

Urban Runoff Source Identification Program in San Diego County Watersheds

Final Workplan

Prepared by:

The County of San Diego and Municipal Stormwater Copermittees

June 25, 2008

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1.0 INTRODUCTION

In January 2007, the San Diego Regional Water Quality Control Board (RWQCB) issued a new National Pollutant Discharge Elimination System (NPDES) for discharges of urban runoff from the municipal separate stormwater sewage systems (MS4s) Permit (Permit) (Order No. R9-2007-0001) to the San Diego Municipal Copermittees (Copermittees). The Permit includes an attachment that describes specific mandates for the Receiving Waters and Urban Runoff Monitoring and Reporting Program. This *Monitoring and Reporting Program* was designed to address the following core management questions:

1. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2. What is the extent and magnitude of the current or potential receiving water problems?
3. What is the relative urban runoff contribution to the receiving water problem(s)?
4. What are the sources of urban runoff that contribute to receiving water problem(s)?
5. Are conditions in receiving waters getting better or worse?

A new requirement of the Permit is a Source Identification Program. The purpose of the program is to identify sources of discharges of constituents causing water quality problems in receiving waters to address question 4 above. This Permit language states:

The Copermittees shall collaborate to develop and implement a monitoring program to identify sources of discharges of pollutants causing the priority water quality problems within each watershed. The monitoring program shall include focused monitoring which moves upstream into each watershed as necessary to identify sources. The monitoring program shall use source inventories and "Threat to Water Quality" analysis to guide monitoring efforts. This monitoring program shall be implemented within each watershed and shall begin no later than the 2008-2009 monitoring year.

This report describes the program proposed by the Copermittees to comply with this Permit requirement. The source identification monitoring program will focus on the assessment of specific activities that may be expected to contribute pollutants, as well as targeting drainage areas where monitoring information suggests urban runoff is a major contributor to the problem.

The Permit provides the Copermittees flexibility to develop a workable source identification monitoring program. Specifically, section II.A.11 of the Permit Fact Sheet states:

"Since a monitoring program for source identification is mostly new, the Copermittees are provided significant leeway in the development and implementation of the program. The Copermittees can utilize the flexibility incorporated into the monitoring and reporting program to develop a program that is workable for them while providing the necessary information."

The source identification studies are special projects, and therefore, by their nature are anticipated to be focused and of relatively short duration that will be targeted to answer specific questions. These studies will be reviewed and modified as necessary to more effectively meet the goals of the program.

1.1 Background

The Southern California Stormwater Monitoring Coalition (SMC) developed the five core management questions identified in the Permit through a consensus building effort that included regulators, municipal copermittees, Heal the Bay and Southern California Coastal Water Research Project (SCCWRP) scientists. A guidance document entitled, "Model Storm Water Monitoring Program for Municipal Separate Storm Water Sewer Systems in Southern California" (Model Monitoring Program) was issued in 1994 (www.sccwrp.org). The Regional Board incorporated much of the Model Monitoring Program in the monitoring requirements of the Permit including MS4 outfall monitoring and a source identification monitoring program.

The Model Monitoring Program provides the following additional background on the nature of the source identification studies:

"More detailed source identification studies address Question 4: What are the sources to urban runoff that contribute to receiving water problems? These are almost always special studies and are conducted when preliminary source identification work under Question 3 shows that urban runoff constitutes a significant portion of the source(s) of a receiving water problem. Information from these more detailed special projects can help refine receiving water monitoring, improve fundamental understanding of stormwater contamination processes, and help guide management actions intended to reduce sources and their attendant impacts.

Only if urban runoff is found to contribute significantly (as discussed below, 5 to 10 % of the problem) to receiving water problems would watershed Copermittees be required to take the lead on conducting further source identification studies at greater resolution (as described in Question 4).

The committee engaged in substantial discussion of criteria for prioritizing source identification work and agreed that several factors should be taken into account in each instance, including:

- *The severity of the problem;*
- *The type of pollutant(s) involved;*
- *The potential for human health risk;*
- *The relative certainty of the estimates of relative contribution from different sources. If the estimate of urban contribution is very low, then even high uncertainty might not be important. However, if the estimate is higher, e.g., 10%, and the uncertainty is high (e.g., could be as high as 30%) then that would be a different situation;*
- *Whether the problem occurs during dry and/or wet weather, since dry weather problems may be more easily dealt with;*
- *The biological resources at issue;*
- *Regulations and other legal mechanisms that require source identification and/or control;*
- *Stakeholder involvement such as watershed group planning priorities.*

The committee agreed that source identification work should be prioritized based on the factors above, and that the threshold level for further independent source identification efforts by the permittees should be somewhere between 5 – 10%.

In the context of Question 4, “sources” can refer to multiple layers of sources, such as a golf course that is the source of pesticides, which are in turn the source of toxicity in the receiving water. Thus, questions about sources should be framed carefully in order to clarify both the spatial definition of “upstream source” as well as the level of causality that is the central focus of the investigation.

The types of data products appropriate for answering Question 4 for both recreational water quality and habitat include:

- *Prioritization of receiving water sites in terms of severity of impact (ranked list of sites);*
- *Description of all potential urban runoff sources of inputs to the higher priority receiving waters (map of potential sources);*
- *Determination of actual sources of urban runoff and their relative magnitude (table of concentrations and flows by source with estimated levels of confidence);*
- *Quantitative estimates of the loads from urban runoff sources (table of loads by source with estimated levels of confidence).”*

1.2 Monitoring Goal

The goal of this monitoring program is to identify and assess the sources of discharges of constituents related to urban runoff causing high priority water quality problems in the receiving water(s) within each watershed management area (WMA).

1.3 Monitoring Objectives

Management Question 4:

“What are the sources of urban runoff that contribute to receiving water problems?”

This management question will be addressed by the collection and analysis of urban runoff within MS4 conveyances. The main purpose of the program is to find the urban sources of discharge(s) of constituents so that appropriate management action can be applied to eliminate the pollutant(s) from adversely impacting the water quality of receiving waters. Approaches that may be utilized to identify urban sources of high priority pollutant discharges include:

1. Monitor immediately downstream of an activity or a cluster of activities that could potentially discharge a high priority pollutant to the MS4 conveyance (Specific Activity Monitoring). If there is evidence suggesting that the activity is a potential source of the high priority pollutant(s), corresponding monitoring should occur immediately upstream of the potential source activity to ensure other sources are not contributing.

