1999

Roles of municipalities in watershed monitoring of nonpoint source pollutants

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**ROLES OF
MUNICIPALITIES IN
WATERSHED MONITORING
OF NONPOINT SOURCE POLLUTANTS**

A Thesis

Presented to

The Faculty of the

Department of Environmental Studies

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Lisa Ann Bennett

December 1999

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Abstract

**Title: Roles of Municipalities in Watershed Monitoring
of Nonpoint Source Pollutants**

Investigator: Lisa Ann Bennett

Nonpoint source pollution is the leading cause of water pollution in the San Francisco Bay, an impaired waterbody under the federal Clean Water Act. Better monitoring of watershed inputs to the Bay is needed to improve water pollution control. A watershed-based approach is mandated locally to ensure that both the Bay and its watersheds are protected and enhanced.

This thesis identifies current watershed monitoring activities and potential future roles of four West Valley (WV) municipalities in the Santa Clara Valley, as they relate to urban nonpoint source pollution of San Francisco Bay. This research also documents current roles of other players' monitoring activities and examines how different players are contributing toward regulatory requirements and the intent of watershed monitoring. The principal product of this work is a watershed policy "toolkit," consisting of an integrated database of monitoring activities, a decision-making framework, and monitoring participation guidelines. These tools help municipalities identify watershed monitoring gaps and their appropriate monitoring contributions. Although there are gaps in the database, the database was used to make preliminary recommendations.

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Abbreviations

BASIN PLAN	San Francisco Bay Basin (Region 2) Water Quality Control Plan
BASMAA	Bay Area Storm Water Management Agencies Association
BMPs	Best Management Practices
CRMP	Coordinated Resource Management and Planning
CWA	Clean Water Act
EPA	Environmental Protection Agency
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
POTW	Publicly Owned Treatment Works
RWQCB	San Francisco Regional Water Quality Control Board
SCB WMI	Santa Clara Basin Watershed Management Initiative
SCV URPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program (formerly Santa Clara Valley Nonpoint Source Pollution Control Program (SCV NSPCP))
SCVWD	Santa Clara Valley Water District
SFE RMP	San Francisco Estuary Regional Monitoring Program
SWRCB	State Water Resources Control Board
URMP	Urban Runoff Management Plan (formerly Storm Water Management Plan (SWMP))
WV Municipalities	Campbell, Los Gatos, Monte Sereno, Saratoga
WV URMP	West Valley Urban Runoff Management Plan

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I. Introduction

A. Motivation

In California's San Francisco Bay Area, a multitude of agencies, organizations, and communities have started to address water quality issues on a watershed basis. The watershed approach is particularly important for the control of urban nonpoint source pollution (urban runoff) in watersheds with overlapping federal, state, regional, and local jurisdictions, and with numerous entities and programs involved in water quality protection. Because downstream surface water quality potentially is affected by all pollution sources within a watershed, coordinating activities throughout the entire watershed is critical.

Employing a watershed-based approach to solve the myriad interdependent water resource problems is of increasing interest to Bay Area regulators and municipal stormwater managers.¹ In particular, four West Valley (WV) municipalities -- Campbell, Los Gatos, Monte Sereno, and Saratoga (App. M, Figs. 1- 2, 6) -- currently are striving to determine their respective roles in regional watershed monitoring, especially as it relates to urban runoff.

The West Valley area consists primarily of small residential and commercial communities (most less than 30,000 people per community) whose contributions, in both source types and magnitudes, to nonpoint source pollution in the watersheds are likely to differ substantially from those of the surrounding larger, heavy industrial or manufacturing communities. Due to these differences, the appropriate roles of the WV municipalities in watershed monitoring might

differ considerably from those of the neighboring communities. In addition to the effects of nonpoint source pollution on the Bay, the effects of nonpoint source pollution on water quality and beneficial uses within the local watersheds are also of concern.

The watersheds of interest encompass creeks that flow first through the small WV communities, Campbell, Los Gatos, Monte Sereno, and Saratoga, and then through larger jurisdictions on their way to the San Francisco Bay. The watersheds lie in the North Central and Central Flood Control Zones (App. M, Figs. 3-5), and include: Los Gatos Creek, which flows primarily through Los Gatos and Campbell (App. M, Figs. 1-2, 5, 6) Saratoga Creek, which flows through Saratoga (App. M, Figs. 1, 4, 6); San Tomas Aquino Creek, which provides a natural jurisdictional boundary between Saratoga, Campbell, Monte Sereno, and Los Gatos (App. M, Figs. 1, 3-4, 6); Calabazas Creek, which flows through Saratoga (App. M, Figs. 1, 3-4, 6) and Prospect Creek, which is a tributary to Calabazas Creek, and also flows through Saratoga (App. M, Fig. 6).

The focus of this thesis is on monitoring and controlling nonpoint source pollution to the Bay and protecting beneficial uses within local WV watersheds. There is a clear mandate to protect the Bay and its tributaries from nonpoint source pollution. Whether this mandate extends to protect all beneficial uses of local watersheds is not entirely clear. This thesis examines the details under the requirements of the mandate, as well as the intent(s) of monitoring, and investigates the extent to which the mandate and intent(s) are protecting both the

Bay and local watersheds.

The goal of this thesis is to determine the potential and appropriate roles WV municipalities could play in regional monitoring of urban nonpoint source pollution (urban runoff).² To accomplish this goal, it is important to assess the monitoring activities currently being conducted in the watersheds, and the extent to which those activities facilitate regulatory and environmental goals.

Comparing the two types of activities identifies gaps that could be filled by the municipalities. Monitoring activities analyzed include: 1) activities that support regulatory mandates and 2) activities that support the public commitment to watershed protection (monitoring intent).

B. Background Information

This section first introduces issues surrounding nonpoint source pollution in the Bay. Second, mandates for watershed monitoring are described, including regulatory mandates, existing mandated activities, and agencies' roles in mandated activities. Third, initiatives and partnerships (voluntary efforts) are briefly described.

1. Nonpoint Source Pollution in the Bay

The State Water Resources Control Board (SWRCB) lists the San Francisco Bay as an impaired waterbody under the federal Clean Water Act.³ Both point and nonpoint sources of water pollution continue to have negative impacts on the formally designated beneficial uses of the Bay. Urban areas,

such as the South Bay, are contributors of urban runoff pollutants, such as heavy metals, oil and grease, pesticides, and sediment from surface runoff. Indeed, stormwater runoff, surface runoff, and urban runoff are cited as the leading cause of water pollution in San Francisco Bay (RWQCB Basin Plan 1995, Ch. 4.2). Through complex systems of pipes, outfalls, and storm drains, these pollutants flow directly into creeks and rivers without treatment, eventually ending up in the Bay.

The fourth largest metropolitan region in California, San Francisco Bay is home to over 6.5 million people as well as to numerous plants and animals. Many Bay Area watersheds serve as spawning areas for fish including endangered species, such as coho salmon and steelhead trout in the Guadalupe River in San Jose (Personal Communication with Larry Johmann, 1997). Their survival is crucial to ensure that the intent of the CWA, fishable and swimmable waters nationwide, is realized. (Federal Water Pollution Control Act §101). Similarly, EPA's indicators for water quality objectives, such as the objective to Conserve and Enhance Aquatic Ecosystems (EPA 1996, ii, iii), depend upon the biological integrity of aquatic communities to ensure CWA compliance.⁴

Pollution in creeks has myriad negative impacts on these species and their host ecosystems. Landscape and garden-related pollutants, such as soil and yard clippings, can smother spawning beds of migratory fish. Automobile-related pollutants such as used motor oil can coat fish gills, bird feathers and fur, and it is toxic to aquatic life. Auto fluids such as antifreeze contain metals and

other chemicals that are toxic to fish. Metals, such as copper from brake pads, can accumulate to toxic levels in the tissues of shellfish and waterfowl in the Bay. Household-related pollutants, such as paints and detergents, also have negative impacts on wildlife, plants, and other organisms (CCRS/SCVWD 1996, Creek Pollution: Sources and Solutions). In a SCV URPPP study on metals (Woodward-Clyde 1997), urban nonpoint pollutant sources were estimated to contribute 53 percent of the total load of copper, 39 percent of the total load of mercury, and 13 percent of the total load of nickel to the Bay.⁵

2. Mandates for Watershed Monitoring

a. The National Pollutant Discharge Elimination System (NPDES) regulatory mandate

Until amended in 1987, the CWA did not effectively regulate nonpoint source pollution. In the 1987 amendment, EPA recognized that nonpoint sources are a large contributor to water pollution. These 1987 amendments allow urban runoff discharges into navigable bodies of water from storm sewer systems only under a nationwide surface water permit program called the National Pollutant Discharge Elimination System (NPDES) (FWPCA §402).⁶ Municipalities are now required to prohibit any discharges other than stormwater from entering the storm drain system and the creeks.

Fifteen agencies, including thirteen municipalities, Santa Clara County, and the Santa Clara Valley Water District, have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCV URPPP) and

jointly hold a stormwater NPDES discharge permit. Each of the four WW municipalities are Co-permittees under the stormwater NPDES discharge permit issued by the Regional Water Quality Control Board (RWQCB), and are part of the SCV URPPP. Thus, any Program requirement or activity directly affects and involves the participation of these municipalities (SCV URMP 1997, Appendix B1). The SCV URPPP's 1995 NPDES permit requires Co-permittees to 1) implement a stormwater management plan that includes a watershed management strategy, and to 2) submit an annual monitoring program plan. This monitoring plan includes provisions for conducting watershed monitoring activities (RWQCB NPDES Permit 1995).

The responsibility for water quality planning and regulatory decisions in the San Francisco Bay is delegated to the San Francisco Regional Water Quality Control Board (RWQCB). The San Francisco Bay Region's 1995 Water Quality Control Plan (Basin Plan) provides some explanation for why watershed management and monitoring have been included as permit provisions. Although the Regional Board has administered the NPDES program for many years to control municipal and industrial wastewater discharges, "...urban and agricultural runoff have continued, for the most part unchecked" (RWQCB Basin Plan 1995, Ch. 1.3).

b. Mandated activities: existing and planned

Because stormwater runoff continues to contribute a majority of the pollutant loading to rivers, streams, bays, lakes, and lagoons in the San Francisco Bay Area, the Regional Board has begun to focus on reducing pollution from urban and agricultural runoff. Taking its lead from the SWRCB and from EPA, the RWQCB has proposed watershed management to more effectively control nonpoint source pollution.

c. Agencies roles in mandated activities

In response to NPDES permit stormwater regulations, many stormwater management programs, such as the SCV URPPP, called for investment of significant time, money, and effort towards stormwater monitoring, often focused on "...end-of-the pipe conditions and chemical and physical water quality criteria" (Claytor and Brown 1996, E1). The SCV URPPP, from 1988 until 1996 primarily focused on fixed-station, wet-weather monitoring, collecting samples from up to four stormwater outflow stations for analysis of metals pollutants and toxicity. (See SCV URMP 1997 p. 69, App. D; Annual Reports 1996, 1995).

Many stormwater managers and regulators have begun to question the adequacy of this kind of monitoring to accurately describe important aspects of existing conditions in receiving waters, to evaluate the overall integrity of aquatic communities, and to assess changes in the status of stream systems (Claytor and Brown 1996, E1).⁷ With this recognition, the RWQCB requested the SCV URPPP in August 1996, to suspend fixed-station, wet-weather monitoring and

redirect resources to watershed monitoring.⁸ Specific requests included "characterization of drainage areas, watershed monitoring proposals, and consideration of physical, biological, and chemical indicators to assess drainage areas" (SCV URMP 1997, 69-70; August 1996 letter from RWQCB to SCV URPPP Management Committee, via Chairman Frank Maitski).⁹

The intent of watershed monitoring is to go beyond traditional "end of the pipe" monitoring and include a broader concern for physical and biological characteristics, and impacts on ecosystems and communities (EPA OWOW website, 3). The SCV URPPP clearly recognized the need to focus resources on watershed monitoring and revised its monitoring goals and planned activities accordingly in its 1997 Urban Runoff Management Plan (URMP).¹⁰

3. Initiatives and Partnerships (Volunteer Efforts)

Complementing the regulatory mandates of the CWA and the NPDES permit are voluntary initiatives and various partnerships that have formed to cooperatively address watershed-based issues. Many voluntary efforts and monitoring activities exist in or affect the WV communities' watersheds indicating a strong public interest in and commitment to watershed protection. This work examines those efforts to assess the full scope of watershed monitoring activities and to help determine potential future roles for WV municipalities.

Voluntary initiatives, such as the Santa Clara Basin Watershed Management Initiative (WMI), are frequently stakeholder-based and interest driven. Some of the WMI stakeholders include environmental groups,

businesses, and agencies. The WMI was initiated by the RWQCB "...as a part of its commitment to facilitating protection of south San Francisco Bay from point and nonpoint sources of pollution" (WV URMP 1997, 20). The WMI includes a diverse group of stakeholders committed to pollution control and watershed protection (See Appendix E).

The WMI is currently developing an assessment and report on the State of the Santa Clara Basin Watershed from which a comprehensive watershed management plan will be devised. This plan will integrate existing programs and identify what additional efforts are required to reduce and prevent nonpoint source pollution in the entire Santa Clara Basin watershed (See App. M, Fig. 2). This study contributes to that effort by identifying existing monitoring programs and activities in WV watersheds and determining the efforts required of WV municipalities to most appropriately monitor and ultimately control nonpoint source pollution discharges from their watersheds to local creeks and the Bay. The four WV municipalities considered in this study are part of the WMI through SCV URPPP activities.¹¹

Additional watershed partnerships and collaborators also exist. Some of the main efforts of interest to the WV municipalities include:

- 1) Bay Area Storm Water Management Agencies Association (BASMAA), which has developed a regional monitoring strategy;¹²
- 2) San Francisco Estuary Regional Monitoring Program (SFE RMP), which is partially funded by the SCV URPPP for special studies with significance to the San Francisco Bay Area;
- 3) Coordinated Resource Management and Planning (CRMP), a cooperative process that led to the development of a draft watershed plan for San Francisquito Creek;¹³

- 4) Coyote Creek Riparian Station (CCRS), which although currently closed, had developed numerous monitoring protocols, "StreamKeeper" programs, training workshops, and had conducted many watershed studies;
- 5) Saratoga School District, which has developed creek curricula and ongoing monitoring programs for children

C. Thesis Statement

The three goals of this thesis are as follows: 1) to identify current monitoring activities of WV communities, 2) to document the current roles and activities of other entities fulfilling regulatory requirements and the intent of watershed monitoring, and 3) to ascertain the WV municipalities' *appropriate* future roles in regional watershed monitoring of urban nonpoint source pollutants. A municipality's contribution to monitoring activities is considered *appropriate* in this work if it addresses the types of pollutants a community is likely to contribute to the watershed and Bay (both directly and indirectly), and best utilizes institutional resources. The research objectives derived from these goals are described below.

D. Research Objectives

- 1) Describe existing monitoring programs in and affecting WV watersheds**
 - a) Determine which agencies and organizations in the WV communities are currently fulfilling what regulatory requirements for watershed monitoring and the intent(s) of watershed monitoring**
 - i) Detail applicable regulatory requirements for watershed monitoring**
 - ii) Describe intent(s) (non-mandated) of watershed monitoring**
 - iii) Identify programs capacities in which WV municipalities currently participate**
 - iv) Identify non-municipal contributions to monitoring activities**
 - b) Identify gaps (where requirements or intent(s) are not being met or where more effort could be placed)**
- 2) Identify potential roles of WV municipalities in regional watershed monitoring of urban nonpoint source pollutants**
 - a) Develop framework to identify probable/known NPS pollutants for each WV watershed, as well as relative financial/infrastructure resources each community could offer, for the purpose of developing criteria for "appropriate" roles in regional watershed monitoring**
- 3) Based on "appropriate" roles in watershed monitoring, describe conceivable monitoring/monitoring-related activities/ways for WV municipalities to enhance participation**
 - a) Determine watershed monitoring participation guidelines**
 - b) Document monitoring activities in which WV municipalities could most effectively participate**

II. Related Research and Literature Review

A. Relevant Literature

The intent of this literature review is to provide an appropriate conceptual framework for the problem and to illustrate the national, state, regional, and local trends towards applying a watershed-based approach to address nonpoint source water pollution. The research is divided into three pertinent fields: 1) Environmental Regulation, 2) Watershed Management and Planning, and 3) Environmental Monitoring. While much informal literature exists, such as brochures on voluntary organizations, this review primarily focuses on government publications, materials with regional significance, and related journal articles.

1. *Environmental Regulation*

a. National/Federal Regulatory Documents

Although no specific section of the 1972 **Federal Water Pollution Control Act (Clean Water Act [CWA])** or the 1987 amendments addresses watershed monitoring requirements explicitly, several sections of the CWA cover general water quality surveillance systems and monitoring (see for example, CWA §104, §106, §303, §304, §308, §502). An extremely important section of the CWA in terms of water quality is §101a: the restoration and maintenance of chemical, physical, and biological integrity of the Nation's waters, referred to in the *Congressional declaration of goals and policy*. Another significant section, §319, *Nonpoint source management programs*, refers to watersheds specifically when

declaring that a State shall, to the maximum extent practicable, develop and implement a management program on a watershed-by-watershed basis (§319 b.4). Thus the CWA does not currently require a watershed approach to address nonpoint source pollution. However, an incentive-based watershed approach has been recommended in other federal clean water initiatives to meet the goals of the CWA.

The **Clean Water Action Plan**, recently submitted to Vice President Albert Gore, Jr., February 1998, on behalf of the Environmental Protection Agency, Department of Agriculture, and other federal agencies, provides a "blueprint for restoring and protecting water quality" (Action Plan 1998, lxxxiv). The key element of the Action Plan is a watershed approach, which involves a new collaborative effort by federal, state, tribal, and local governments, the private sector, and the public to restore watersheds not currently meeting clean water goals, and to sustain healthy watersheds (Action Plan 1998, iii). About 1,000 of over 2,000 watersheds nationally need restoration and protection to meet basic water quality goals, such as fishable and swimmable waters (Action Plan 1998, vii). Stormwater runoff is one of the leading remaining causes of water quality problems in the United States (Action Plan 1998, lvii). The Action Plan illustrates many benefits of a watershed approach. For example, the approach promotes the coordinated implementation of programs to control point source discharges and reduce polluted runoff; goes beyond reducing chemical contamination of water to enhance overall aquatic health in a watershed; promotes greater

accountability and participation from the public, private landowners, and businesses, and allows for identification of cost-effective pollution control strategies to meet clean water goals (Action Plan 1998, lxviii).

The Action Plan lists four essential components of the proposed watershed approach: 1) unified watershed assessments, 2) watershed restoration action strategies, 3) watershed pollution prevention, and 4) watershed assistance grants. Currently, state and federal agencies and other entities use a diverse and often separate set of processes to assess water quality and identify watershed restoration and protection priorities in various areas including the San Francisco Bay-Delta. Unified assessments under a watershed approach will allow for a more efficient assessment process and provide a foundation to link programs with common priorities for watershed restoration and protection. Watershed restoration and pollution prevention on a watershed basis will require implementation of various actions, such as defining watershed restoration priorities and building strong partnerships. Because "nothing in the current [federal] law requires a watershed approach to addressing water quality problems," federal agencies will offer watershed grants as incentives to develop restoration strategies (Action Plan 1998, lxxv).

Perhaps most relevant to the roles of WV municipalities in watershed monitoring is the Action Plan's emphasis on the importance of the commitment and resources of local communities to clean up and protect watersheds and on building strong, effective partnerships. Besides helping to restore and protect

watershed health, watershed partnerships can also "lead to a common understanding of individual roles, priorities, and responsibilities" (Action Plan 1998, lxxvii). Additionally, the Action Plan suggests that better monitoring and characterization of the conditions of water bodies will support improved water pollution control programs and build public understanding of water pollution problems. The Action Plan also provides some possible roles government agencies can play in facilitating watershed partnerships such as providing information, financial assistance, staff support, and technical assistance, or helping to design management strategies and implement actions related to clean water. One action that federal agencies have undertaken is to increase information and technical assistance to support local organizations and citizens in locally based watershed protection efforts.

b. Regional Regulatory Documents

The San Francisco Bay Basin (Region 2) 1995 Water Quality Control Plan (Basin Plan) provides information on the San Francisco Bay Region, including watershed management planning and approaches; beneficial uses; water quality objectives; an implementation plan that includes nonpoint source control and urban runoff management measures; plans and policies; and surveillance and monitoring. The Basin Plan illustrates the trend towards a watershed management framework for regional water quality control. The Regional Water Quality Control Board (RWQCB) incorporates three levels of programs in its watershed approach directed at: 1) the larger San Francisco Bay;

2) smaller segments within the Estuary, and 3) individual watersheds draining into the larger system, in which the WV communities fall (See App. M, Fig. 2). As stated in the implementation component of the Basin Plan, "...watershed management involves ongoing research, investigation, and monitoring, along with control measures or changes in practice" (RWQCB Basin Plan 1995, Ch. 4.1), regardless of whether the focus is on a whole system or a single creek. The RWQCB's new philosophy guiding watershed management, reflected in the Basin Plan, Ch. 1.3, is particularly relevant to the potential roles of local municipalities such as the West Valley communities:

The emphasis will be on preventing pollution before it occurs by managing resources more carefully, as opposed to cleaning up pollution after the fact. To help accomplish this goal, the Regional Board is initiating watershed management planning for several counties.¹⁴ The Regional Board firmly believes that *watershed planning and protection efforts will not be effective unless solutions are defined and implemented at the local level*. An effective watershed management plan will require formulating water quality goals and objectives for watershed protection and enhancement, then committing to specific tasks that will eventually allow the objectives, and ultimately the goals, to be met. Tasks could include a wide range of actions, such as improving coordination between regulatory and permitting agencies, increasing citizen participation in watershed planning activities, improving public education on water quality and protection issues... (RWQCB Basin Plan 1995, Ch.1.3) (Italics added)

Several provisions of the SCV URPPP's RWQCB 1995 National Pollutant Discharge Elimination System (NPDES) Permit mandate monitoring and watershed measures, illustrating a watershed approach. Watershed management measures in the Permit "seek to develop and implement the most cost effective approaches to solving identified problems and to coordinate these

activities with other related programs" (RWQCB NPDES Permit 1995, C. Prov. 7, 15).

The SCV URPPP's 1997 Urban Runoff Management Plan (SCV URMP) satisfies certain conditions of the SCV URPPP's 1995 NPDES Permit. The SCV URMP details what the SCV URPPP is doing to reduce urban runoff pollution in Santa Clara Valley watersheds. The monitoring component of the 1997 SCV URMP is most relevant to the WV municipalities watershed monitoring, and includes a revised monitoring strategy that demonstrates a reorientation towards a watershed approach. In following this strategy, the **SCV URPPP's March 1998 Monitoring Plan** recognizes that watershed management is "subsuming pollution prevention as the operating model for protection of aquatic resources (and particularly for protection of creeks and wetlands)" (SCV URPPP Monitoring Plan 1998, 2). The monitoring plan is composed of diverse projects grouped by objective for coordination, such as "watershed" projects, which are intended to assess the beneficial uses of creeks, wetlands, and riparian areas; identify causes preventing attainment of beneficial uses, and identify cost effective ways to address the causes preventing attainment (SCV URPPP Monitoring Plan 1998, 3). Another element of the monitoring strategy is continued SCV URPPP participation in the Santa Clara Basin Watershed Management Initiative (SCB WMI), in preparation for an eventual State of the Watershed Report.

c. Local Regulatory Documents (Within WV Watersheds)

The September 1997 **West Valley Clean Water Program Community Specific Urban Runoff Management Plan (WV URMP)** details how the four municipalities of Campbell, Los Gatos, Saratoga, and Monte Sereno plan to implement the SCV URMP, to prevent and/or reduce stormwater pollution. The WV URMP also recognizes the trend toward a watershed approach, evident in its short physical descriptions of the WV watersheds (p. 2) and in its descriptions of related programs such as the Santa Clara Basin Watershed Management Initiative (SCB WMI). Furthermore, a creek/watershed monitoring strategy was developed as a project for the West Valley Clean Water Program, and intended as a component of the WV URMP.

