

From 2005 through 2007, Program staff and additional BASMAA representatives have actively participated in the development and provided oversight on the following tasks designed to provide pertinent information in pursuit of the purpose:

1. Mapping Storm Drains: At the completion of the project storm drains from Richmond to San Jose on the east Bay up to San Francisco on the Peninsula will have been mapped.
2. A Geographic Information System: A GIS of land use, watershed/stormwater catchment boundaries, historic industrial areas, PG&E facilities, auto wrecking facilities, 1950s railway lines, crematoriums, known PCB and Hg spill and industrial accident sites, pump stations, wastewater treatment facilities, and rainfall is being used to help design sampling programs, and to estimate discharge from stormwater catchments.
3. Estimates of Sediment Loads: We have developed a conceptual understanding of the supply and magnitude of sediment that passes through stormwater conveyances. This will be used along with the GIS to help determine where contaminated bed sediments occur.
4. Mercury and PCBs White Paper: This 150 page document provides a thorough review of all that is known about Hg and PCBs in urban areas, the potential of commonly applied BMPs and pollution prevention to remove mass, and an analysis of data gaps.
5. BMPs Desktop Evaluation: This report describes the development and outcomes of a spreadsheet model of the application of a combination of feasible and commonly applied BMPs to address the TMDL goals. Preliminary findings suggest the potential to meet the PCB load reduction goals but only limited possibility to meet the Hg TMDL goals. The model will be updated using data collected during the period of this study.
6. Soil/Sediment Sampling: Based on previous products and oversight from BASMAA/Water Board, sample collection is being focused in older industrial areas in Richmond, San Leandro, Hayward, San Jose, Sunnyvale, San Carlos, South San Francisco, San Bruno, Daly City, and Brisbane. The objectives are to better understand the distribution of Hg and PCBs in urban areas and to determine how release occurs (i.e. runoff, wind, wheel tracking, and grain size distribution).
7. Base Flow and Storm Sampling: Based on previous products and oversight from BASMAA/Water Board, sample collection is being focused in older industrial areas in Richmond, Oakland, Hayward, San Jose, and San Carlos. The objective of this sampling is to characterize the distribution of Hg and PCBs is 3 particles sizes (<25, 25-75, and >75 microns) and determine the potential of control of either urban dry-weather flow or early season storm flow for addressing TMDLs goals.

8. Street Sweeping/ Washing Studies and Catch Basin Cleaning: Data will be collected this fall to determine the potential mass removed by these maintenance practices.
9. Pollution Prevention Status Reports: A series of 5 page Status 2007 reports will be written on 1. Instruments containing Hg recycling, 2. Switches/ thermostat recycling, 3. Fluorescent bulb recycling, 4. Battery recycling, 5. Auto / white-good recycling, 6. Compact fluorescent bulb recycling / buyback, 7. Crematoriums / hospitals, 8. building demolition / remodeling, 9. Voluntary PCB in-use reporting and phase-out / PCB equipment I.D. inspection and removal, 10. PG&E PCB change out/ phase out implementation, 11. Small capacitor / light ballast change out, and 12. Auto recycling / shredder waste.
10. Recommended Implementation Activities: Based on a series of meetings with BASMAA reps and Water Board TMDL staff and the scientific information generated in through this project including collation of data from other BASMAA studies, Hg and PCB implementation plans will be written for guidance to BASMAA on how to cost effectively address the TMDL goals. Guidance will include where PCB and Hg are likely to occur in urban areas, what kinds of BMPs and combinations have the best probability to be effective, how existing programs could be focused or enhanced to improve effectiveness, methods for sampling during site evaluations, implementation, and effectiveness monitoring, specific sample preprocessing and lab methods that will yield reliable data, and estimates of implementation costs where information is applicable or available.

The grant is scheduled from completion in FY 07-08. Though in-kind support, Program staff will continue to actively participate and provide oversight to SFEI staff during the completion of this project.

Small Tributaries Loading Study (Watershed #2)

Since 2000, the RMP's Sources Pathways and Loadings Workgroup (SPLWG) has supported the establishment of a "Regional Network of Observation Watersheds". The SPLWG suggested that the RMP:

- Choose watersheds that represent different urban landscapes, different hydrological, climatological, and geological type;
- Provide a testing grounds for development of improved monitoring and modeling techniques;
- Enable a testing ground for management actions and strategies to detect the effect of management actions on long-term trends in loads; and,
- Extrapolate data to other watersheds in each region that are sampled less intensively.

In 2002, the CEP and RMP began jointly funding a mercury and PCBs loading study on the Guadalupe River. Based on the success of this study, the SPLWG proposed adding a second loading study in 2006. After much discussion, a small industrialized watershed in Hayward named Zone 4-Line A was chosen for sampling, which began in October 2006.

Results from this study were not yet available at the time this Annual Report was completed, but information can be found at RMP at <http://www.sfei.org/rmp/index.html> and an update will be provided in the Programs FY 07-08 Annual Report.

Mercury in Biosentinel Fish in the San Francisco Bay

The Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) funded a three-year pilot study to develop baseline data on mercury concentrations in small fish in San Francisco Bay. The study includes annual monitoring of fixed monitoring stations in 2005 through 2008. The ultimate objective is to develop a monitoring program to evaluate long-term change in Hg bioavailability in the Estuary, including response to wetland modifications and other management actions. The following paragraphs summarize findings from the first year of monitoring in this study.

Eight nearshore locations in San Francisco Bay were sampled with beach seines from November through December of 2005. Multiple composite samples of five to ten individuals each were collected at each sampling location, weighed, measured, and analyzed for whole-body total Hg concentration. Seven small fish species representing a range of vagility and salinity tolerance were captured. Of 97 composite samples analyzed, 39 (40%) had Hg concentrations higher than a proposed 0.03 µg/g (wet-weight) TMDL target threshold. The average wet-weight mercury concentration of the samples was 0.049 µg/g. Mississippi silverside (*Menidia audens*) had higher Hg concentration than other species tested, and bay goby (*Lepidogobius lepidus*) had lower concentrations. For cheekspot goby (*Ilypnus gilberti*), concentrations were significantly higher at Alviso Slough than stations farther north. For Mississippi silverside, concentrations were significantly higher at four South Bay sites than at China Camp or Benicia State Park.

Guadalupe River TMDL for Mercury

The Santa Clara Basin Watershed Management Initiative (SCBWMI) is serving as the stakeholder forum for the development of the Guadalupe River TMDL Report for Mercury. The Guadalupe River Watershed encompasses parts of San Jose, Los Gatos, Campbell, Monte Sereno and the unincorporated Santa Clara County. The Program is a stakeholder in the Guadalupe River TMDL. The Santa Clara Valley Water District (SCVWD) is taking a lead role in the TMDL development process by funding a \$900,000 study of mercury sources, fate and transport, and is participating as Co-Chair of the TMDL Work Group and Stakeholder Group. Program staff is also participating in the TMDL process. In addition, the SCVWD entered into a Memorandum of Understanding (MOU) with the Water Board for Phase I and Phase II studies which were funded by the SCVWD.

Since FY 02-03, Program staff, along with other Co-permittee staff, have attended Work Group meetings and reviewed draft technical memoranda developed by the consultant (i.e., Tetra Tech). During July and August 2003, a synoptic survey and preliminary field sampling effort was conducted. The results of the synoptic survey were incorporated into the *Draft Conceptual Model Report* (Tetra Tech, October 2, 2003). Based on the information collected for the conceptual model, a *Data Collection Plan* (Tetra Tech, February 20, 2004) was developed. Sampling in the Guadalupe River watershed, which began in February 2004, included an element to compare total and methyl mercury in creeks draining urban watersheds unaffected by mining (Ross, Canoas and Los Gatos Creeks) to those affected by mining (Alamitos, Guadalupe, Arroyo Calero, Canoas, Randol Creeks and Guadalupe River). Under a contract with the Water Board, the consultant has incorporated the data collection results into the *Final Conceptual Model Report* (Tetra Tech, May 22, 2005). A summary of the findings in this report were provided in the Program's *FY 04-05 Annual Report*.

Building on the information presented in the conceptual model report, Water Board staff released a TMDL Project Report in January 2006 that describes the estimated loads from source categories, TMDL targets and load and wasteload allocations, and preliminary implementation actions. Program, City of San Jose and SCVWD staff presented oral comments to Water Board staff during the SCBWMI TMDL Stakeholder Workgroup meeting on May 14, 2006. The purpose of the meeting was to obtain Workgroup input on the TMDL Implementation Plan.

Public notice of the release of the Basin Plan Amendment (BPA) package is currently scheduled for FY 2007/08, with Water Board hearings tentatively scheduled for the Fall/Winter of 2007. Program and Co-permittee staff will continue to participate in the development of the Guadalupe River Watershed TMDL for mercury by attending meetings and reviewing/commenting on future TMDL reports.

Pesticide Monitoring Activities (Provision C.9.d)

In response to Provision C.9.d of the Program's NPDES Permit, the SCVURPPP developed a Pesticide Management Plan consistent with the Provision. The Pesticide Management Plan, which has many components, is described in Section 6 of the Annual Report. Pesticide-related monitoring activities conducted during FY 06-07 are described below.

Santa Clara Valley Creek Monitoring

During FY 06-07, the Program analyzed water and bedded sediment samples collected in Santa Clara creeks through the implementation of its Revised Multi-Year Plan. Water and sediment samples were collected as screening level indicators of water/sediment quality at a variety of creek sites draining urban and rural land use areas. Specific to pesticides, creek water was analyzed for organophosphate pesticide concentrations and aquatic toxicity (acute and chronic endpoints), while sediment was analyzed for pyrethroid pesticides and sediment toxicity (acute and chronic endpoints). As described in the Program's Revised Multi-Year Plan, water grab samples were collected during two seasons (wet and dry). Sediment samples were collected in September 2006 and May 2007.

Organophosphate pesticides were not detected in the four samples collected from two creeks (i.e., Stevens and Permanente) in the Santa Clara Valley in FY 06-07. Results from three species aquatic toxicity testing also indicated very few problems in Santa Clara Valley creeks. Two sites were sampled two times (wet and dry seasons) during FY 06-07. No significant acute toxic effects (i.e., reduced survival) were observed in the four samples. Growth/Reproduction (i.e., chronic effects) of the test organism *Ceriodaphnia dubia* was inhibited in two of the four samples analyzed.

Sediment samples were collected from 8 sites in FY 06-07. Pyrethroid pesticides *Permethrin* and *Bifenthrin* were detected in 8 of 8 and 2 of 8 sites, respectively. All pesticide detections were observed in samples collected in May 2007. Permethrin concentrations (normalized to total organic carbon) in 7 of 8 samples were above published toxic concentrations (i.e., LC50s), while concentrations of Bifenthrin were below LC50s. In contrast to pyrethroid results, acute sediment toxicity was almost entirely observed in samples collected in September 2006, as opposed to May 2007. In September, 5 of 6 sites exhibited significant sediment toxicity, while only 1 of 5 sites had toxic sediments in May. A full description of methods, results and conclusions are presented in the Summary Assessment Report (see Appendix C-2) and the Pilot Sediment Quality Triad (SQT) Report (see Appendix C-3).

