ANNUAL MONITORING REPORT 2002-2003

Stormwater Monitoring Coalition
Of Southern California

September 30, 2003

INTRODUCTION

As a result of the increasing regulatory focus and the lack of scientific knowledge base, both stormwater regulators and municipal stormwater management agencies throughout southern California have developed a collaborative working relationship. The goal of this relationship is to develop the technical information necessary to better understand stormwater mechanisms and impacts, and then develop the tools that will effectively and efficiently improve stormwater decision-making. As individuals and agency representatives, there was early recognition that these issues are oftentimes not localized, but typically cross watershed and jurisdictional boundaries. This relationship culminated in a formal letter of agreement, signed in 2000, by all of the Phase I municipal stormwater NPDES lead permittees and the NPDES regulatory agencies in southern California to create the Stormwater Monitoring Coalition (SMC) (Table 1).

Table 1. List of member agencies in the Stormwater Monitoring Coalition.

California Regional Water Quality Control Board, Los Angeles Region
California Regional Water Quality Control Board, San Diego Region
California Regional Water Quality Control Board, Santa Ana Region
City of Long Beach
County of Orange, Public Facilities and Resources Dept.
County of San Diego Stormwater Management Program
Los Angeles County Department of Public Works
Riverside County Flood Control and Water Conservation District
San Bernardino County Flood Control District
Southern California Coastal Water Research Project
Ventura County Flood Control District

As a first step, a panel of experts was commissioned to help define a five-year research agenda for the SMC. The research agenda, published in 2001, consisted of 15 unique projects developed around three main foci: 1) developing a regional monitoring infrastructure; 2) understanding stormwater runoff mechanisms and processes; and 3) assessing receiving water impacts. Regional monitoring infrastructure included projects such as standardization of sampling and reporting programs. Stormwater runoff and mechanisms included projects such as peak flow impacts. Receiving water impacts included projects such as developing microbial source tracking tools.

As the research agenda enters its second year, the SMC is evolving and maturing to accomplish its challenging goals. For example, the SMC member agencies have modified their management structure to include an Executive Committee of upper level management to oversee progress, with multiple technical working groups to provide guidance and insight around specific projects. Another example is the variety of funding mechanisms to implement specific projects. Mechanisms to date include equal cost share, unequal cost share, single agency support, monitoring trade-offs, and support from outside agencies.

This document outlines the activities that the SMC has accomplished over the last year. The SMC Executive Committee meets on a quarterly basis to discuss these projects and ensure their success. Completed projects are already finding their way into environmental decision making. Cumulatively, these activities demonstrate that the SMC is an active organization and is making great strides in achieving its stated goals. The common vision shared in by the initial founding members of the SMC has taken root and is being implemented to the benefit of both regulatory and regulated communities.

PROJECT ACCOMPLISHMENTS

Microbial Source Tracking Method Comparison

Status: 100% completed
proposed budget $395,000

There are numerous waterbodies throughout southern California, both marine and freshwater, that suffer contamination of fecal indicator bacteria such as total coliforms, fecal coliforms, and *enterococcus*. There are several Microbial Source Tracking (MST) techniques now being developed for determining sources (i.e. humans, dogs, cats, horses, etc.) of fecal indicator bacteria in receiving waters. However, all of them are in the early stages of development and none have been tested side-by-side for their ability to accurately discriminate or quantify these sources of fecal contamination. This study was designed to evaluate each of these new methods for accuracy and precision, using bacterial sources from southern California, and then make recommendations to the management community on the most effective and efficient method application(s). The SMC is partially funding this study in collaboration with the US Environmental Protection Agency, State Water Resources Control Board, City of Santa Barbara, and the National Water Research Institute.