The four **WV Municipalities' General Plans** also give examples of the local trend towards employing a watershed approach. **Los Gatos's 1985 General Plan** Open Space, and Conservation and Historic Preservation policies consider the effects on watershed areas before allowing development of any open space (sec. 7.5); keep a maximum of the watershed in an open natural state and require EIRs for development in undeveloped watershed areas (sec. 8.4.2); and protect natural watershed lands (sec. 7.6). **Saratoga's General Plan** has a Conservation element to protect watersheds by stringent erosion control and by minimizing grading during development. There is also an Open Space element that includes watershed lands as open space and has a policy of protecting watershed and water resources to ensure water supply and water

quality (Saratoga GP 1993, 2-17, 4). **Monte Sereno's General Plan** recognizes the value of watersheds as natural resources, and has a Natural Resource Preservation policy to monitor and participate in regional activities affecting water resources, groundwater, and water quality (Monte Sereno GP n.d., 48, 51-52). **Campbell's General Plan** includes Conservation and Open Space goals and policies to prevent the pollution of streams and to preserve streams, fish, and wildlife habitats (Campbell GP 1972, 78-79; 1990, 1).¹⁵

d. Other Regulatory Documents

Additional federal, state, and other plans and guidance also apply to watershed management and monitoring, such as: Code of Federal Regulations; Coastal Zone Act Reauthorization Amendments of 1990 (CZARA); California Water Code (Porter-Cologne Act); Fish and Game Code; Comprehensive Conservation and Management Plan (CCMP); California Health and Safety Codes, and Santa Clara Valley Water District Flood Control Regulations. (See SCV URMP App. B; CCRS/SCVWD 1996 Community Creek Watch Program: StreamKeeper's Program Report, San Francisquito Creek. Applicable sections of these regulations and plans are included in Section IV.E., Table 3.

e. Journal Articles

Additionally, several authors of journal articles dealing with regulation also point to a need for a watershed approach. EPA Administrator Carol Browner (1994) argues that America's waters are in trouble. She states that "the single greatest remaining threat to America's rivers, lakes, and estuaries is polluted

runoff, sometimes called nonpoint source pollution, [and] to solve this problem we must change the Clean Water Act to embrace a comprehensive 'watershed' approach to water quality" (Browner 1994, 6).

Similarly, Vincent Leclair (1997) states that nonpoint water pollution sources may come under tighter regulation as a result of courts forcing EPA and states to regulate with total maximum daily loads (TMDLs). TMDLs, which are part of the CWA, "identify the pollution contributed to a body of water by different sources and allocate reductions among the sources to meet water quality standards" (Leclair 1997, 178A). The manager of the TMDL program in EPA Region 3 views TMDLs as the basis for a watershed approach as well as the means to finally quantify nonpoint source pollution (Leclair 1997, 178A). This TMDL process is pertinent regionally because TMDLs are currently being determined for San Francisco Bay and are also being addressed in the SCB WMI through the Bay Monitoring and Modeling Subgroup and a TMDL workgroup. The current focus of the copper and nickel TMDL workgroup is on data collection and analysis, conceptual model development, assessment of beneficial use impairment, and simulation model development (SFEI RMP News Spring 1999, 4).

2. Watershed Management And Planning

a. Statewide Documents

Just as using a watershed approach to resolve complex water resource problems is advocated in numerous regulatory documents, so too is the

approach advanced in various watershed planning reports and strategies. **Water Environment Research Foundation's 1996 Framework for a Watershed Management Program** establishes a statewide unifying watershed management framework that is particularly insightful with regard to local roles within the framework. In a section on defining local roles, the report provides a range of suitable watershed activities, possible watershed plan content, and incentives for local participation. Suggested watershed activities include monitoring; public outreach and education; defining watershed boundaries; environmental assessment; determining goals, objectives, strategies, roles and responsibilities; documenting results, and implementation. Specific recommended activities include stormwater control and coordination of point and nonpoint source control programs, among other elements (WERF 1996, 3-6, 3-7). Suggestions for local watershed plan content include floodplain mapping; reservoir protection; instream flows; *stormwater, wastewater, and NPS planning*, and wetlands protection, among other elements (WERF 1996, 3-8). Some incentives for local participation in monitoring and assessment activities include: better identification of nonpoint sources of pollution; ways to consolidate monitoring requirements such as stormwater and NPDES programs, and the "belief that an objective process will result in a more manageable agenda than the program mandate model" (WERF 1996, 3-15). The report advocates the approach being taken by the WV municipalities, namely that local watershed plans be consistent with basin plans, such as the RWQCB Basin Plan, and correlate large basin issues with small

watershed priorities.

b. Regional Documents

The Bay Area Stormwater Agencies Association's (BASMAA) February 1998 Regional Monitoring Strategy (BRMS) also advocates a watershed approach. In the draft support document for the development of the regional stormwater monitoring strategy, the introduction (p.4) states that "it is necessary to expand the stormwater programs' fundamental approach toward watershed management, both locally and regionally," to fulfill the intent of the CWA. The BRMS is intended to provide a basis for coordinated Bay Area stormwater monitoring. Since the SCV URPPP (and thus the WV municipalities) is a member of BASMAA, and since the SCV URPPP's monitoring strategy supports the BRMS, it is particularly important that this work reviews the guiding principles, objectives and study design plans of the BRMS.

The San Francisco Estuary Institute's (SFEI) 1996 Watershed Characterization Strategies and Monitoring Goals developed out of the need for an overarching watershed characterization strategy for the San Francisco Bay Area. This guidance document provides a conceptual model for watershed management to assist volunteer groups and agencies in volunteer inventory, assessment, and monitoring activities. It also suggests roles for volunteer monitors and provides a framework for the use of data from volunteers in stormwater monitoring programs. Finally, this document provides a hypothetical watershed characterization and monitoring design framework, and a proposed

adaptive watershed management model that includes a monitoring component, as well as a list of monitoring objectives provided by different San Francisco Bay Area groups (Hoenicke, Rigney, and Kaufman 1996, 6-27).

SFEI, in January 1997, also developed the **Bay Area Watersheds Science Plan: The Role of Watershed Science to Support Environmental Planning and Resource Protection**. This document is intended to show how SFEI can help provide scientific information required to protect and manage local watersheds in the Bay Area. The document emphasizes that many policies and programs are enacted by local agencies to manage various aspects of watershed health, such as land use, water supply, flooding, and pollution; however, no local or regional assessment of watershed conditions exist. A regional plan of watershed science is needed "to integrate among the various efforts of government to assess and report on the health status of local watersheds" (Science Plan 1997, 3). One interesting item that this plan asserts is that all aspects "are scientific and not political; SFEI is uniquely qualified as a [scientific] organization to conduct and coordinate regional science because SFEI does not have private or political interests in the results" (Science Plan 1997, 4). Another item of interest is the emphasis placed on managers' understanding of the *contributions of local sources of pollution to improve water quality*- a dominant concern for watershed managers (italics added) (Science Plan 1997, 5). The plan can be summarized in three steps: 1) Develop an understanding of the environmental past, the present, and change (through reconnaissance and data

collection, and detailed investigation); 2) Based upon the understanding of change, develop quantitative resource objectives for the future, and 3) Monitor progress toward the objectives, and monitor the risk that the objectives might not be achieved (Science Plan 1997, 5).

Another regional document reflecting a watershed management approach is the **SCB WMI's July 1997 Draft Work Plan for Preparing a State of the Watershed Report**. This work plan describes the tasks necessary to produce a State of the Santa Clara Basin Watershed Report and provides background, goals and objectives of the State of the Watershed, as well as the scope of the work plan, and the structure of the document. Elements include: a preliminary assessment report; revised assessment report; recommended follow up activities; report production and distribution; and concurrent support activities. Also included are a glossary of terms and acronyms and specific tasks and work products for each element. It is very important for the WV municipalities to understand the goals and objectives and to closely follow the activities of the SCB WMI to know what role(s) to potentially play in these regional monitoring activities.

c. Local Documents (Outside WV Watersheds)

The San Francisquito Creek Coordinated Resource Management and Planning (CRMP) 1997 Draft Watershed Management Plan (in Palo Alto, CA) describes the CRMP process and who has been involved; states the draft planning goals and proposed actions to implement these goals; outlines the

accomplishments of the CRMP process to date; and lists opportunities for the various stakeholders to participate in implementing the planning goals. Task forces include: Natural Resource Preservation, Flood and Erosion Control, Pollution Prevention, Land Use and Development, Social Issues, and Public Education and Involvement. The various recommendations of the Task forces make up the Plan. To illustrate, the Pollution Prevention Task Force has a planning goal of ensuring "that the waters of San Francisquito Creek are of sufficient quality and quantity to sustain native riparian and aquatic habitat for both wildlife populations and human recreational activities" (CRMP 1997, 5). To meet that goal, some proposed actions include: identifying problem activities, educating stakeholders, suggesting alternatives to prevent pollution, and involving stakeholders in implementing solutions (CRMP 1997, 5). Several actions were taken by the Task Force, including: starting a streamkeeper program to monitor for pollution; re-publication of a yardwaste dumping brochure; placement of trash bins at bus stops near the Creek; an evaluation of local stormwater pollution prevention activities; and reviewing recycling and household hazardous waste collection services (CRMP 1997, 18-19). Implementation of the Plan suggests multiple partnership opportunities. Although San Francisquito Creek is not in the WV watersheds, this document may serve as an important watershed management and planning model for the WV municipalities.

Another successful watershed plan outside of the WV watersheds that could inspire the WV municipalities planning process is Napa County Resource

Conservation District's Napa River Watershed Owner's Manual: An Integrated Resource Management Plan. The Napa River, identified by the EPA and the RWQCB as a priority pollutant contributor to San Pablo Bay, requires best management practices to control sediment and other nonpoint sources of pollution in the watershed. The goals of this manual are to maintain a sustainable river ecosystem for the Napa River watershed, and to increase water quality and "water quantity available for beneficial [uses] of the watershed [for] human, plant, and animal communities" (Watershed Manual n.d., 9). The manual provides various recommendations for voluntary, cooperative resource conservation and community participation, and "attempts to begin integrating the many parts of the watershed through recommendations for land use practices and programs developed with the complexity of the system in mind" (Watershed Manual n.d., 8). Recommendations are listed by objectives, as well as by land use and resource type. The WV municipalities may benefit from recommendations such as "encouraging partnerships, alliances, and cooperation between and among groups" (Watershed Manual n.d., 29).

d. Journal Articles

In addition to regional and local plans and documents, many journal articles also address watershed management and planning issues. For example, in the *Engineering News-Record*, September 1996, the Association of Metropolitan Sewerage Agencies (AMSA) sponsored a special section entitled **Watershed Management: Clean Water's Next Act**, which contained over

fourteen articles on watershed management. In the introductory article, Robert Hite (1996), President of AMSA, argues that many of the nation's waters remain "imperiled due to hard-to-control sources of pollution...despite the successes achieved during the first 25 years of CWA protection and remediation" (Hite 1996, W-4). Only by changing the way water programs are managed, Hite believes, can water quality improvements be met. Hite advocates for comprehensive watershed management, which, he states, "has been identified as the most cost-effective, environmentally sound approach to address the remaining sources of water quality impairment without breaking the bank" (Hite 1996, W-4). AMSA's Principles of Watershed Management are also included in this article. One principle is particularly relevant to local communities; it states that "local stakeholders, which include government entities, sources of watershed impacts, users of watershed resources, the public, and others, must have the *primary role of protecting the watershed by making and executing watershed planning decisions*" (italics added) (Hite 1996, W-4).

Although every article in **Watershed Management: Clean Water Act** argues for a watershed approach, some are particularly relevant to the local communities. For example, Fox, Schellpfeffer, and Ridge (1996) state that "a watershed approach will enable limited local resources to be targeted to the most critical problems and also encourage regional solutions" (Fox, Schellpfeffer, and Ridge 1996, W-25). Abramson and Garner (1996) provide a particularly convincing argument regarding the role of small urban Kentucky watersheds.

They argue that CWA programs developed based on large watersheds may have little to do with small urban watersheds, which are often overlooked in national discussions on water quality in major watersheds (Abramson and Garner 1996, W-46). Although CWA goals of "fishable, swimmable" are definitely worthy, often times they are not achievable without tremendous cost in an urbanized watershed, for example, where areas of a stream are completely enclosed in concrete channels for flood control or drainage purposes. Abramson and Garner (1996, W-47) contend that "it is virtually impossible to undo the work that has been done [and also] totally unacceptable to make changes that would put property and individuals at risk from increased flooding." However, they offer many local watershed activities and projects that can be done, such as assessments of the watershed's flora and fauna, environmental education, and regular stream clean-up events involving local school children and other citizens. Abramson and Garner (1996, W-47) conclude by declaring that EPA and states should encourage and support projects in urban watersheds "and accept trade-offs with Clean Water Act programs if the net benefits from the watershed improvement projects can attract broad public support and achieve demonstrable results." This article is of special relevance to the small, urban WV communities since portions of several creeks in the watersheds are already in concrete channels. A more reasonable goal might be to make certain stretches in the communities fishable and swimmable or to improve or restore certain degraded sections. Furthermore, if small WV municipalities focus entirely on complying

with narrow CWA water quality standards, "our streams are left with trash, destroyed aquatic habitat, limited access, and no serious recreational use of any sort" (Abramson and Garner 1996, W-47). WV municipalities can look to the types of projects conducted in Kentucky for applicability in their own watersheds.

e. Conference Papers

Besides journal articles, many conference papers also illustrate invaluable watershed management and planning principles and theory. (See Martinson 1991, Romm 1994). For example, Martinson, Chief of the Nonpoint Source section at the State Water Resources Control Board, contends that cooperation and coordination with public and private land use and water quality agencies "is the link between watershed protection, water quality, and NPS control" (Martinson 1991, 108).

3. Environmental Monitoring

Environmental monitoring is the last component of the theoretical framework of the related research, and it provides a balance to the regulatory and policy-driven documents and papers described above in the Environmental Regulation and Watershed Planning sections. Rather than focus on actual physical protocols that can be used to monitor particular parameters, this section covers some specific trends in monitoring including environmental indicators and biological criteria, and the trend towards using volunteer monitors.¹⁶

One recent monitoring trend has been the use of environmental indicators to characterize environmental conditions. Because traditional compliance

monitoring "tracks only a small subset of pollutants and does not account for factors such as sedimentation and habitat alteration" (Pelley 1996, 381A), water bodies can be in compliance with water regulations and still be impaired. In other words, chemical water quality might not be in violation of standards, but biological communities could be impaired, nonetheless. Traditional stormwater monitoring can not inform the public whether "watershed health is getting better or worse, and why" (Science Plan 1997, 3). Managers and others require a set of assessment indicators or measures to evaluate the effectiveness of resource protection programs, goals, and objectives, and to track the health of aquatic ecosystems and watersheds. Monitoring for every possible parameter is not practical or "cost-feasible." Using environmental indicators is proposed as an effective way for organizations operating within a watershed to measure achievement toward water quality goals (Fellows, Belefski, Lehmann 1996, 1).

a. National/Federal Documents

The EPA, cognizant of the shortcomings of traditional monitoring for chemical or physical criteria, has given national attention to water quality indicators. As recent as February 1996, EPA's Office of Water, along with other partners, defined water quality objectives and related indicators as part of a National Goals Project. In June 1996, EPA "issued a set of 18 environmental indicators to track the health of the nation's aquatic ecosystems (Pelley 1996, 381A). Indicators, defined by the EPA in their June 1996 **Environmental Indicators of Water Quality in the United States** report, "measure progress

toward water quality goals, milestones, and objectives...provide information on environmental and ecosystem quality or give reliable evidence of trends in quality" (p.1). The eighteen indicators are designed to measure five broad water quality objectives: 1) to conserve and enhance public health; 2) to conserve and enhance aquatic ecosystems; 3) to support uses designated by the States and Tribes in their water quality standards; 4) to conserve and improve ambient conditions, and 5) to reduce or prevent pollutant loadings and other stressors (EPA 1996, iii). Indicators twelve and seventeen, surface water pollutants and nonpoint source loadings to surface water, address trends of selected surface water pollutants and agricultural nonpoint source pollutants, respectively.

Twenty-seven states were researching or developing environmental indicator projects in 1996, and twelve states were using biological indicators in their water programs in 1996 (Pelley 1996, 381A).¹⁷ Clearly, a widespread interest in the use of environmental indicators is developing. For example, In connection with EPA, Richard Claytor and Whitney Brown (1996) at the Center for Watershed Protection advocate the use of environmental indicators as an alternative technique to stormwater monitoring. Claytor and Brown maintain that environmental indicators can "provide insight into general environmental trends over time, and measure the effectiveness of existing environmental monitoring and management programs" (Claytor and Brown 1996, I-1). They stress the importance of "utilizing a comprehensive monitoring program, relying on multiple indicators [and] ...monitoring strategies on a watershed-wide basis" (Claytor and

Brown 1996, II-1). The report also includes six indicator categories, usefulness and advantages, and profile sheets for each indicator. Additionally, urban characteristics, such as impervious surface coverage, have recently emerged as environmental indicators (Arnold and Gibbons 1996, 243).

Another area that increasingly has gained recognition by the EPA and others is the use of biological criteria. EPA, in its 1990 **Biological Criteria National Program Guidance for Surface Waters** guidance document, describes biological criteria as "narrative expressions or numerical values that describe the biological integrity of aquatic communities inhabiting waters of a given aquatic life" (EPA 1990, viii).¹⁸ In direct reference to the three main goals of the CWA (chemical, physical, and biological integrity), EPA recognizes the necessity of chemical and physical integrity to address remaining water quality problems, but indicates that they aren't sufficient to attain biological integrity. "Only when chemical, physical, and biological integrity are achieved, is ecological integrity possible" (EPA 1990, 4). The purpose of the document is to provide states, regions, and others with a conceptual framework to develop and implement narrative and numeric biological criteria.

b. Regional Documents

SFEI produced a paper in January 1996 entitled, **The Developing Relationship Between Public Agencies and Volunteer Groups for Watershed Monitoring and Stewardship in the San Francisco Bay Area: An Issue Paper Based Upon a Survey of Agencies and Volunteer Groups**. The

paper is intended to "provide some general understanding of how the collection of environmental data can be used to benefit the environmental and economic well-being of the region" (Issue Paper 1996, 1). SFEI indicates that there is a large potential for agency-volunteer relationships for monitoring and stewardship [because] "the scope of Bay Area monitoring programs proposed by government is increasing, as the complex concepts of watersheds and ecosystems are built into a regulatory framework" (Issue Paper 1996, 1). The paper points out that regional monitoring can provide new understanding about natural variability, but not without tremendous data collection and fieldwork. This observation is significant because trends can not be assessed without understanding the nature of the variability. SFEI contends that "volunteer monitoring by citizens is a practical and ethical way to provide field data required to monitor local and regional progress toward environmental health" (Issue Paper 1996, 1). The paper also suggests an important and growing relationship between local stewardship efforts and local agencies: "As local and regional agencies take on more responsibility for environmental health, the developing relationships between agencies and volunteer groups will become increasingly important" (Issue Paper 1996, 27). Understanding and building these relationships with volunteer groups may be a very valuable monitoring strategy for the WV municipalities. Additional support and roles for volunteer monitors can be found in SFEI's **Watershed Characterization Strategies and Monitoring Goals** (see pages 6-11, 17-19, 23), discussed in the Watershed Planning section above.

B. Summary

The literature on environmental regulation, watershed management and planning, and environmental monitoring clearly illustrates that there is enormous emphasis on a watershed-based approach to monitor and control diffuse nonpoint sources of pollution. Yet, what is omitted from the literature is as important as what it contains.

While it is certainly commendable that a watershed-based approach is now considered a key element of a national clean water initiative, because the concept and practice are still new, many questions remain. For example, 1) How should watershed monitoring be defined? The term *watershed monitoring* has not yet been precisely defined at the federal, state, regional, or local level. Definitions of monitoring are also transitional. 2) What are the watershed monitoring requirements? No one plan or document currently contains or specifies regulatory requirements for watershed monitoring; thus applicable requirements need to be derived from statutes and other regulations. 3) What should be the roles and responsibilities of government, businesses, environmental groups, residents, and the public in watershed monitoring? 4) Who should make which decisions? For example, federal or state definitions and descriptions may not be applicable to or appropriate for small urban watersheds. All of these questions, virtually omitted from the literature, are important to the outcome of this thesis and to the future of watershed management.

III. Research Design

A. Conceptual Framework

To achieve the research objectives outlined in Section I, a multi-method approach was utilized. Section B1 describes the four approaches used for data acquisition. Section B2 describes the analysis.

B. Components of Research

This discussion of research methods is divided into two categories: data acquisition and data analysis. There were four main means by which data were acquired for this thesis: a) documentation review, b) questionnaire c) semi-structured interviews, and d) participant observation. Once acquired, data from all sources were compiled into a database (WV Monitoring Activities Database), providing information necessary to address research objectives 1, 2, and 3. Data were analyzed by two main means:

- a. Data placed into the WV Monitoring Activities Database were compared with regulatory requirements to identify data gaps and to identify potential partnerships and volunteer monitoring activities;
- b. Data gathered from all sources were used to develop a decision-making framework for selecting appropriate monitoring roles, and to develop monitoring participation guidelines.

A flow chart describing the relationship between various elements of the research design is included in Figure 7, below.

Figure 7: Relationship Between Elements of Research Design

1. Data Acquisition

a. Documentation review

The documentation review focused primarily on pertinent environmental regulation (federal, state, regional, and local documents), watershed management and planning, environmental monitoring, and local interest documents and literature. General Plans were reviewed for types of land uses, monitoring policies, and for information on community structures and resources. Regional and local regulatory plans, such as the Basin Plan, SCV URMP, and

WV URMP, were reviewed for regulation of pollutants of concern; local information on the watersheds; agency jurisdictions; and pollution prevention programs and strategies. The WV URMP (1997) was particularly instrumental for determining general classes of pollutants and the local impacts of pollutants on the watersheds. Relevant sections of the following legislative and regulatory documents were reviewed for details of regulatory requirements: the Code of Federal Regulation, Clean Water Act, Safe Drinking Water Act, Coastal Zone Management Act /Coastal Zone Act Reauthorization Amendments; California Water Code (Porter-Cologne Act), Fish and Game Code, Bay/Delta Water Quality Control Plan; RWQCB's Basin Plan, Comprehensive Conservation Management Plan, and SCV URPPP's 1995 NPDES permit. Watershed management and planning and environmental monitoring documents, such as EPA's *Top 10 watershed lessons learned* (1997); SFEI's "Issue Paper" (1996), and *The Volunteer Monitor* newsletters and conference materials, were reviewed to determine opportunities to use partnerships to encourage volunteer monitoring. Watershed, topography, and vegetation maps also were reviewed and compiled for a visual illustration of the watersheds (see App. M, Figures 1-6).

b. Questionnaire

An existing SWRCB monitoring questionnaire (Appendix B) was distributed by fax to all Bay Area governmental agencies and non-governmental entities known to have responsibility over water resources/stormwater pollution and/or known to conduct monitoring in WV watersheds, 31 in total (Appendix D).