In future years, the Program will continue to coordinate pesticide and toxicity monitoring activities with regional monitoring efforts (e.g., BASMAA and RMP) to ensure that useful and adequate information is being collected. This information should assist the Program in determining the impacts of pesticides on local water bodies.

Copper and Nickel Control Measures (Provisions C.9.a and b)

Management Activities

Copper Action Plan and Nickel Action Plan Reviews

In FY 05-06, Program staff, in consultation with Water Board staff, decided that the SCBWMI Bay Modeling and Monitoring (BMM) Subgroup did not need to conduct semi-annual reviews of the Copper Action Plan (CAP) and Nickel Action Plan (NAP) due to the pending related activities of the Clean Estuary Partnership (CEP) and Water Board regarding the Municipal Regional Permit (MRP).

Limited discussions about how the transition would likely occur to a bay-wide Copper Management Strategy (CMS) occurred within the MRP Work Groups. MRP development related activities were considered higher priority by Water Board staff than CAP/NAP activities during most of FY 2005-2006. Ambient monitoring and trigger criteria were revisited to move towards a consistent and equivalent level of effort expended North and South of the Dumbarton Bridge. The proposed approach North of the Dumbarton Bridge is to rely on RMP data that is collected once per year versus the monthly dry season data collected south of the Dumbarton Bridge. The City of San Jose prepared a report entitled *Re-evaluation of San Francisco Bay Triggers for Copper and Nickel* (dated April 2006) that evaluated alternative strategies for a consistent bay-wide approach. The report results were presented to Water Board and SFEI staff. The City of Palo Alto continued to offer to convert its Copper Indicators Report to a model for a bay-wide indicators report, if provided the necessary information. New funding mechanisms will need to be identified for on-going implementation of these bay-wide CMS components (stormwater and POTW annual reporting, indicators reporting and ambient monitoring).

The Basin Plan Amendment adopting the North of Dumbarton Bridge Copper site-specific water quality objectives (SSOs), translators, and the CMS was approved by the RWB in June 2007. The Bay-wide CMS will replace what was adopted in the Basin Plan in 2002 as part of the South San Francisco Bay copper and nickel SSO project. The copper control measures and monitoring program has a Bay-wide scope so the majority of existing Basin Plan language pertaining to the implementation of copper and nickel objectives in South San Francisco Bay will be replaced. Chapter 7 of the Basin Plan contains a lengthy, narrative discussion of the project history for developing copper and nickel SSOs in South San Francisco Bay, the associated monitoring program, and the implementation plan for the SSOs. Nearly all of this text is unnecessary, non-regulatory language and is being deleted.

Because SSOs and translators were the only regulatory elements from the South San Francisco Bay project (SFBRWQCB 2002), the only regulatory element from the existing text in Chapter 7 is the specification of copper and nickel translators that apply to wastewater discharges to South San Francisco Bay, so this element will be retained. The South San Francisco Bay copper and nickel SSOs are likewise retained in Chapter 3. The deleted non-regulatory language in Chapter 7 is replaced with more efficient language describing the Bay-wide implementation strategy for copper. There is no Bay-wide implementation strategy for nickel because nickel SSOs have only been adopted for South San Francisco Bay. Chapter 4 of the

Basin Plan states the implementation measures necessary to implement the South Bay nickel SSOs are in the form of numeric nickel effluent limits for South Bay wastewater facilities.

The replacement Basin Plan Amendment language in Section 7.2.2.1 regarding Control Measures for Urban Runoff Management Agencies is as follows:

- *The NPDES permits for urban runoff management agencies shall require the implementation of best management practices and copper control measures designed to prevent urban runoff discharges from causing or contributing to exceedances of copper water quality objectives. Requirements in each permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce copper in stormwater runoff to the maximum extent practicable. Urban runoff management agencies must implement control measures targeting: vehicle brake pads, architectural copper, copper pesticides, and industrial copper use. Additionally, these permits shall contain requirements to conduct or cause to be conducted: monitoring of copper loading to the Bay at locations and frequency sufficient to track loading trends; and technical studies to investigate possible copper sediment toxicity and sublethal effects on salmonids.*
- *If an ambient trigger concentration in any San Francisco Bay segment (see Basin Plan Section 7.2.2.5) is exceeded, all urban runoff management agencies discharging to that segment shall submit a report to the Water Board that describes best management practices that are currently being implemented and additional measures, with a schedule, that will be implemented to prevent their copper discharges from causing or contributing to the exceedance.*

Implementation of CAP/NAP Baseline Activities

The majority of baseline actions are implemented at the Program level (except for those assigned to San Jose, Sunnyvale and Palo Alto), and are included in the Program's Annual Reports and Work Plans. In mid-2003, the Program identified the following copper control activities that were deemed appropriate to implement at the Co-permittee level:

- CB-1: Measures to reduce copper discharges from vehicle washing operations;
- CB-3: Measures to control copper in discharges of stormwater in targeted industrial sources;
- CB-6, 7: Measures to reduce traffic congestion/promote alternative transportation;
- CB-8: Measures to classify and assess watersheds and improve institutional arrangements for watershed protection;
- CB-11: Measures to improve street sweeping controls and stormwater system operation and Maintenance;
- CB-12: Measures to control copper discharges from pools and spas;
- CB-21: Measures to discourage architectural use of copper; and
- NB-1: Measures to control nickel discharges from construction sites (sediment).

The *FY 07-08 Copper/Nickel Work Plan* and summary of FY 06-07 accomplishments are provided within Appendix C-4. Currently, the Copper/Nickel Work Plan contains twenty-one copper and seven nickel baseline actions. During FY 06-07, some specific accomplishments included:

- The Program distributed approximately 715 Watershed Watch campaign brochures at public events, ZunZun assemblies and through website and hotline requests. In

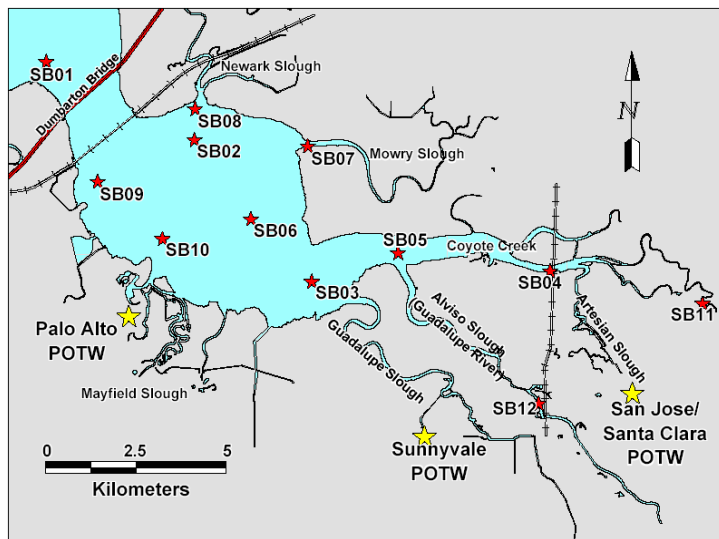
addition, English and Spanish Watershed Watch (WW) campaign brochures that included outreach on car washing (aimed at reducing copper and nickel; and other pollutant inputs to stormwater) were distributed on request (CB-1).

- The Cities of San Jose and Sunnyvale conducted distributing stand alone vent BMP information to applicable facilities that may be potential sources of copper (CB-3);
- The City of Palo Alto prepared the sixth annual Copper Action Plan Report (CB-4.3);
- Continued to actively support the Brake Pad Partnership (BPP) (CB-5), providing resources to fund and advocate BPP through BASMAA, actively tracking activities of BPP and efforts under the Proposition 13 grant;
- Continued to work with and support the Land Use Subgroup (LUS). Tasks included conducting one workshop (December 2006) relating to impacts on water quality. (CB-6 and CB-7);
- Implemented the five year of the Multi-Year Monitoring Plan (Included specific water quality and sediment sampling and analyses for all metals including copper and nickel.) (CB-8.4);
- Continued to implement Co-permittee street sweeping and catch basin cleaning programs consistent with performance standards (aimed at reducing discharges of pollutants, including copper and nickel, to storm drains and receiving waters). Summarized the amount of material collected and miles swept within the Program's jurisdiction (CB-11);
- Continued distributing the updated brochure entitled Keep Pool, Spa and Fountain Water Out of Storm Drains, Creeks, and the Bay (aimed at reducing discharges of pool water, which can contain copper and nickel, to storm drains and receiving waters.) (CB-12);
- Updated the copper "uncertainty studies" research tracking web portal to include additional studies. This web portal is available on the Program's website (www.scvurppp.org). A link to the web portal was also placed on the SFEI website (www.sfei.org)(CB-17(1)).
- The City of San Jose continued to monitor dissolved copper and nickel during the dry season (in Lower South San Francisco Bay) as part of their ambient monitoring program (additional information provided below).

Lower South Bay Ambient Monitoring

In February 1997, the City of San Jose, on behalf of all local agencies in the South Bay, began sampling total and dissolved copper and nickel concentrations at ten stations in the Lower South San Francisco Bay (LSSB). In October 1997, two fresh water stations were added, one each in the lower reaches of Coyote Creek and the Guadalupe River, bringing the total number of stations to twelve (Figure 4-1). The sampling design from the CAP/NAP requires monthly compliance sampling. Ten locations in South San Francisco Bay have been monitored to compare mean dry season dissolved copper and nickel concentrations to respective trigger levels. Results from monthly monitoring at ten stations show ambient concentrations continuing to be well below the adopted SSOs of 6.9 ug/L and 11.9 ug/L for copper and nickel, respectively. Ambient concentrations have remained consistent (no upward or downward trend) and below the stringent Action Plan trigger values (established as NPDES permit requirements in 2000) of 4.0 ug/L and 6.0 ug/L for copper and nickel, respectively. The monitoring results are located on http://www.sanjoseca.gov/esd/pub_res.asp, the City of San Jose's Environmental Services Department website

Figure 4-1: Map of monitoring station locations in LSSB (City of San Jose)



The North of Dumbarton Copper SSO Basin Plan amendment (June 2007) deleted and replaced the above South Bay monitoring program with the following Bay-wide Ambient Monitoring Program (BPA Section 7.2.2.5).