Twenty-two of the most prominent researchers in the field tested 10 different MST techniques all at the same time on the same split samples. The methods included techniques such as ribotyping, antibiotic resistance (ARA), pulsed-field gel electrophoresis (PFGE), polymerase chain reaction (PCR), and terminal restriction fragment length polymorphism (TRFLP). Each of the specific sources were collected in October and shipped to the researchers for characterization. Next, each sample was added to sterile freshwater or seawater in varying mixtures and densities, then were delivered blind to each laboratory. Each researcher was asked three questions regarding the blind samples: 1) are human or non-human sources of indicator bacteria are present? 2) if non-human sources are present, what source are they (i.e., dog, cow, seagull)? and 3) what fraction of the sample is attributable to each source?

No MST method tested predicted the source material in the blind samples perfectly. Host-specific PCR performed best at differentiating between human and non-human sources, but primers are not yet available for differentiating among the non-human sources. Virus and F+ coliphage methods reliably identified sewage, but were not able to

identify fecal contamination from individual humans. Library-based isolate methods were able to identify the dominant source in most samples, but had difficulty with false positives, identifying the presence of fecal sources that were not in the samples. Among the library-based methods, genotypic methods generally performed better than phenotypic methods. The final report will be available September 11th. A copy of the final report, including reports from each of the individual researchers, will be published in the December volume of the *Journal of Environmental Health* that is dedicated to this study.

Develop Standardized Sampling and Analysis Protocols

Status: 75% completed

proposed budget $180,000

This project is an attempt to develop a recommended stormwater monitoring infrastructure in order to increase comparability among programs throughout southern California. The SMC developed a four-step approach to accomplish this goal: (1) define the monitoring questions of interest, (2) assess what monitoring programs are currently doing to determine how well they are answering the monitoring questions, (3) create an optimum design for answering the monitoring questions, and (4) conduct QA intercalibration studies. This study is partially funded by the State Water Resources Control Board (SWRCB) in response to SB 72, whose legislative goal was to standardize sampling, analysis and reporting for stormwater monitoring. It has been made clear that the SMC is only developing a design for the southern California region.

A technical working group has been formed to guide the study and meets on a monthly basis. The working group includes the stormwater agencies and regulators on the SMC, the SWRCB, and Heal the Bay (an environmental advocacy group). Step one of the project has been completed. Five monitoring questions have been defined including:

1) Are conditions in receiving water protective of beneficial uses?
   1a) What are the mechanism(s) causing receiving water problems?
2) What is the extent and magnitude of the receiving water problems?
3) What is the relative urban runoff (both storm and non-storm, wet and dry) contribution to the receiving water problem(s)?
4) What are the sources of the urban runoff contribution to receiving water problems?
5) Are conditions in receiving waters getting better or worse?

The group has developed a philosophy and framework for building the standardized program. The philosophy begins with recognition that monitoring is required to assess impacts to receiving waters from urban wet and dry weather runoff. However, the monitoring should focused on answering the five questions and, if the data collection does not help to answer one of these questions, then the utility of that monitoring should be re-evaluated. A second philosophy is that the monitoring should be proportional to the amount of impact. If wet and/or dry weather runoff results in large receiving water impacts, then the monitoring should be increased. Likewise, if no impact from stormwater is observed, then the monitoring effort should be reduced. Therefore, the

working group is continually looking for ways to identify quantifiable triggers that will initiate additional, or reductions in, monitoring effort. Finally, the group has defined a framework for developing monitoring designs. This framework includes:

1) Core monitoring to address ongoing, site-specific needs. This monitoring design would be useful for assessing trends;
2) Regional monitoring to address large spatial scales at infrequent (i.e. every five years) intervals. This monitoring design would be useful to put localized site-specific results into context of the larger ecosystem; and
3) Special studies to address directed needs or to answer specific questions. This monitoring would be useful to address unique issues, oftentimes triggered by routine monitoring to help understand results or identify efficient management measures. Special studies are short-term studies with a predefined beginning, middle and end.

The inventory of existing programs has been completed (step 2) and the working group is actively creating an optimum monitoring design (step 3). A guidance document on the standardized design should be completed by January 2004.