The questionnaire determined what is monitored and how often, the goals of the monitoring programs, and the potential usefulness of volunteer support. The survey was cross-sectional; each respondent was surveyed only once. The 31 organizations (total population size) were initially identified with the help of WV Clean Water Program, a local nonpoint source program that represents the four WV municipalities. In addition to contacting the WV municipalities, the neighboring cities in the watersheds were also contacted. Follow-up phone/in-person interviews were conducted where appropriate.

c. Semi-structured interviews

Forty-three people in total were interviewed – 31 by phone and 12 in person – using the interview framework outlined in Appendix C. Follow-up interviews were conducted for 21 people who received the questionnaire. Twenty-two additional people who did not receive the questionnaire were also interviewed (see Appendix D); many of the additional respondents were identified from follow-up interviews. The interviews supplemented data from the questionnaire and helped fill in data gaps, as well as addressed a broad set of watershed values. The estimated number of questions for in-person interviews was between 10 and 20. The estimated length of in-person interviews was between one and one and one-half hours; phone interviews were between 15 and 30 minutes per interview. Questions asked during in-person interviews were more structured than those asked during phone interviews (Appendix C).

d. Participant Observation

Data on regional watershed monitoring activities were acquired by the author at local watershed management and coordination meetings as a participant-observer. These included:

- Santa Clara Basin Watershed Management Initiative (SCB WMI) Core Group Meetings (monthly);
- SCB WMI Watershed Assessment Subgroup Meetings (intermittently);
- SCV URPPP's Ad-Hoc Monitoring Strategy Meetings (intermittently);
- San Francisco Estuary Regional Monitoring Program's (RMP) Annual Meeting
- Other (for example, Volunteer Monitoring Conference; Symposium on Pollution Prevention, Creek and Watershed Symposium)

2. Data Analysis

a. WV Monitoring Activities Database

The data acquired from all sources were compiled into an integrated database (WV Monitoring Activities Database), created using Microsoft Access Database software. This Database was both a product of and analytical tool for this research. The WV Monitoring Activities Database is designed to be used by and shared with Bay Area regional monitoring organizations and was tested as an analytic tool for this study. It enables interested groups to look up local information, organized by the following fields: monitoring program category, organization, contact information, monitoring goals, description of activities, parameters monitored, monitoring frequency, watersheds, data collected, data available, and monitoring related activities. Monitoring program categories include: California State, regional, county-wide, municipality, educational, and

other programs. Although the database was as complete as possible at the end of this thesis, rapid changes in agency and community activities will require that it be continually updated to remain a useful planning tool.

After the surveys and interviews were conducted, the data (both quantitative and qualitative) were reviewed for completeness and sorted into the eleven fields indicated above.¹⁹ Because the maximum number of characters allowed per field in the database was 255, data over 255 characters were shortened and summarized before being entered into fields of the database, or split into two fields (e.g., data collected and data available). Data under 255 characters were also summarized before being entered into the database.

The WV Monitoring Activities Database was used in this analysis to compare data on existing monitoring programs and activities with regulatory requirements and intent(s), from which gaps in monitoring efforts were identified. The Database was also used to identify opportunities to implement potential partnerships and volunteer monitoring to address nonpoint source pollution. Data on pollutant contributions and resource contributions (community financial and infrastructure) of WV municipalities were not included in the regional WV Monitoring Activities Database, but they are used in the decision making framework, below.

b. Decision-making framework, guidelines

A decision-making framework was developed that gives WV municipalities a means to identify likely pollutants and financial/infrastructure resource

contributions using pollutant contribution and institutional resource (PC/IR) data sheets. Likely pollutants were based on general classes of urban runoff pollutants derived from the 1997 WV URMP and SCV URPPP's 1995 NPDES permit. Relative financial/infrastructure resource contributions were determined from: available staff resources; technical expertise; computer capabilities (i.e. GIS); data analysis, storage, retrieval capabilities; monitoring budgets/physical resources, e.g., sampling equipment; current pollution prevention programs and strategies; current public interest in monitoring and monitoring activities. Data for resource contributions were obtained from interviews (with WV municipalities and others) and from documents, summarized, and placed into IR data sheets for each municipality (see Appendix G). Completed PC/IR data sheets formed the basis for criteria used to address probable pollutants. Comparing PC/IR data sheets allows WV municipalities to identify probable differences in pollutant contributions to their watersheds and differences in institutional resources to contribute to monitoring activities.

Additionally, monitoring participation guidelines were developed, which communities can apply to decide which programs to support and in what capacities to act. One criterion was whether and how a monitoring program or activity's stated goals or purpose fits in with SCV URPPP and regional goals and strategies. Broad and specific potential activities in which each WV municipality could engage or support were also identified from data in the WV Monitoring Activities Database. Activities included: fostering partnerships that encourage

volunteer monitoring of NPS and other NPS activities; acquiring additional information on current and proposed NPS programs/activities affecting the WV watersheds, or implementing NPS monitoring-related activities such as public outreach. Criteria including advantages and disadvantages; opportunities for potential implementation; feasibility/ease of implementation; potential timelines, and gaps/further research needed, were applied to activities. The decision-making framework, WV Monitoring Activities Database, and monitoring participation guidelines are intended as a watershed policy "toolkit" for policy makers to use to identify appropriate roles and new contributions to watershed monitoring activities.

IV. Results

A. Overview

This section describes the results of all data acquisition and analyses. Sections B through K detail the results of each analysis. Section L provides a summary of the main findings.

B. Results of monitoring questionnaire (Appendix B)

Ten of the 31 questionnaires distributed to monitoring organizations and entities were returned. The organizations fit into the following four main categories (see Appendix D):

Entities situated:

1. *Within* the WV communities that monitor parameters within WV watersheds
2. *Within* the WV communities that monitor parameters outside of WV watersheds
3. *Within* the WV communities that do not conduct any monitoring or conduct only monitoring-related activities
4. *Outside* of the WV communities that monitor parameters within and/or outside of WV watersheds

Entities that conduct monitoring differ in the parameters that they monitor. Questionnaires reveal that across all categories, four entities monitor for physical parameters (e.g., water temperature or flow); six monitor for chemical parameters; three monitor for flora; three monitor for fauna; two monitor for bacteria; and four monitor for general parameters (see Appendix D).

Parameters were monitored at intervals ranging from hourly or daily for parameters such as rainfall, to bi-weekly, monthly, quarterly, semi-annually, or

annually for other parameters. One chemical parameter, pH, for example, is monitored by six entities; their schedules vary from annually, to three times per year, semi-annually, monthly, and as funding permits. However, it is difficult to determine precisely the extent of variability in parameter monitoring because some respondents did not respond using the provided key (e.g. D=daily, W=weekly, M=monthly, etc.).

The questionnaire also inquired about reasons for monitoring (see Appendix B). Resource planning and Other (e.g., drinking water assessment, salmonid recovery) was checked most often (by four entities) followed by stormwater permit, education, research, baseline determination, habitat restoration, and watershed planning, each checked by four entities (see Appendix D).

C. Results of semi-structured interviews (in person/phone)

Follow-up interviews, by phone or in-person, were conducted with many of the same people who completed questionnaires, as well as with individuals who did not receive the questionnaire, to supplement data. A total of 47 people were interviewed: 34 by phone and 13 in person (see Appendix D). Although interviews were generally tailored to respondents, ten of the interviewees were administered an identical set of questions, ranging in topic from their main concerns regarding creeks/storm drains to how their program promotes watershed health. Interview questions (and those in the questionnaire) were originally designed to address a broad set of values. This thesis focuses on

responses only to those questions related to monitoring of nonpoint source pollutants.

Q1: *What do you think are the major concerns with regard to creek(s)/ storm drain(s)?*

Monitoring organizations were concerned about a wide range of different problems. As illustrated in Figure 8, below, nonpoint source pollution was the most frequently cited concern (eight out of ten entities). The type of pollutant of concern differed among organizations. For example, West Valley Sanitation District (WVSD) was mainly concerned about pollutants ending up in the storm drains such as swimming pool discharges or wash downs from contractors, auto shop primers, or basic and chemical contaminants. The City of Campbell was also primarily concerned about nonpoint source pollutants from auto repair shops ending up in the storm drains and creeks. Friends of Calabazas Creek (FOCC), on the other hand, was primarily concerned about pollution affecting flood control, such as residential garden waste and other debris causing blockages downstream (see Appendix D for a summary of responses).

Figure 8: Greatest Concerns Expressed by Entities

Q2: Which creeks/watersheds are you monitoring?

Entities monitor in various locations within and outside of WV watersheds.

Figure 9, below, illustrates monitoring activity in the West Valley watersheds (see also Appendix D and the WV Monitoring Activities Database). Los Gatos Creek is monitored by the greatest number of entities interviewed (five out of ten entities), followed by Saratoga Creek (three out of ten entities).

Q3: *What are the goals of your monitoring/nonpoint source programs?*

Personal interviews indicated that agencies and organizations have very different monitoring/program goals (see Figure 10 below and Appendix D). The goals most directly related to nonpoint source pollution fall into regulatory compliance, which three agencies, WVSD, City of Campbell, and SCWWD (both water quality and environmental compliance) are striving to achieve. For example, WVSD's goals are to clean and inspect storm drains and catch basins in the WV watersheds and to notify agencies if they see illegal dumping. The City of Campbell is directed by the State (as a Co-permittee under an NPDES

permit) to monitor and take action to reduce pollution, to keep debris from entering the creek, and to identify illegal dumping and illicit connections.

SCVWD (water quality) has three main goals related to regulatory standards for drinking water and beneficial use protection: 1) to ensure/monitor quality of water used for drinking and to treat to standards; 2) to monitor water quality in the reservoirs and downstream for possible impacts to beneficial uses; and 3) to monitor impacts of specific land uses.

Q4: *What are you using the data for currently?*

Uses for data vary as much as do goals for monitoring and are often tied to those goals (see Figure 11 below and Appendix D). For those agencies with regulatory-driven goals, data appears to be used in part to satisfy reporting requirements. For example, data from WVSD on catch basin cleanings are either kept internally or supplied to agencies (e.g. municipalities, WV Clean Water Program) for reporting requirements (such as the Annual Report); WVSD is also collecting storm drain map data for conversion into GIS. The City of Campbell uses data in required reporting to the urban stormwater runoff program (e.g. NPDES permit, Annual Report). Some of the baseline data collected by SCVWD goes to the Department of Health Services in quarterly reports; some data is compared to Water Quality Objectives (WQO's) that are based on beneficial uses to see if current objectives are being met. Much of the data is kept within the District; for example, reservoir quality sampling data is retained with the water quality unit for plant operation information. Some of the data is incorporated into various reports; some of the data may be used in RWQCB watershed management projects; some information is used for litigation/defense; a permit condition, or for response to a permit.

Q5: *What do you think the role(s) of cities should be with regard to monitoring/watershed management?*

Many agencies and entities expressed their opinions on the roles of cities in watershed monitoring and management. Responses varied from providing resources and funding for other groups to monitor, educating the public through outreach, and coordinating with other agencies and entities, to training public works or WVSD employees how to sample runoff at the storm drains (see Figure 12, below, and Appendix D). These responses clearly indicate the importance of nonpoint source pollution issues to the communities and their desire for cities to help address them. Responses pertaining to NPS were included in the following

categories of Figure 12 (shown in shades of green): monitor/sample storm drain, creek discharges (three out of ten entities); develop partnerships with other entities (two out of ten entities); and utilize/train volunteers to collect water samples (one out of ten entities).

SCC PPP falls into both the fourth and fifth categories in Figure 12, and believes that the city, possibly public works, should be responsible for monitoring

the storm drain system to comply/conform with regulations once residential or commercial development has occurred. To have someone already familiar with storm drains do monitoring/sampling takes little extra effort and cost. Sampling technicians could be collectively trained to keep costs low and provide technical expertise. Properly trained volunteers could take/collect samples, and SCVWD or a lab could conduct analysis. A coordinating body, e.g. public works, could be a means of exchange between volunteers, sharing data for efficiency.

WVSD falls into the fourth and sixth categories of Figure 12 and believes that cities should have some way to systematically monitor, and be aware of outfalls, at least along main channels, such as Saratoga Creek, Los Gatos Creek, and San Tomas Aquino Creek. Since WVSD only inspects one to two times per year (except for any problem areas), systematic sampling should be done more often to avoid problems, maybe every three to six months. Cities could help answer the questions of what contributes to an outfall, which possible contributors may be around the area; and also educate all of the contributors.

The City of Campbell views its role in creek/storm drain monitoring in various ways. A large number of visual observations are made by people along LG Creek Trail and a small number on San Tomas Aquino Creek (considered a storm water drainage channel) and reported to the City. This helps the City to determine whether a lot of substances are being dumped in the creeks. The City has never tried to do qualitative/quantitative analyses; no problems exist as far as they are aware of because bedroom communities like Saratoga, Los Gatos,

and Monte Sereno are not believed to be significant polluters. The City has always resisted end-of-the-pipe solutions and instead focused on Best Management Practices (BMPs) and on what's reasonable. Since the RWQCB focus is now on metals such as copper from brakepads getting into storm drains, creeks, and SF Bay, Campbell has to ask itself what role it has with regard to brakepads. Street sweeping, for example, could stir up particles that end up in creeks. SCVWD (water quality) believes cities should have responsibility over discharges of any kind into a creek; for example, when someone applies for building permits, the city should make sure of proper drainage/sewer connections.

D. Description of existing monitoring and related programs in and affecting WV watersheds

Thirty-three existing programs and activities occurring in or affecting West Valley watersheds are listed in Appendix E and in the WV Monitoring Activities Database. Programs are categorized as state, regional, countywide, municipalities, educational, and other. The monitoring organizations, their types and categories are listed in Table 1. Table 2 summarizes the main types of pollutants/parameters being monitored, the number of organizations (of the thirty-three) conducting this monitoring, and the locations (creeks/watersheds) of this monitoring (see also Appendix D). This data was derived from responses to questionnaires and interviews. Water quality parameters appear to be monitored by the most organizations (seven of thirty-three total).

Table 1: Existing Monitoring Programs and Corresponding Categories

Organization	Organization Type	Category (1-4)/None*
SCC Pollution Prevention Program	County-Wide	1
Saratoga School District	Educational	1
Westmont High School	Educational	1
Youth Science Institute	Educational	1
Walden West	Educational	1
San Jose Water Company	Other	1
West Valley Sanitation District	Other	1
Santa Clara County Parks and Recreation	County-Wide	2
SCC Central Fire Protection District	County-Wide	3
City of Campbell	Municipality	3
Town of Los Gatos	Municipality	3
City of Monte Sereno	Municipality	3
City of Saratoga	Municipality	3
West Valley Clean Water Program	Municipality	3
LG/Saratoga High School Dist.: Nova Prg.	Educational	3
Friends of Calabazas Creek	Other	3
Los Gatos Creek Streamside Park Comm.	Other	3
SF Estuary Regional Monitoring Program	Regional	4
SCV Urban Runoff Poll. Prevention Prog.	County-Wide	4
Santa Clara Valley Water District	County-Wide	4
City of Cupertino	Municipality	4
City of San Jose	Municipality	4
City of Santa Clara	Municipality	4
San Jose State University	Educational	4
Guadalupe-Coyote Res. Conserv. Dist.	Other	4
United States Geological Survey	Other	4
CA State Water Resources Control Board	State	None
CA State Department of Fish and Game	State	None
Bay Area Stormwater Mgmt Agencies Asc.	Regional	None
Santa Clara Basin Wtrshed Mgmt Initiative	Regional	None
SCC Dept of Env Health/Hazardous Mat.	County-Wide	None
Sierra Club-Loma Prieta Chapter	Educational	None
Santa Clara Valley Audubon Society	Educational	None

1: Entities situated within the WV communities that monitor parameters within WV watersheds

2: Entities situated within the WV communities that monitor parameters outside WV watersheds

3: Entities situated within the WV communities that do not conduct any monitoring or conduct only monitoring-related activities

4: Entities situated outside of the WV communities that monitor parameters within and/or outside of WV watersheds

None = entities completely outside of WV watersheds that do not monitor

**Table 2: Known Pollutant-Related Monitoring Activities
Within and Outside WV Watersheds**

Pollutants/ parameters monitored	Number of organizations (of 33 total) conducting pollutant-related monitoring	Creeks/watersheds monitored within WV watersheds	Creeks/ watersheds monitored outside WV watersheds
Bacteria	3	Saratoga Creek, Los Gatos Creek, Lexington Reservoir, Calabazas Creek	Unknown
Water Quality (e.g., pH, nitrogen, ammonia, phosphorus, dissolved oxygen, turbidity)	7	San Tomas Aquino Creek, Los Gatos Creek, Lexington Reservoir, Saratoga Creek	San Francisco Estuary and 2 watershed stations; Santa Clara County reservoirs
Metals	4	Saratoga Creek, Lexington Reservoir, Vasona Lake	San Francisco Estuary and 2 watershed stations; Santa Clara County reservoirs; Almaden Quicksilver, Guadalupe, Deep Gulch, Mine Hill
Pesticides	1	None Known	San Francisco Estuary and 2 watershed stations
Erosion	3	Los Gatos Creek	Ed Levin and Grant Parks; Guadalupe River, Guadalupe Creek; Stevens Creek
Outfalls (pipe surveys)	4	Los Gatos Creek, San Tomas Aquino Creek, Saratoga Creek, Calabazas Creek	Coyote Creek, Guadalupe River, San Tomas Aquino, Saratoga, Calabazas Creeks in Santa Clara

E. Description of applicable regulatory requirements for watershed monitoring

Since no one statute or plan specifically defines the regulatory requirements for watershed monitoring/management, the requirements were derived from sections of existing federal, state, and regional regulations and plans, summarized in Table 3.²⁰ This thesis found that 1) while federal and state requirements do address NPS pollution, few directly address watershed monitoring; 2) most monitoring requirements pertain specifically to States and do not directly apply to local entities (e.g., state mandates do not appear to be delegated to the local level), and 3) several State and regional plans (Comprehensive Conservation Management Plan, Bay-Delta Plan, Basin Plan) are primarily guidance documents for protecting the San Francisco Bay, Estuary, and tributaries, and not local mandates. When documenting requirements, therefore, this research concentrated on monitoring and watershed management requirements specified in the SCV URPPP's NPDES permit and on guidance provided in the Basin Plan, shown in gray in Table 3. This section describes these requirements.

1. Regional Regulations/Plans:

a. RWQCB NPDES Permit (1995)

Several provisions of the SCV URPPP's RWQCB NPDES permit mandate monitoring and watershed measures.²¹ Monitoring requirements are specified in Section C. Provision: 4. Monitoring Program (RWQCB NPDES Permit 1995, 12),

which requires submission of an Annual Monitoring Program Plan. The monitoring program must include three components: a) provisions for conducting special studies designed to determine the effectiveness of a best management practice, or assess adverse impacts of a pollutant on beneficial uses; b) provisions for conducting watershed monitoring activities; and c) identification and justification of sampling locations, methods, pollutants, and conditions for proposing alternative monitoring methods (see Appendix F for detailed requirements and Table 4 for monitoring program plan objectives).

Table 3: Sections of Federal, State, and Regional Requirements for Watershed Monitoring

Regulation Type: Federal, State, Regional	Regulation/Plan	Applicable Sections
Federal	Code of Federal Regulation (CFR)	40 CFR: Protection of the Environment Part 122-EPA Administered Permit Programs: The National Pollutant Discharge Elimination System
Federal	Federal Water Pollution Control Act (Clean Water Act)	Secs.: 104, 106, 208, 303, 304, 305, 308, 319, 401, 402, 404, 502
Federal	Safe Drinking Water Act	Sec. 125, Monitoring and Information Gathering
Federal	Coastal Zone Management Act/Coastal Zone Act Reauthorization Amendments (1990)	Sec. 6217
State	Porter-Cologne Water Quality Control Act (California Water Code)	Sec. 13000 et seq.: 13001, 13392.5
State	California Fish and Game Code	Secs.: 1601, 1603
State	1994 State Water Resources Control Board/Cal EPA Water Quality Control Plan for the SF Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Water Quality Control Plan)	Chapter on implementation programs
Regional	Comprehensive Conservation Management Plan (SFEP 1993)	Chapter 4: Research and Monitoring
Regional	Regional Water Quality Control Board 1995 National Pollutant Discharge Elimination System (NPDES) Permit	Secs.: C, Provision 4, Monitoring Program; C, Provision 7, Watershed Management Measures
Regional	San Francisco Bay Basin (Region 2) 1995 Water Quality Control Plan	Chapters: 1, 4, 5, 6

The Annual Monitoring Program Plan is intended to support the development, implementation, and assessment of the effectiveness of the Storm Water Management Plan (SWMP) (or Urban Runoff Management Plan (URMP)). The Monitoring Plan is required to meet the four objectives listed below as well

as any additional objectives indicated in the URMP: (RWQCB NPDES Permit 1995, 12)

- (1) Characterization of representative drainage areas and storm water discharges, including land use characteristics, pollutant concentrations, and mass loadings;
- (2) Assessment of existing or potential adverse impacts on beneficial uses caused by pollutants of concern in storm water discharges,²² including an evaluation of representative receiving waters;
- (3) Identification of potential sources of pollutants of concern found in storm water discharges; and
- (4) Evaluation of effectiveness of representative storm water pollution prevention or control measures

Dischargers are also required (in Provision C.7. Watershed Management Measures) to submit a Watershed Management Measures element as part of their SWMP (or URMP). This element describes how the actions of the many SWMP (or URMP) programs and activities will be integrated (e.g., Metals Control Measures or New Development and Construction). This element also required dischargers to develop an area-wide watershed management strategy in fiscal year 1996-97 and to implement the strategy beginning in fiscal year 1997-98 (RWQCB NPDES Permit 1995, 15). This watershed management strategy was included in both the SCV URPPP's 1997 URMP and in their March 1998 Monitoring Plan. Implementation of these measures occurs primarily through coordination of watershed-based tasks with the SCB WMI and through the SCV URPPP carrying out the watershed projects identified in these plans.

b. RWQCB Basin Plan (1995)

The Basin Plan, which the RWQCB is required to develop, adopt, and implement by both EPA and the Porter-Cologne Water Quality Control Act, refers to monitoring and watershed management in several different sections.²³

Monitoring programs including the Regional Monitoring Program (RMP) (see Appendix E), Compliance Monitoring, and State Mussel Watch and Toxic Substances Monitoring Program, are detailed in the Basin Plan. The RWQCB uses information produced by these programs to satisfy requirements of the CWA and applicable portions of the State's Porter-Cologne Water Quality Control Act.²⁴

Compliance Monitoring is an important component of the State's water quality surveillance and monitoring program, relating specifically to point and nonpoint pollutant sources of discharge. Any entity issued a Regional Board permit "...must conduct regular sampling and analysis of waste released to surface and groundwaters" (RWQCB Basin Plan 1995, Ch. 6-3). Depending on the nature of the discharge and potential environmental effects, specific parameters (chemical, physical), types (tests, sampling, studies), frequencies, and other requirements are determined case by case (RWQCB Basin Plan 1995, Ch. 6-3). Each permit issued by the Board describes the specific compliance monitoring requirements for that permit holder. Monitoring data collected by point source dischargers and nonpoint pollution control programs are used to: (RWQCB Basin Plan 1995, Ch. 6-3)

- 1. Determine compliance with and provide documentation to support enforcement of permit conditions;**
- 2. Support derivation of effluent limitations and wasteload allocations;**
- 3. Provide information needed to relate receiving water quality to mass emissions of pollutants by dischargers**

Data from special studies, such as characterization of pollutant loads from urban runoff, and data obtained by the RWQCB during site inspections, often supplement the monitoring data collected by permit holders.

F. Intent(s) of watershed monitoring

In addition to monitoring for regulatory compliance, monitoring can serve many other purposes or objectives. As determined from the review of guidelines and regulations and from the original research conducted here (see data acquisition and analysis), the expressed purposes and objectives related to nonpoint source pollutants include the following:

General Intents of Watershed Monitoring for NPS

- To detect NPS pollutants/identify NPS problems**
- To determine impact/identify threats of certain NPS pollutants on beneficial uses**
- To evaluate pollution prevention/reduction measures**
- To support local government planning and decision making that limits NPS pollution**
- To determine effectiveness of Best Management Practices (BMPs) for controlling NPS pollutants**
- To foster stewardship, community involvement towards identification/control of NPS pollution**
- To improve public education about NPS pollutants**
- To ensure NPS pollution issues are included in environmental, watershed planning/management**

Various NPS-related activities transcend mere compliance in important ways. To illustrate, monitoring conducted to improve public education on water quality and increase community involvement encourages personal investment, responsibility, commitment to problem solving, and environmental sensitivity, which helps a community develop a sense of ownership and stewardship. Monitoring also encourages public involvement in ongoing stewardship by directly involving citizens in critical sustained monitoring efforts. Similarly, residents who document illicit residential drains, and map outfalls and non-native vegetation, become active participants, decreasing NPS pollution of the watersheds and Bay.