2. Monitor the MS4 conveyances upstream of a high priority water quality problem identified in the receiving water. Use the results to guide additional upstream monitoring in the MS4 conveyance until the potential source of the pollutant discharge is identified or isolated (MS4 Monitoring Upstream of High Priority Water Problem).

Additionally, other factors will be considered in the design of the specific source studies including the watershed priorities, leveraging information from other watershed studies and considering guidance from the Model Monitoring Program.

2.0 MONITORING DESIGN

The overall monitoring design is based on a combination of both specific activity sampling and sampling within MS4 conveyances upstream of an identified high priority water quality problem in the receiving water(s). The type of monitoring design used depends on the type of information available concerning identified threats to water quality or receiving water quality problems. If adequate information already exists on activities in the watershed that could potentially release high priority constituents, then the sampling is focused on those activities. For example, if chromium is a high priority water quality problem, then activities that could potentially result in the discharge of chromium, such as metal plating or fabrication facilities, would be located within the watershed and their threat to water quality would be evaluated to determine a monitoring strategy. If water quality problems are identified by other monitoring programs and insufficient information exists on the location of specific activities that could be a potential source, then sampling within the MS4 conveyance upstream of the identified water quality problem is a strategy that may be used to track the potential source of the discharge.

2.1 Specific Activity Monitoring Approach

This approach focuses monitoring on areas where identified activities could potentially release the pollutant and therefore, be a potential threat to water quality. This sampling approach consists of four steps (Figure 2-1):

1. Identify activities that could potentially release the constituent that may cause exceedances of water quality benchmarks or action levels in the receiving waters (e.g., Threats to Water Quality from the Baseline Long-term Effectiveness Assessment).
2. Identify locations for monitoring in MS4 outfalls or conveyance sites that drain from areas containing concentrations of these activities.
3. Collect water samples and/or flow data from the outlet(s) downstream from each activity or cluster of activities.

4. Initiate additional investigations of potential sources of constituents in those drainage areas upstream of the outfall where exceedances of water quality benchmarks or action levels are identified if previous steps do not isolate the source.

Monitoring locations selected for sampling will be based on a survey of the sources and/or activities that could potentially release the constituent. The survey should identify clusters of activities that are to the extent practical hydrologically isolated. The survey of the location of activities that could potentially release the pollutant will identify a location at which a sample and flow measurement can logistically be taken downstream of the identified sources. This location is generally where sheet flow begins to concentrate in a channel, ditch or pipe, and may entail sampling from a manhole above the conveyance.

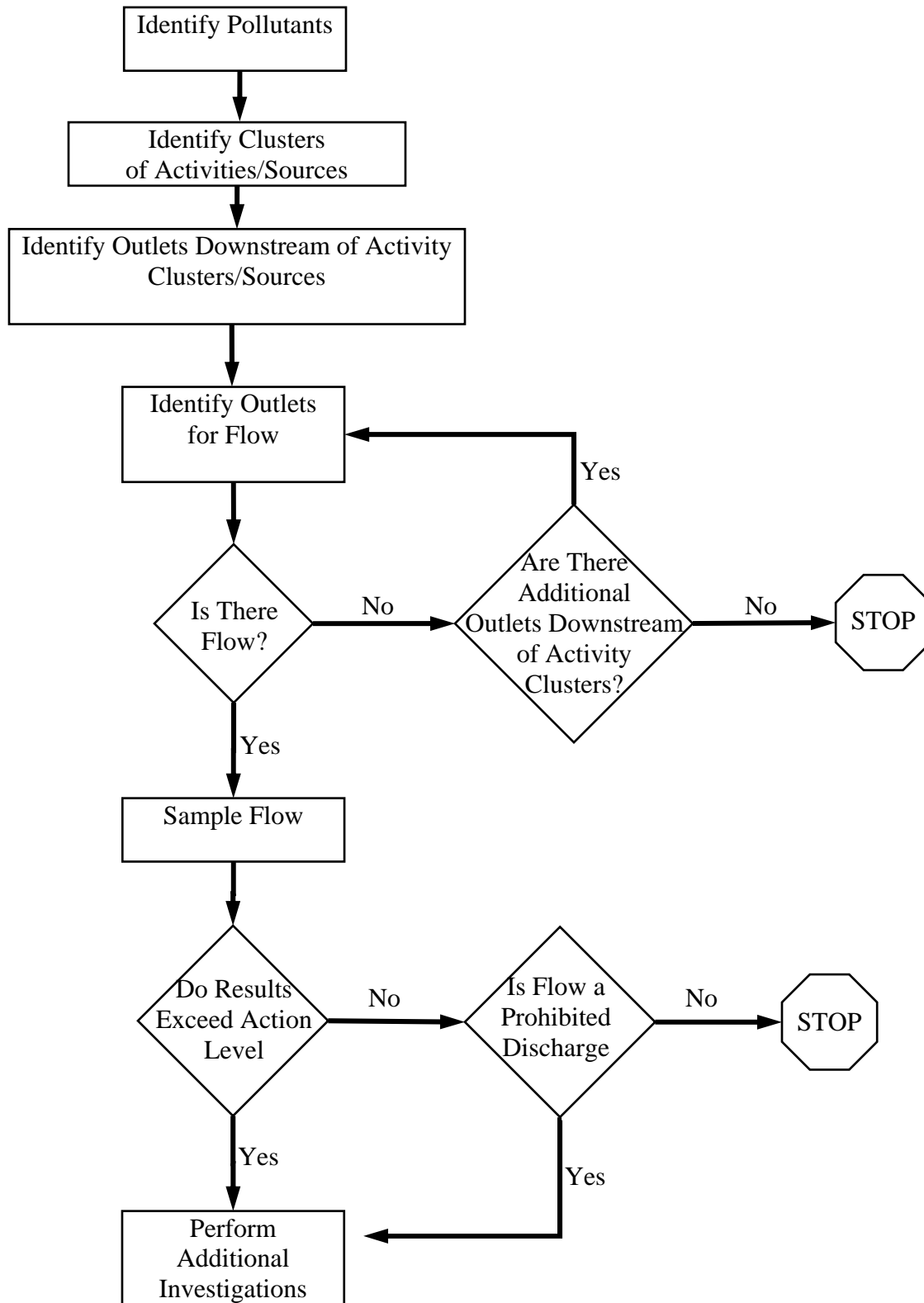


Figure 2-1: Specific Activity Sampling Flow Chart

2.2 Monitoring in MS4 Upstream of Water Quality Problem in Receiving Water Approach

This approach targets sampling locations upstream of identified problems based on results from the MS4 outfalls, mass loading stations, temporary watershed assessment stations, dry weather sites, or visual observations. This monitoring approach consists of four steps (Figure 2-2):