- The implementation plan establishes copper control measures in order to prevent increases in ambient dissolved copper concentrations. Ambient concentrations of copper in the Bay have remained essentially unchanged from 1993 through 2006 and are not expected to increase in the future. In order to determine systematically if ambient concentrations have increased, specific copper concentration triggers are compared to data collected through the Regional Monitoring Program for Trace Substances (RMP). This is accomplished by calculating every year the three-year rolling mean of RMP copper concentrations in segments of the Bay. These rolling mean concentrations will be compared to trigger concentration values for each segment. The trigger concentrations (shown in Table 7.3) were calculated in order to detect a change (from 2003 concentrations) in dissolved copper concentration of about 1 µg/L with a statistical power of 99%. If the trigger concentration is exceeded in any Bay segment, the Water Board will investigate causes of the exceedance and potential control options and require wastewater and urban runoff dischargers to that segment to investigate whether they have caused or contributed to the exceedance and, if so, to identify and submit a plan and schedule to implement controls to resolve their contribution to the exceedance.*
- The Water Board will assess the continued appropriateness of the SSOs for San Francisco Bay should conditions change in Bay water quality. Dissolved organic carbon (DOC) will be used as a surrogate measure of the protective effect of Bay water against copper water column toxicity. An analysis and evaluation of trends in DOC data collected through the RMP will determine whether or not additional water column toxicity tests are needed to confirm that the SSOs are protective. In addition, the Water Board will evaluate sediment copper concentration and sediment toxicity data collected through the RMP to assess possible effects related to copper accumulation in Bay sediments. The need for a reevaluation of the SSOs or other regulatory actions will be established through the triennial review of the Basin Plan.*

The new dissolved copper ($\mu\text{g/L}$) trigger concentrations at 99% statistical power for each Bay segment (or portion thereof) are as follows:

Suisun Bay 2.8 $\mu\text{g/L}$, San Pablo Bay 3.0 $\mu\text{g/L}$, Central San Francisco Bay and Lower San Francisco Bay (north Hayward Shoals) 2.2 $\mu\text{g/L}$, Lower San Francisco Bay (south of Hayward Shoals) 3.6 $\mu\text{g/L}$, and South San Francisco Bay (SSFB) 4.2 $\mu\text{g/L}$. The RMP will collect three dry season samples per year from each bay segment and five samples per year from SSFB to be used in calculating the 3-year moving average value for annual comparison to the triggers. When implemented, this will result in a significant reduction in SSFB Cu/Ni monitoring requirements.

Future CAP/NAP Approach

Since 2003, the BMM Subgroup determined that further efforts at fine-tuning the CAP baseline activities would likely be unproductive due to certain remaining inherent challenges with the original CAP/NAP language. To assist in the identification of key baseline copper control activities that are most effective in the removal of copper, the Program helped fund preparation of a Clean Estuary Partnership document entitled *Copper Sources in Urban Runoff and Shoreline Activities: Information Update*. This report was prepared as part of North of Dumbarton Cu/Ni SSOs project funded through the CEP and finalized in November 2004.

The CEP also funded a follow-up project to prepare a reporting template and guidance on how the top priority stormwater CMS activities should be implemented and how the effectiveness of those activities should be assessed. The first source assessed was architectural copper in the CEP report entitled *Copper Management Strategy Development Resources, Element 1: Architectural Copper*. The report was reviewed at a Work Group meeting in December 2005. The CEP funded a follow-up report entitled *Copper Management Strategy Development Resources, Version 1* that addressed brake pads, copper pesticides and marine antifouling compounds. Other sources of copper in urban runoff are proposed to be addressed through existing permit requirements and public outreach.

The above information was used in developing the Bay-wide CMS that was adopted in the North of Dumbarton Copper SSO Basin Plan amendment (BPA) that deleted and replaced the above CAP/NAP requirements in the Basin Plan. The BPA changes will not be fully effective until the BPA is approved by the SWB, Office of Administrative Law (OAL) and USEPA. Once this has happened, the corresponding requirements in the stormwater and POTW NPDES permits will also need to be amended to delete the outdated requirements and include the new BPA bay-wide CMS requirements. This will likely occur as part of the MRP issuance and reissuance of the POTW NPDES permits, rather than as permit amendments.

Monitoring Activities

Watershed Monitoring

During FY 06-07, the Program continued to analyze water samples collected in Santa Clara creeks through the implementation of its Revised Multi-Year Plan. Water samples were collected as screening level indicators of water quality at a variety of creek sites draining urban and rural land use areas and analyzed for total recoverable copper and dissolved copper concentrations. As described in the Program's Revised Multi-Year Plan, grab samples were collected during two seasons (wet and dry).

In FY 06-07, total recoverable copper concentrations ranged from 0.65 to 3.6 ug/L in four samples collected from two creeks in Santa Clara County. At the same sites, dissolved copper concentrations ranged from 0.46 – 1.1ug/L.

Dissolved copper concentrations were adjusted for hardness and compared to copper water quality standards for freshwater described in the California Toxics Rule (CTR). Analytical results indicated that only none of the four samples exceeded the Continuous Concentration Criterion (CCC) for copper. A full description of methods, results and conclusions are presented in the Watershed Monitoring and Assessment Summary Report within Appendix C-2.

Brake Pad Partnership

The Brake Pad Partnership (BPP) is a multi-stakeholder effort to understand the environmental impacts of automobile brake pad wear debris (which contains copper). Manufacturers, regulators, stormwater management agencies (e.g., SCVURPPP) and environmentalists are working together to understand these impacts. BPP efforts are aimed at developing an approach for evaluating potential impacts of copper (from brake pad debris) affecting water quality in the South San Francisco Bay. Brake pad manufacturers have committed to adding this evaluation approach (to existing practices) for designing products that are safe for the environment while meeting performance requirements.

To understand the fate and transport of copper from automobile brake pad wear debris, the Program (through BASMAA) continued to financially support the BPP in conducting a set of interlinked laboratory, environmental monitoring and environmental modeling studies. The BPP efforts include the following three environmental modeling studies:

- Air Deposition Modeling—To predict how much brake pad wear debris is released and deposited in the study watershed (Castro Valley);
- Watershed Modeling—To estimate how much copper from the deposited wear debris washes into the storm drainage system and eventually reaches the waters of the South San Francisco Bay; and.
- Bay Modeling—To determine whether and, if so, to what extent copper from brake pad wear debris affects short- and long-term concentrations of copper in the Bay.

In support of these modeling efforts, the BPP conducted additional studies to develop accurate input data for the models. An air deposition monitoring effort provided data necessary for comparison with the air deposition model results. Stormwater monitoring data was collected to help calibrate and validate the watershed modeling. In addition, the BPP is conducting physical and chemical characterization analyses to determine model parameters specific to brake pad wear debris.

In FY 06-07, the BPP completed much of its work on air deposition monitoring; generation and characterization of a representative sample of brake pad wear debris; estimating the amount of copper released to the watershed from brake and non-brake sources; water quality monitoring; and watershed modeling. Available results were presented at a BPP stakeholder meeting on July 31, 2007 in Oakland. The status and/or findings of each project can be found at <http://www.suscon.org/brakepad/documents.asp>

PCBs and Dioxin Compounds Control Program (Provision C.9.e)

Provision C.9.e. of the Program's NPDES permit requires development of a control program to reduce or eliminate discharges of polychlorinated biphenyls (PCBs) and dioxin-like compounds

from urban runoff conveyance systems from controllable sources (if any). As part of the PCBs/Dioxins Control Program, monitoring activities were conducted by the Program during FY 06-07. In addition, PCBs/Dioxins related management activities are described.

Polychlorinated Biphenyls (PCBs)

The Water Board has placed high priority on addressing PCBs in the Bay and is currently developing a PCBs TMDL. The Water Board released a PCB TMDL staff report and proposed Basin Plan amendment late in June 2007 (*Total Maximum Daily Load for PCBs in San Francisco Bay, Proposed Basin Plan Amendment and Staff Report, June 22, 2007*). Program staff are reviewing these documents and assisting BASMAA to develop a comment letter to submit to the Water Board.

The Program has provided leadership to Bay Area stormwater management agencies in their efforts to assist the Bay PCBs TMDL. This included leading a regional study that characterized the distribution of PCBs concentrations in storm water conveyance sediments in Bay Area watersheds. The Program also performed PCBs case studies in selected areas where elevated concentrations of PCBs were found during the regional study and coordinated similar case studies by other Bay Area storm water management agencies. The case studies were aimed at identifying PCBs sources and controls. The Program also prepared work plans for the above regional and local field studies. The work plans included a preliminary list of known sites where PCBs were used, stored and/or released in Santa Clara County. To facilitate regional coordination, the Program led a work group of representatives from BASMAA and Water Board staff and provided a staff to represent BASMAA on the CEP PCBs workgroup.

The Program also completed a report on efforts to develop methods of controlling discharges of PCBs from Bay Area urban runoff conveyances. The study describes 1) past, current and planned efforts to identify PCBs control options in the Bay Area, 2) management practices currently implemented by Bay Area storm water management agencies that may reduce discharges of PCBs from urban runoff conveyances, and 3) potential additional PCBs storm water control options and some of their advantages, limitations and cost factors.

During FY 06-07, the Program continued to work with other Bay Area dischargers and Water Board staff through BASMAA, the CEP and the RMP to coordinate and plan activities related to PCBs and other pollutants of concern. Efforts included providing funding to these organizations, participating in selected stakeholder meetings, committees and work groups and, as appropriate, reviewing and commenting on relevant documents prepared by the CEP, RMP and Water Board staff. Program staff continued to represent BASMAA on the RMP TRC, RMP SPLWG and RMP CFWG. Specific projects related to PCBs are summarized below.

Taking Action for Clean Water

In November 2006, the State Water Resources Control Board awarded the San Francisco Estuary Project (SFEP) a Proposition 50 Coastal Nonpoint Source Pollution grant (Taking Action for Clean Water) that includes several tasks to further implementation of Bay Area Total Maximum Daily Loads (TMDLs). One of these tasks involves PCBs used in historic building materials and aims to help reduce PCB stormwater loads to San Francisco Bay.

The CEP has evaluated available data on sources of PCBs in urban runoff and found that one such source is PCB-containing historic building materials, specifically uncontained materials like sealants, caulking and paint (*Larry Walker Associates, TDC Environmental, and Ann Blake, PCB TMDL Implementation Plan Development, Prepared for CEP, May 2006*). When the

building materials fail or buildings are remodeled or demolished, PCBs are released onto the ground and can be washed off by urban runoff.

The Taking Action for Clean Water project is partnering with the Bay Area Stormwater Management Agencies Association (BASMAA) and its member cities to develop Bay Area-specific Best Management Practices (BMPs) to prevent release of PCBs from building materials into urban runoff during renovation, maintenance and demolition of structures. SFEP will coordinate development of the BMPs by completing trial implementation projects in cooperation with BASMAA and local municipalities. The San Francisco Estuary Institute (SFEI) will obtain Bay Area-specific information about the presence of PCBs in building materials, so that management actions can be targeted specifically to the structures most likely to contain PCBs that threaten water quality. During FY 06-07, Program staff helped develop the scope for the grant application and represented BASMAA during all project activities. In the future Program staff will continue to represent BASMAA during all phases of the project.