Monitoring can also provide a summary of present and potential sources of pollution and impacts for each watershed, allowing for problem identification, more targeted Best Management Practices (BMPs), and pollution prevention and control measures. Additionally, monitoring can assure and document implementation of pollution prevention and reduction programs, helping to assess whether those programs are effective. Information compiled helps to address pollutant loading.

G. Programs in which WV municipalities currently participate

1. Pollution prevention and reduction activities

The WV municipalities of Campbell, Los Gatos, Monte Sereno, and Saratoga do not individually conduct monitoring but do participate with the SCV URPPP to carry out monitoring activities. They also adhere to pollution

prevention and reduction standards including performance standards, standard operating procedures, and Best Management Practices as prescribed in the WV URMP. The 1997 WV URMP details the community-specific urban runoff programs in which each municipality participates to implement control measures to prevent and reduce pollution (see Appendix G). .

2. Collective efforts

Through collective SCV URPPP efforts, WV municipalities participate in additional monitoring activities including Bay Area Stormwater Management Agencies Association's (BASMAA) Regional Monitoring Strategy, the San Francisco Estuary's Regional Monitoring Program (RMP), and StreamKeepers (until January 1999). (See Appendix E and attached WV Monitoring Activities Database). WV municipalities direct and indirect participation in collective programs (such as BASMAA and RMP) is generally accomplished through the WV Clean Water Program, a cooperative nonpoint source program representing the four municipalities. Their participation usually takes the form of financial contributions, reviewing and commenting on reports and documents, and/or direct involvement (e.g., attending monitoring meetings or participating on task forces). Additionally, the WV municipalities contribute to SCV URPPP's Watershed Action Fund, which provides funding for watershed projects in the Santa Clara Basin. Two such projects fall within the WV communities: Youth Science Institute (YSI) (creek awareness program) and Walden West (creek care/education program). Support for YSI is intended to "provide the opportunity

for middle school students to monitor the health of a portion of Los Gatos Creek, thereby increasing their understanding and awareness of creek environments" (SCV URPPP's Annual Report 1998, Table 2-6). Support for Walden West is intended to encourage kids to care for and protect their environment.

3. General Plan policies and implementation measures

The WV municipalities further accomplish creek and watershed management by incorporating natural resource/conservation regulations, goals, policies, and implementation measures into their General Plans and ordinances. Campbell's General Plan's conservation goals include preventing the pollution of streams and other waters. Los Gatos's General Plan encourages the retention of streambed corridors in their natural setting and their utilization, wherever possible, for paths and trails. Monte Sereno's General Plan includes provisions to look at potential environmental impacts on the watershed, and includes preservation elements in development projects (to allow for habitat corridors and riparian vegetation). Saratoga's General Plan includes specific creek policies designed to preserve, protect, and maintain creek corridors, riparian habitats, and policies for erosion control to protect watersheds during development. Saratoga also recently passed a creek ordinance that established a creek protection easement and setback requirements (Ordinance 71-184, September 1998). (See Campbell GP 1972, 1990; LG GP 1985; Monte Sereno GP n.d., and Saratoga GP 1993.)

H. Agencies and organizations in/affecting the WV communities currently fulfilling regulatory requirements and the intent(s) for watershed monitoring

1. Regulatory requirements for watershed monitoring

The many existing programs satisfy different regulatory requirements for watershed monitoring. Together, all requirements appear to be fulfilled, although not all within the WV watersheds. Safe Drinking Water Act regulations and drinking water quality assessments are satisfied by the SCVWD monitoring water quality for drinking water treatment and treating to standards, or by San Jose Water Company monitoring specific physical, chemical, and bacteria parameters. Agencies and entities including West Valley Sanitation District, San Jose Water Company, City of Campbell, City of San Jose, City of Cupertino, and Santa Clara Valley Water District monitor for various physical, chemical, flora, fauna, bacteria, and general parameters, satisfying reporting and monitoring requirements in the SCV URPPP's NPDES stormwater permit, and elements of the Basin Plan, California Water Code and CWA. (See Appendix D.) The Cities of Sunnyvale and San Jose funded and implemented independent monitoring projects based on the Metals Control Measures Plan, which partially fulfill NPDES permit monitoring requirement C.4 (see Table 4, below). United States Geological Survey's (USGS) Benthic Invertebrates Study (which includes sites on streams in WV communities) is conducted as part of the surface water component of a National Water Quality Assessment Program, to identify the status and trends of the nation's water quality, satisfying several CWA requirements.

The focus in the remainder of this research is on regional requirements and plans, including the RWQCB Basin Plan and SCV URPPP's NPDES permit. Although agencies and organizations that only monitor parameters in the WV and/or surrounding communities do not meet monitoring requirements for the San Francisco Bay and Estuary, indicated in plans such as the CCMP and Bay-Delta Water Quality Control Plan, monitoring requirements are satisfied collectively through participation in regional monitoring efforts. The WV municipalities, as Co-permittees in the SCV URPPP, participate in 1) BASMAA, 2) the SCB WMI, and 3) the RMP. This participation satisfies RWQCB requests stated in the SCV URMP, NPDES permit requirements for monitoring, as well as portions of the 40 CFR, Part 122 and CWA requirements. WV municipality participation in the SCV URPPP also meets monitoring requirements in the Basin Plan. Table 4, below, provides a matrix of regional monitoring efforts and the regulatory requirements satisfied by these efforts, within and outside WV watersheds.

Table 4 indicates how all of the regulatory requirements for the larger watershed are being fulfilled by existing programs. It also indicates which requirements are *not* being met directly within the WV watersheds. It is currently unclear whether requirements need to be satisfied for each WV watershed because the SCV URPPP's NPDES permit does not specify. Co-permittees of the NPDES permit satisfy permit requirements collectively, and have so far not interpreted requirements to apply separately to each watershed (personal

communication with WV CWP, July 1999).

**Table 4: Existing Programs Fulfilling Monitoring Requirements
Within and Outside WV Watersheds**

Applicable Regional Monitoring Requirements	Requirement Fulfilled in WV Watersheds by Existing Programs	Requirement Fulfilled Outside WV Watersheds	Existing Program(s) Within WV Communities' Watersheds	Existing Programs Outside WV Communities' Watersheds
Basin Plan Ch. 6-3: Compliance Monitoring-Entities holding Regional Board discharge permits must conduct regular sampling and analysis of waste released to surface and groundwaters; Ch. 4-31: Comprehensive Urban Runoff Control Program	x	x	WV CWP: WV URMP	SCV URPPP: Fixed-Station, Wet-Weather, Watershed Monitoring; SCV URMP: Monitoring/ Watershed Management Measures (brake-pad partnership, WMI), Monitoring Projects ²⁵
NPDES Permit C.4.-Monitoring Plan Objective (1): Characterize representative drainage areas and storm water discharges, including land use characteristics, pollutant concentrations, mass loadings	x	x	WV CWP: WV URMP, Saratoga Schools,	SCV URPPP: WMI, RMP; Monitoring Projects: Watershed; City of San Jose Storm Water Monitoring; SCVWD-Metals in Water Supply
NPDES Permit C.4.-Monitoring Plan Objective (2): Assess existing/potential adverse impacts on beneficial uses caused by pollutants of concern in stormwater discharges	o	x	None	SCV URPPP: WMI; Monitoring Projects: Watershed, Bay
NPDES Permit C.4.-Monitoring Plan Objective (3): Identify potential sources of pollutants of concern found in storm water discharges	x	x	WV CWP: WV URMP; SCC PPP: Perc Ponds Study	SCV URPPP: WMI; Monitoring Projects: Watershed, Bay
NPDES Permit C.4.-Monitoring Plan Objective (4): Evaluate effectiveness of representative storm water pollution prevention/control measures	x	x	WV CWP: WV URMP	SCV URPPP: WERF Environmental Indicators; Monitoring Projects: Effectiveness, BMPs; SCV URMP

**Table 4: Existing Programs Fulfilling Monitoring Requirements
Within and Outside WV Watersheds (continued)**

Applicable Regional Monitoring Requirements	Requirement Fulfilled In WV Watersheds by Existing Programs	Requirement Fulfilled Outside WV Watersheds	Existing Program(s) Within WV Communities' Watersheds	Existing Programs Outside WV Communities' Watersheds
NPDES Permit C.4.-Monitoring Program (a): Provisions for conducting special studies to determine effectiveness of BMPs/control measures, define a Performance Standard, or assess adverse impact of pollutants on beneficial uses	x	x	WV CWP: WV URMP	SCV URPPP: WERF Environmental Indicators; Monitoring Projects: Effectiveness, BMPs; City of San Jose and City of Sunnyvale Monitoring; SCVWD-Metals in Water Supply
NPDES Permit C.4.-Monitoring Program (b): Provisions for conducting watershed monitoring activities including: identification of major sources of pollutants; evaluation of effectiveness of control measures/ BMPs; use of physical, chemical, biological parameters/indicators	x	x	WV CWP: WV URMP	SCV URPPP: WMI, RMP; Monitoring Projects: Watershed, Effectiveness, City of Cupertino
NPDES Permit C.4.-Monitoring Program (c): Identification and justification of sampling locations, methods, pollutants, and conditions for proposing alternative monitoring methods	o	x	None	SCV URPPP: BASMAA's Regional Monitoring Strategy, SCB WMI, RMP; Monitoring Projects: Watershed, Bay, Effectiveness, BMPs
NPDES Permit C.7.-Watershed Management Measures: Procedures for identifying appropriate watershed characteristics; procedures for identification and implementation of control measures on a watershed basis	x	x	WV CWP: WV URMP: Creek Assessment Project	SCV URPPP: WMI; Monitoring Projects: Watershed, Bay

x = requirement fulfilled within/outside WV communities' watersheds

o = requirement not fulfilled directly within WV communities' watersheds

One of the main reasons for this interpretation is that Co-permittees want to get the most benefit out of the resources they contribute to the SCV URPPP,

and select watersheds and monitoring activities within the Santa Clara Basin that best represent pollutant types and sources. This reasoning supports the first objective of the NPDES permit: "to characterize *representative* drainage areas and stormwater discharges" (RWQCB NPDES Permit 1995, 12) – not *all* drainage areas and stormwater discharges (*italics added*) (see Table 4). The SCB WMI's recent selection of three representative pilot watersheds for assessment in the Santa Clara Basin, further supports this objective.

For the purposes of this work, the places where requirements could be met within WV watersheds are considered gaps and signify potential roles/places where WV municipalities could exert additional effort (see research objective 1. b.). These may include assessing impacts on beneficial uses caused by local pollutants of concern or identifying/justifying sampling locations, methods, pollutants, and conditions for proposing alternative monitoring methods (see Table 4). Because some requirements are only satisfied by one or a few program's activities in one or a few locations within a large watershed, the question of whether existing efforts are adequate must be raised. Further monitoring efforts within WV watersheds may be warranted, providing additional roles for WV municipalities. These efforts may include further characterization of drainage areas for pollutant concentrations or additional provisions for conducting watershed monitoring activities within WV watersheds (see Table 4).

2. Monitoring intents (voluntary)

Because the implementation of mandated measures, alone, "can not control all pollutants [that affect] beneficial uses in local creeks and South San Francisco Bay," relevant voluntary programs are also summarized here (SCV URPPP Technical Memo 1998, 21). Many existing monitoring organizations' programs satisfy certain intents of monitoring. Table 5, below, indicates these intents and the programs that are satisfying them (see Appendix E and attached WV Monitoring Activities Database for program details). Nearly all of these intents are satisfied by WV participation in the SCV URPPP. Additionally, because of the importance and overlap of certain non-monitoring activities in achieving long-term NPS monitoring goals, the status of these is also summarized here. Many of these voluntary activities, while satisfying certain monitoring intents, also satisfy the mandates described above.

The SCV URPPP's monitoring strategy and activities indicated in the 1997 URMP and 1998 Annual Report (and WV municipalities' participation in these efforts) satisfy NPS pollution detection/problem identification; watershed planning, and public education/stewardship (see Table 5). In the 1997 URMP, one stated goal is to determine watershed successes or improvements (SCV URMP 1997, 24-25, 39), such as the effectiveness of specific control measures at pollution reduction. The 1997 URMP also states that a viable watershed management plan would require stakeholder involvement and area-wide planning. By coordinating its ongoing watershed planning through the SCB WMI,

the SCV URPPP meets this watershed planning intent. The September 1998 Annual Report further supports public education/stewardship. In FY 97-98, the SCV URPPP conducted three education and citizen participation activities including: 1) funding a Watershed Action Fund grant program to support pollution prevention and watershed awareness projects conducted by schools and community organizations; 2) supporting educational activities at the SF Bay National Wildlife Refuge in Alviso; 3) supporting CCRS's Streamkeeper program on three creeks to provide for creek monitoring, illegal dumping, and public education activities.

Additionally, the SCV URPPP's 1998 Monitoring Plan contains four categories of 32 projects that further address the non-regulatory monitoring intents listed below.²⁶ These categories are: Watershed, Bay, Effectiveness, and BMP projects (SCV URPPP Monitoring Plan 1998, 2). *Watershed* projects include those that assess beneficial uses of creeks, wetlands and riparian areas; identify impediments to attainment of beneficial uses, and identify cost-effective ways to overcome these impediments. Examples include support for WMI watershed assessment, environmental indicators, and Streamkeepers.²⁷ *Bay* projects assess the loading, fate, transport, and effects of stormwater pollutants in San Francisco Bay. Examples include support for the RMP and the WMI Bay Monitoring and Modeling subgroup. *Effectiveness* projects assess the effectiveness of Program activities and facilitate continuous improvement. One example is support for an Integrated Community Involvement Program on

Saratoga Creek. *BMP* projects investigate potential effectiveness of new *BMPs*. One example is San Jose's industrial monitoring (SCV URPPP Monitoring Plan 1998, 3, 5; see also Appendix E).

**Table 5: Existing Programs Satisfying Monitoring Intent
Within and Outside WV Watersheds**

Monitoring Intents	Intent Satisfied in WV Watersheds by Existing Programs	Intent Satisfied Outside WV Watersheds	Existing Program(s) Within WV Communities' Watersheds	Existing Programs Outside WV Communities' Watersheds
To detect NPS pollutants/identify NPS problems	X	X	WV CWP: WV URMP	SFEI, SCV URPPP, SCC Parks, GC-RCD
To determine impact of certain NPS pollutants on beneficial uses	O	X	None	SFEI, GC-RCD, SCV URPPP, SCVWD
To evaluate pollution prevention/reduction measures	X	X	WV CWP: WV URMP, WV Municipalities	SCV URPPP
To support local government planning that limits NPS pollutants	X	X	WV CWP, WVSD	SFEI, SCVWD
To determine effectiveness of Best Management Practices (BMPs) for controlling NPS pollutants	O	X	None	SCV URPPP, City of San Jose
To foster stewardship, community involvement towards identification/control of NPS pollution	X	X	Saratoga School District	SCV URPPP
To improve public education about NPS pollutants	X	X	Saratoga Union School District, SCC PPP, YSI, Walden West, WV CWP	City of Cupertino, SFEI, GC-RCD, SCV URPPP
To ensure NPS pollutant issues are included in environmental, watershed planning/management	X	X	WV CWP: WV URMP, SCC PPP, WVSD	SFEI, SCVWD, GC-RCD, SCC Parks, SCV URPPP

X = intent satisfied within/outside WV communities' watersheds

O = intent not satisfied directly within WV communities' watersheds

As Table 5 indicates, all monitoring intents are satisfied by existing programs overall, though not all are satisfied directly within WV watersheds. Two places for potential roles of WV municipalities may be determining effectiveness of BMPs for controlling NPS and determining impacts of NPS on beneficial uses (see Table 5). Because some intents are only satisfied by one or a few programs' activities, further monitoring efforts within WV watersheds may be warranted, such as further efforts in pollution detection and problem identification, providing additional roles for WV municipalities.

I. Description of decision-making framework

In addition to the roles identified from the gaps in the monitoring requirements and intents above, further roles for WV municipalities in regional watershed monitoring can be ascertained by using a decision-making framework. A framework was developed that uses a sequence of pollutant contribution and institutional resource (PC/IR) data sheets and step-by-step criteria. This framework is an analytical tool provided to assist the WV municipalities in identifying the types of NPS pollutants they are likely to be contributing to their watersheds, determining whether existing monitoring programs are adequately addressing these pollutant types, and if warranted, developing strategies for additional monitoring efforts, including contributing additional financial/infrastructure resources. The step-by-step criteria build on the information gathered in these PC/IR data sheets. Data sheets are described in Section I.1 and I.2, and decision-making framework criteria are described in Section I.3 (see

also Figure 13). Section I.4 summarizes the results of applying the framework to the WV municipalities.

1. PC Data Sheet

The PC data sheet (see Table 6, below) helps to identify the types of NPS pollutants WV communities are likely to contribute to their watersheds. Ideally, NPS pollutant loading should be demonstrated by the use of a model and backed up by extensive field testing. Unfortunately, no such model currently is available or widely accepted by the monitoring community, nor are the data available that would be needed to run it: "Nonpoint pollution processes such as storm-water runoff are inherently difficult to model due to their stochastic nature in both time and space [and] modeling generally requires organizing and processing large amounts of spatially referenced data that is either not feasible or difficult to implement" (Corbitt 1989; see also Wong, Strecker, and Stenstrom 1997; Ventura and Kim, 1993).

As Table 6 indicates, classes of urban runoff pollutants closely reflect land uses. The rationale for using land uses as indicators of potential pollutants is that NPS pollutants, by definition, are potentially distributed over large amounts of land. To identify the source of a probable pollutant requires knowing what types of land uses may be contributing to it. Both the WV URMP and NPDES permit associate land uses with pollutants. Land uses also are often integral components of urban NPS pollution loading models, especially those that use geographic information systems (GIS) (see Ventura and Kim, 1993; Tim,

Mostaghimi, and Shanholtz, 1992; Wong, Strecker, and Stenstrom, 1997; Gilliland and Baxter-Potter, 1987). Both urban and agricultural areas typically use empirical models that are driven primarily by land use data to estimate pollutant loading (Ventura and Kim, 1993). Gilliland and Baxter-Potter (1987), for example, used GIS to predict nonpoint source pollution potential from agricultural sources. Urban nonpoint source pollution is also viewed as a function of land uses, e.g., "... [the] amount of impervious surface and land use associated contaminant sources such as vehicles, industrial debris, leaf and animal litter" (Ventura and Kim, 1993).

The pollutant classes listed in Table 6 were derived from combining probable pollutants listed in the 1997 WV URMP with the pollutants of concern listed in the SCV URPPP's 1995 NPDES permit. *Litter*, neither directly a probable pollutant nor a pollutant of concern, was also included as a pollutant class because it often collects on streets and parking lots and can be easily transported by stormwater to storm drains. Actors and polluting practices listed in Table 6 were determined from SCV URPPP and WV CWP informational materials. According to the WV URMP (p.3), the seven most probable pollutant sources in the WV communities are as follows:

- Vehicle related – waste fluids from general use, care, maintenance, repair
- Sedimentation – construction grading, hillside exposure²⁸
- Retail food facilities – waste disposal, grease overflows, equipment cleaning
- Construction – storage, debris/waste disposal
- Exterior surface/mobile cleaners – detergents

- Landscaping/gardening – pesticides, fertilizers, lawn clippings, yard trimmings
- Household chemicals – pools/spas, root killers, cleaners, detergents

Pollutants of concern listed in the SCV URPPP's NPDES permit include:

...certain heavy metals: cadmium, chromium, copper, lead, mercury, nickel, silver, selenium, zinc; sediment from erosion due to anthropogenic activities, petroleum hydrocarbons from sources such as used motor oil; microbial pathogens of domestic sewage origin from illicit discharges, certain pesticides associated with in stream acute toxicity, and other pollutants which may cause aquatic toxicity in the receiving waters (RWQCB NPDES Permit 1995, 1, 4).

It is important to note that although these categories of pollutants are listed as pollutants of concern in the NPDES permit, many of these within WV watersheds are low region-wide priorities compared to high priority pollutants such as metals targeted for TMDLs (e.g., mercury from surface mining and mine tailings in the Guadalupe River; copper and nickel in San Francisco Bay). Therefore, local watershed monitoring conducted by WV municipalities would be above and beyond monitoring requirements, and conducted to further monitoring intents.

Table 6: Potential Types of NPS Pollutants WV Communities Are Likely to Contribute to Their Watersheds

Classes of Urban Runoff Pollutants/Transport Mechanisms	Actors/Polluting Practices¹	Land Use Type
<i>Erosion/sedimentation</i> – construction grading, bare soil that erodes or blows into the street, hillside exposure	Contractors who rinse trucks, equipment, aggregate concrete in the street or near storm drains; do not establish cleanup areas before starting work; who do not minimize use of water in cleanup	Residential/Commercial/Municipal
<i>Landscaping/gardening</i> – pesticides, fertilizers, chemical weed killers, leaves, lawn clippings, yard trimmings	Gardeners who blow and rake leaves and yard waste into the street or gutter; lawn maintenance services who do not limit fertilizer and nitrogen applications, or apply chemical weed killers and pesticides when rain is forecast; landscapers who schedule excavation and grading projects for wet weather periods and who do not protect stockpiles and materials from wind and rain; residents	Residential/Commercial/Municipal
<i>Vehicle related</i> - antifreeze, gasoline, oil dumped into the gutter/storm drains; oil and auto fluids leak from cars onto roads, highways, parking lots; soap and dirt from washing cars	Residents with leaking vehicles, vehicle exhaust, residents who wash cars in their driveway or street	Residential
<i>Vehicle related</i> - waste fluids from general use, care, maintenance, repair	Mobile auto detailers who dispose of wastewater down the drain, do not use spill containment aids; auto service centers that do not recycle oil and antifreeze or follow shop cleanup practices to protect water quality	Commercial/Municipal
<i>Light industrial/small commercial shops</i> – detergents, paints, photo/print chemicals	Retail facilities, small businesses who dispose of chemicals down storm drains, do not employ best management practices, etc.	Commercial
<i>Retail food facilities</i> – waste disposal, grease overflows, equipment cleaning	Restaurants that do not use grease traps, do not contain dumpsters, etc.	Commercial
<i>Exterior surface/mobile cleaners/contractors</i> – detergents, paints; storage, debris/waste disposal	Painting contractors who do not clean brushes and containers and dispose of paint residues and solvents in a street or storm drain, not as hazardous waste; housecleaners, window washers, carpet cleaners who dump dirty cleaning water into storm drains; other mobile contractors who improperly use, store, and dispose of products/waste	Commercial

Table 6: Potential Types of NPS Pollutants WV Communities Are Likely to Contribute to Their Watersheds (continued)

Classes of Urban Runoff Pollutants/Transport Mechanisms	Actors/Polluting Practices¹	Land Use Type
<i>Pool/spa maintenance - copper, pool/spa water</i>	Contractors who use copper products in pools; dispose of filter backwash where it can run into a drain; who do not neutralize acid-wash rinsewater before pumping to a cleanout; residents who drain into street or storm drain	Residential/Commercial
<i>Household chemicals – root killers, cleaners, detergents, paints, aerosols</i>	Residents who dump chemicals into the street or storm drain	Residential
<i>Litter – trash and debris that collects on parking lots and sidewalks</i>	Residents, retail facilities	Residential/Commercial/Municipal
<i>Bacteria/pathogens – animal/human wastes</i>	Residents who poorly maintain their septic systems; residents who leave their pet wastes on lawns, streets, gutters, or sidewalks; wild animals who have habitats near streams; homeless who live near/use streams; broken sewer lines, poorly kept horse stables	Residential/Commercial/Municipal

¹ Sources: SCC Wide Household Hazardous Waste Program; SCV NPSPCP: *The Bay Begins at Your Front Door*; WV URMP 1997; *Home Maintenance Tips for a Cleaner Bay*

2. IR Data Sheet

The IR data sheet delineates WV municipalities' possible financial and infrastructure resource contributions to watershed monitoring (see Appendix H).