1. Identify a high priority pollutant in a receiving water(s) of a watershed.
2. Conduct a review of MS4 maps and/or field reconnaissance to identify potential subwatersheds (hydraulically separate) in the MS4 conveyances.
3. Conduct additional sampling and/or flow monitoring upstream of the receiving water. This sampling is performed at outfalls from drainages with observed flows.
4. Initiate an investigation of activities that could potentially release the pollutant in those drainage areas upstream of the outfall where exceedances of water quality benchmarks or action levels are identified.

Using this approach, the sampling will start at the location of the observed water quality problem. Further sampling will focus on upstream sites within the MS4 conveyance. The chemistry and/or flow results from the samples collected upstream will be used to target other locations even further up stream. This cyclical process will continue to the extent practical to identify specific sources contributing to the high priority pollutants in the receiving waters.

2.3 Other Considerations in the Design

Table 2-1 summarizes the high priority pollutants identified in the Region's 2008 Watershed Urban Runoff Management Plans. These priorities may be for portions of the watershed, not the entire watershed. This table may be used as a starting point in conjunction with other information to develop a pollutant-specific strategy.

A challenge the Copermittees face is how to leverage resources and identify collaborators with the myriad of ongoing and recent studies to design cost-efficient and effective source identification studies. Table 2-2 summarizes ongoing and recent studies by watershed that will be considered in the future design of source identification studies.

The Model Monitoring Program provides additional guidance that will be considered in the specific source identification monitoring for recreational and habitat-focused studies:

“The model monitoring framework for detailed source identification for both recreational water quality and habitat involves two kinds of studies. The first are studies at downstream stations to gain additional insight into the sources of the problem. For bacteria, this may include more traditional sanitary survey methods and/or more sophisticated biological testing. For habitat, this may include toxicity tests with a broader suite of test organisms, toxicity identification evaluations (TIEs), or more detailed analyses of the pattern of impact in communities or on key

organisms. The second kind of study will be upstream source tracking and source identification studies that may use a variety of methods. In general, however, they will share the same design, which will involve using a basic indicator of impact (e.g., bacterial indicator, toxicity) to trace the strength of the impact signal upstream, in either wet or dry weather, combined with more powerful and/or targeted methods (e.g., genetic source identification, TIEs, chemical reconnaissance, physical reconnaissance) to locate the specific source(s) of pollution.

The committee also recognized the need to supplement these method descriptions with more explicit starting and stopping rules for detailed source identification studies. Starting rules are necessary for ensuring that source identification studies, which can be costly and time consuming, are triggered where and when monitoring data strongly suggest the presence of a persistent problem. Such rules are also needed to focus available resources on the highest priority problems. Stopping rules are essential for ensuring that source identification studies do not continue indefinitely, but end when reasonable and realistic expectations have been met. Such rules are proposed for receiving water problems associated with both recreational water quality and habitat.”

Examples of the triggers identified for recreational and habitat focused source identification studies from the Model Monitoring Program are presented in Figures 2-3 and 2-4.