Multibox Bay PCBs Fate and Transport Model and Sediment Coring Program

This project is a multi-year program, building on model development efforts already underway, to construct a mechanistic model that will advance our understanding of pollutant behavior in the Estuary and provide a new tool for water quality management. The project goals include: 1) developing a better tool for predicting future pollutant concentrations and testing potential management actions; 2) clarifying the uncertainty of existing model predictions; 3) identifying key areas where fieldwork can reduce uncertainties; and 4) conducting key fieldwork, including sediment coring in the Bay to improve estimates of the PCB inventory and historic loads and tracer experiments to quantify flushing. During FY 06-07, the PCBs multi-box model was independently tested by Tetra Tech and additional testing was conducted by SFEI. A final report on the model is currently being developed and should be released in early FY 07-08.

In concert with Multi-box model development, the RMP/CEP embarked on a joint study in 2006 to collect and analyze 17 sediment cores from the Bay and adjacent wetlands. The study has three objectives: (1) provide a more comprehensive characterization of contamination with depth that can be used to assess future changes, (2) verify the historic loading of pollutants to the Bay and how those loads have changed in the last several decades, and (3) provide valuable data for parameterization and evaluation of the multi-box or other Bay models. The cores were collected in 2006 and have been segmented for radiodating using thorium, cesium and lead. The radiodating process should be completed by early FY 07-08. Depending on the date of the segment, the segments will then be analyzed for pesticides, PCBs, PBDEs, and mercury.

Dioxins

All segments of San Francisco Bay were listed as impaired by certain dioxin compounds in the 1998 and 2002 Clean Water Act Section 303(d) lists. The Water Board opposed the 1998 listing of dioxins in the Bay but was overruled by the USEPA. The 2002 303(d) list designates the TMDL priority for dioxins in the Bay as low, and a schedule for performing a TMDL is not included. The Program understands that the Water Board does not plan to perform a TMDL for dioxins in the Bay. A recent report prepared by the CEP (*Dioxins in San Francisco Bay: Conceptual Model/Impairment Assessment, January 2005*) provides a comprehensive discussion of issues related to dioxins in San Francisco Bay.

The Program has developed and implemented three work plans related to dioxins. In March 2002, the Program submitted an initial work plan. This work plan specified reviewing readily

available data on methods used to characterize dioxins in storm water runoff and surface waters and concentrations typically found in the Bay Area and other areas. The completed review revealed that dioxins have been found in urban runoff in the Bay Area and other locations, and in sediments in the Bay and other estuaries. It was concluded that existing data are not sufficient to characterize the distribution in urban runoff among Bay Area land uses or calculate loadings to the Bay. The second work plan was completed in March 2004 and described the Program's collaboration with other Bay area storm water management agencies to develop an introductory report on dioxins. The completed report emphasized issues related to urban runoff in the Bay area, including regulatory context, impacts, sources, pathways, review of relevant Bay Area, national and international studies, and qualitative review of potential storm water controls. The third work plan was completed in March 2004. It specified that Program Staff will track regional, state and federal efforts to address dioxins and encourage Co-permittees to track, understand, and participate in these programs, as appropriate. A memorandum documenting the results of this tracking was completed in FY 04-05.

During FY 05-06, Program staff surveyed the Co-permittees regarding dioxins pollution prevention actions they currently implement and any related formal policies, resolutions or ordinances already adopted. The survey revealed that Co-permittees currently implement a wide range of activities that may help prevent formation of dioxins. In particular, the survey revealed most Co-permittees are taking measures that may help address what are the potentially the largest contemporary sources of dioxins in the Bay Area: residential wood burning, diesel exhaust and use of the pesticide 2,4-D. Program staff also continued to track regional, state and federal efforts to address dioxins.

Dioxins Control Program - FY 06-07 Activities

During FY 06-07, Program staff prepared a fact sheet on dioxins, which may be downloaded from the SCVURPPP's web site. The fact sheet describes dioxins and how they are produced, the Bay Area regulatory background, potential sources of dioxins to the environment and stormwater runoff, and the Program's accomplishments in addressing dioxins.

Sediment Control Program (Provision C.9.f)

San Francisquito Creek Sediment TMDL

In response to a listing of impairment by sediment under section 303(d) of the Clean Water Act and a need to provide information for a TMDL assessment, two separate (but coordinated) projects have been developed. These projects are the San Francisquito Creek Watershed Analysis and Sediment Reduction Plan (Plan), administered by the San Francisquito Creek Joint Powers Authority (JPA); and the Aquatic Habitat Assessment and Limiting Factors Analysis (AHALFA), managed by the Santa Clara Valley Water District (SCVWD). The Plan fulfills Permit Provisions C.9.f.i and C.9.f.ii of the Program's NPDES permit.

The primary issues driving the TMDL are flooding and degradation of habitat, impacting steelhead trout and other threatened aquatic species. The approach adopted by the JPA and SCVWD in these projects is to assess factors limiting the threatened aquatic species, including but not confined to those related to excessive sedimentation caused by human land use activities. Project products are intended to produce information that will assist the Water Board to confirm or reject the validity of the sediment impairment listing and help identify other causes of impairment to aquatic species and their habitats in San Francisquito Creek.

There were two main objectives for developing the Sediment Reduction Plan. The first objective was to understand the erosion, transport and deposition of sediment in the San Francisquito Creek watershed, focusing on human-related activities that modify hydrology, alter erosion rates or trap sediment. The second objective was to review existing sediment management policies and practices and recommend management measures to effectively reduce erosion and sediment transport in the watershed. The specific tasks for this project are:

- 1) Historical Conditions Analysis: Analyze historical conditions in the San Francisquito watershed, particularly sediment supply, transport, and deposition as they relate to stream and water character;
- 2) Existing Conditions Analysis: Analyze land use, biological resources, stream management and maintenance and designated beneficial uses;
- 3) Watershed Sediment Analysis: Develop a rapid sediment budget for the watershed, detailing sediment sources, sediment sizes, storage and sediment yield;
- 4) Assessment of Existing Management Practices: Assess existing policies and regulations that provide erosion control or channel protection, identified deficiencies and recommended improvements; and
- 5) Watershed Analysis and Sediment Reduction Management Plan: Incorporate all analyses completed in previous tasks and makes recommendations for measures to manage erosion of the identified human-related sediment sources and estimate reduction of sediment load from these measures.

The Watershed Analysis and Sediment Reduction Management Plan (Final Report) was completed in May 2004. The sediment study was funded under a Proposition 13 grant and administered by the JPA. This report can be found at www.cityofpaloalto.org/jpa/references.html.

The *Aquatic Habitat Assessment and Limiting Factors Analysis* (AHALFA) is intended to characterize channel and habitat conditions with respect to factors that limit the steelhead population in the San Francisquito Creek watershed. Information for this analysis came both from direct data collection and analysis and from studies that have already been performed. Data collection and analysis evaluated stressors that limit: (1) aquatic habitat, (2) steelhead (*Oncorhynchus mykiss*), and (3) development of individuals in specific steelhead life history stages within the lower San Francisquito Creek watershed. The study area includes the lower mainstem of San Francisquito Creek and the Los Trancos Creek subwatershed within Santa Clara County.

The AHALFA Final Report was released on June 12, 2006. The study concluded the following:

1. Suitable winter refuge in pools and other habitats is the key limiting factor limiting smolt production within the study area. The primary cause for lack of overwintering habitat appears to be disconnection of upstream sources of material and loss of material due to hydraulic simplification of the watershed. Existing evidence suggests that overwintering habitat was likely to be historically a limiting factor for steelhead in the lower San Francisquito Creek watershed.
2. Juvenile summer rearing and spawning habitat was determined to be degraded in the study area; however increases in quality and quantity of these habitat features would not likely increase smolt production with commensurate increases in winter rearing habitat.
3. Steelhead outmigration success is limited by seasonal drying of the channel, which may be exacerbated when habitat connectivity is interrupted by passage impediments.

4. Limited available water temperature data suggests that temperatures are generally suitable for steelhead in Los Trancos Creek and unsuitable during the summer months in the San Francisquito Creek mainstem.

The Final Report identified key information needs and future studies to extend the temporal and geographic data sources; and to increase the certainty of the analysis. Some of the key recommendations include:

1. Extend the analysis into the upper reaches of the watershed in San Mateo County, with emphasis on the San Francisquito Creek mainstem, Bear Creek subwatershed and Corte Madera Creek subwatershed.
2. Document the location and carrying capacity of critical steelhead habitat for the entire watershed.
3. Conduct smolt outmigrant trapping and determine the timing and magnitude of flows necessary for downstream passage by smolts.
4. Monitor juvenile steelhead populations in established reaches once (fall) or twice (fall and spring) annually.

Additionally, the Water Board released its Preliminary TMDL Project Report for the watershed in July 2007. During FY 07-08, the Program will continue to follow and participate in the sediment-related activities within the San Francisquito watershed.

Upper Penitencia Creek Sediment Management Practices and Source Assessments

The Program developed a *Work Plan for Conducting a Watershed Analysis and Management Practice Assessment in Other Creeks Potentially Impaired by Sediment from Anthropogenic Activities* (Work Plan) in fulfillment of Permit Provision C.9.f.iii paragraph 2. The Work Plan identifies a two-phased approach to assess watersheds previously identified by the Program as high priority for watershed analysis due to the potential for anthropogenic sediment impairment.

Phase I includes conducting a Limiting Factors Analysis (LFA) and sediment management practices assessment. Phase II includes conducting a rapid sediment budget, which will only be conducted when the Phase I study results indicate that excessive sediment from anthropogenic sources is impacting beneficial uses in the watershed.

The Upper Penitencia Creek watershed was identified as a high priority watershed to conduct a watershed analysis focused on sediment. An LFA was initiated in the Upper Penitencia Creek watershed in FY 04-05. The final Upper Penitencia Creek LFA report was included within Appendix C-5 of the Program's FY 05-06 Annual Report.

Based on the results, conclusions and recommended next steps presented in LFA report the Program began conducting two projects in FY 06-07, a sediment management practices assessment and a sediment source assessment. The Upper Penitencia Creek watershed sediment management practices assessment is intended to meet the following three objectives:

1. Document current sediment management practices in the watershed;
2. Assess the effectiveness of these practices in preventing excess sediment reaching Upper Penitencia Creek and its tributaries; and,
3. Recommend improvements to existing practices and/or recommend new practices that are within or outside of the Program's jurisdictional boundaries.

The Upper Penitencia Creek sediment source assessment is deigned to:

1. Identify and locate sediment sources in the upper part of the Upper Penitencia Creek basin using repeat large-scale aerial photographs and limited field reconnaissance, building on previous studies where possible;
2. Characterize the apparent influence of human activities on sediment sources in the watershed;
3. Identify priority concerns and locations for controlling sediment supply and deposition that may impact juvenile steelhead overwintering habitat, with a focus on sources associated with urban runoff (i.e. roads);
4. Recommend general management actions to reduce sediment supply from high priority locations; and,
5. Provide the foundation for future analyses of sediment production, delivery, and yield, which can more thoroughly describe and potentially address sediment-related management issues in an effective and process-oriented manner.