These resource profiles catalogue information in the following seven categories:

1. Staff Resources (including contracted services);
2. Staff Monitoring Expertise (technical knowledge of what data to collect, how to interpret);
3. Computer Capabilities (e.g., GIS);
4. Data Analysis, Storage, Retrieval Capabilities;
5. Monitoring Budget/Physical Resources (e.g., sampling equipment);
6. Current Pollution Prevention/Reduction Programs and Strategies (individual/collective);
7. Current Public Interest in Monitoring, Monitoring Activities

None of the four municipalities have technical monitoring expertise on staff nor sampling equipment; at least three (Campbell, Los Gatos, Monte Sereno) have some computer (GIS) and data storage capabilities (there is a data gap for Saratoga). Furthermore, none of the four municipalities have staff resources designated specifically for monitoring, and monitoring would be difficult to incorporate into their existing departments due to this lack of technical expertise and equipment. However, if these difficulties are overcome, perhaps through partnerships with agencies such as the Santa Clara Valley Water District to supply technical services, monitoring could be incorporated in Campbell into environmental programs or public works. Saratoga could incorporate monitoring into public works. Los Gatos could incorporate monitoring into parks, forestry, and maintenance services. Monte Sereno, which is only 1.5 square miles and entirely residential, has few staff resources and contracts for many services. If monitoring in Monte Sereno is warranted, it could be incorporated into the building official's programs (see Appendix G). Alternately, the WV CWP could carry out monitoring activities for all four municipalities.

3. Description of criteria for determining appropriate roles in regional watershed monitoring

The PC/IR data sheets described above form the basis for the criteria used to identify appropriate contributions and additional roles for WV municipalities in regional watershed monitoring. Criteria are illustrated below as a flowchart and outline three sequential steps (Figure 13). Examples of how the

WV municipalities could apply the criteria are included in section K and in Appendix H.

The first Step (*Step 1*) described in Figure 13 is to identify the types/numbers of applicable urban runoff pollutant classes, listed in Table 6. Three of the four WV municipalities (Campbell, Los Gatos, and Saratoga) have both commercial and residential land use types and could potentially identify all eleven pollutant classes. Because Monte Sereno is entirely residential, most of the commercial pollutant classes (*vehicle related-commercial; light industrial/ small commercial shops; retail food facilities*) would be excluded with one exception, *exterior surface/mobile cleaners/contractors*. Furthermore, since mobile cleaners (by their nature) do not have to be located in Monte Sereno to serve their residents, additional contractors and services (e.g., from Campbell or Los Gatos) may actually be operating there.

Figure 13: Criteria Flow Chart

To prioritize monitoring efforts (*Step 2*), the extent of current monitoring efforts and the adequacy of these efforts in addressing pollutant classes needs to be determined. Possible sources for making this determination are the individual/collective pollution prevention/reduction programs and strategies identified in the IR data sheet (see Appendix G); existing monitoring programs (see Appendix E); and data from the WV Monitoring Activities Database. Step 2 also involves a determination of what resources could be offered if additional efforts are warranted in a community. Information from the IR data sheet (Appendix G) should also be used to identify staff resources, potential community interest in monitoring, and additional forms of participation (such as forming partnerships to conduct volunteer monitoring or offering NPS training workshops). The last step (*Step 3*) is to determine the most appropriate combination of resources and forms of participation that can be contributed, based on those identified in Step 2.

4. Results of applying decision-making framework, criteria to WV municipalities

This section summarizes the results of the application of the framework that are common to all four WV municipalities. Details on individual municipalities can be found in Appendix H. All four municipalities' current monitoring programs appear to be adequate in collectively addressing pollutant classes in WV watersheds, but in most cases, additional strategies and activities should also be considered, especially in watersheds where no or few activities

are occurring. Two exceptions are *exterior surface/mobile cleaners/contractors* and *pool/spa maintenance*, which do not appear to warrant additional local efforts at this time as they are being adequately addressed regionally. Possible resources and strategies (appropriate roles for WV municipalities) include:

- 1) Continuing participation in current activities such as Common Ground for the Environment's Brake Pad Partnership (funding, reviewing, commenting on documents, implementing actions via WV CWP)
- 2) Continuing distribution of educational materials to retail shops;
- 3) Considering partnering with schools, creek groups, creekside residents, Adopt-a-Creek groups to monitor for auto, landscaping, household pollutants, and/or erosion;
- 4) Training auto/commercial facilities in the proper use and application of BMPs;
- 5) Training inspectors to better convey BMP information to auto/commercial facilities

J. Description of watershed monitoring participation guidelines

In addition to defining possible roles and contributions, such as continuing or expanding current NPS monitoring efforts or considering partnerships with volunteer monitors, WV municipalities need to know how and under what circumstances efforts should be implemented. This section recommends how WV municipalities can enhance participation.

Numerous local and regional monitoring activities occur in or affect West Valley watersheds. Monitoring participation guidelines outline a process for West Valley (WV) municipalities to consider and compare potential and actual projects or activities and involve the application of specific multi-level criteria, and inquiry and response to questions, both intended to help decision-making. Two levels of criteria are proposed to help municipalities decide which programs to support and

in what capacities to act.

1) Application of Level 1 Criteria

The first level (Level 1) of this process can be represented graphically as a pyramid (see Figure 14, below). The narrowest point represents the narrowest focus: WV municipalities' goals and objectives. The next point down represents a broader focus: SCV URPPP goals and objectives. The broad base of the pyramid represents the broadest focus: Regional goals and objectives.

To apply Level 1 criteria, the first step is to *determine if and how the proposed activity's goals and objectives are related to the WV municipalities, the SCV URPPP, and the Region* (see Figure 14, below). The proposed activity's goals and objectives could: 1) support or relate to goals and objectives without any modifications; 2) fit under goals and objectives with modifications, or 3) have no bearing on goals and objectives (see Figure 15, below).

Besides considering the relationships between the goals and objectives of a proposed activity and local and regional programs, it is important to *determine the arena (e.g., local or regional) in which the proposed activity would produce the most benefit* (Step 2). For example, WV municipalities partnering with a local school to monitor for NPS may result in direct benefits to WV watersheds (e.g., increased local creek protection), whereas participating in the RMP may result in more benefits regionally (e.g., increased protection of the Bay). Determination of the appropriate arena may also help to *identify possible types of participation*

(Step 3), such as direct, hands-on involvement, or indirect involvement (i.e. funding).

Figure 14: Level 1 Criteria

Level 1 - Does proposed program or activity relate to/support:

STEP 1:

2) Application of Level 2 Criteria

In determining the type of participation in an activity, the following *Level 2 criteria should be applied* (Step 4):

- a) Advantages/disadvantages of program/activity
- b) Possible opportunities for implementing program/activity
- c) Feasibility/ease of implementing program/activity
- d) How partnerships encouraging volunteer monitoring and monitoring-related activities might be implemented
- e) Suitability (time frame) for program/activity
- f) Gaps/further research needed

Level 2 criteria are applied to sample alternatives below (Section V.D) (see Figures 15 and 16, below).

Figure 15: Steps 1-4

3) *Inquiry and response*

Addressing the following types of questions can help municipalities refine decisions on which projects and activities to support (see also Appendix I). If the municipalities determine that they want to use volunteers to visually monitor for auto-related pollutants, they would need to determine how data should be collected (which protocols to follow), analyzed and presented (i.e., raw data or reports). Additional questions regarding information/data needs may include:

- 1. What is the purpose(s) of information/data collection (i.e. complying with permit requirements, pollution prevention, watershed management)?**

2. How do municipalities expect to use the information/data (e.g., keep data internally, share with other agencies and community groups)?
3. What types of activities/monitoring programs meet information/data needs (i.e. one time activity or periodic activity)?

Besides addressing information/data needs, it is especially important that WV municipalities evaluate the monitoring programs to assess whether current programs have achieved their original goals, and whether the programs could easily change or expand their monitoring parameters or activities to accommodate WV needs. A strategy for evaluating current programs is not included as part of this work but is recommended for future work. Other general questions municipalities might want to ask and address to help decision-making include:

1. Whose needs could potentially be met by monitoring (i.e. municipalities, SCV URPPP, SCB WMI)?
2. What are the potential costs of monitoring and what potential benefits might municipalities receive from the program/activity?
3. What type of commitment do municipalities want to make to a program/activity (i.e. long term/short term)?
4. Which types of programs might be able to contribute time, resources, and effort for the long term versus the short term?

WV municipalities may benefit from a monitoring participation strategy that includes the components described above. This strategy will enable municipalities to be proactive and to prepare for potential activities, in both the short and long term, and will also provide municipalities options for action and response. (See Figure 16, below, and Appendix I for a list of items municipalities should consider when applying criteria and steps.)

FIGURE 16: STRATEGY COMPONENTS IN THE DECISION MAKING PROCESS

K. Summary of main findings

This research identified and catalogued in a computer database thirty-three existing programs and activities in or affecting the WV communities' watersheds. Many organizations and entities within WV communities are monitoring various parameters within their watersheds. Organizations within and outside WV watersheds monitor for select physical, chemical, flora/fauna, bacteria, and general parameters, and vary in their reasons for monitoring (e.g., nonpoint source pollutant detection/problem identification, watershed planning). The majority of entities interviewed (eight out of ten) were concerned with nonpoint source pollution.

This thesis also reviewed various federal, state, and regional requirements for monitoring. When documenting requirements satisfied by existing programs, this research concentrated primarily on monitoring and watershed management measure requirements specified in the SCV URPPP's NPDES permit (and on guidance in the Basin Plan), as these requirements were most applicable locally.

Existing monitoring programs (individually and collectively through SCV URPPP) appear to satisfy monitoring requirements and many intents of monitoring both within and outside WV watersheds. WV municipalities' participation in collective programs including BASMAA, WMI, and RMP satisfies many NPDES permit requirements for watershed monitoring. SCV URPPP's Watershed, Bay, Effectiveness, and BMP monitoring projects satisfy both permit requirements and intents such as determining effectiveness of Best Management

Practices (BMPs) for controlling NPS pollutants. Because some requirements and intents are only satisfied by one or a few programs' activities in one or a few locations in a large watershed, further monitoring efforts within WV watersheds may be warranted. Additional roles WV municipalities should consider include:

- **Assessing impacts on beneficial uses caused by pollutants of concern**
- **Identifying/justifying sampling locations, methods, pollutants, and conditions for proposing alternative monitoring methods**
- **Further characterization of drainage areas for pollutant concentrations**
- **Additional provisions for conducting watershed monitoring activities within WV watersheds**
- **Determining effectiveness of BMPs for controlling NPS**

To determine new contributions for WV municipalities, a decision-making framework using a sequence of PC/IR data sheets and step-by-step criteria was developed. All four municipalities' current monitoring programs appear to be adequately addressing pollutant classes; however, in most cases, additional strategies and activities (future possible roles) should also be considered, and include: considering partnering with schools or creek groups to monitor for pollutants, training facilities and/or inspectors to better convey information on/apply BMPs, and continuing current monitoring efforts.

V. Discussion

A. Overview

Based on the watershed monitoring participation guidelines described in the previous section, Section B recommends conceivable monitoring/monitoring-related activities and implementation options. Sections C and D then present conclusions and recommendations for future work.

B. Recommendation of monitoring-related activities and implementation options

This section recommends sample alternatives and implementation options and applies the Level 1 and Level 2 criteria indicated above. Sample alternatives include: (See Appendix J):

- 1) Foster partnerships that encourage volunteer monitoring of NPS and NPS monitoring related activities (Level 1 and Level 2 criteria are applied in detail to this alternative);
- 2) Acquire additional information on current and proposed NPS activities or programs affecting WV watersheds;
- 3) Implement NPS monitoring related activities, such as public outreach.

1. Foster partnerships that encourage volunteer monitoring and monitoring related activities

Partnerships

The sixth watershed lesson learned, from the list of EPA's top 10 Watershed Lessons Learned (EPA 1997, 27), is that *partnerships equal power*. No one entity, such as a single jurisdiction, can solve all of the issues in any given watershed. Anyone in a given watershed could be a potential partner.

Two successful programs that could serve as models for partnerships are the Napa County Resource Conservation District (RCD) and the Friends of Corte Madera Watershed (Marin County). (See Appendix K.) Partnerships allow municipalities to expand their monitoring programs at least cost.

Volunteer Monitoring

There are many opportunities and reasons for volunteer monitoring. California's Directory of Volunteer Monitoring Organizations, (CDVMO 1997, 4), and The Volunteer Monitor newsletter (Spring 1996, 3), give various examples of reasons for monitoring. People may be individually motivated to volunteer and participate in long-term watershed protection efforts for many reasons including the desire to help inform local government planning and decision-making and promote environmental stewardship. People who volunteer often do so to feel part of their local community and may have a personal interest in protecting their local environment. Volunteers may be motivated by a particular issue, such as pollution in creeks, or by incentives such as recognition for their efforts or perceived value of their work. As part of the SCVWD's Adopt-a-Creek program, for example, a sign recognizing the name of the volunteer group adopting the stretch of creek is placed near the stretch of creek, providing an incentive for the group to take ownership of it and to keep it clean. The following quote, taken from the summary and introduction of the Napa River Watershed Owner's Manual (p. 9), may provide a broad view as to why volunteers ultimately monitor:

No amount of government funding or regulation can equal the effects of broad voluntary participation on the part of individuals in the effort to provide long term protection to the watershed's natural resource system.

a) Goals and objectives (Level 1 criteria-Steps 1-3)

Encouraging volunteer monitoring through partnerships is designed to meet the SCV URPPP and regional goals and objectives for NPS pollutants described in earlier sections. Table 7, below, lists the general categories (first column) and the detailed objectives (second column) that might be achieved through volunteer efforts. These objectives were derived from the general intents of watershed monitoring described in Section IV. F.

As Table 7 indicates, WV municipalities should focus their NPS monitoring efforts on six related objectives, all of which can be addressed through partnerships. Listed objectives strongly correlate to many overall goals and objectives of the SCV URPPP, the SCB WMI, and BASMAA (see Appendix E and WV Monitoring Activities Database). Furthermore, these objectives can be used to satisfy NPDES permit requirements and intents within WV watersheds, including: assessing the impacts on beneficial uses caused by pollutants of concern; further characterizing drainage areas for pollutant concentrations; determining the effectiveness of BMPs for controlling NPS; and further efforts in pollution detection and problem identification.

Table 7: Objectives for Partnerships and Volunteer Monitoring of NPS

General Categories	Detailed Objectives
Pollution Detection/Problem Identification	Detect point/nonpoint sources of pollution; inventory sources such as yard wastes, eroded land or stream bank areas; detect illicit connections, illegal discharges
Beneficial Uses	Determine impact/identify threats of certain NPS pollutants on beneficial uses
Pollution Prevention/Stormwater Program Efforts	Evaluate pollution prevention/reduction measures; assess effectiveness of BMPs, performance standards for controlling NPS pollutants
Local Government Planning/Watershed Management	Support local government planning and decision making that limits NPS pollution; ensure NPS pollution issues are included in environmental, watershed planning/management
Public Education	Improve public education about NPS pollutants; promote interest, understanding of local NPS issues; build understanding that our actions affect the watersheds
Stewardship	Foster stewardship, community involvement towards identification/control of NPS pollution

b) Advantages/disadvantages of using partnerships that encourage volunteer monitoring (Level 2a criteria)

Considerable benefits and advantages to both community groups and agencies occur from forming local partnerships as well as from using volunteer monitors. Some of the main advantages, as well as several potential obstacles or disadvantages, are included in Appendix L.

c) Possible opportunities for implementing partnerships/volunteer monitoring (Level 2b criteria)

To decide where and how partnerships and volunteer monitoring might be encouraged, it is necessary first to list the existing programs that currently or

could potentially conduct volunteer monitoring, and the opportunities for potential partnerships, in the WV communities' watersheds. Programs are listed in Table 8, below, by watershed. This list is not comprehensive, as additional programs, such as other schools, potentially could be included, but it reflects current opportunities. As Table 8 indicates, few organizations currently have volunteer monitoring programs. Partnerships could be formed with schools, environmental education organizations, or creekside residents or groups.

Partnerships applicable to any watershed

WV municipalities would benefit most from partnerships with entities that can meet or further specific municipality and overall SCV URPPP and regional NPS goals, objectives, and data needs.²⁹ Potential partnerships need not apply to only one watershed. For example, a partnership with universities and community colleges (e.g., San Jose State, West Valley College, De Anza), could be applied in any or all of the WV communities watersheds. Additionally, a partnership could be considered with an entity, such as the Santa Clara Valley Audubon Society or Sierra Club, who may not actually conduct monitoring, but could influence or encourage potential monitors. Another type of partnership that may be considered is with local businesses.

Table 8: Current Monitoring Programs and Opportunities for Potential Partnerships in WV Watersheds

Watershed	Current Volunteer Monitoring	Potential Partnerships
Saratoga Creek	Saratoga School District	<ol style="list-style-type: none"> 1. Saratoga School District and other schools; 2. Walden West; 3. San Jose Water Company; 4. Adopt-a-Creek groups; 5. Creekside residents (e.g., homeowners associations)
Los Gatos Creek	Guadalupe-Coyote Resource Conservation District (RCD)	<ol style="list-style-type: none"> 1. Guadalupe-Coyote RCD; 2. StreamKeepers, Urban Creek Assessment Project, (UCAP), Integrated Community Involvement Program (ICIP);³⁰ 3. Youth Science Institute (YSI); 4. Los Gatos/Saratoga High School District: Nova Program; 5. Los Gatos Creek Streamside Park Committee; 6. Santa Clara County Parks and Recreation; 7. Adopt-a-Creek groups; 8. Creekside residents (e.g. homeowners associations)
San Tomas Aquino Creek	Westmont High School	<ol style="list-style-type: none"> 1. Westmont High School; 2. Adopt-a-Creek groups; 3. Creekside residents
Calabazas Creek	None encountered	<ol style="list-style-type: none"> 1. Friends of Calabazas Creek (FOCC); 2. Adopt-a-Creek groups; 3. Creekside residents
Prospect Creek	None encountered	<ol style="list-style-type: none"> 1. Adopt-a-Creek groups; 2. Schools

d) Feasibility/ease of implementing partnerships/volunteer monitoring for NPS (Level 2c criteria)

The feasibility of implementing each of the potential partnerships and monitoring efforts described in Table 8 is illustrated in this section, by watershed. All potential partnerships described in Table 8 (and considered below) are either

currently feasible or may be feasible sometime in the future (due to further research needed and/or data gaps). A time frame for implementing partnerships is included in Section f below.

Saratoga Creek watershed

Partnerships with Saratoga School District, designed to satisfy multiple objectives such as pollution detection/pollution prevention or public education/stewardship, are currently very feasible. Partnerships should be used to encourage volunteer monitoring and creek curriculum to continue at Saratoga School District, in other schools and in environmental education programs (such as Walden West). The City of Saratoga could refer interested teachers, staff, coordinators and others to places such as Aquatic Outreach Institute, San Francisco Estuary Institute (SFEI), SWRCB, Bay Area Regional Watershed Network (BARWN), or other technical experts who could provide training and protocols. The City could also refer other educators to schools with existing creek curriculums such as Saratoga School District (or applicable schools in Santa Clara) (see Section e below).

Additionally, encouraging environmental education programs, such as Walden West, to use children as monitors to collect and share relevant NPS data with the City of Saratoga and the Community, is currently feasible (see Section e below). A partnership between the City of Saratoga and San Jose Water Company is also currently feasible for obtaining specific water quality information. Although Adopt-a-Creek groups are primarily "...an opportunity for

citizen participation in creek-cleaning projects" (SCVWD Adopt-a-Creek brochure 1997), partnering with people who already care about and are actively trying to improve the condition of creeks, would be very beneficial for the City of Saratoga.

Similarly, partnering with creekside residents to help monitor portions of Saratoga Creek also is feasible in the future. A StreamKeepers program, involving volunteer monitors, was established on Saratoga Creek from 1995-1996; Creek watchers may still be active, independent of any formalized program. Additionally, preliminary research needs to be conducted to determine how many creekside residents there are, how many might be interested in creek monitoring, and whether any (or how many) homeowners associations exist. Significant outreach and education is required.

Los Gatos Creek watershed

A partnership between Los Gatos and Campbell and Guadalupe-Coyote Resource Conservation District may be feasible in the future to help determine the impact of NPS pollutants on beneficial uses pertaining to fish and wildlife on the Los Gatos Creek watershed. The municipalities should act in the following capacities:

1. Encourage (or fund) additional data loggers to be placed on different sections of Los Gatos Creek for data collection;
2. Specify NPS parameters that would meet data needs to be included in monitoring;
3. Encourage the RCD to tie in with local schools' science/creek curriculums for potential volunteer monitors, since the RCD has worked with schools in the past;
4. Sponsor school activities and recognize teachers' and students' efforts

Coyote Creek Riparian Station's (CCRS) StreamKeepers program (renamed STREAMWatch), involving volunteer monitors, was established on Saratoga Creek from 1995-1996 as one component of an Integrated Community Involvement Program (ICIP). The SCV URPPP allocated \$60,000 in 1998-1999 to support volunteer monitoring in their Monitoring Plan, as one recommended "watershed" project. Although CCRS no longer runs the program, other entities may be able to run it in the future (for example, Coastal Watershed Council and Aquatic Outreach Institute). Carrying out similar programs in Los Gatos and Campbell may be feasible in the future.

To encourage a STREAMWatch program in Los Gatos and Campbell, many factors first need to be considered, including: selecting an entity to run the program, determining costs, recruitment and outreach strategies, and conducting training. Additionally, the number of creekside residents interested in creek monitoring should be determined (see CCRS's StreamKeepers in Your Community-A Manual for Starting a StreamKeepers Program). The San Francisquito Creek CRMP in Palo Alto and Friends of Corte Madera Creek Watershed in Marin are good resources for the municipalities as they currently conduct CreekWatch programs (see Appendix K).

An Integrated Community Involvement Program or Urban Creek Assessment Project (UCAP) on Los Gatos Creek watershed is also feasible in the future, for there are a large number of potential stakeholders. Hikers, bikers, creekside residents, recreation groups, and other stakeholders of Los Gatos

Creek Trail, such as Adopt-a-Creek groups, all serve as potential monitors of auto related, household, and landscaping/gardening pollutants as well as trail/streambank erosion (see Appendix H).

Currently, Youth Science Institute (YSI) conducts hands-on creek exploration/creek biodiversity programs (among other programs) for school classes at Vasona and Los Gatos Creek. YSI is now in the final process of developing curriculum for a creek awareness program designed to provide middle school students the opportunity to monitor the health of a section of Los Gatos Creek (SCV URPPP Annual Report 1998). A potential partnership with YSI may be feasible in the future. One possibility is for the Town of Los Gatos to encourage and/or engage in partnerships between YSI and local schools. For example, a teacher with a creek curriculum in class can take her students to the YSI site on the creek for data collection. The schools could analyze the data and share it with YSI who could share it with other schools and with Los Gatos. Teachers would need to be trained in protocols for formal data collection, and YSI and the schools would need to obtain or have access to the appropriate monitoring equipment. YSI and schools should also be encouraged to incorporate monitoring for trail or streambank erosion on Los Gatos Creek into their creek program(s).

Because data gaps exist, it is not currently feasible to form a partnership with Los Gatos/Saratoga High School District's Nova Program to encourage monitoring. Additional information on the goals and activities of the Nova

Program needs to be gathered before a partnership could be considered.

Although the Los Gatos Creek Streamside Park Committee primarily is an advocacy group for Los Gatos Creek Trail, it is currently feasible for Los Gatos and Campbell to partner with the Streamside Committee to monitor for pollutants and/or trail and streambank erosion on Los Gatos Creek.