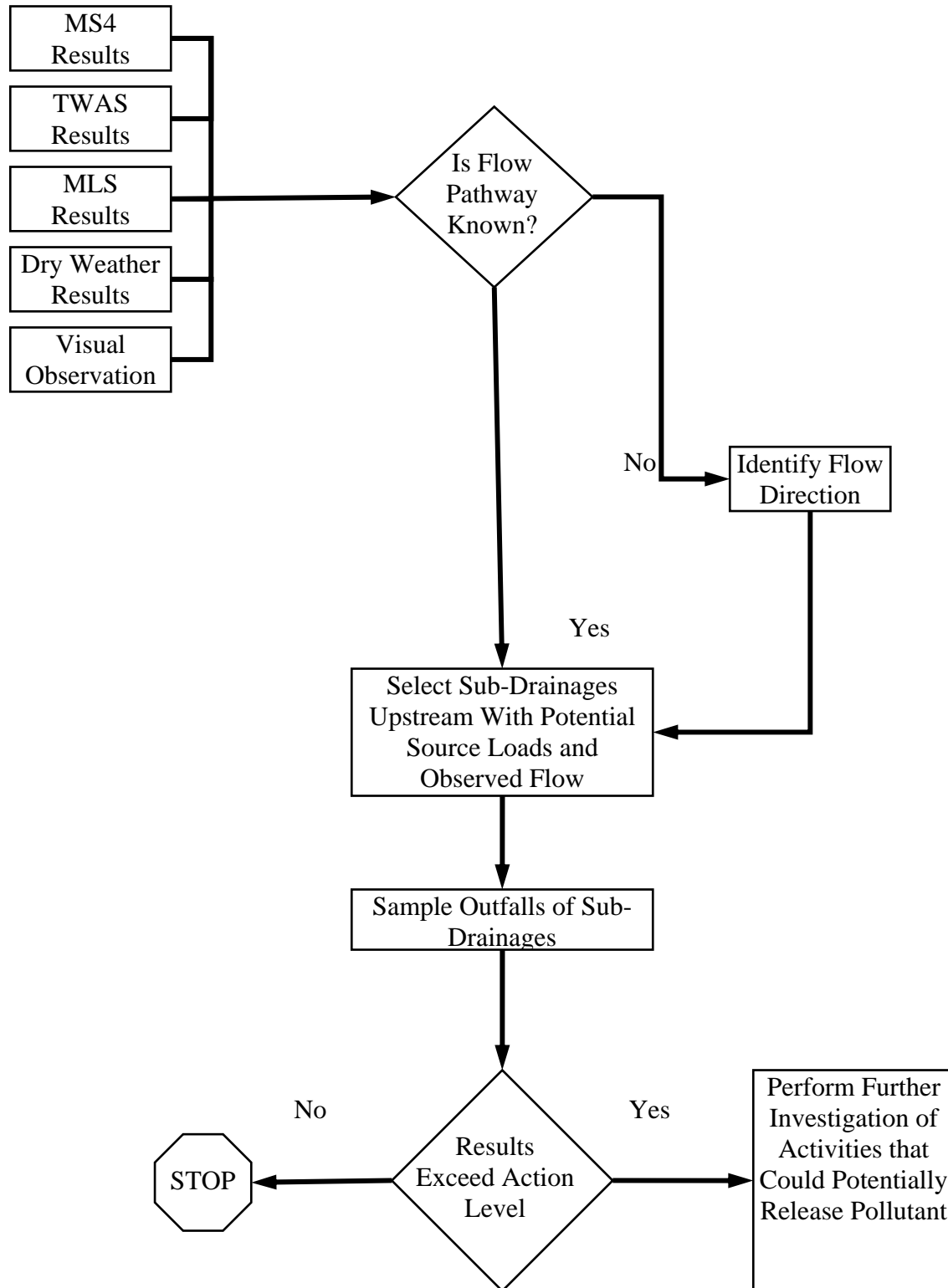


Figure 2-2: Monitoring in MS4s Upstream of Water Quality Problem in Receiving Water

Stormwater Monitoring Coalition Decision Tree for Upstream Bacterial Source Identification Study

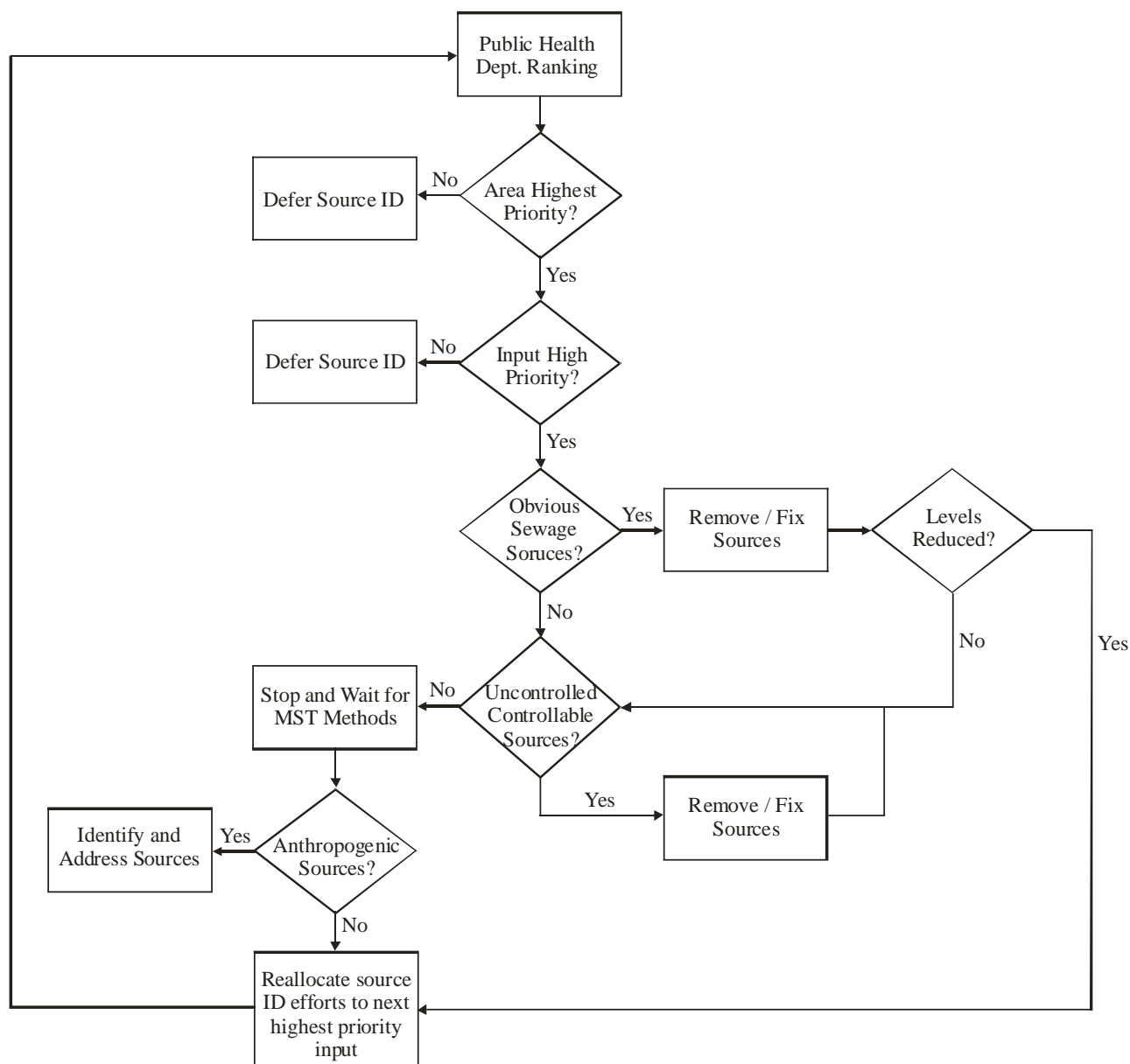


Figure 2-3: Decision tree that organizes starting and stopping rules for upstream bacterial source identification efforts. MST refers to microbial source tracking methods (Modified Figure 7 of the Model Monitoring Program).