The laboratory intercalibration study, utilizing more than 11 laboratories throughout southern California has been initiated and nearing completion. Three intercalibration exercises have been conducted. The first exercise distributed three types of samples blind to each laboratory for analysis of TSS, nutrients, and trace metals. The samples included a runoff sample from an urban catchment, a non-urban catchment, and a certified reference material developed specifically for this study. All of the laboratories performed well on the reference material and the urban runoff sample. There was some additional variability observed in the highly turbid non-urban sample, mostly for those analytes that are particulate bound. The second exercise, which is currently underway, focuses on particulate-laden samples. The third intercalibration exercise was for microbiological analysis. This exercise was conducted in collaboration with the Bight'03 regional monitoring program that included up to 26 laboratories. Although most labs performed well, follow up quality assurance reviews and training are being used to minimize interlaboratory variability. A performance-based laboratory guidance manual should be completed by January 2004.

Peak Flow Impacts
Status: 10% completed
proposed budget $280,000

Watershed development increases imperviousness eventually leading to alterations in runoff flow regimes. This alteration in flow regime, particularly increased flows during high frequency events (i.e. 1-2 year storms), can result in downstream impacts such as increased erosion or habitat loss. The goal of this study is to quantify impacts from increased peak flows as a result of watershed development. Ultimately, the objective of this study is to develop indicators of peak flow and resulting peak flow impacts so that regulators and regulated agencies can develop numerical criteria for peak flow. This

project is fully funded by the Los Angeles County Department of Public Works (LACDPW), although most of the SMC members are interested in this study.

This project is in its initial stages. A technical workgroup has been formed to guide the study. Their first accomplishment was the selection of a consultant (EarthTech/Aquifor-Beech), through a competitive bid process, who will implement the project. The consultant has begun the early phases of the study including site-selection and developing a project workplan. Site selection had several criteria including recently developed catchments upstream of relatively natural watercourses. Work over the next year will include sampling and analysis of geomorphic changes at these sites.

Building A Regionally Consistent and Integrated Freshwater Stream Bioassessment Monitoring Program

status: pre-initiation
proposed budget $140,000

Assessment of freshwater biological communities represents a potentially powerful tool for evaluating the effects of discharges in southern California creeks and streams. Bioassessments integrate the effects of multiple stressors, including chemical pollutants and physical alterations in receiving waters. The value of biological assessments is that they are closer to many of the defined beneficial uses of receiving waters (i.e. aquatic life, warm water habitat, cold water habitat) than chemically-derived water quality objectives.

One of the main drawbacks of using rapid bioassessments in southern California has been the lack of biological thresholds for evaluating benthic community data. The lack of an assessment tool for bioassessments has hindered most managers because there has been no scientifically defensible manner for discerning if a site is “good” or “bad”. IBIs generally create rank sums of community parameter metrics such as abundance, species composition, and/or diversity and integrates these complex community parameters into a single number, typically from 1 to 100 with cutpoints for various levels of impact. Only recently has an IBI been developed, which was calibrated in San Diego County (Ode *et al.* 2002), but the suitability of the San Diego IBI for extrapolation throughout southern California is unknown.

The goal of this study is to build a regionally consistent bioassessment monitoring program. This project will be completed in three phases including: 1) methods standardization; 2) calibrating and validating a regional assessment tool; and 3) designing and implementing an integrated, coordinated regional monitoring program. The first phase focuses on creating a monitoring infrastructure so that multiple agencies are properly trained, data are collected in comparable manners, and data can be efficiently shared. The second phase focuses on developing an assessment tool that is robust enough to be used by all agencies across the region. This will enable a consistent approach for evaluating the status of freshwater biological communities and provide the answers regarding community impacts to managers in meaningful and understandable terms. The third phase focuses on creating a study design that most efficiently answers specific

questions of interest at large regional scales. Addressing some questions at regional scales can provide cost efficiency for addressing reference condition, cumulative impacts, and when nested within a local sampling design, provides unparalleled information for providing context to local monitoring data.