Partnerships between Los Gatos and the Santa Clara County Parks and Recreation (SCC Parks) for monitoring Los Gatos Creek watershed are less desirable, since SCC Parks is not currently monitoring within the watershed. SCC Parks Department presently has a volunteer monitoring program for Ed Levin and Grant Parks in San Jose and has indicated that they may extend this monitoring (within one to two years) to Los Gatos Creek, Vasona, and Lexington. A partnership with SCC Parks may be feasible in the future.

Partnerships with Adopt-a-Creek groups and creekside residents for pollutant monitoring also are feasible in the future. As of April 1999, there were at least five Adopt-a-Creek groups for Los Gatos Creek in Los Gatos and Campbell (SCVWD list 1999). As in the Saratoga watershed, partnerships with creekside residents are feasible in the future; significant research, education, and outreach first need to be conducted.

San Tomas Aquino watershed

Currently, Westmont High School conducts volunteer monitoring in the San Tomas Aquino Creek watershed. Partnerships with Westmont High are

currently feasible to conduct NPS monitoring for auto related, household, landscaping/gardening, and/or streambank erosion at points along San Tomas Aquino Creek. Additionally, the WV municipalities (particularly Campbell) should consider whether the data currently collected by Westmont are useful to them, and whether additional parameters could be easily added to meet data needs.

Partnerships with Adopt-a-Creek groups to monitor for NPS are also feasible in the future. As of April 1999, there were at least two Adopt-a-Creek groups on San Tomas Aquino Creek in Campbell. Additional groups may exist. Creekside residents may make particularly good partners on certain stretches of San Tomas Aquino Creek (e.g., through Monte Sereno), mainly because it is hard for anyone but residents to gain access to the Creek. Research, outreach, and education are necessary before establishing partnerships.

Calabazas Creek watershed

The City of Saratoga could consider a partnership with Friends of Calabazas Creek to receive data on NPS from the Calabazas Creek watershed. For a partnership to be feasible, local neighborhood projects and community data needs first have to be determined and agreed upon. FOCC could help monitor the stretch of Calabazas Creek that flows through Saratoga for various NPS pollutants such as auto related, household, landscape/gardening, and streambank erosion. Additionally, partnerships with Adopt-a-Creek groups and creekside residents may be feasible in the future.

Prospect Creek watershed

At this point, monitoring is not occurring in the Prospect Creek watershed. The City of Saratoga could consider future partnerships with universities, Adopt-a-Creek groups, or local schools to monitor for NPS pollutants in the watershed.

- e) How partnerships encouraging volunteer monitoring and other monitoring activities might be implemented (specific examples in Saratoga Creek watershed) (Level 2d criteria)**

Walden West Program

Volunteer monitoring and other activities might be encouraged through a partnership with the Walden West Program. Walden West educates children about creek ecosystems through fun and games by exploring Saratoga Creek (and others). The coordinator indicated she would love to collect data for the City of Saratoga. Through a partnership with Walden West, the City of Saratoga (or West Valley Clean Water Program) could act in several capacities:

1. Refer coordinator to places for technical information, so that any data collected would be collected according to some protocols and reported in certain formats (although currently there is no standardization);³¹
2. Investigate the costs of purchasing additional equipment (or actually funding it), which could also serve other educational programs or school programs;
3. Refer coordinator to current monitoring programs in Saratoga and to additional grant information or to programs who have successfully received grants (e.g. Money for Creeks, Funding Sources for Communities)

In exchange, Walden West could provide the City of Saratoga with certain data that meets their objectives including streambank erosion monitoring and/or

NPS pollutant monitoring. Public education/stewardship, and also SCV URPPP, regional objectives, and other criteria could also be met by this partnership.

Saratoga School District

Through a partnership with Saratoga School District, the City of Saratoga would meet several WV objectives including: public education/stewardship; pollution detection; and beneficial uses. The City of Saratoga (or West Valley Clean Water Program) could act in the following capacities:

- 1. Help print and distribute a streamside planting guide to go with the native plants that Saratoga schools plan to raise to give to creekside residents;**
- 2. Help fund purchasing plants for revegetation sites;**
- 3. Reproduce the Saratoga Creek Telephone Directory and make it available to all residents of Saratoga (Directory contains numbers citizens can use to report pollution incidents, addresses concerns about a creek)**

The Saratoga community currently has access to many types of data collected because the Saratoga schools enter the data into their website for sharing with other schools (see the Saratoga Creek Project website). The City of Saratoga could partner with Saratoga schools to monitor for NPS pollutants, including surface auto related pollutants, household pollutants, or landscaping/gardening pollutants; or ask the schools to conduct streambank erosion monitoring, since the schools already monitor for other parameters at their study sites. This partnership could benefit Saratoga by expanding its monitoring program at the least cost to the City.

f) Suitability (time frame table) for implementing partnerships that encourage volunteer monitoring, other monitoring activities (Level 2e criteria)

Table 9, below, indicates existing volunteer monitoring programs and potential opportunities for partnerships, by watershed; objectives met by the programs, activities, and partnerships; potential NPS pollutants monitored; and a potential time frame for implementation. Table 9 illustrates two partnerships, with Saratoga Schools and Westmont High School, which could be implemented in six months. Four partnerships could be implemented in six months to a year. Most partnerships could be implemented in one to two years while a few may take between two and five years to implement. These recommendations are intended to help WV municipalities further satisfy local and regional program goals and objectives and monitoring requirements and intents. The time frames listed are estimates.

Table 9: Time Frame for Implementation of Partnerships That Encourage Volunteer Monitoring and Other Monitoring Activities

Watershed ¹	Monitoring Program/ Potential Partnership	Objectives Met ²	Potential NPS Pollutants Monitored ³	Time Frame For Implementation			
				Present- 6 Mo	6 Mo - 1 Yr	1 Yr - 2 Yrs	2 Yrs - 5 Yrs
Saratoga	Saratoga School District/other schools	PE/S; BU; PD/PP	A, H, L, E	X			
Saratoga	Walden West	PE/S; GP/WM	E		X		
Saratoga	San Jose Water Company	PD/PP	A, H, L, E		X		
Saratoga	Adopt-a-Creek groups/ creekside residents	PE/S, PD/PP	A, H, L, E			X	
Los Gatos	Guadalupe-Coyote Resource Conservation District	BU; GP/WM	E			X	
Los Gatos	STREAMWatch Program	PD/PP; PE/S; BU	A, H, L, E			X	
Los Gatos	UCAP/ICIP	PE/S; BU; PD/PP	A, H, L, E				X
Los Gatos	Youth Science Institute	PE/S; GP/WM	E		X		
Los Gatos	Los Gatos/Saratoga High School District: Nova Program	?	?			?	
Los Gatos	LG Creek Streamside Park Committee	PE/S; PD/PP	A, H, L, E			X	
Los Gatos	County of Santa Clara Parks and Recreation	BU; PD/PP; GP/WM	A, H, L, E				X

Table 9: Time Frame for Implementation of Partnerships That Encourage Volunteer Monitoring and Other Monitoring Activities (continued)

Watershed ¹	Monitoring Program/ Potential Partnership	Objectives Met ²	Potential NPS Pollutants Monitored ³	Time Frame For Implementation			
				Present-6 Mo	6 Mo - 1 Yr	1 Yr - 2 Yrs	2 Yrs - 5 Yrs
Los Gatos	Adopt-a-Creek groups/ creekside residents	PE/S, PD/PP	A, H, L, E			X	
San Tomas Aquino	Westmont High School	PE/S; BU; PD/PP	A, H, L	X			
San Tomas Aquino	Adopt-a-Creek groups/ creekside residents	PE/S, PD/PP	A, H, L, E			X	
Calabazas	Friends of Calabazas Creek	PE/S, PD/PP	A, H, L, E		X		
Calabazas	Adopt-a-Creek groups/ creekside residents	PE/S, PD/PP	A, H, L, E			X	
Prospect	Adopt-a-Creek groups, schools	PE/S, PD/PP	A, H, L, E				?
N/A	Santa Clara Valley Audubon Society, Sierra Club	PE/S? GP/WM?	?			X	
N/A	Local Businesses	PD/PP?	?			X	
N/A	Universities/ Community Colleges	PE/S? PD/PP?	?			X	

? = data gaps

¹ Watersheds are: Saratoga, Los Gatos, San Tomas Aquino, Calabazas, Prospect Creek

² Objectives: PD/PP = pollution detection/pollution prevention; PE/S = public education/stewardship; BU = beneficial uses; GP/WM = local government planning/watershed management

³ Pollutants are: A = auto related (oil sheen, antifreeze, soap & dirt); H = household chemicals (paints, detergents, solvents); L = landscaping/gardening pollutants (leaves, lawn clippings, yard trimmings); E = erosion (streambank and/or trail erosion)

g) Gaps/further research needed (Level 2f criteria)

One reason some time frames for implementation remain in the future is because information gaps currently exist. Further efforts are necessary to:

1. Conduct further research on the data formats and protocols used for current schools' monitoring programs (e.g. Westmont); research on additional local schools/universities where volunteer monitoring might be encouraged (i.e. Lexington, Pioneer, West Valley College, San Jose State University) (might include looking at land use/watershed maps for identifying which schools are close to creeks);
2. Acquire information on the qualifications of the program planners/ contacts of all monitoring programs in WV watersheds (e.g., technical skills, ability to train volunteers; expertise);
3. Conduct additional research on the Friends of Calabazas Creek (FOCC) to determine the types of local projects or monitoring that would benefit both the City of Saratoga and FOCC;
4. Acquire additional information on the structure and function of the Los Gatos/Saratoga High School District's Nova Program and interest level in monitoring;
5. Obtain more detailed information on the County of Santa Clara Parks and Recreation; learning more of their detailed plans as to when they might begin monitoring Los Gatos Creek watershed before Los Gatos and Campbell could make any effort;
6. Obtain more information on the Prospect Creek watershed; currently it is a place holder in the strategy;
7. Identify, for Saratoga School District, the exact time frame and costs for their plant project and the types and purposes of their revegetation sites;
8. Identify current Adopt-A-Creek groups in WV watersheds and utilize them as potential volunteer monitors;
9. Determine whether partnerships with volunteer monitors around SF Bay exist and identify additional programs where partnerships could be considered

Additionally, some specific questions regarding partnerships and monitoring need to be answered including:

- 1. What are some specific steps to take when forming partnerships?**
 - 2. Who might be good candidates for potential business partnerships, and how might monitors meet specific business objectives?**
 - 3. What are the best ways to recruit volunteers (e.g., go to current creek groups, creekside residents, homeowners associations, coastal clean-up participants, Santa Clara Valley Audubon Society volunteers, hikers and bikers; local advertising)?**
 - 4. Who should train volunteers to monitor for NPS pollutants (e.g., SCVWD, Aquatic Outreach Institute, Coastal Watershed Council)?**
- 2. Acquire additional information on current and proposed programs and activities affecting the WV watersheds**

If the WV municipalities are aware of proposed activities and have a solid base of knowledge, they will be well prepared to make decisions or take action on such activities. As stated in the Napa River Watershed Owner's Manual (p. 30): "A community that has a high degree of awareness of the condition and trends of their watershed is better equipped and more likely to manage the watershed in a thoughtful, sustainable manner."

One area that increasingly has gained recognition by the EPA, the SWRCB, the RWQCB, the SCV URPPP, BASMAA, RMP, and the SCB WMI is the use of environmental indicators and bio-criteria.³² For example, the SCV URPPP received a \$250,000 grant and is currently conducting a Stormwater Environmental Indicators Pilot Demonstration Project in the Coyote Creek watershed and Walsh Avenue catchment in Santa Clara for the Water Environment Research Foundation. The Indicators Project tests and evaluates

the usefulness of the Environmental Indicator methodology, proposed by EPA and the Center for Watershed Protection, in assessing the effectiveness of stormwater management programs (Woodward-Clyde 1996). This Project satisfies several of the SCV URPPP's Monitoring Plan's watershed and effectiveness projects. WV municipalities could conduct further research on environmental indicators and bio-criteria literature; by learning more about indicators now, the WV municipalities will be prepared for possible action in the future.

3. Implement monitoring-related activities

The third recommended watershed monitoring strategy is to conduct additional local monitoring and related activities. Activities, some actual monitoring and some related to monitoring (such as public outreach and education), should be undertaken within one to three years. Many of the activities described below are not directly related to monitoring; however they are included as recommendations because they are important to achieve the ultimate goals of monitoring – reduction and control of NPS pollutants and protection of beneficial uses within local WV watersheds and the Bay. Furthermore, activities such as having school children create signs to identify creeks, and developing specific watershed brochures for each community, help to satisfy several monitoring intents including: fostering stewardship and community involvement towards identification/control of NPS pollution; improving public education about NPS pollutants; and ensuring NPS pollution issues are included in watershed

planning. Five activities are described below:

a. Create a general watershed brochure

A general watershed brochure describing what a watershed is, how it works, and how it relates to the communities, could be designed by WV Clean Water Program or by one or more of the WV municipalities. The brochures could be distributed locally, perhaps by partnering with San Jose Water Company to have them include it with their utility bills, and/or made publicly available at both the WV Clean Water Program and municipalities. This type of brochure should convey the concept that everyone lives in a watershed and everyone must work together to keep their watershed healthy and productive. Several models for watershed brochures exist such as those developed by the Terrine Institute or the Conservation Technology Information Center (CTIC).

b. Create a specific watershed brochure for Los Gatos Creek watershed (modeled after Saratoga Creek), possibly for other watersheds

As part of the Integrated Community Involvement Program (1995-1996) on Saratoga Creek, CCRS created a useful Saratoga Creek watershed brochure, which includes information and pictures on: physical qualities, vegetation and wildlife, the riparian community, pollution prevention, historic information, and a short telephone directory. Similar brochures could be designed for Los Gatos Creek and Calabazas Creek watersheds.

c. Conduct field work on Los Gatos, Calabazas Creek, other watersheds

Conducting fieldwork on Los Gatos, Calabazas Creek, and other local watersheds is an important activity for the municipalities to undertake, especially in anticipation of potential data needs of the SCB WMI. Moreover, conducting fieldwork would help WV municipalities further characterize these drainage areas for pollutant concentrations, as required in their NPDES permit (C.4.1).

Fieldwork activities should include visual identification of outfalls and intakes; locations of visual impacts (garbage/yard waste); habitat/bank characteristics, and types of vegetation. These activities could be coordinated by the WV Clean Water Program, and conducted by volunteer monitors through a partnership with FOCC, local schools, or Adopt-a-Creek groups.

The planning process begins with gathering information about the watershed, including land use patterns, occurrence of plants and animals, characterization of soils, geology, hydrology, and climate, as well as knowledge of specific creek issues and concerns. To monitor the health of a watershed is to determine what the resources are and to ascertain their current condition. As the California's Directory of Volunteer Monitoring Organizations (CDVMO 1997, 4) indicates, volunteer monitoring groups often start their efforts with an inventory of their creek, describing either quantitatively or qualitatively the physical, chemical, and biological nature of their creek. This type of inventory provides the basic (baseline) information needed to assess the health of the creek, and once baseline information has been gathered, periodic sampling can help to determine

changes over time. For example, Napa County RCD has a volunteer watershed monitoring program that is monitoring the health of their watershed as an important part of enhancing and maintaining resources. The first step of their program is to determine what the resources are and to ascertain their current condition (see Napa County RCD's Napa River Watershed Owners Manual).

- d. Hold workshops or train small NPS businesses, restaurants, and auto facilities and/or inspectors, in the use and application of Best Management Practices (BMPs) to prevent NPS pollution*

In order for businesses and restaurants to apply BMPs, they need to understand them and sometimes see exactly how they are intended to work. Although providing business owners or managers with BMP booklets and materials is a step in the right direction, many do not take the time to read them and the information is essentially wasted. WV CWP could improve the effectiveness of these efforts by either holding BMP workshops training owners and managers of NPS commercial facilities, or alternately, better training and preparing inspectors to be familiar with materials, convey or demonstrate BMPs, and to answer questions. WV CWP could then follow up to survey implementation of BMPs and answer additional questions. Additionally, incentives could be included for owners/managers to read and pass on materials to employees such as giving the shops a sign to post recognizing those businesses as WV Clean Businesses, for example (see Palo Alto's Clean Bay Business Program).

e. *Create signs that indicate the names/animals of particular creeks*

One additional activity that has been successful in other parts of California and the nation, is placing names and/or graphics on signs to indicate the location of local urban creeks (especially as they pass under roads and disappear). This activity could increase local awareness and help to prevent creek pollution. WV municipalities could form partnerships with schools, such as Los Gatos High School or Saratoga School District, to have children create creek signs. The Volunteer Monitor Newsletter provides great examples of ways to engage in this activity.

C. Conclusions

This thesis set out to: 1) identify current monitoring activities of WV communities; 2) document the current roles and activities of other entities fulfilling regulatory requirements and the intent of watershed monitoring; and 3) ascertain the WV municipalities' *appropriate* future roles in regional watershed monitoring of urban nonpoint source pollutants. To accomplish these goals, a watershed policy "toolkit" was developed, which included an integrated database of WV monitoring activities, a decision-making framework, and monitoring participation guidelines.

This work identified multiple programs and activities in and affecting the WV communities' watersheds and showed that many monitoring regulations and intents are satisfied by WV participation in these programs, especially participation in the SCV URPPP. Research also revealed that while there

appears to be some activities in all required aspects of monitoring in the larger watershed, many activities do not appear to be occurring directly within WV watersheds. This suggests that the current watershed activities may be doing a better job at monitoring and protecting the Bay – where region-wide priorities are high – than they are at monitoring and protecting beneficial uses within the WV watersheds. To illustrate, no activities were identified on Prospect Creek, indicating that not enough information is known about certain areas of the WV watersheds, where region-wide priorities are low. Although monitoring requirements and intents are being met regionally, within the WV communities, further monitoring intents, above and beyond the requirements, could still be realized.

From the outset, this research was based on the criterion that a contribution to monitoring should be based on the types of pollutants likely to be contributed to the watersheds, and on the financial/infrastructure resources communities could contribute. To identify probable/known NPS pollutants and resources each community could offer, a decision-making framework using a sequence of PC/IR data sheets and step by step criteria was developed, and examples of how this criteria could be applied by each of the WV municipalities were illustrated. All of the WV municipalities, except Monte Sereno (entirely residential) had eleven potential pollutant classes. Typical roles or contributions for WV municipalities, based on their resources and current monitoring efforts, include continuing current strategies; continuing distribution of educational

materials to retail shops; partnering with schools or creek groups to monitor for auto, landscaping, and household pollutants, and/or erosion; and training facilities the proper use of BMPs, or training inspectors to better convey BMP information to auto/commercial facilities.

Based on these roles, monitoring participation guidelines were developed to demonstrate how and under what circumstances monitoring activities should be implemented. These guidelines recommend ways for WV municipalities to enhance participation using two-tiered, step-by-step criteria. These criteria were then applied to sample alternatives including fostering partnerships that enhance volunteer monitoring and monitoring related activities. Through partnerships, municipalities are able to expand their monitoring programs at least cost. Twenty possible monitoring programs/potential partnerships were identified with estimated time frames for implementation. The majority of the programs could be implemented in one to two years. Additional alternatives include acquiring additional information on current and proposed activities or programs affecting WV watersheds, such as environmental indicators and biocriteria; and implementing monitoring-related activities, intended to reduce NPS pollutants and protect beneficial uses of local watersheds and the Bay.

D. Recommendations for Future Work

In theory, in much of the literature, and in practice, a watershed-based approach is essential to effectively monitor and control diffuse nonpoint sources of pollution. However, because the term "watershed monitoring" is such a new

concept and practice, many questions remain about its definition, requirements, and applications. One such question is: *What should be the roles and responsibilities of government, businesses, environmental groups, residents, and the public in watershed monitoring?* This research could only address a small portion dealing with potential roles and responsibilities for government of small urban municipalities. Perhaps the frameworks developed to identify probable pollutants and possible resources of small WV municipalities could be applied to larger municipalities. Additional components might need to be added to fit the needs of larger municipalities, such as including other likely pollutant sources (sewage treatment plants, manufacturing/large industrial facilities).

Although this work recommended potential roles for WV municipalities in regional watershed monitoring, the WV watersheds extend beyond the jurisdictions of the four municipalities, and decision-making cannot be influenced directly on other communities within the larger watershed. For WV municipalities ultimately to decide appropriate activities on which to place efforts, they need to be aware of not only the activities occurring within their watersheds, but also those occurring outside of them. The watershed policy tools that were developed in this work may serve as potential guidance models for other communities within and outside of the WV watersheds. However, for improved, coordinated decision-making, a regional database similar to the one recommended here, should be created by all communities within the larger watershed. Although roles may change over time, an integrated database may prove useful to regional

efforts, especially if it is updated. Hopefully, initiatives such as the Santa Clara Basin WMI will also provide the needed framework for cooperation between multiple and very different jurisdictions in the same watershed.

One related question that requires further consideration is whether a municipality should be responsible for monitoring and controlling *all* pollutants generated within their community, or only those pollutants that the community, itself, generates. To illustrate, who should be ultimately responsible for monitoring pollutants generated by mobile cleaners based in Cupertino, but operating in Saratoga? Who should be ultimately responsible for monitoring pollutants generated on highways that traverse WV communities? The need for regional coordination is even greater if the responsibility is apportioned by jurisdiction, e.g., Caltrans taking responsibility for monitoring auto-related pollutants from highways.

This thesis identified the types of monitoring activities occurring in and affecting WV watersheds, but a plot of exactly where monitoring is occurring within local watersheds and the larger watershed was beyond its scope. It is questionable whether the types of monitoring activities occurring within WV watershed are comprehensive enough to protect the local watersheds and the Bay from NPS pollution. Additional work should be done to pinpoint the exact monitoring locations of WV activities and put them into a geographic information system (GIS). The resultant data should be analyzed and evaluated to determine if and where efforts are sufficient, and where further efforts should be

placed. Ideally, this work should be done for the entire region, not just for WV watersheds.

Additional research also should be conducted on the roles in watershed monitoring of entities besides government. For example, besides becoming partners and monitoring for NPS pollutants, environmental groups, businesses, and residents could monitor for biological indicators, collect baseline data, engage in beneficial use protection, and conduct stream restoration. Partnerships should be designed to be mutually beneficial, meeting the monitoring/data gathering goals and objectives of municipalities while accommodating the needs of volunteers.

Furthermore, research should be conducted on the relationship between monitoring and Total Maximum Daily Loads (TMDLs), which are currently being established for San Francisco Bay. A TMDL for copper, for example, will require copper loading to the Bay to be kept under a specific quantity. If the sources of the copper load are allocated amongst communities in the Santa Clara Basin, and WV municipalities are included in the allocation, who should be responsible for monitoring for copper from the WV watersheds? How should monitoring be conducted?

Answers to these questions and the asking of others may lead to better monitoring and ultimately, control of nonpoint pollution sources and increased environmental protection of our creeks, watersheds, and San Francisco Bay. As Steven Kinsey, Marin County Supervisor, said at a 1997 Volunteer Monitoring

Conference: *"The best time to protect our watersheds is 100 years ago. The next best time is now."*

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Notes

¹ More than two dozen federal and state agencies, in addition to numerous local governments, special districts (i.e. sanitation district), utility companies, and flood control agencies in the San Francisco Bay Area have some jurisdiction over watershed resources of one kind or another. In addition, a growing number of private organizations and regional partnerships are becoming involved (Hoenicke, Rigney, and Kaufman 1996, 3).

² The terms "nonpoint source pollution," "stormwater surface runoff," and "urban runoff" are not necessarily interchangeable. Nonpoint source is a comprehensive term, covering diffuse agricultural pollutants as well as urban, construction, mines, etc. Stormwater surface runoff can refer to nonpoint source pollutants that are carried by rainwater into receiving waters and is not necessarily limited to urban pollutants. The term stormwater surface runoff also may not extend to surface runoff from urban activities causing surface runoff such as lawn watering. Urban runoff, the focus of this thesis, refers to both stormwater surface runoff and surface runoff from urban uses (in both wet & dry weather conditions).