Stormwater Monitoring Coalition Decision Tree for Upstream Bacterial Source Identification Study Targeted at Habitat

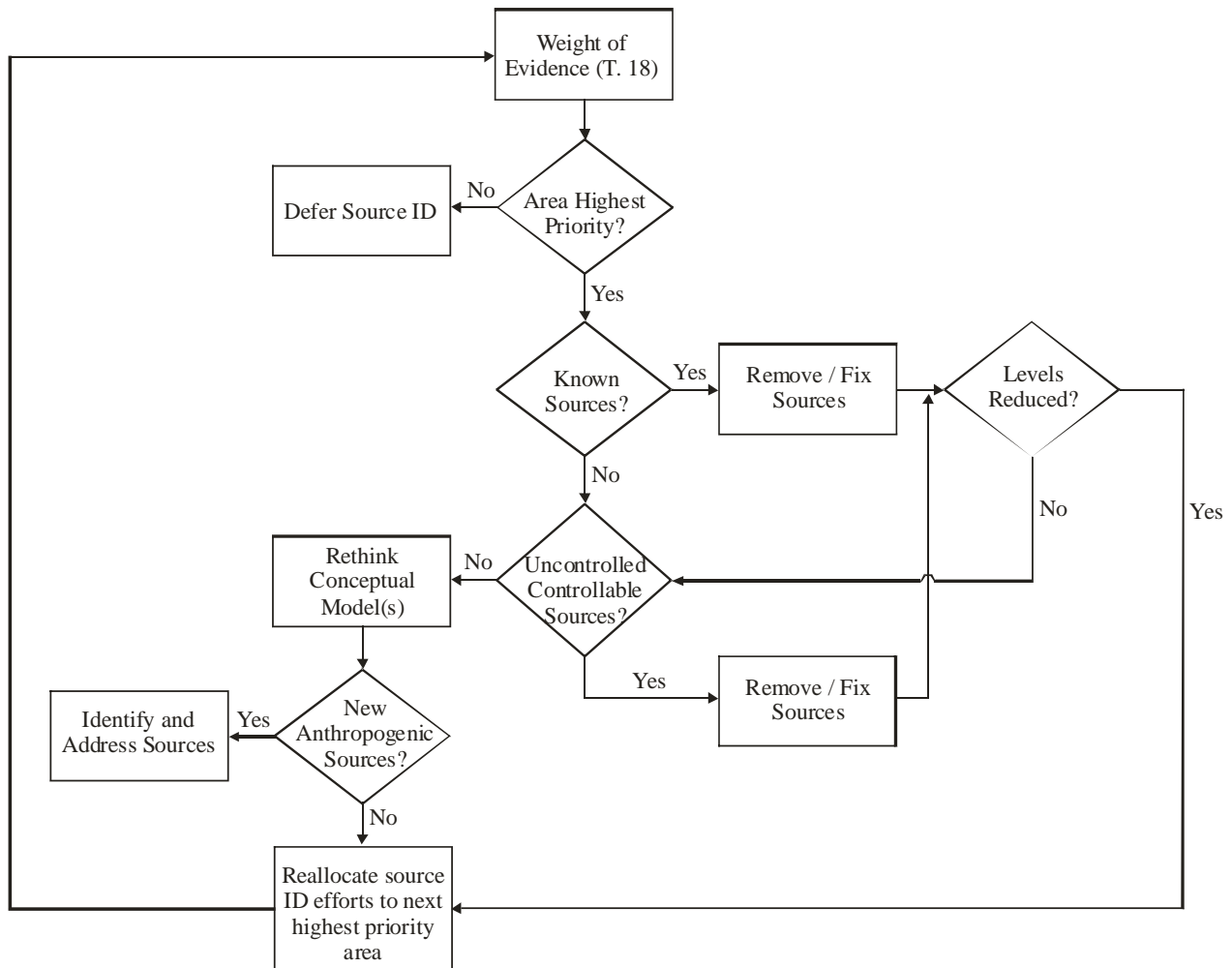


Figure 2-4: Decision tree that organizes starting and stopping rules for upstream source identification efforts targeted at habitat. (Modified Figure 8 of the Model Monitoring Program)

Table 2-1: High Priority Water Quality Problems Identified in the Watershed Urban Runoff Management Plans

Watershed Management Area	Hydrologic Area	High Priority Water Quality Problems
Santa Margarita	All	Nutrients, Sediment
San Luis Rey	All	Bacteria, Nutrients
Carlsbad	904.1, 904.2, 904.3, 904.5, 904.6	Bacteria/Pathogens
	904.3, 904.6	Sediment
	904.1, 904.2, 904.6	Nutrients
San Dieguito	All	Bacteria/Pathogens
	906.1	Sediment
Penasquitos	All	Bacteria/Pathogens
	906.1	Sediment
Mission Bay	All	Bacteria/Pathogens, Heavy Metals, Nutrients
San Diego River	All	Bacteria, Phosphorous, Total Dissolved Solids, Low Dissolved Oxygen, Turbidity
San Diego Bay	908.1	Bacteria, Gross Pollutants*, Metals, Oil & Grease, Pesticides
	908.2	Bacteria, Metals, Sediment, Trash, Pesticides
	908.3	Bacteria, Sediment, Trash
	909.1	Bacteria
	909.2	Pesticides
	910.1	Bacteria, Gross Pollutants*
	910.2	Bacteria
Tijuana River	911.1	Bacteria/Pathogens, Total Suspended Solids, Turbidity, Pesticides, Gross Pollutants*, Metals, Organics
	911.3	Manganese, pH, Color
	911.4	Bacteria/Pathogens, Turbidity, Phosphorus
	911.5	pH, Manganese, Color

* Gross Pollutants are ammonia, biological oxygen demand, chemical oxygen demand, conductivity, dissolved oxygen, methylene blue activated substances, and pH.

Table 2-2: Recent and Ongoing Studies Conducted in San Diego County Watersheds – Potential Leverage Opportunities for the Source Identification Monitoring (List of known studies as of June 25, 2008. Other 3rd party studies may exist).