Both assessment reports will be finalized in early FY 07-08 and included in the Program's FY 07-08 Annual Report. Completion of both reports will be coordinated through the Program's Watershed Analysis AHTG.

Saratoga Creek Water Body Assessment

Following Upper Penitencia Creek, Saratoga Creek (upstream of the San Jose Water Company diversion) is the next highest priority creek scheduled for investigation of potential sediment impairment due to anthropogenic activities. In FY 05-06, Program staff began conducting a water body assessment in Saratoga Creek to:

- Evaluate potential sediment impacts to fish/habitat;
- Evaluate Beneficial Use attainment; and,
- Identify data gaps and additional monitoring needs.

In FYs 05-06 and 06-07, the Program used the Unified Stream Assessment (USA) method (developed by the Center for Watershed Protection) on Saratoga Creek to evaluate instream and riparian corridor conditions and associated stressors. In addition, fish population surveys were conducted in fall 2005, spring 2006 and fall 2006 to assess the current population of cold water fisheries within the watershed.

An assessment report that summarize results, findings and recommendations based on all the Program's survey data for Saratoga Creek is currently in draft form and being reviewed by the Program's Watershed Analysis AHTG and the Water Board. After finalizing the report, the AHTG will provide recommended next steps to the Program's Management Committee. Depending on the results, next steps may include conducting a sediment management practices assessment and/or a sediment source assessment in FY 07-08 similar to Upper Penitencia Creek.

Trash Characterization and Management Activities

On November 14, 2001, the Water Board released the document entitled *Proposed Revisions to Section 303(d) List of Priorities for Development of Total Maximum Daily Loads for the San Francisco Bay Region* Report. This report states that "between now and the next 303(d) listing cycle, municipalities will be expected to assess trash impairments in their jurisdiction ...", Water

Board staff will review information concerning trash in the next listing cycle to determine whether specific water bodies warrant 303(d) listing. In a proactive response to the 303(d) Staff Report, the Program's Management Committee formed a Trash AHTG (first meeting on February 21, 2002). The Trash AHTG developed a Work Plan (submitted March 1, 2003) to identify a strategy for addressing trash problem areas that occur in or near urban streams and waterways of the Santa Clara Basin.

In Fiscal Years 03-04, 04-05 and 05-06, the Program assisted Co-permittees in completing the following Work Plan tasks: 1) document existing trash management practices implemented by municipalities and agencies within the Program's jurisdiction; 2) identify and map high priority trash problem areas and sources of trash in Santa Clara Basin watersheds; 3) develop a strategy to conduct trash evaluations in or near creeks; 4) sponsor a training workshop on how to use existing trash assessment tools (i.e., Water Board Rapid Trash Assessment Protocol and Keep America Beautiful (KAB) Litter Index); and 5) develop standardized reporting format for documenting and evaluating trash management and monitoring activities. Summaries of Program efforts to complete these tasks have been provided in previous Annual Reports.

Building on the existing Trash Work Plan, the SCVURPPP developed a *Trash Management and Effectiveness Assessment Strategy* in October 2006 that identifies three areas of focus:

1. Trash Problem Area and Source Identification;
2. Pilot Testing and Implementing Trash Control Measures; and,
3. Water Body and BMP Effectiveness Assessments.

The following paragraphs provide summaries of trash-related tasks conducted by the SCVURPPP in FY 06-07. Tasks are organized by the three focus areas listed above.

Trash Problem Area and Source Identification

This task is intended assist Co-permittees in identifying trash problem areas and sources that will allow the effective implementation of trash control measures. This task encompasses Program activities conducted in previous fiscal years and in FY 06-07.

Trash Problem Area Survey

Beginning on November 4, 2003, when Program staff distributed the memorandum entitled *Identification and Documentation of Known Trash Problem Areas*¹. The memorandum requested that Co-permittees document and compile relevant information regarding known trash problem areas within their jurisdictions. Co-permittee survey responses were submitted to Program staff in late December 2003. Program staff then compiled the trash survey information and converted the location descriptions into spatial coordinates using a Geographic Information System (GIS).

In May 2004, the trash problem area survey results were finalized in a *Trash Problem Area Survey Results Memorandum*. The problem areas survey results memo contains data from 14 out of 15 Co-permittees², including the location, reported ownership, trash source, information resource and relevant comments for 195 potential trash problem areas within SCVURPPP's jurisdiction. Sixty-four sites are located in creeks or in close proximity to a creek (i.e., banks);

¹ All SCVURPPP products referenced in this letter are available at www.scvurppp.org.

² Given community characteristics, the City of Los Altos Hills did not submit trash problem areas list.

and 131 sites are located in areas that were not in the creek (e.g., areas near dumpsters, freeway exit ramps, road sides, etc.). The Santa Clara Valley Water District reported 34 trash problem areas within its jurisdiction. The City of San Jose and Santa Clara County, Co-permittees with the largest jurisdictional areas, reported 30 and 24 trash problem areas, respectively. The highest number of trash problem areas was reported for the Guadalupe River and Coyote Creek watersheds with 41 and 35 sites, respectively. These watersheds also represent the largest watersheds in the Santa Clara Basin. Sunnyvale West, Baylands and San Francisquito Creek (within Santa Clara County) had the fewest number of sites with one, six and six, respectively.

Creek and Watershed Trash Assessments

During FY 04-05, Co-permittee staff and volunteers from watershed stakeholder groups conducted a total of 189 trash evaluations (146 using the KAB Litter Index and 43 trash using the Water Board Rapid Trash Assessment Protocol). A summary of the trash evaluation results was provided in the Program's *FY 04-05 Annual Report*.

In FY 05-06, the Program revised the Water Board's RTA Protocol (Version 7.0) to improve the effectiveness of the evaluation tool to better assess trash problem areas in urban streams. The revised Urban Rapid Trash Assessment (RTA) Protocol (Version 1.0) was implemented by Co-permittees for trash evaluations of creek sites. In FY 05-06, a total of 149 unique sites were assessed (128 KAB and 19 Urban RTA). In addition, the Program revised the format for reporting trash evaluation results to improve consistency of Co-permittee responses and to enhance the analysis of trash assessment data on a Program-wide basis.

In FY 06-07, Co-permittees conducted a total of 228 trash evaluations, including 168 trash evaluations using the KAB Litter Index (i.e., non-creek sites) and 60 trash evaluations using the Urban RTA Protocol (Version 1.0) (i.e., creek sites). *Table 1: Summary Results of FY 06-07 Trash Evaluations* (see Appendix C-5) provides scores (for both KAB and RTA trash evaluations) by watershed. A total of 164 unique sites were assessed. The KAB Litter Index was used at 114 sites and the Urban RTA Protocol at 39 sites. A combination of the KAB and Urban RTA Protocol was used at two sites.

Sixty-five sites were evaluated more than once (i.e., two to four times), typically during different seasonal time periods (i.e., late fall/winter and spring/ early summer). The re-assessed sites included 50 non-creek sites and 15 creek sites. Sixty-four percent of the trash evaluations were conducted in the Guadalupe River (n=57), San Tomas Aquino Creek (n=41), Calabazas Creek (n=23) and San Francisquito Creek (n=19) watersheds.

Evaluation scores are provided within the following tables provided with Appendix C-5:

- *Trash Problem Area Evaluations Results by Watershed*
- *Trash Problem Area Evaluations Results by Co-permittee and Watershed*
- *Trash Problem Area Evaluations Results by Assessment Tool*

The following results were observed during FY 06-07:

KAB Litter Index – Non-Creek Sites

The KAB Litter Index uses a four-point scoring system to estimate the presence of litter within a specific area. To ensure consistent KAB Litter Index scoring between Co-permittees, Co-permittee staff reviewed materials developed by Keep America Beautiful. These materials

included written descriptions (on how to score), photographs (which show conditions) and a training video (which detail how to conduct an evaluation). Several Co-permittees increased the resolution of the original KAB litter scale by assigning scores as fractions. The following describes the modified scoring system of the KAB Litter Index: 0 – 1.0 (“no litter”); 1.1 – 2.0 (“slightly littered”); 2.1 – 3.0 (“littered”); and 3.1 – 4.0 (“extremely littered”).

- Eighty-five percent of the sites were scored as “no litter” or “slightly littered”;
- Fifteen percent of the sites were scored as “littered”. Less than one percent were scored as “extremely littered”;
- Guadalupe River and San Tomas Aquino Creek watersheds had the greatest number of sites, thirty-six and twenty-nine respectively, that were scored as “no litter” or “slightly littered”;
- Guadalupe River and San Tomas Aquino Creek watersheds had the greatest number of sites, eleven and five, respectively, that were scored as “littered”; and
- Only one site in the entire Program’s jurisdiction was considered “extremely littered”. It was observed in the Guadalupe River watershed. (**Note:** Guadalupe River is the second largest watershed in the Santa Clara Basin and contained the greatest number of sites (n=38) and evaluations (n=57) compared to all other watersheds. As a result, Guadalupe watershed exhibited a wide range of trash conditions).

The majority of trash problem areas in non-creek areas occurred adjacent to roadways (32%), commercial areas (24%) and residential homes (13%) and apartments (8%). Ninety-two percent of the most prevalent trash items reported by Co-permittees during KAB evaluations (n=313) were plastic/Styrofoam (64%) and biodegradable/paper (28%). Approximately six percent of the remaining trash items observed during these evaluations were a combination of glass and miscellaneous items (includes cigarette butts) (**Note:** the actual number of trash items was not recorded). Sixty-eight percent of the suspected trash sources reported by Co-permittees during KAB evaluations (n=237) included litter from both vehicular traffic (42%) and pedestrians (26%). Approximately twenty-six percent of the remaining trash sources reported was from a combination of litter at commercial areas, illegal dumping, litter at restaurants and litter at schools.

During FY 06-07, a fewer number of trash evaluations were conducted in non-creek areas (n=168) compared to FY 05-06 (n=208). Trash scores were very similar for both years with seventy-eight (FY 05-06) and eighty-five percent (FY 06-07) of all sites scored as “no litter” or “slightly littered”. Similar to FY 05-06, there was no consistent pattern in changes of trash condition over time at non-creek sites. In addition, KAB assessment results did not indicate any spatial relationships between littered non-creek sites and creek sites with poor/marginal trash condition. The KAB assessment results were not conclusive for identifying and prioritizing trash problem areas that are sources of litter in the creeks.

SCVURPPP Urban Rapid Trash Assessment (RTA) – Creek Sites

The Urban Rapid Trash Assessment consists of six assessment parameters (with narrative descriptions) that qualitatively rate the trash condition of each parameter on a scale of 0 – 120. The range of scores for each parameter is divided into four categories: “poor”, “marginal”, “suboptimal” and “optimal”. The total site score represents the summation of the six individual parameter scores. For the purposes of this analysis, the total site score was divided into the same four categories: 0 – 30 (“poor”); 31 – 60 (“marginal”); 61-90 (“suboptimal”); and (91 – 120: “optimal”).