³ EPA considers San Francisco (SF) Bay impaired because it exceeds certain water quality standards for dissolved metals (such as cadmium, copper, lead, mercury, selenium, and silver). Storm drains and three publicly owned treatment works (POTWs) are listed as probable causes (RWQCB 303(d) List, 1997). This does not account for other causes such as natural occurrences of metals in the SF Bay and other Bay characteristics, or other scientific data that indicate no significant problems are associated with the levels of metals (Personal Communication with Kelly Carroll, WV CWP, 1999).

⁴ EPA also developed 18 indicators for the water quality objectives; three of these indicators address the objective to Conserve and Enhance Aquatic Ecosystems: 1) Biological integrity-percentage of rivers and estuaries with healthy aquatic communities; 2) Species at risk-percentage of aquatic and wetland species currently at risk of extinction; 3) Wetland acreage-rate of wetland acreage loss (EPA 1996, ii, iii).

⁵ Urban nonpoint sources included: auto, industrial, construction erosion, water supply, and tailpipe emissions. Auto sources accounted for 44% of the total load of copper, the majority (42%) from brake pads; tailpipe emissions accounted for 31% of the total load of mercury. Other NPS, such as reservoir spills, were estimated to contribute 19% of the total copper, 60% of the total nickel, 58% of the total mercury, 14% of the total silver, and 22% of the total selenium. Silver and selenium percentages included both urban and non-urban nonpoint sources. Point sources were estimated at 28% of the total copper, 27% of the total nickel, 3% of the total mercury, 86% of the total silver, and 78% of the total selenium (Woodward-Clyde 1997, Tables 5-23-5-31).

⁶ The EPA delegated to the State of California, through the RWQCB, the authority to adopt and enforce NPDES permits in the Bay Area (SCV URMP 1997, Appendix B1).

⁷ Objectives for numeric water quality standards may be attained for compliance through stormwater monitoring, for example, but physical and biological characteristics still may be impaired. Moreover, pollutants may be hazardous below detection limits, water quality objectives may be set too low, etc.

⁸ The SCV URPPP had been leading discussions with the RWQCB and others to approach monitoring by other unconventional methods.

⁹ Recognition of the importance of conducting watershed monitoring is clearly demonstrated in the SCV Nonpoint Source Pollution Control Program's 1995 Storm Water Management Plan, 8.2. For additional support for watershed approaches and monitoring, see also 1997 SCV URMP sections: 2D; 3G, 4G; NPDES permit section C. Provisions: 4. Monitoring Program, p. 12 and Provision: 7. Watershed Management Measures; Basin Plan Ch. 1.3.

¹⁰ The URMP is the new name for the SCV URPPP's Storm Water Management Plan, required under the provisions of the 1995 NPDES permit. The URMP details what the Co-permittees will do (acting individually and collectively) to reduce urban runoff pollution. The WV municipalities have a WV URMP as local implementation for the Program's collective URMP.

¹¹ Of particular importance to the SCV URPPP, and therefore to WV municipalities, is following the planned activities of three subgroups: Watershed Assessment Subgroup, focusing on biological, physical, and chemical assessment; Bay Monitoring and Modeling Subgroup, focusing on pollutant load studies and Bay monitoring; and Land Use Subgroup, focusing on land use planning interests and issues.

¹² The SCV URPPP is a member of BASMAA; thus the interest from West Valley municipalities.

¹³ Although not included in monitoring program descriptions, this watershed plan serves as a potential model for WV municipalities to emulate for watershed management/planning.

¹⁴ For example, the RWQCB has selected Santa Clara County for a pilot Watershed Management Initiative in Santa Clara Basin (App. M, Fig. 2).

¹⁵ Campbell's Conservation and Open Space elements were adopted in different years (1972 and 1990) but come from the same General Plan. Campbell and Los Gatos are in the process of revising their General Plans.

¹⁶ A partial list of accepted monitoring protocols and assessment guides are included in Appendix A.

¹⁷ A biological indicator can be a precise indicator of actual conditions because communities inhabit waters continuously (Pelley 1996, 381A).

¹⁸ Biological criteria are valuable because they directly measure the condition of the resource at risk, detect problems that other methods may miss or underestimate, and provide a systematic process for measuring progress resulting from the implementation of water quality programs (EPA 1990, vii).

¹⁹ Examples of qualitative/quantitative data include: types of chemical parameters monitored in a watershed, the number of agencies conducting monitoring.

²⁰ For additional regulatory background, see also Appendix B of 1997 SCV URMP; SFEP Draft Regulatory Analysis for SF Estuary, June 1992; CCRS/SCVWD 1996 StreamKeepers Program Implementation Report: San Francisquito Creek, Legal Section 8-1 - 8-41; and portions of California Health and Safety Code and SCVWD Flood Control Regulations (RWQCB NPDES Permit 1995).

²¹ See, for example, C. Provisions: 3a, 3b: Annual Reports and Work Plans, p. 11; C. Provision: 4: Monitoring Program, p. 12; C. Provision: 7: Watershed Management Measures, p. 15; C. Provision: 6: Metals Control Measures, p. 14; Appendix B: Construction Project Storm Water Pollution Prevention Plan Provisions, p. B-4.

²² Pollutants of concern in these discharges are certain heavy metals: cadmium, chromium, copper, lead, mercury, nickel, silver, selenium, zinc; sediment from erosion due to anthropogenic activities, petroleum hydrocarbons from sources such as used motor oil, microbial pathogens of domestic sewage origin from illicit discharges, certain pesticides associated with in stream acute toxicity, and other pollutants which may cause aquatic toxicity in the receiving waters (RWQCB NPDES Permit 1995, 1, 4).

²³ See, for example, Chapters 1; 4; 5, and 6. Chapter 5-3, Plans and Policies, details the resolutions under the Regional Monitoring, Data Use, and the Aquatic Habitat Program. In Resolution No. 92-043, for example, "the Regional Board endorses the development and implementation of a comprehensive, Estuary-wide monitoring program that will regularly collect information on concentrations of pollutants in water, sediment, and biota" (RWQCB Basin Plan 1995, Ch. 5-3).

²⁴ Specifically, information is used to satisfy § 104, 106, 208, 301, 303, 304, 305, 307, 308, 314, 402 of CWA (RWQCB Basin Plan 1995, Ch. 6-1).

²⁵ By supporting the Brakepad Partnership, the SCV URPPP is addressing a major urban runoff source of copper loading to the Bay and implementing control measures (AUTO-1) in the Metal Control Measures Plan and the URMP (SCV URPPP Annual Report 1998, 2-18). Additionally, the SCV URPPP was implemented in accordance with EPA stormwater regulations and CWA §402(p).

²⁶ The submission of the Annual Monitoring Plan, and the selection of monitoring projects, also fulfill NPDES monitoring requirement: Provision C.4. and the goals and objectives of both the URMP and BASMAA's Regional Monitoring Strategy.

²⁷ The SCV URPPP received a \$250,000 grant to test and evaluate the use of environmental indicators in determining the effectiveness of stormwater programs. Projects are currently underway.

²⁸ Hillside exposure does not apply in Campbell since Campbell has no hillsides.

²⁹ Many existing programs could also provide valuable data to the WV municipalities but do not conduct volunteer monitoring and may not be appropriate partners. One example is SCC PPP/SCVWD Los Gatos Creek Park Ground Water Recharge Ponds Water Quality Protection Study. It is important that the WV municipalities keep abreast of and obtain relevant information from these types of programs, which generate models, reports, or other data of local interest and use.

³⁰ CCRS ran these programs in the past but closed in 1999 and no longer conducts monitoring for the SF Bay; however, for this thesis, these programs are still listed as potential programs with the assumption that other entities could potentially run these same or similar types of programs.

³¹ Examples of referrals for technical help are: SFEI, BARWN, SWRCB, EPA, and Aquatic Outreach Institute (AOI). For example, SFEI has developed Volunteer Monitoring Protocols for monitoring rivers, streams, and watersheds. SFEI/CCRS have a Riparian Station How-To Manual. SWRCB has a Directory of Volunteer Monitoring Organizations, which also includes resources for nonprofit organizations and a volunteer monitor's library. EPA has various manuals, such as a Volunteer Stream Monitoring methods manual and numerous other types of environmental indicators and biocriteria technical guidelines, etc. AOI holds creek workshops for educators. Additionally, Friends of the Estuary (East Bay) has specific workshops for volunteer recruitment, training, and retention.

³² Monitoring for every possible parameter is not practical or "cost-feasible"; indicators may be effective monitoring tools. An indicator can measure whether goals are being achieved; can help assess environmental conditions and trends; can provide information about whether management objectives and beneficial uses have been achieved and whether actions are working. RWQCB included in the Program's 1995 NPDES permit, under provisions for conducting watershed monitoring, the use of indicator parameters.

APPENDICES

APPENDIX A:
Partial List of Monitoring Protocols
And Assessment Guidelines

Partial List of Accepted Protocols and Assessment Guidelines

Bay Area Stormwater Management Agencies Association (BASMAA). 1997. *Start At the Source: Residential Site Planning & Design Guidance Manual for Stormwater Quality Protection*.

Coyote Creek Riparian Station (CCRS). 1996. *StreamKeepers in Your Community: A Manual for Starting a StreamKeeper Program*. Prepared for Santa Clara Valley Nonpoint Source Pollution Control Program.

Environmental Protection Agency. 1990 (Apr.). *Biological Criteria: National Program Guidance for Surface Waters*. EPA-440/5-90-004. Off. Water, Washington, D.C.

_____ **1990 (Aug.). *Volunteer Water Monitoring: A Guide for State Managers*. EPA 440/4-90-010. Off. Water, Washington, D.C.**

_____ **1991. *Volunteer Lake Monitoring: A Methods Manual*. EPA 440/4-91-002. Off. Water, Washington, D.C.**

_____ **1993 (Sept.). *Paired Watershed Study Design*. EPA 841-F-93-009. Off. Water, Washington, D.C.**

_____ **1993 (Dec.). *Volunteer Estuary Monitoring: A Methods Manual*. EPA 842-B-93-004. Off. Water, Washington, D.C.**

_____ **1995. *Volunteer Stream Monitoring: A Methods Manual* Office of Water. Field Test Draft. EPA 841 D 95-001. Off. Water, Washington, D.C.**

_____ **1996 (May). *Biological Criteria: Technical Guidance for Streams and Small Rivers*. EPA 822-B-96-001. Off. Water, Washington, D.C.**

_____ **1996 (Sept.). *The Volunteer Monitor's Guide to Quality Assurance Project Plans*. EPA 841-B-96-003. Off. Water, Washington, D.C.**

_____ **1997. *State Source Water Assessment and Protection Programs Guidance*. Final Guidance. EPA 816-R-97-009. Off. Water, Washington, D.C.**

**EPA monitoring materials internet address:
<http://www.epa.gov/OWOW/monitoring>**

Partial List of Accepted Protocols and Assessment Guidelines (cont.)

San Francisco Estuary Institute. n.d. *Volunteer Monitoring Protocols A reference guide for monitoring California's rivers, streams, and watersheds.*

_____ n.d. *Riparian Station How-To Manual.* Collaborated effort with Coyote Creek Riparian Station (CCRS), Bay Area Regional Watershed Network (BARWN).

_____ 1996. *Watershed Characterization Strategies and Monitoring Goals.*

_____ 1997. *Bay Area Watersheds Science Plan: The Role of Watershed Science to Support Environmental Planning and Resource Protection.*

Terrell, Charles et. al. 1996. *Water Quality Indicators Guide: Surface Waters.* Terrine Institute Wash D.C. Kendall/Hunt Publishing Co. Dubuque, IA. 2nd ed.

US Department of Agriculture. 1991. *Water Quality Field Guide.* Soil Conservation Service SCS-TP-160.

_____ *Stream Channel Reference Sites: An Illustrated Guide to Field Technique.* Forest Service. Rocky Mountain Forest and Range Experiment Station. Colorado. General Technical Report RM-245.

APPENDIX B:
State Water Resources Control Board
Survey of Agencies Monitoring Needs

SURVEY OF AGENCIES' MONITORING NEEDS

ORGANIZATION INFORMATION

Name of Contact Person: _____

Name of Organization: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: (____) _____ County: _____

Fax: (____) _____

1. What parameters of streams or riparian corridors do you monitor, how often and why? Also, are volunteers assisting you in monitoring? What parameters could volunteers monitor for your agency?

First column: Check parameters that you currently monitor.

Second column: Identify how often you monitor this parameter. Use the key below.

*D - Daily W - Weekly BW - Biweekly M - Monthly BM - Bimonthly
Q - Quarterly S - semiannual A - Annual X - Other NA - Not Available*

Third column: If volunteers assist you now in sampling or monitoring of the parameter, check this box.

Fourth column: Indicate "yes" for the parameters which volunteers could monitor. If uncertain, print "?". If you do not want help from volunteers, indicate with a "no".

Physical Parameters	Current Monitoring	Schedule	Current Volunteer Support	Potential Volunteer Support
Water Temperature				
Rainfall				
Substrate Characteristics				

Flow				
Stream Typing				
Channel Characteristics (e.g. Water depth)				
% Canopy				
Other:				

Chemical Parameters

	Current Monitoring	Schedule	Current Volunteer Support	Potential Volunteer Support
pH				
Nitrogen				
Ammonia				
Phosphorus				
Dissolved Oxygen				
Alkalinity				
Salinity				
TDS				
Metals				
Trace Elements				
Organics (excluding pesticides)				
Pesticides				
Sediment				
TSS				
Turbidity				
Other:				

Conductivity				
Other:				

Flora Parameters

	Current Monitoring	Schedule	Current Volunteer Support	Potential Volunteer Support
Riparian Vegetation				
Aquatic Vegetation				
Other:				

Fauna Parameters

	Current Monitoring	Schedule	Current Volunteer Support	Potential Volunteer Support
Macroinvertebrates				
Fish				
Birds				
Other:				

Bacteria Parameters

	Current Monitoring	Schedule	Current Volunteer Support	Potential Volunteer Support
Coliform Bacteria				
Total				
Fecal				
BOD				
Other:				

General Parameters

	Current Monitoring	Schedule	Current Volunteer Support	Potential Volunteer Support
Debris Clean-up				
Photo Surveys				
Pipe (outfalls) Surveys				
Watershed Mapping				
Land Use				
Water Divisions				
Stream Obstructions (i.e. to fish migration or flow)				
Bank Stability Evaluation				
Erosion				
Other:				

2. Why are you doing this monitoring? Check the *first* box for all that apply. How do you envision your agency using volunteer monitoring data? Check the *second* box for all that apply.

☐ ☐ Stormwater permit	☐ ☐ Park Management
☐ ☐ Flood control	☐ ☐ Problem ID
☐ ☐ Local govt. planning	☐ ☐ Enforcement
☐ ☐ Local Decision Making	☐ ☐ Baseline Determination
☐ ☐ Local ordinances	☐ ☐ Resource planning
☐ ☐ Beneficial use assessment	
☐ ☐ 305(b) (<i>Biennial Water Quality Assessment Report to EPA</i>)	
☐ ☐ Nonpoint Source Pollution Assessment	
☐ ☐ Education	☐ ☐ Legislation
☐ ☐ Research	☐ ☐ Habitat Restoration
☐ ☐ Water Classification	☐ ☐ Watershed Planning
☐ ☐ Other _____	

Additional Comments:

3. What would maximize your confidence in volunteers?

4. Do you have any concerns about working with volunteer monitoring programs?

On the scale below, indicate your confidence that volunteer monitoring groups could provide your agency with useful data.

Please explain your concerns.

5. Would your agency have constraints responding to data generated by volunteer monitoring groups?

If so, please explain. *(An example of a constraint is the time constraint of meeting with volunteers during your off hours.)*

6. Are there other Divisions, Sections or individuals at your agency that might have an interest in Citizen Monitoring?

☐ YES

☐ NO

If Yes, Please send us a copy of your organization chart.

Name(s) of Divisions, Sections, and/or individuals:

APPENDIX C:
Sample Interview Categories And
Questions; Sample Interview Questions

Sample Interview Categories and Questions

What Are You Monitoring?

- Q: Regarding your volunteer monitoring program, describe elements
- Q: What type of photo surveys do you take? Are they available?
- Q: What type of land use do you monitor?
- Q: How long have you been monitoring these parameters?

Where Are You Monitoring?

- Q: Where do you currently monitor? Where do you plan to monitor? Why these locations?

Why Are You Monitoring?

- Q: Why do you find it important to monitor in general?
- Q: How did you come to choose these parameters?
- Q: What are the goals of the program?
- Q: What are the major concerns with regard to creeks?

Sample Interview Questions

Q1: What do you think are the major concerns with regard to creek(s)/storm drain(s)?

Q2: Which creeks/watersheds are you monitoring?

Q3: What are the goals of your monitoring/nonpoint source programs?

Q4: What are you using the data for currently?

Q5: What do you think the role(s) of cities with regard to monitoring/watershed management should be?

Q6: What do you think the indicators of watershed health are?

Q7: How does your monitoring program promote watershed health?

APPENDIX D:
Responses to Questionnaire
And Interviews

Responses to Questionnaire and Interviews

Category (1 - 4)	Organization	Returned Questionnaire Yes/No Not Received	Interviewed Yes/No Phone/In Person
1	Walden West Environmental Education	Not Received	Yes Phone
1	Westmont School	Not Received	Yes Phone
1	Youth Science Institute (Re: Los Gatos Creek)	Not Received	Yes Phone
1	Santa Clara County Pollution Prevention Program	No	Yes In Person
1	Saratoga School District	No	Yes In Person
1	West Valley Sanitation District	No	Yes In Person
1	San Jose Water Company	Yes	No
2	Santa Clara County Parks and Recreation	Yes	Yes In Person
3	Friends of Calabazas Creek	Not Received	Yes Phone
3	Los Gatos Creek Streamside Park Committee	Not Received	Yes Phone
3	Los Gatos/Saratoga High School District: Nova Program	Not Received	Yes Phone
3	Santa Clara County Fire Department	No	Yes Phone
3	Town of Los Gatos	Not Received	Yes Phone
3	City of Campbell	No	Yes In Person
3	City of Monte Sereno	No	Yes In Person
3	West Valley Clean Water Program	Not Received	Yes In Person
3	City of Saratoga	Yes	No
4	City of San Jose	Yes	Yes Phone
4	City of Santa Clara	No	Yes Phone
4	EOA (SCV Urban Runoff Pollution Prevention Program)	No	Yes Phone

Responses to Questionnaire and Interviews

Category (1 - 4)	Organization	Returned Questionnaire Yes/No Not Received	Interviewed Yes/No Phone/In Person
4	Santa Clara Valley Water District	Not Received	Yes Phone
4	Guadalupe-Coyote Resource Conservation District	Yes	Yes In Person
4	Santa Clara Valley Water District	No	Yes In Person
4	Santa Clara Valley Water District, Reservoir & Tributary Monitoring	Yes	Yes In Person
4	City of Cupertino	Yes	No
4	San Francisco Estuary Institute	Yes	No
4	San Jose State University	No	No
None	Blackford Elementary & High Schools	Not Received	Yes Phone
None	CA Department of Fish & Game	Not Received	Yes Phone
None	CA State Water Resources Control Board	Not Received	Yes Phone
None	Eisenberg, Olivieri, & Associates (EOA)	Not Received	Yes Phone
None	Guadalupe-Coyote Resource Conservation District	Not Received	Yes Phone
None	Los Gatos Union School District	Not Received	Yes Phone
None	Mission College	No	Yes Phone
None	Napa County Resource Conservation District	Not Received	Yes Phone
None	Natural Diversity Database	Not Received	Yes Phone
None	Santa Clara County Department of Environmental Health	No	Yes Phone
None	Santa Clara County Department of Environmental Health	No	Yes Phone
None	Santa Clara County Health Department	No	Yes Phone
None	Santa Clara County Parks and Recreation	Yes	Yes Phone

Responses to Questionnaire and Interviews

Category (1 - 4)	Organization	Returned Questionnaire Yes/No Not Received	Interviewed Yes/No Phone/In Person
None	Santa Clara Valley Urban Runoff Pollution Prevention Program	No	Yes Phone
None	Santa Clara Valley Water District	Not Received	Yes Phone
None	Santa Clara Valley Water District	Not Received	Yes Phone
None	Santa Clara Valley Water District	Not Received	Yes Phone
None	Santa Clara Valley Water District	Not Received	Yes Phone
None	Santa Clara Valley Water District	Not Received	Yes Phone
None	Sierra Club	Not Received	Yes Phone
None	United States Geological Survey	Not Received	Yes Phone
None	West Valley College	No	Yes Phone
None	Friends of Calabazas Creek	Not Received	Yes In Person
None	Friends of Calabazas Creek	Not Received	Yes In Person
None	CA Department of Fish & Game	No	No
None	City of Sunnyvale	No	No
None	Santa Clara County, Source Control	No	No
None	Santa Clara Valley Urban Runoff Pollution	No	No
None	Town of Los Gatos	No	No
None*	Coyote Creek Riparian Station	Yes	Yes In Person

Categories:

- 1: Entities situated within the WV communities that monitor parameters within WV watersheds
- 2: Entities situated within the WV communities that monitor parameters outside of WV watersheds
- 3: Entities situated within the WV communities that do not conduct any monitoring or conduct monitoring-related activities
- 4: Entities situated outside of the WV communities that monitor parameters within and/or outside of WV watersheds

None = entities completely outside of WV watersheds that do not monitor, or duplicate organization/entity

* CCRS closed in 1999, thus data compiled from the questionnaire and interview were not categorized

Responses of Ten Respondents to Questions Asked During In-Person Interviews, by General Category

	Saratoga Union School District	Coyote Creek Riparian Station	Santa Clara County Pollution Prevention Program (Peric Ponds Study)	West Valley Sanitation District	City of Campbell	Friends of Calabazas Creek	Santa Clara County Parks and Recreation (Los Gatos)	Santa Clara Valley Water District (Water Quality)	Santa Clara Valley Water District (Environmental Compliance)	Quadrupia-Coyote Resources Conservation District
Q1: What do you think are the major concerns with regard to creek(s)/storm drain(s)?										
Water quality	x				x			x	x	x
Nonpoint source pollution	x		x	x	x	x		x	x	x
Fish (habitat, spawning, migration, passage)								x		x
Biology (processes, ecosystem health)		x						x		x
Water quantity (reliability of supply, manipulation, flows)		x							x	x
Flooding						x			x	x
Erosion						x				
Access						x				
Human activities (e.g., impacts of recreational activities, homelessness, development up to creek)							x			x
Q2: Which creeks/watersheds are you monitoring?										
Saratoga Creek watershed	x	x		x						
Los Gatos Creek Watershed		x	x	x	x					
Calabazas Creek watershed						x				
San Tomas Aquino Creek watershed				x	x					

Responses of Ten Respondents to Questions Asked During In-Person Interviews, by General Category

	Santa Clara County School District	Coyote Creek Riparian Station	Santa Clara County Pollution Prevention Program (Peric Ponds Study)	West Valley Sanitation District	City of Campbell	Friends of Calabazas Creek	Santa Clara County Parks and Recreation (Los Gatos)	Santa Clara Valley Water District (Water Quality)	Santa Clara Valley Water District (Environmental Compliance)	Guadalupe-Coyote Resources Conservation District
Q2: Which creeks/watersheds are you monitoring? (cont.)										
Other West Valley Watersheds		x		x						
Santa Clara County Reservoirs								x	x	
Guadalupe Creek/River watersheds										x
Other Santa Clara Basin watersheds		x					x		x	
Q3: What are the goals of your monitoring/nonpoint source programs?										
Environmental education	x	x	x							
Environmental research and planning		x	x				x	x	x	
Regulatory compliance (stormwater permits, drinking water standards, ordinances, policies)				x	x			x	x	
Environmental protection/ecosystem health						x	x	x		x
Environmental/watershed management			x	x	x		x	x	x	
Q4: What are you using the data for currently?										
Reporting/permit requirements				x	x			x	x	
Internal use				x		x			x	
Baseline determination							x	x		