Watershed Management Area	HA*	Project Names	Project Dates	Project Contact	Approximate Project Costs	Project Summary
Santa Margarita	902.1 902.2	Assessment of Nutrient and Sediment Reducing BMPs in Santa Margarita Watershed	12/2007 to 4/2009	Joanna Wisniewska, County of San Diego	\$800,000 Prop 40/50 Grant	Test effectiveness of manure buffer strips, efficient irrigation systems and minimizing fertilizer use to reducing nutrient and sediment loads from agricultural fields
Santa Margarita	902.2	Rainbow Creek Nutrient Reduction TMDL Implementation	12/2005 to 12/2008	Sheri McPherson County of San Diego	\$380,000 319(h) Grant	Prepare Nutrient Reduction Management Plan and test effectiveness of efficient irrigation and use of plant biofilter for removing nutrients from nursery irrigation runoff in Rainbow Creek
Santa Margarita	902.1	Lagoon Study to Comply with RWQCB Order 2006-076	10/2007 to 4/2009	Greg Krzys US Bureau of Reclamation	\$370,000	Collect data for TMDL eutrophication modeling effort by RWQCB including loadings during dry and wet weather and during 4 index periods
San Luis Rey	903.1	Lower San Luis Rey Bacteria Source Identification Project	5/2008 to 2/2010	Mo Lahsaie, City of Oceanside	\$696,125 (Prop 50 CBI + match)	<p>The goal of the study is to identify the sources and quantify the loading of bacterial contamination in the lower San Luis Rey River and river mouth using a tiered approach including FIB analysis, genetic source tracking technology and an intensive visual observation program.</p> <p>The project will also utilize the information from the City of Oceanside and the County of San Diego's joint monthly monitoring program of the SLRR.</p> <p>The specific objectives are:</p> <ul style="list-style-type: none"> Identify point and non-point sources of bacterial contamination in the lower San Luis Rey River and at the river mouth during dry and wet

Watershed Management Area	HA*	Project Names	Project Dates	Project Contact	Approximate Project Costs	Project Summary
						<p>weather.</p> <ul style="list-style-type: none"> Estimate wet and dry bacterial loadings from tributaries and along the main stem of the SLRR. <p>Recommend BMPs to reduce and/or eliminate bacterial sources.</p>
Carlsbad	904.1 904.2 904.3 904.6	Lagoon TMDL Investigative Order	2007/2008	Erik Steenblock City of Encinitas	\$1,900,000	Collect data in support of TMDL development for lagoons including sediment, nutrient, bacteria, and TDS constituents.
	904.3	Agua Hedionda Watershed Management Plan	2007-Present	Jayne Strommer City of Vista	\$500,000	Development of comprehensive watershed management plan for the Agua Hedionda Watershed
Peñasquitos	906.1	Peñasquitos Lagoon - Lagoon Investigation Order - TMDL	2007/2008	Ruth Kolb City of San Diego	\$277,000	<p>Los Peñasquitos Watershed</p> <p>Activity is a Level 1 Effectiveness Outcome – the results will be used to develop the TMDL and set load allocations.</p> <p>Next phase should include source ID followed by Tier I&II BMP Implementation.</p>
Mission Bay	906.5	Tecolote Creek Bacterial Study – Source ID Study – TMDL and Permit	2007/2008	Ruth Kolb City of San Diego	\$250,000	<p>This is a Level 1 Effectiveness Outcome Activity- Provides Level 4, 5 and 6 data to allow for the assessment of watershed activities that will be implemented based on study findings.</p> <p>This is a Tier II activity that includes Source ID studies and Design Storm determination – next phase should include developing Tier I & II BMPs to reduce bacteria loadings per the study findings – a phase II study may be needed to better define anthropogenic vs. non-anthropogenic sources to creek.</p>

Watershed Management Area	HA*	Project Names	Project Dates	Project Contact	Approximate Project Costs	Project Summary
						Sampling will include assessment of contribution of MS4 compared to sediment and ponded areas in the creek. The source of dry weather flows will also be noted (e.g. over-irrigation, car washing, etc.) in order to better understand the sources of flows.
Mission Bay	906.3	ASBS Monitoring – Sediment and Pollutograph Monitoring - TMDL	2007/2008	Ruth Kolb City of San Diego	\$185,000	This is a Level 1 Effectiveness Outcome Activity- Provides Level 4, 5 and 6 data to assess potential and future BMPs. The activity is linked to Tier II BMPs as it provides source data and design storm determination – results will be used to develop Tier I, II and III BMPs resulting in load reduction of sediments. The methods for this survey are being developed through the Bight08 program. Second phase to be used to conduct a second wet weather event to verify the results of the first phase that indicated a clear difference in sediment type and contribution from the upper open space portion and the lower developed portion of the watershed. Once the Bight 08 methods are finalized and the Exception Process permitting program is initiated, the biological surveys can then be performed next fiscal year.
San Diego River	907.1	Famosa Slough Lagoon Monitoring – Lagoon Investigation Order - TMDL	2007/2008	Ruth Kolb City of San Diego	\$520,000	Activity is a Level 1 Effectiveness Outcome – the results will be used to develop the TMDL and set load allocations. Next phase should include a Tier II source ID study followed by Tier I&II BMP Implementation. Three additional index period sampling events will be completed by November 2008.
San Diego Bay	908.2 906.3	Air Deposition Follow-up Study – TMDL	2007/2008	Ruth Kolb City of San Diego	\$260,000	Activity is a Level 1 Effectiveness Outcome – the results will be used to identify portion of metals loading from air deposition contributing to TMDL

Watershed Management Area	HA*	Project Names	Project Dates	Project Contact	Approximate Project Costs	Project Summary
		YEAR 2 of 3				load allocations. Linkage to Tier I Source Control activities – participation in Copper Brake Bad Partnership, and to Aggressive Street Sweeping project – Effectiveness of street sweeping to address metals loading from air deposition being assessed – as well as optimal frequency and sweeping method.
San Diego Bay	908.2	La Mesa /Lemon Grove Storm Water Sampling - TMDL	2007/2008 Year 2 of 2	Ruth Kolb City of San Diego	\$150,000	San Diego Bay Watershed Management Area – Chollas Creek Watershed This is a Level 1 Outcome Project that will provide Level 6 data for baseline assessment data, and jurisdictional pollutant load data for TMDL implementation.
San Diego Bay	908.2	Pueblo San Diego Watershed Pesticide Investigation - TMDL	2007/2008	Ruth Kolb City of San Diego	\$80,000	This is a Level 1 Outcome Project. The data obtained from this study is consistent with the Tier II Source study program to provide data on Tier I and II BMPs. Based on the results of this study, Phase II may consist of a source study program for Chollas and Paleta Creeks.