- Seventy-two percent of the sites were scored as “optimal” (n=21) or “suboptimal” (n=22);
- Twenty-six percent of the sites were scored as “marginal” (n=16); two percent of the sites were scored as “poor” (n=1);

The majority of trash problem areas in creek areas occurred adjacent to roadways (25%), park/trail land uses (23%) and school (16%). Ninety-one percent of the most prevalent trash items reported by Co-permittees (n=146) during Urban RTA evaluations were plastic/Styrofoam (81%) and biodegradable/paper (10%) (**Note:** trash items are classified and enumerated for a 100 foot section of stream). Over nine percent of the remaining trash items reported, in order of most frequent, were a combination of glass, toxic items, construction materials and metal. Over seventy-four percent of the suspected trash sources reported by Co-permittees (n=109) during Urban RTA evaluations included litter from pedestrians (27%); upstream/stormdrain catchment (19%); and litter from vehicular traffic (14%) and homeless encampments (14%). Approximately twenty-six percent of the remaining trash sources reported were from a combination of litter at schools, recreational areas, illegal dumping, and dumpsters.

During FY 06-07, a larger number of trash evaluations were conducted in creeks (n=60) compared to FY 05-06 (n=27). Overall trash scores for creek sites evaluated in FY 06-07 were generally lower than creek sites evaluated in FY 05-06. Seventy-two percent of the creek sites evaluated in FY 06-07 were scored “optimal” or suboptimal”, while ninety-five percent of the creek sites evaluated in FY 05-06 were scored “optimal” or suboptimal”. The lower overall scores in FY 06-07 may have been the result of fewer large storms resulting in reduced stream flows during winter and spring season of FY 06-07. This may have resulted in less flushing of litter and debris out of previously identified trash problem areas.

Conclusions

KAB trash evaluation results for non-creek sites indicate that a majority of the trash problem areas have no or limited amounts of litter (i.e., eighty-five percent). Preliminary analysis of sites evaluated more than once indicated that there was no consistent pattern in changes of trash condition over time. In addition, KAB site locations and assessment scores did not appear to have any spatial correlation with location and severity of trash problem areas in creeks. As a result, current implementation of the KAB assessment tool does not appear to be useful approach for identifying potential sources of litter in creeks.

Urban Rapid Trash Assessment evaluation results for creek sites indicate that the majority of the trash problem areas were scored as “optimal” or “suboptimal” (i.e., seventy-two percent). A majority of these sites occurred adjacent to roadways, park/trail land uses and school. These sites contained primarily plastic/Styrofoam and biodegradable/paper, which are highly mobile litter easily transported by wind and water. Sources of trash were reported to be primarily from littering by pedestrians; upstream/stormdrain catchments, litter from vehicular traffic and homeless encampments. There were no apparent spatial patterns for trash conditions in creeks (i.e., optimal and suboptimal sites were located in upper, middle and lower reaches of watersheds). [

Trash Sources and Pathways Conceptual Model

To better define potential trash sources in urban creeks and transport processes, the SCVURPPP developed a simple conceptual model in FY 06-07. Source and pathway categories described are based on urban creek trash assessments in Santa Clara County and local agency staff knowledge of how trash is deposited and transported to local waterways. The conceptual model identifies four distinct source categories for trash to urban creeks: 1) Pedestrians, 2)

Vehicles, 3) Inadequate Waste Container Management, and 4) Illegal Dumping. Trash from source categories can potentially enter urban creeks by four major transport pathways: a) Stormwater Conveyance Systems, b) Wind Transport, c) Direct Disposal into a Creek, and 4) Downstream Transport. The conceptual model is presented in Appendix C-6.

Prioritizing Trash Source Areas

In addition to the Trash Problem Area Survey finalized in 2004 and the Conceptual Model completed in FY 06-07, the SCVURPPP began a process which may assist Co-permittees in prioritizing watershed areas based on the probability that they are sources of trash to creeks in the Santa Clara Basin. The process is intended to assist Co-permittees in identifying the location of optimal creek assessment sites to detect trends in trash impacts to creeks, and help identify optimal watershed areas where trash control measures could be optimized or implemented in the future. The initial approach selected variables and assigned associated criteria that could be modeled in a GIS. The output would be a map of stormwater catchments that are predicted to be sources of trash. Once specific catchments are identified, ground-truthing may occur to valid the model predictions or refine the parameters/criteria initially used. The project was still underway at the time this Annual Report was completed, so no data are included at this time. A project summary will be completed in FY 07-08 and submitted as part of the Program's FY 07-08 Annual Report.

Pilot Testing and Implementing Trash Control Measures

The second of the four main areas of focus included in the trash strategy is the selection and implementation of appropriate control measures at high priority problem areas. This includes developing a better understanding of potential trash control measures, and beginning the process of implementing structural treatment controls as part of a trash pilot demonstration project. The following are summaries of two tasks conducted in FY 06-07 - Trash Control Measures Toolbox and Pilot Demonstration Project.

Trash Control Measures Toolbox

To gain a better understanding of the best possible treatment and institutional BMPs, a thorough review of literature from government, academic, and commercial entities was conducted by Program staff in FY 06-07. This information was bolstered by discussions with municipal employees that operate trash control measures and with representatives who sell trash control devices. The results of the literature review are presented in 12 technical information sheets which makeup a large portion of the Trash Control Measures Toolbox.

The toolbox is intended to assist stormwater managers, municipal officials, and other stakeholders in understanding what options are available for controlling and capturing trash within the storm drain conveyance system and the urban landscape. Additional information on potential trash impacts on water quality and beneficial uses, and SCVURPPP creek assessments and characterizations is also provided.

Technical information sheets were developed for the following five categories of structural treatment control devices: 1) Catch Basin Inserts, 2) Netting Devices, 3) Hydrodynamic Separators, 4) Racks and Screens, and 5) Litter Booms. Each technical information sheet provides information related to the description/design, applicability/siting requirements, demonstrated performance and/or effectiveness, maintenance requirements, predicted or known costs (capital and operation and maintenance), and a brief overview of reported advantages and disadvantages.

The technical information sheets on institutional controls provide a broad overview of various practices/strategies that have been used to prevent trash to, or remove trash from water bodies. Sheets were developed for the following seven institutional controls: 1) Enhanced Street Sweeping, 2) Storm Drain Signage/Stenciling, 3) Education and Outreach, 4) Volunteer Cleanup Efforts, 5) Improved Trash Bin/Container Management, 6) Anti-littering/Dumping Enforcement, and 7) Source Control through Official Bans/Prohibitions and Legislation. Each technical information sheet provides information related to the description/design, performance and/or effectiveness, predicted or known costs (capital and operation and maintenance), and a brief overview of reported advantages and disadvantages.

The draft version of the toolbox is currently being reviewed by the Trash AHTG and will be publicly available in early FY 07-08 via the Program's website www.scvurppp.org.

Pilot Demonstration of Trash Treatment Controls

In accordance with the Program's FY 06-07 Work Plan, SCVURPPP CO-permittees began to implement pilot trash demonstration projects in FY 06-07. The demonstration projects focus on testing the effectiveness and evaluating the costs of implementing stormwater treatment controls designed to prevent trash from entering Santa Clara Basin creeks and Lower South San Francisco Bay. Co-permittees that have initially agreed to conduct demonstration projects include the City of San Jose, City of Sunnyvale, City of Palo Alto and the Santa Clara Valley Water District. Demonstration projects may include the implementation of catch basin inserts, litter booms in creeks, and pump station redesign elements beginning in Fall 2007. Study designs are currently in early development stages and are therefore not included in this Annual Report. Additional information will be available on the Program's website in FY 07-08 and included in the FY 07-08 Annual Report.

Water Body and BMP Effectiveness Assessments

Assessing the condition of urban creeks (as related to trash) and evaluating the effectiveness of control measure implementation over time is the third focus area identified in the trash strategy. This element is currently scheduled to be completed in FY 07-08 in concert with the implementation of pilot demonstration projects.

Polycyclic Aromatic Hydrocarbons (PAHs)

On July 20, 2006, the RMP held a workshop on the effects of PAHs in San Francisco Bay Sediments. The purpose of the meeting was to reach a common understanding of the state of knowledge regarding the concentration of PAH in sediments and potential effects to estuarine/marine fishes. The RMP invited scientists who address these issues nationally and locally to summarize the status of what we know about sources, fate, and effects of PAH and management strategies for their assessment and control. Finally, the RMP convened a panel of the same experts to address specific questions posed by the management and user community and suggest ways in which the existing assessment of PAH could be improved.

The expert panelists agreed that sediment testing using chemical and biological methods outlined in the USEPA/USACE national testing manuals allow scientists at the management agencies to assess the risk of sediments contaminated with PAH. The panelists also suggested ways in which managers could assess the overall status of the Bay in regards to these issues through the monitoring of the Bay conducted by the RMP.

In FY 2007-2008, there will be a follow-up to this meeting that will specifically allow for more discussion by any and all interested parties. This workshop should be seen as a first step in that process.

Summary of Co-Permittee Street Sweeping Results

A summary of street sweeping activities conducted by Co-permittees is provided within the table entitled *Summary of Co-permittee Street Sweeping Activities- FY 2006-2007* (see Appendix C-7). During FY 06-07, Co-permittees swept approximately 193,110 miles of paved streets and removed approximately 95,066 yd³ or 61,745 tons of material³. Approximately 8,229 yd³ of leaf litter was removed⁴ by Co-permittees who have leaf removal programs other than routine street sweeping. In addition, approximately 133,020 tons of yard waste (which includes large amounts of leaves) was routinely collected by Co-permittees. As a result, yard waste pick-up programs are keeping large amounts of leaves out of Co-permittee storm drain systems.

Evaluation of Effectiveness

One way to measure street sweeping effectiveness is to determine what solids and associated pollutants are collected within street sweeping debris. A typical unit of measure is the total volume of the pollutant removed by the sweeper relative to the curb length swept (e.g., yd³/curb mile). This unit is typically referred as the removal rate. During FY 06-07, the average Co-permittee removal rate was 0.49 yd³/curb mile (see Appendix C-7). The Co-permittee removal rate ranged from 0.21 yd³/curb mile (City of Los Altos) to 0.73 yd³/curb mile (City of Palo Alto). During FY 05-06, the average Co-permittee removal rate was 0.41 yd³/curb mile. The effectiveness of street sweeping depends upon a number of factors including accumulation rates of pollutants, the relationship between rainfall and sweeping frequencies, particle size, pavement condition and automobile parking controls⁵.