Watershed Management Area	HA*	Project Names	Project Dates	Project Contact	Approximate Project Costs	Project Summary
San Diego Bay	908.2	Use Attainability Study for Chollas Creek – TMDL and Basin Plan	2007/2008	Ruth Kolb City of San Diego	\$80,000	<p>This is a Level 1 Outcome Project. The project is consistent with the Tier I BMP implementation strategy under the Basin Plan amendment activity as described in the Strategic Plan.</p> <p>The applicability of the Use Attainability for Shell and REC1 was discussed with the City and was decided to proceed with the first steps in this process with a focus on the Shell designation. These first steps include evaluating the historical records for past use, historical and current access to the site, and an evaluation of the habitat for shellfish at the mouth.</p>
San Diego Bay	908.2 906.3 906.5	Street Sweeping BMP Effectiveness Monitoring	2007/2008	Drew Kleis City of San Diego	\$165,000	<p>Chollas Creek, Tecolote and La Jolla Shores ASBS Watersheds</p> <p>This is a Level 1 Outcome Activity. The data generated from this study will provide Level 4 load reduction data to assess the effectiveness of the aggressive street sweeping program that is a Level 4 outcome activity.</p>
San Diego Bay	908.2	Strategic Monitoring – Target Sub-watershed for Master Plan	2007/2008	Drew Kleis City of San Diego	\$100,000	<p>San Diego Bay Watershed Management Area – Chollas Creek Watershed</p> <p>This is a Level 1 Outcome Project. The data obtained from this study will provide baseline Level 5 data to assess the multi-tiered BMPs effectiveness that will be implemented under a Master Plan for the selected sub-watershed San Diego Bay Watershed Management Area – Chollas Creek Watershed</p> <p>The project is consistent with the Tier I BMP implementation strategy under the Basin Plan amendment activity as described in the Strategic Plan.</p>

Watershed Management Area	HA*	Project Names	Project Dates	Project Contact	Approximate Project Costs	Project Summary
						The applicability of the Use Attainability for Shell and Rec 1 was discussed with the City and was decided to proceed with the first steps in this process. These first steps include evaluating the historical records for past use and to evaluate the design storm requirements under the Bact-1 TMDL for Rec 1.
San Diego Bay	908.1	Shelter Island TMDL Monitoring	2007/2008	Ruth Kolb City of San Diego	\$15,000	The site reconnaissance has been completed and the work plan has been prepared. Samples were collected during a storm event in March.
Tijuana River	911.1	Tijuana River Bacterial Source Tracking Study/CBI Grant	2008-Present	Judith Keir City of Imperial Beach	\$1,300,000 CBI Grant	CBI Grant/Bacterial Source Tracking Study in the Tijuana River on the U.S. Side of the Border. Goal is to develop concept designs for BMP development to reduce bacterial loads.
All Watersheds		Rain Barrel Pilot Program – Watershed Activities	2007/2008	Drew Kleis	\$45,000	This activity is a Level 4 Outcome. The implementation of the rain barrels and planters will result in a load reduction that will be measured. Rain barrels are a Tier II BMP.
Chollas Creek, Tecolote, and La Jolla Shores ASBS Watersheds	908.2 906.3 906.5	BMP Baseline Effectiveness Monitoring	2007/2008	Drew Kleis City of San Diego	\$125,000	This is a Level 1 Outcome Activity. The results provide Level 4 and 5 baseline data to assess the effectiveness of the BMPs that will be installed at these sites. This is the baseline monitoring that will be followed by effectiveness assessment monitoring following installation.

* HA = Hydrologic Area

2.4 Work Plan Development

Details of the Source Identification Study will be due as part of the Scope of Work submitted to the RWQCB on September 1 of each year beginning in 2009 for the current monitoring year. For the 2008-2009 monitoring year, the Copermittees from the Regional Monitoring and WURMP Workgroups will support two dry weather Source Identification Studies scheduled to be conducted in the cities of La Mesa and Carlsbad. Both studies will focus on predominantly single-family residential neighborhoods. The La Mesa study will include a small area of commercial development that will be analyzed separately and provide additional insight on dry weather flows from mixed use areas. Key study questions for these investigations may include:

1. When are the dry weather or nuisance flows detected from single-family residences (during what part of the day/week)?
2. What is the water quality and load of constituents of dry weather or nuisance flows from single-family residences?
3. What are the potential sources of dry weather flows from single-family residences?

The data will provide information on the sources of dry weather/nuisance flows from single family residences. These data can then be used by Copermittees to develop effective BMP strategies for residential areas, which is one of the most common land uses in the San Diego region.

The Copermittees intend to leverage the results of the Proposition 50 Nonpoint Source Pollution Control Program Grant entitled “Evaluating Best Management Practices (BMPs) Effectiveness to Reduce Volumes of Runoff and Improve the Quality of Runoff from Urban Environments” that is being conducted by Dr. Darren Haver of the University of California, Davis. Dr. Haver is coordinating the collection of wet and dry samples from four residential communities in Sacramento and four residential communities in Orange County. First, baseline samples will be collected and then after an intensive outreach program to encourage reduced water runoff through the implementation of BMPs, additional water quality/water quantity samples will be collected to evaluate the effectiveness of BMP implementation. A similar model will be implemented by the Copermittees, however, only enough water quality data will be collected within the City of La Mesa to verify that the University of California Study results apply to the San Diego Region. This U.C. Davis source identification study will potentially apply to all watersheds in the San Diego Region. Additional details of the proposed study are presented in the following section.

Elements

Quality Assurance

Standardized quality assurance procedures will be developed for this specific project to include minimum requirements for sampling methods, analytical methods, and procedural controls to ensure a sound and comparable study. Elements include defining the roles and responsibilities of the persons conducting the study and the assessment measurements and controls. This study is primarily focused on analyzing continuous flows from a residential land use area. UC Davis is conducting a long term assessment of a residential drainage area as discussed above. The Copermittees’ study will utilize the analytical data from the UC Davis study to assess loads from

the residential area by combining the flow data collected through the Copermitees' study. Water quality samples will be collected from a limited set of samples from a commercial area in the City of La Mesa and selected sets in the residential areas to verify the UC Davis study results.

Monitoring Plan

A monitoring plan will be developed that includes location of sampling sites, frequency of sampling, and the duration of sampling. The plan will also include other pertinent information, such as instrumentation to be used, calibration, and other information with respect to site access and safety.

Location of sample sites—sample location should be placed with respect to capturing representative flow conditions from the defined land use area and should not include areas of mixed land use. It is preferred to have a location that drains a single land use.

Frequency of Sampling— flow monitoring will be conducted such that flow measurements can be determined every 5 minutes over a 24-hour period. Continuous flows will be recorded over the period of 6 months to 1 year. Sample downloads will occur every month to provide monthly records of flow.

Flow Monitoring

Flow in the MS4 outlet or conveyance sites will be measured quantitatively using standard USGS protocols (Rantz, 1982). If the flows are too small to measure with instrumentation, the indirect methods described by USGS may be used to estimate flow (e.g., float method, Manning formula). Specific control elements include conducting a survey of the cross sectional area, determination of the slope of the water flow longitudinal axis, determination of the surface roughness, calibration or verification of water level instrumentation, water velocity, and the appropriate calculations to be used for the determination of flow in cubic feet per second (cfs).

Special site visits may be needed if a weir is installed for low flow measurements. Storm events pose a threat of flooding if a weir is installed. Installation of a weir may cause debris to be collected and result in flooding of areas upstream of the location. Weather monitoring will be required and any weirs will be removed 3 days prior to any forecasted storm event.

Field Equipment

Automated field sampling equipment will be used to collect long term flow monitoring data. The specific instrumentation to be used will be determined following a field inspection of the sample location area. Once the equipment need is determined (e.g. pressure transducer, area velocity sensor, weir, etc...) the appropriate standard operating procedures will be developed. Water quantity instruments will be calibrated per the manufacturer's specifications during the installation. Equipment quality checks of the calibration will be performed at a predetermined frequency (e.g. bi-monthly, or monthly). Recalibration will be performed as needed.

Field crews will perform site visits to ensure the sampling equipment is in proper working order, batteries are fully charged, data is being logged successfully at the predetermined logging interval, and that sufficient data storage capacity is available. All site visits will include documenting all pertinent information on a field log sheet created for this project. Field

measurement equipment will be checked for operation in accordance with the manufacturer's specifications.

Analytical Monitoring in a Commercial Drainage Area

Samples will be collected from a commercial area to determine differences in loads between the residential and commercial specific areas. Analytical constituents to be monitored will be based at a minimum on the watersheds high priority constituents or based on regional priorities. Field technicians will be responsible for preparing sampling kits that include field logs, chain of custody forms, sample labels, sampling bottles, decontamination equipment and tools.

Quality assurance and quality control for sampling processes begin with proper collection of the samples in order to minimize the possibility of contamination. Water samples will be collected in laboratory-certified, contaminant-free sample bottles. Samples will be collected in the correct container per the specific method for each analysis. Samples will be labeled with all pertinent information including the sample location, sample ID, sample date and time, analysis to be performed, and initials of the person collecting the sample.

Field blanks will be collected at a rate of 1 sample per sampling event or as determined to be representative of the sample conditions and time frame. Field blanks are check samples that monitor contamination originating from the collection, transport, or storage of environmental samples. A field blank is analyte-free water that is poured into the sample collection device immediately following equipment decontamination and sub-sampled for chemistry analyses to verify that field cleansing procedures are adequate and sampling handling and transportation does not introduce any analytes of interest.

Field duplicates will be collected at a rate of 1 sample per event or as determined to be representative of the sample conditions and time frame. Field duplicate samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision; therefore, the results may have more variability than laboratory duplicates which measure only laboratory performance.

Chain of custody (COC) forms will accompany all samples and will be initiated immediately following sample collection. The COC will be used to document and track the possession of the samples to the appropriate laboratory for analysis and also indicates which analyses will be performed on each sample. All samples will be stored in a secured cooler on ice or per the method specified holding conditions. Delivery of the samples to the laboratory will be made with sufficient time to meet the method specified holding times for analysis.

The chemistry analysis of the samples collected will be performed by a California Department of Health Services ELAP accredited laboratory. All analyses will be conducted following the method specified on the COC or as included in the workplan provided to the laboratory and will follow the minimum quality control checks specified by the method.

In future years, the Regional Monitoring Workgroup will continue to work collaboratively with the WURMP Workgroup in the development of a list of potential source identification areas and will prioritize the list based on the guidance presented in the Model Monitoring Program. Additionally, the watershed priority problems in Table 2-1 developed by the WURMP Workgroups and the leveraging of information from the studies presented in Table 2-2 will be considered in the prioritization of potential source identification studies.

3.0 ASSESSMENT AND REPORTING

3.1 Reporting

The Annual Regional Monitoring Report submitted January 31 will include a description of the source identification monitoring that was implemented in the past Permit year. To be reported are the locations, constituents sampled, the results of the sampling, and follow-up actions taken.

Copermittees will consider the results of the studies in the implementation of their Jurisdictional Urban Runoff Management Programs and Watershed Urban Runoff Management Programs.

3.2 Program Review and Modification

As stated previously in this document, Order 2007-0001 provides the Copermittees flexibility to develop a workable source identification monitoring program. Specifically, section II.A.11 of the Permit Fact Sheet states:

“Since a monitoring program for source identification is mostly new, the Copermittees are provided significant leeway in the development and implementation of the program. The Copermittees can utilize the flexibility incorporated into the monitoring and reporting program to develop a program that is workable for them while providing the necessary information.”

The program described in this document meets the Permit criteria for a source identification monitoring program. As stated previously in this program, the initial year of the program will focus on data analysis collected in the MS4s and on developing a list of potential source identification studies. The prioritization will include watershed priorities and leveraging resources with other watershed studies. Copermittees should ensure that the data they collect can be directly related to making management decisions (such as site cleanups and improved BMPs) for water quality improvements.

The source identification studies are special studies, and therefore, by their nature are anticipated to be focused studies of relatively short duration that will be targeted to answer specific questions. The studies will be reviewed and modified as necessary to more effectively meet the goals of the program.

4.0 REFERENCES

Model Monitoring Technical Committee. 2004. *Model monitoring program for municipal separate storm sewer systems in southern California*. Southern California Coastal Water Research Project, Westminster, CA. Online at: ftp://ftp.sccwrp.org/pub/download/PDFs/419_smc_mm.pdf

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