Many studies have shown that street sweeping removes significant quantities of dirt and debris from street surfaces⁶. However, results also demonstrate that the coefficient of variation of copper values and other metals (e.g., lead and zinc) in street sweeping debris is quite high⁷. To illustrate the effectiveness of street sweeping activities for pollutant removal, Program staff estimated the mean pollutant reduction for the following four metals: copper, nickel, lead and zinc. These estimates are provided within the tables entitled *Summary of Co-permittee Street Sweeping Activities and estimated Mean Pollutant Load Reduction for Copper and Nickel- FY 2006- 2007* and *Summary of Co-permittee Street Sweeping Activities and estimated Mean Pollutant Load Reduction for Lead and Zinc- FY 2006- 2007*. Both tables are provided within Appendix C-7. To determine the estimated pollutant load reduction (in pounds), the volume of

³ To determine the total volume of material removed in tons, it is necessary to convert cubic yards to tons. It is estimated that the average density of street sweeping material is 1,299 pounds per cubic yard (0.6495 tons per cubic yard) (Source: EOA, Inc., October 1996, Estimation of Copper Collected Through Street Sweeping Efforts. Prepared for San Mateo Countywide Stormwater Pollution Prevention Program). A value of 61,745 tons is calculated when 95,066 cubic yards is converted over to tons (95,066 cubic yards * .6495 tons/cubic yard= 61,745 tons).

⁴ An additional 1,957 tons of leaf litter was collected by the City of Palo Alto. However, this figure is a combined figure that included the weight of the material collected from street sweeping plus the leaves collected by our autumn leaf pushing and pickup program. Since all of the material (both street sweeping debris and leaves gathered by leaf pusher trucks) is combined and hauled to the landfill in garbage compactor trucks, there is no way to provide a separate figure for leaf removal.

⁵ Source: Woodward Clyde Consultants, December 1994. *Street Sweeping Literature Review/Storm Inlet Modification*, Prepared for Alameda County Urban Runoff Clean Water Program.

⁶ Source: Sartor, J. and G. Boyd, 1972. *Water Pollution Aspects of Street Surface Contaminants*. Prepared for United States Environmental Protection Agency, Washington, DC.

⁷ Source: EOA, Inc, October 1996. *Estimation of Copper Collected Through Street Sweeping Efforts*: Final Report. Prepared for San Mateo Countywide Stormwater Pollution Prevention Program.

material collected (in cubic yards) for each Co-permittee land use type (i.e., residential, commercial and industrial) was determined. This value was then multiplied by the mean concentration of trace metal content for street sweeping samples collected in the study entitled *Chemical and Physical Characteristics of Street Sweeping Sediments in Tampa, Florida, May 1999* and converted over to pounds of pollutant removed. These mean concentration values and the algorithm used to calculate the pounds of pollutant removed are provided within the tables. The estimated mean pollutant load reduction values for each land use type were summed. During FY 06-07, it is estimated that Co-permittees street sweeping activities resulted in the following pollutant load reductions for copper, nickel, lead and zinc:

Land Use Type	Estimated Mean Pollutant Load Reduction (Pounds)			
	Copper	Nickel	Lead	Zinc
Residential	1361	2690	2536	3413
Commercial	512	1014	2447	1734
Industrial	308	60	289	237
Total	2181	3764	5271	5384

It is important to note that there is uncertainty with these estimates since certain assumptions were made regarding the exact volume of material collected from a particular land use type.

EVALUATION OF EFFECTIVENESS

The success (i.e., effectiveness) of a stormwater management program can be measured using many different assessment methods. Effectiveness assessment is defined as the process that managers use to evaluate whether their programs are resulting in desired outcomes, and whether these outcomes are being achieved efficiently and cost-effectively. The specific approach to be used in assessing effectiveness depends on a variety of factors including the type of program element or activity being evaluated and the stage of program development (i.e., planning, implementation, completion). Effectiveness assessments fall into two general categories:

- **Implementation Assessment** - Provides managers feedback on the effectiveness of their programs in achieving targeted objectives. This type of assessment is essential in determining whether priority sources of pollution are being effectively addressed. Implementation assessment may include any of three levels of analysis: the overall program, the elements that comprise the program (construction sources, municipal sources, etc.), or the specific activities that are conducted within these program elements. These may range in complexity from simple activities (e.g., verifying the completion of activities) to more sophisticated techniques (e.g., assessing the probable or actual locations of these activities and the significance of their spatial distribution).
- **Water Quality Assessment** - is the use of sampling data and related information to evaluate the condition of non-stormwater or stormwater discharges and the water bodies that receive these discharges. This can include a variety of chemical, biological, and

physical parameters or outcomes. In instances where water quality assessment is used to draw conclusions about overall program effectiveness, results are usually very general and require extended periods of analysis.

Ideally, the two types of assessments should be linked together to create an integrated assessment, which is process of evaluating whether program implementation is resulting in the protection or improvement of water quality. In this process, relationships between program activities and water quality improvements are explored and refined. Due to the number and variety of BMPs and control programs being implemented at any given time, and because data are limited, establishing these relationships is difficult. Efforts to date often include speculative or hypothetical exercises aimed at better understanding likely program outcomes and potential relationships to water quality. Although costly and difficult to develop, quantitative “cause and effect” relationships will increasingly be sought in the future.

Over time, correlating water quality improvement to programmatic results will assist the Program in identifying the most expedient and cost-effective approaches to planning and assessing their programs. In the interim, the effectiveness of Program monitoring and assessment activities will continue to be assessed using an implementation assessment approach (i.e., were project/program objectives met). In concert with implementation assessments, the collection of data from receiving water bodies continues to inform us about the condition of water bodies in the Santa Clara Valley and allows resources to be focused on the most pressing problems. Conducting both implementation and water quality assessments are necessary steps toward establishing a sound regulatory basis for locally based watershed management described in Section 5.

Effectiveness of FY 06-07 Monitoring and Assessment Activities

In FY 06-07, the Program effectively conducted all tasks stated in its FY 06-07 Monitoring Program and Watershed Management Measures Work Plan. Monitoring and assessment activities were implemented through a variety of programs and projects which include the following: 1) baseline water quality monitoring described in the Program’s Annual Monitoring Plan and Watershed Management Measures Work Plan; 2) regional collaborative efforts (e.g. RMP); and 3) active participation in TMDL development. In addition, the Program continued to address the following monitoring program objectives (as stated in the Program’s NPDES Permit): (1) characterization of representative drainage areas and stormwater discharges; (2) assessment of existing or potential adverse impacts on beneficial uses caused by pollutants of concern in stormwater discharges; (3) identification of potential sources of pollutants of concern found in stormwater; and (4) evaluation of effectiveness of representative stormwater pollution prevention of control measures. The following paragraphs briefly describe the effectiveness of monitoring activities described in this Annual Report in addressing these objectives.

1) Characterization of Representative Drainage Areas and Stormwater Discharges

- Prioritizing Trash Source Areas - In FY 06-07, the SCVURPPP began a process which may assist Co-permittees in characterizing watershed areas based on the probability that they are sources of trash to creeks in the Santa Clara Basin. The process is intended to assist Co-permittees in identifying the location of optimal creek assessment sites to detect trends in trash impacts to creeks, and help identify optimal watershed areas where trash control measures could be optimized or implemented in the future.
- Zone 4 – Line A Loading Study – Through funding from the Program and other

dischargers, field work was conducted by RMP staff to estimate the loading of sediment-associated pollutants from this small industrialized watershed in Hayward. This data collection contributes to a long term data collection efforts equipped to assess trends in POC loads from local watersheds to San Francisco Bay. In FY 06-07, Program staff were heavily involved in the selection of site and reviewed and commented on the study design.

2) *Assessment of Existing or Potential Adverse Impacts on Beneficial Uses Caused by Pollutants of Concern in Stormwater Discharges*

- *Receiving Water Monitoring* – SCVURPPP water quality monitoring and assessments continue to yield baseline information on the condition of water bodies in the Santa Clara Basin. Potential impacts to beneficial uses are identified in the Summary Assessment Report (Appendix C-2) and the Pilot Sediment Quality Triad (Appendix C-3). Recommended next steps are also outlined to better define the potential issues or management actions that can be implemented.
- *Saratoga Creek Water Body Assessment* – The Program made progress in analyzing two years of screening level monitoring data collected during FY 04-05 and FY 05-06 in the Saratoga Creek watershed. SCVURPPP monitoring data was evaluated with other available data sources to evaluate the status and extent of aquatic life uses in the watershed. The study also assessed the potential effects of excessive sediment deposition on the existing trout population and aquatic habitat. It is scheduled for completion in FY 07-08.
- *Trash Assessment Activities* – During FY 05-06, Co-permittees conducted a third year of trash evaluations at a subset of trash problem areas to establish baseline levels of trash. During trash evaluations, Co-permittee staff, where feasible, identified potential management actions to address trash problem areas (e.g., educational outreach to businesses and schools). During FY 07-08, a trash effectiveness assessment plan will be developed. The plan will likely include water quality (creek evaluations conducted at selected locations) and implementation assessments that will be conducted over time to determine the effectiveness of both existing and planned trash management actions.

3) *Identification of Potential Sources of Pollutants of Concern Found in Stormwater*

- *Upper Penitencia Creek Sediment Source Assessment* – The Upper Penitencia Creek sediment source assessment successfully identified sediment sources in the upper part of the Upper Penitencia Creek basin, and recommended general management actions to reduce sediment supply from high priority locations. The assessment is currently in draft form and will be completed early FY 07-08. It is intended to provide the foundation for future analyses of sediment production, delivery, and yield, which can more thoroughly describe and potentially address sediment-related management issues in an effective and process-oriented manner.
- *Trash Sources and Pathways Conceptual Model* – Based on initial comments, the conceptual model was an effective way to illustrate and define distinct trash sources and pathways to creek. Additionally, it serves as an effective tool to: 1) develop consistent terminology for effective communication between Co-permittees, regulatory agencies and other stakeholders; 2) continue to build conceptual understanding of trash source types present in watersheds and how these sources enter creeks and waterways; and,

3) determine the most optimal and cost effective control points to implement institutional and/or treatment controls.

- Urban Runoff BMP Evaluation for Pollutants of Concern – In FY 04-05, SFEI was awarded a Proposition 13 grant to evaluate the effectiveness BMPs in reducing POCs in urban runoff. During FY 06-07, BASMAA member agencies (including SCVURPPP) played an active role in developing studies conducted under the project and participated in technical advisory committee meetings. Results from the project will likely assist the Program in further understanding sources for POCs in urban runoff, specifically mercury and PCBs.

4) *Evaluation of Effectiveness of Stormwater Pollution Prevention and Control Measures*

- Urban Runoff BMP Evaluation for Pollutants of Concern – In FY 04-05, SFEI was awarded a Proposition 13 grant to evaluate the effectiveness BMPs in reducing POCs in urban runoff. During FY 06-07, BASMAA member agencies (including SCVURPPP) played an active role in developing studies conducted under the project and participated in technical advisory committee meetings. Results from the project will likely assist the Program in further evaluation of the effectiveness of control measures for POCs, specifically mercury and PCBs.
- Changes in Trash Evaluation Results - Changes in Urban RTA scores at 24 creek sites assessed during multiple years were evaluated. Urban RTA scores indicate improvement in 67% (n=16), reduction in 29% (n=7), and no change in 4% (n=1) of sites assessed in multiple years. Seven sites had higher Urban RTA scores during the second assessment that resulted in changes in ranking from marginal to suboptimal or optimal, while only one site changed from marginal to poor. Trash removal conducted during the initial Urban RTAs and management actions put into place between assessments may have influenced the increase in Urban RTA scores (i.e., better condition) during subsequent evaluation. However, it is difficult to evaluate trends in site condition without more data since seasonal and interannual variability of trash levels for these sites is currently unknown.

**Table 4-1
Status of FY 2006-2007 Monitoring Activities¹**

Title/Subtitle	Category/ Monitoring Priority (MP) ² / Permit Provision	Origin	Capsule Scope	SCVURPPP Participation	Product(s) ³	Status Schedule
FY 06-07 Receiving Waters Monitoring and Assessment	Permit Provision C.7(c)	Permit	Conduct water/sediment quality monitoring and biological and physical habitat assessment activities in Santa Clara Basin watersheds to meet Program and Permit monitoring objectives.	Conducted by SCVURPPP	<i>Watershed Monitoring and Assessment Summary Report: 2002-2007^{4a,b}</i> <i>Pilot Sediment Quality Triad (SQT) Report – Coyote Creek</i>	Complete-9/15/07 Complete-9/15/07
FY 07-08 Annual Monitoring Program Work Plan	Permit Provision C.7(c)	Permit	Develop an annual monitoring plan that identifies Program monitoring activities in Santa Clara Basin watersheds that will be implemented in FY 07-08.	Developed by SCVURPPP	<i>FY 07-08 Annual Monitoring Plan and Watershed Management Measures Work Plan^{4b}</i>	Completed-3/1/07

¹ Projects reviewed and approved by Budget Ad Hoc Table Group for inclusion in Work Plan.

² Monitoring Priorities (updated at Monitoring AHTG meeting November 8, 1999):

- 1) New projects needed to implement the results, and achieve the goals, of current projects.
- 2) New projects that implement continuous improvement items identified through the annual review process.
- 3) Projects that support the Santa Clara Basin Watershed Management Initiative in one of the following ways:
 - a) Investigate Beneficial Uses and Causes of Impairment (including field work)
 - b) Review and Compile Environmental Data and Make it Accessible
 - c) Develop Strategies for Controlling Impacts of Land Use on Beneficial Uses
 - d) Facilitate and Support WMI Subgroups (including coordination with other agencies)
- 4) Projects identified through participation in regional monitoring collaborative efforts, including the Regional Monitoring Program and BASMAA

³ Refer to Appendix C-1 for additional details

⁴ a) Provided within *FY 06-07 Annual Report*

b) Provided on Program's website (www.scvurppp.org)

**Table 4-1
Status of FY 2006-2007 Monitoring Activities, continued**

Title/Subtitle	Category/ Monitoring Priority (MP) ² / Permit Provision	Origin	Capsule Scope	SCVURPPP Participation	Product(s) ³	Status Schedule
Receiving Waters Monitoring Quality Assurance Project Plan (QAPP)	MP#2	RWQCB Review of Program's Monitoring Program	Develop and implement a quality assurance and control plan for the SCVURPPP Multi-Year Receiving Waters Monitoring Program.	Developed by SCVURPPP	Draft QAPP	Draft (on hold until MRP monitoring requirements are finalized)
Regional Monitoring Program (RMP) for Water Quality in the San Francisco Estuary	MP #2, Permit Provision C.7(b)	Permit	Provide water quality information needed to manage the Estuary effectively.	Financial contribution and active participation in Committees by Program staff	2006 <i>Pulse of the Estuary</i> , various other technical reports (see pollutant specific sections below)	Completed as needed
Clean Estuary Partnership (CEP)	MP #4		Assist in developing sound science, adaptive management, and public collaboration needed to develop and implement technically valid and cost-effective strategies that result in identifiable, sustainable water quality improvements for the Estuary.	Financial contribution and active participation in Committees by Program staff	Various technical reports (see pollutant specific sections below)	Completed as needed
BASMAA Monitoring Committee	MP #4		Coordinate monitoring activities conducted by the Bay area urban runoff management programs.	Active participation in Committee by Program staff	SCVURPPP Summaries	Completed as needed

**Table 4-1
Status of FY 2006-2007 Monitoring Activities, continued**

Title/Subtitle	Category/ Monitoring Priority (MP) ² / Permit Provision	Origin	Capsule Scope	SCVURPPP Participation	Product(s) ³	Status Schedule
<p>Mercury-related Monitoring Activities</p> <ul style="list-style-type: none"> • <i>SCVURPPP Receiving Waters Monitoring</i> • <i>Regional Stormwater Monitoring and Urban BMP Evaluation (SFEI)</i> • <i>Mercury Loadings from the Sacramento and San Joaquin Rivers (RMP)</i> • <i>Guadalupe River Pollutant Loading Study (RMP)</i> • <i>Guadalupe River TMDL for Mercury (SCBWWI)</i> • Zone 4 – Line A Pollutant Loading Study 	Permit Provision C.9(c)	Permit	<p>Measure water column mercury concentrations in Santa Clara Basin creeks.</p> <p>Through the completion of a variety of tasks, provide direction to BASMAA and the Water Board on how to apply limited resources to meeting TMDL goals.</p> <p>Develop annual loading estimates of mercury from the Sacramento and San Joaquin Rivers to the San Francisco Bay</p> <p>Develop annual loading estimates of mercury from the Guadalupe River to the San Francisco Bay.</p> <p>Participate in the development of the Guadalupe River Watershed TMDL for Mercury by attending meetings and reviewing technical results and reports.</p> <p>Develop annual loading estimates of mercury and PCBs from a small industrialized watershed (Hayward) to the San Francisco Bay.</p>	<p>Conducted by SCVURPPP</p> <p>Active participation by Program staff</p> <p>Financial contribution and active participation by Program staff</p> <p>Financial contribution and active participation by Program staff</p> <p>Active participation by Program staff</p> <p>Financial contribution and active participation by Program staff</p>	<p><i>Watershed Monitoring and Assessment Summary Report: 2002-2007^{4a,b}</i></p> <p>SCVURPPP meeting summaries and SFEI deliverables</p> <p>See http://www.sfei.org</p> <p>See http://www.sfei.org</p> <p>SCVURPPP meeting summaries</p> <p>See http://www.sfei.org</p>	<p>Complete-9/15/07</p> <p>Scheduled for completion in FY 07-08</p> <p>On-going</p> <p>On-going</p> <p>Completed as needed</p> <p>On-going</p>

**Table 4-1
Status of FY 2006-2007 Monitoring Activities, continued**

Title/Subtitle	Category/ Monitoring Priority (MP) ² / Permit Provision	Origin	Capsule Scope	SCVURPPP Participation	Product(s) ³	Status Schedule
Pesticide-related Monitoring Activities <ul style="list-style-type: none"> • SCVURPPP Receiving Waters Monitoring 	Permit Provision C.9(d)	Permit	Measure water column organophosphate pesticide concentrations and toxicity in Santa Clara Basin creeks.	Conducted by SCVURPPP	<i>Watershed Monitoring and Assessment Summary Report: 2002-2007^{4a,b}</i>	Complete- 9/15/07
Control Program for Copper and Nickel	Permit Provision C.9.a & b	Permit	Review of the Copper Action Plan and Nickel Action Plan Conduct environmental monitoring via Multi-Year Monitoring Plan Provide funding and technical participation to the Brake Pad Partners (BPP). Review technical results and reports.	Conducted by SCVURPPP Financial contribution	<i>Copper and Nickel Action Plan FY 06-07 Accomplishments and FY 07-08 Work Plan</i> <i>Watershed Monitoring and Assessment Summary Report: 2002-2007^{4a,b}</i> See http://www.suscon.org/brakepad/index.asp	Complete- 9/15/07 Complete- 9/15/07 On-going
PCBs and Dioxin Compounds Control Program <ul style="list-style-type: none"> • <i>Taking Action For Clean Water (Proposition 50)</i> 	Permit Provision C.9(e)	Permit	Assessing the concentrations of PCBs used in historic building materials to potentially help reduce PCB stormwater loads to San Francisco Bay.	Active participation by Program staff	<i>SCVURPPP Summaries</i>	On-going Completed- 7/05

**Table 4-1
Status of FY 2006-2007 Monitoring Activities, continued**

Title/Subtitle	Category/ Monitoring Priority (MP) ² / Permit Provision	Origin	Capsule Scope	SCVURPPP Participation	Product(s) ³	Status Schedule
<ul style="list-style-type: none"> • <i>Multibox Bay PCBs Fate and Transport Model and Sediment Coring Program(CEP/RMP)</i> • <i>Dioxins Fact Sheet</i> 			<p>Developing a better tool for predicting future pollutant concentrations and testing potential management actions, 2) clarifying the uncertainty of existing model predictions, 3) identifying key areas where fieldwork can reduce uncertainties, and 4) conducting key fieldwork, including sediment coring in the Bay to improve estimates of the PCB inventory and historic loads and tracer experiments to quantify flushing.</p> <p>Describe dioxins, how they are produced, regulatory background, potential sources and SCVURPPP accomplishments.</p>	<p>Financial contribution and active participation in Committees by Program staff</p> <p>Developed by SCVURPPP</p>	<p>See http://www.sfei.org</p> <p><i>SCVURPPP Dioxins Fact Sheet</i></p>	<p>On-going</p> <p>Completed-1/07</p>
<p>Control Program for Sediment</p> <ul style="list-style-type: none"> • <i>San Francisquito Creek Watershed</i> 	<p>Permit Provision C.9 (f)</p>	<p>Permit</p>	<p>Track the development of the San Francisquito Creek Watershed TMDL for Sediment by attending meetings and reviewing technical results and reports.</p>	<p>Conducted by SCVURPPP</p>	<p><i>SCVURPPP Summaries</i></p>	<p>On-going</p>

**Table 4-1
Status of FY 2006-2007 Monitoring Activities, continued**

Title/Subtitle	Category/ Monitoring Priority (MP) ² / Permit Provision	Origin	Capsule Scope	SCVURPPP Participation	Product(s) ³	Status Schedule
			<p>Identify and prioritize watershed areas based on the probability that they are sources of trash to urban creeks.</p> <p>Conduct literature review of possible trash control measures to better understand effectiveness, costs, and maintenance requirements.</p> <p>Prepare an implementation plan for pilot demonstration projects developed and implemented by Co-permittees.</p>	<p>Conducted by SCVURPPP</p> <p>Conducted by SCVURPPP</p> <p>Developed by SCVURPPP</p>	<p><i>Draft Preliminary Trash Source Assessment for Santa Clara Valley Watersheds</i></p> <p><i>Draft Trash Control Measures Toolbox</i></p> <p><i>To be developed.</i></p>	<p>Scheduled for completion in FY 07-08</p> <p>Completed in 7/07</p> <p>Scheduled for completion in FY 07-08</p>