Responses of Ten Respondents to Questions Asked During In-Person Interviews, by General Category

	Saratoga Union School District	Coyote Creek Riparian Station	Santa Clara County Pollution Prevention Program (Perc Ponds Study)	West Valley Sanitation District	City of Campbell	Friends of Cabezas Creek	Santa Clara County Parks and Recreation (Los Gatos)	Santa Clara Valley Water District (Water Quality)	Santa Clara Valley Water District (Environmental Compliance)	Guadalupe-Coyote Resource Conservation District
Q4: What are you using the data for currently? (cont.)										
Creating maps, strategies		x	x	x						
Supplying data/ideas to agencies/entities/schools	x	x	x	x		x				
Environmental monitoring and documentation	x						x	x		x
Q5: What do you think the role(s) of cities with regard to monitoring/watershed management should be?										
Resources, funding (producing, distributing materials; providing support for creek groups)	x	x								
Data gathering and sharing		x						x		
Developing partnerships with other entities (counties, multi-agency task forces, businesses, creek groups, CRMPs)		x					x			
Monitoring, systematic sampling of storm drain system, discharges into creek			x	x				x		
Utilizing and training volunteers to take/collect water samples			x							
Educating and outreach to contributors, public				x		x			x	
Focusing on Best Management Practices					x					
Participating and taking active role in watershed management									x	
Focusing on land use, protecting riparian corridors									x	x

Responses of Ten Respondents to Questions Asked During In-Person Interviews, by General Category

	Saratoga Union School District	Coyote Creek Riparian Station	Santa Clara County Pollution Prevention Program (Perc Ponds Study)	West Valley Sanitation District	City of Campbell	Friends of Calabazas Creek	Santa Clara County Parks and Recreation (Los Gatos)	Santa Clara Valley Water District (Water Quality)	Santa Clara Valley Water District (Environmental Compliance)	Quadrup-Coyote Resource Conservation District
Q5: What do you think the role(s) of cities with regard to monitoring/watershed management should be? (cont.) Restoring and revegetating sections of creek and riparian areas										x
Q6: What do you think the indicators of watershed health are?				Not Asked	Not Asked	Not Asked				
Water quality indicators (e.g. high oxygen, shade, temperature, lack of turbidity)	x	x	x					x		x
Fish and wildlife indicators							x	x	x	x
High diversity of macroinvertebrates, birds, reptiles, amphibians	x	x					x	x	x	
Index of plant communities		x							x	x
Amount of erosion (instream and from upstream)		x								
Presence/absence of nutrients, bacteria								x		
Natural creeks, low amount of channelization							x			x
Health of ecosystem							x			
Opportunities for recreation (including habitat for fishing, aesthetic values)							x			
Beneficial uses and flood protection							x			x

Responses of Ten Respondents to Questions Asked During In-Person Interviews, by General Category

	Searsville Union School District	Coyote Creek Riparian Station	Santa Clara County Pollution Prevention Program (Pond Study)	West Valley Sanitation District	City of Campbell	Friends of Calabazas Creek	Santa Clara County Parks and Recreation (Los Gatos)	Santa Clara Valley Water District (Water Quality)	Santa Clara Valley Water District (Environmental Compliance)	Quadrangle-Coyote Resources Conservation District
Q7: How does your monitoring program promote watershed health?					Not Asked	Not Asked				
Providing baseline of what's in creek (disappeared, reappeared); on hydrology, vegetation, soils	x	x					x			x
Reintroducing species into watershed, restoration efforts	x									
Educating/outreach to school kids, families in beneficial/harmful practices, promoting stewardship	x								x	
Serves as good model for future analyses			x							
Makes storm drain system more efficient, allows managers, agencies to know 80%-98% of own system				x						
Sharing information with ranchers on grazing management							x			
Getting to understand what is in upper watersheds								x		
Improving environment (e.g. flood control where debris is removed, area revegetated)									x	
Restoring river to a more natural channel										x
Documenting importance of shade cover, temperatures to thriving salmon										x

Monitoring Survey Results

Types of Parameters	Organizations/Agencies Within West Valley Communities Monitoring Outside West Valley (Category # 2)	Organizations/Agencies Outside West Valley Communities Monitoring Within/Outside West Valley (Category # 4)
	Santa Clara County Parks and Recreation (Los Gatos) (1)	Coyote Creek Riparian Station, City of San Jose, San Francisco Estuary Institute, Santa Clara County Parks and Recreation (San Jose), Santa Clara Valley Water District (reservoir & tributary monitoring), San Jose Water Company, Guadalupe-Coyote Resource Conservation District, City of Cupertino (8)
Physical Parameters		
Water Temperature		III
Rainfall	I	III
Substrate Characteristics		I
Flow		
Stream Typing	I	I
Channel Characteristics		II
Percent Canopy	I	III
Other		I (fisheries, birds, amphibians)
Chemical Parameters		
pH	I	IIII
Nitrogen		III
Ammonia		II
Phosphorus		III
Dissolved Oxygen		III
Alkalinity		III
Salinity		II
TDS		IIII
Metals		IIII
Trace Elements		II (AS, SE)
Organics		(PCBs, PAHs)
Pesticides		I (CHs, OPs, selected others)
Sediment		II
Total Suspended Solids		III
Turbidity	I	III
Conductivity		IIII
Other		
Flora Parameters		
Riparian Vegetation	I	II
Aquatic Vegetation	I	II
Other		
Fauna Parameters		
Macroinvertebrates	I	I
Fish	I	II
Birds	I	I
Other		I (Amphibians)
Bacteria Parameters		
Total Coliform Bacteria		II
Fecal Coliform Bacteria		I
Biological Oxygen Demand		
Other		

Monitoring Survey Results

Types of Parameters	Organizations/Agencies Within West Valley Communities Monitoring Outside West Valley (Category # 2)	Organizations/Agencies Outside West Valley Communities Monitoring Within/Outside West Valley (Category # 4)
	Santa Clara County Parks and Recreation (Los Gatos) (1)	Coyote Creek Riparian Station, City of San Jose, San Francisco Estuary Institute, Santa Clara County Parks and Recreation (San Jose), Santa Clara Valley Water District (reservoir & tributary monitoring), San Jose Water Company, Guadalupe-Coyote Resource Conservation District, City of Cupertino (6)
Current Parameters		
Debris Clean Up		III
Photo Surveys	I	II
Pipe (outfalls) Surveys		III
Watershed Mapping		II
Land Use	I	I
Water Diversions		I
Stream Obstructions		II
Bank Stability	I	II
Erosion	I	III
Other		I (first flush, site characterization, industrial pilot program)

Survey and Table design modeled after CA State Water Resources Control Board, CA Directory of Volunteer Mon Organizations, p.6

Listed Reasons For Conducting Monitoring

Number of Agencies/ Organizations Responding	Listed Reasons For Conducting Monitoring
III	Stormwater Permit
	Flood Control
II	Local Government Planning
II	Local Decision Making
	Local Ordinances
II	Beneficial Use Assessment
	305(b) (Biennial Water Quality Assessment Report to EPA)
III	Nonpoint Source Pollution Assessment
IIII	Education
IIII	Research
I	Water Classification
I	Park management
IIII	Problem Identification
	Enforcement
IIII	Baseline Determination
IIII	Resource Planning
	Legislation
IIII	Habitat Restoration
IIII	Watershed Planning
IIII	Other: characterize pollutants in runoff; Sec.13267 CA Water Code, NPDES permit requirement; drinking water quality assessment; salmonid

APPENDIX E:
Description of Existing Monitoring Programs
in And Affecting WV Watersheds

Description of Existing Monitoring Programs in and Affecting WV Watersheds

1. California State programs:

- a) California State Water Resources Control Board (SWRCB)
- b) California State Department of Fish and Game (CDFG)

a) California State Water Resources Control Board (SWRCB): Volunteer Monitoring

Mission Statement:

Preserve and enhance the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations

Goals and Objectives:

Components of SWRCB strategy to address nonpoint pollution statewide

Proposed Activities:

?

Current Activities:

- Volunteer Monitoring Directory to identify community groups in California monitoring aquatic resources, foster communication between groups, connect interested parties with existing groups

b) California State Department of Fish and Game (CDFG)

Goals and Objectives:

- Jurisdiction over a creek's natural resources (plants and animals), from the outer range of the riparian vegetation down into the creek

Proposed Activities:

- Oil Spill Response: usually for marine waters but will respond if freshwater spill threatens marine (San Francisco Bay) water
- CALTIP: to report poaching in progress (secret witness program with reward incentive)
- Dispatch Line: to report fish kills, illegal dumping into waters, poaching in progress

CDFG (cont.)

Proposed Activities (cont.)

- **Stream Alteration Agreement Office:** to do work within riparian corridor, streambank, creek
- **Menlo Park Office of Fish and Game:** primarily marine resources but also handles inquiries
- **Saratoga Creek, Fisheries:** inquiries regarding biological aspects of Saratoga Creek fish
- **Saratoga Creek, Water Quality:** inquiries regarding water quality

Current Activities:

- **Major say in any construction issues up to and affecting the high water mark of the creek**
- **Any proposals for work in or along the creek, such as a bridge, retaining walls, bank protection, or other construction must be reviewed by the agency, and a stream alteration permit needs to be obtained**
- **Operate two databases out of Sacramento:**
 - **WHR (Wildlife Habitat Relationships) database,** which indicates the type of species most likely found in a particular habitat
 - **CA Natural Diversity Database,** which can produce information by print outs on threatened and endangered species (plant and animal) in a search area. The search area can coincide with USGS by quads.

2. Regional programs:

- a) Bay Area Stormwater Management Agencies Association (BASMAA)
- b) Santa Clara Basin Watershed Management Initiative (SCB WMI)
- c) San Francisco Estuary Regional Monitoring Program (RMP)

a) BASMAA: Regional Monitoring Strategy (BRMS)¹

Mission Statement:

To develop regionally consistent and integrated information for BASMAA members in assessing compliance with "maximum extent practicable" (MEP), identifying and evaluating impacts on beneficial uses in receiving waters, evaluating appropriate actions to protect and enhance those beneficial uses, and documenting effectiveness of county-wide programs

Goals:

A regional monitoring strategy provides the foundation for coordinated Bay Area storm water monitoring efforts. The BRMS is a guide for county-wide program managers in developing individual monitoring programs over the next five years to achieve regional coordination by:

- prioritizing problems based on regional importance and tractability
- sharing responsibility and expertise among programs
- removing redundancy
- making better use of accumulated knowledge
- using pooled resources
- creating and take advantage of synergism among programs
- helping program managers make informed decisions

Objectives:

#1: Evaluate Best Management Practice (BMP) effectiveness

- BMP's ability to remove a constituent from or change a characteristic of storm water discharge
- BMP's affect on protecting or enhancing beneficial uses

#2: Assess relative contribution of metals to SF Bay from urban vs. non urban sources

- Determine impact BMPs will have on protecting or enhancing beneficial uses in the Bay
- Coordinate with SCB WMI and others to prevent duplication of effort

¹ In December 1996, the SCV URPPP asked the RWQCB for more time to develop its own monitoring strategy based on the need to coordinate efforts with other stormwater programs. The SCV URPPP (of which the four WV municipalities are a part) sponsored and participated in BASMAA's development of a Regional Monitoring Strategy; thus BASMAA is included as one of regional monitoring programs. Information on BASMAA RMS is taken from March 1998 BRMS and support document.

BRMS (cont.)

Objectives: (cont.)

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

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

Proposed Activities:

- Storm water programs will continue to support identification and updating of beneficial uses and assessment of those uses and, to the extent practicable, will work with volunteer monitors and watershed management initiatives
- Study design plans will be used to assist development and review of monitoring studies
 - Written by member agencies for each study to be completed as part of Monitoring Strategy
 - Draft plans submitted to BASMAA Monitoring Committee for review and comment
- Objectives to be accomplished within current level of funding allocated by the programs for monitoring; combined level of funding expected to be approximately \$500,000 per year with levels of effort for individual programs varying according to size of program
- Revisions will be accounted for in an Annual BRMS Status Report
 - Report will include: status of Strategic Objectives; recommendations for changes to Strategic Objectives; implications of study results on BMP implementation; prioritization of BMP effectiveness studies; other recommendations for revisions

Current Activities:

- BASMAA's Regional Monitoring Strategy was completed February 19, 1998 and includes six components: guiding principles, strategic objectives, study design, funds, revisions, and schedule. Also includes a draft support document
- BRMS set stage for development of SCV URPPP's Monitoring Plan, required in their 1997 Urban Runoff Management Plan

b) Santa Clara Basin Watershed Management Initiative (SCB WMI)²

Mission Statement:

To protect and enhance the watershed, creating a sustainable future for the community and the environment

² Information on SCB WMI mission statement, goals, and some current activities is taken from the SCB WMI Fact Sheet, Sept. 1998

SCB WMI (cont.)

Goals:

- Ensure that the WMI is a broad, consensus-based process
- Ensure that necessary resources are provided for WMI implementation
- Simplify compliance with regulatory requirements without compromising environmental protection
- Balance the objectives of water supply management, habitat protection, flood management and land use to protect and enhance water quality
- Protect and/or restore streams, reservoirs, wetlands and the Bay for the benefit of fish, wildlife and human uses
- Develop an implementable Watershed Management Plan that incorporates good science and will be continuously improved

Objectives:

- 1) Gather and evaluate data to determine the state of the Santa Clara Basin
- 2) Identify conditions affecting the Basin
- 3) Develop goals for the conditions of the Basin
- 4) Issue reports on the results of this effort
- 5) Develop and implement a plan including techniques which will serve to improve conditions and beneficial uses of the Basin

Proposed Activities:³

- WMI is preparing a Watershed Assessment Report (WAR) consisting of three volumes:
 - Volume 1: Characteristics of the Santa Clara Basin
 - Introduction, Methodology, Cultural Setting, Land use, Community and Organizational Setting, Regulatory Setting, natural Setting, Water Management Facilities and Practices
 - Volume 2: Assessment of Suite of Representative Watersheds A, B, and C
 - Assessment Methodology, Assessment of Suite of Representative Watersheds, Implications of Assessment of Representative Watersheds for Next Phase of WMI
 - Volume 3: Assessment of Other Watersheds (same outline as Volume 2)
- When completed in 2000, the assessment will be foundation for a regional watershed management plan

³ Information on WAR is taken from the SCB WMI Watershed Assessment of the Santa Clara Basin Final Outline, 01/7/99.

SCB WMI (cont.)

Current Activities:

- WMI members currently conducting scientific assessment to document the basin's environmental conditions and regulatory framework
- Core group, subgroups, report preparation team, and consultants have begun work on various sections of the WAR, based on a Consolidated Action Plan and completed outline

c) San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP) [4]

Goals:

Comprehensive effort to:

- Collect data on chemical contaminants in water and sediments of San Francisco Bay
- Evaluate in situ bioaccumulation potential of trace contaminants through biota in the Bay
- Determine potential for water and sediment of San Francisco Bay to cause toxicity in bioassay organisms

Objectives:⁴

- To describe patterns and trends in contaminant concentration and distribution
- To describe general sources and loadings of contamination to the Estuary
- To measure contaminant effect on selected parts of the Estuary ecosystem
- To compare monitoring information to relevant water quality objectives and other guidelines
- To synthesize and distribute information from a range of sources to present a more complete picture of the sources, distribution, fates, and effects of contaminants in the Estuary ecosystem

Proposed Activities:

- Monitoring (water, sediment, bivalves in the SF Estuary)
- Pilot and special studies
- Redesigning monitoring and special study components to meet RWQCB water quality management issues (beginning in 2000)

⁴ Information on objectives: RMP Regional Monitoring News Vol 4 Issue 2, Summer 1998, 10.

RMP (cont.)

Current Activities:⁵

- **Monitoring**
 - Monitoring began in 1993; samples taken three times a year. In 1996, samples were taken during rainy season (Feb), during period of declining Delta outflow (late Apr), and during dry season (Jul-Aug)
 - Two dozen sampling stations located throughout Estuary and at major tributaries, including mouths of Guadalupe River and Coyote Creek in extreme southern portions of Estuary. Locations extend northward to confluence of Sacramento and San Joaquin Rivers
 - Five types of samples are collected:
 - Conventional water quality parameters, such as salinity, dissolved oxygen, and temperature; chemistry, such as metals, pesticides and other synthetic hydrocarbons
 - Aquatic bioassays (toxicity tests)
 - Sediment quality characteristics (such as particle size) and chemistry
 - Sediment bioassays (toxicity tests)
 - Transplanted bivalve bioaccumulation, survival, and condition
 - In addition to the three samples taken per year by RMP contractors, USGS conducts monthly sampling of water quality and phytoplankton and measures suspended sediments
- **Pilot and special studies (See database for more detailed information.)**
 - Pilot studies: intended to assess methods under consideration for incorporation into the RMP program
 - Special studies aimed at improving interpretation of RMP data
 - Specific pilot study with South Bay relevance: Coyote Creek Watershed Pilot Study, 1996-1998 (SFEI, Applied Marine Sciences)

⁵ Information on current activities for RMP: Science Plan, 1997, (p)

3. County-Wide programs

- a) Santa Clara Valley Urban Runoff Pollution Prevention Program (SCV URPPP)
- b) Santa Clara County (SCC) Parks and Recreation
- c) Santa Clara County Department of Environmental Health (SCC DEH)/Hazardous Materials
- d) Santa Clara County Central Fire Protection District
- e) Santa Clara County Pollution Prevention Program (SCC PPP)
- f) Santa Clara Valley Water District (SCVWD)

a) *Santa Clara Valley Urban Runoff Pollution Prevention Program (SCV URPPP): Monitoring⁶ [4]*

Mission Statement:

To assist in the protection of beneficial uses of receiving waters by preventing pollutants generated from activities in urban service areas from entering runoff to the maximum extent practicable

Program Monitoring Goals and Objectives:

- Determine success
 - Periodically evaluate the attainment of beneficial uses in selected waterways
 - Evaluate changes in public awareness and behavior
 - Evaluate effectiveness of specific control measures at pollution reduction
- Adjust activities to meet changes
 - Define what constitutes success (how much is enough?) as it relates to programmatic and technical MEP
 - Utilize what we learn to plan the next steps

Proposed Activities:

- Reorient approach to monitoring to redirect resources to watershed monitoring; assist BASMAA and SCB WMI
- Revise SCV URMP monitoring strategy

Current Activities:

Elements of Program's revised monitoring strategy:

- Continue participation in RMP
 - Includes ongoing financial support, participation in technical review and decision-making, coordination of Program monitoring activities with RMP activities

⁶ Information on SCV URPPP Monitoring Strategy is from March 1, 1998 Monitoring Plan.

SCV URPPP: Monitoring (cont.)

Current Activities: (cont.)

- Continue participation in the SCB WMI Watershed Assessment Subgroup and Lower South Bay Monitoring and Modeling Subgroup
 - Participation in the preparation of a State of the Santa Clara Basin Watershed Report including compilation of existing data, preliminary assessment of watershed characteristics, and collection of additional data including field work
 - Staff participation, funding staff support for subgroups and consultant services
 - Coordinate data management for monitoring activities through WMI's Data Management Subgroup; work with Land Use Subgroup to analyze watershed impacts of development/redevelopment
- Pursue basin-wide watershed monitoring strategy that is consistent with the BASMAA regional strategy
 - Monitoring plan composed of diverse projects, all in accord with Program goals and objectives
 - Projects, grouped by objective for coordination, include:
 - "Watershed," intended to assess the beneficial uses of creeks, wetlands, and riparian areas; identify causes preventing attainment of beneficial uses, and identify cost-effective ways to address the causes preventing attainment
 - Examples: Watershed Assessment Initial Inventory; Physical/Hydrological/Biological Indicators in Coyote Creek Watershed; Streamkeepers
 - "Bay," intended to assess the loading, fate, transport, and effects of stormwater pollutants in SF Bay
 - Examples: RMP and Interface Watershed Pilot Study; Bay Monitoring and Modeling (TMDL)
 - "Effectiveness," intended to assess the effectiveness of Program activities and facilitate continuous improvement
 - Examples: Integrated Community Involvement Program (CCRS); Develop and Revise Performance Standards
 - "BMPs," intended to investigate the potential effectiveness of new BMPs
 - Examples: Protocols for Implementing BMPs at Parking Lots; Catch Basin Retrofit Feasibility
- Use innovative measures to assess effectiveness of urban runoff program
 - May include the use of water quality indicators, physical and hydrological indicators, social indicators, and programmatic indicators

SCV URPPP: Monitoring (cont.)

Current Activities: (cont.)

- Assist citizen monitoring
 - May include continuation of Program-level support for citizen monitoring on creeks
 - Where opportunities exist, Co-permittees will provide in-kind assistance to encourage volunteer monitoring efforts at the local level
- Support and encourage efforts to develop new control measures and determine potential effectiveness
 - Regional efforts to investigate control measures that have the potential to reduce the quantity of fine particulate metals released to the environment
 - Site design and landscape features that reduce total quantity of runoff
- Summarize results of previous year's monitoring activities and specify tasks for current year, in Annual Report

Cooperation with related programs:

- Common Ground for the Environment, through Management Committee (MC) funding and participation in special studies that further the technical and scientific understanding associated with pollutants of concern in the lower South SF Bay
- Bay Area Air Quality Management District, through MC following policy and program development as it might be related to the source control of pollutants of concern

b) Santa Clara County Parks and Recreation (SCC Parks and Recreation) in Los Gatos (Grant, Ed Levin Parks) [2]

Goal:

Long term: increase the health of the water systems within the parks while still accommodating recreation and human activities

Objectives:

- Gather baseline data on riparian areas, habitat, fisheries
- Determine impacts of cattle grazing on riparian areas, habitat, fisheries
- Share information with ranchers on grazing management
- Evaluate management program and determine effectiveness and impacts of management strategies and activities

Proposed Activities:

- Volunteer monitoring program for data collection

SCC Parks and Recreation (cont.)

Current Activities:

- Started stream monitoring program with Department Volunteer Coordinator at Grant and Ed Levin parks in San Jose
- Following type of data is collected: rainfall; stream typing; percent canopy; chemical, flora, fauna, general parameters; aquatic/riparian vegetation; hope to collect data for about 2 years
- Data is used to determine the best strategies for managing cattle and for baseline determination
- Volunteers may include seasonal rangers, which would ensure continuity and a level of consistency, and people recruited from shoreline clean-ups; volunteers will take over monitoring monthly vegetation and photo monitoring at Grant and Ed Levin Parks
- Future plans to expand the volunteer monitoring, hopefully within 1-2 years to Coyote Hellyer, and to other parks such as Los Gatos Creek, Vasona, Lexington
- To satisfy NPS Permit conditions, Parks and Recreation (San Jose) also monitors physical and chemical parameters for 2 storm events per year for Almaden Quicksilver, Guadalupe, Deep Gulch, and Mine Hill

c) Santa Clara County Department of Environmental Health (SCC DEH)/Hazardous Materials: Nonpoint Source Inspections

Goals and Objectives:

To include stormwater or NPS issues in the implementation and enforcement of the California Uniform Retail Food Facilities Law (CURFFL) for all retail food facilities

Proposed Activities:

- To conduct site inspections of all retail food facilities at least annually
- To include NPS inspections in site inspections of retail food facilities

Current Activities:

DEH has contracted with City of Campbell, Town of Los Gatos, and City of Saratoga to:

- Provide annual facility inspection lists

SCC DEH/Hazardous Materials (cont.)

Current Activities: (cont.)

- Report observed NPS violations not under own regulatory or enforcement powers, and evidence of outdoor spills and discharges to pavement or storm drain systems, to appropriate City contact

DEH also has other responsibilities such as:

- Inspecting public pools and monitoring the quantity/quality for drinking water in new residential well construction. During inspection or surveillance, DEH notifies appropriate agency
- Through hazardous materials program, conducting NPS inspections, permitting, and enforcement for unincorporated areas

d) Santa Clara County Central Fire Protection District: Nonpoint Source Inspections [3]

Goals:

To provide Industrial Stormwater System Protection Inspection Services for the Town of Los Gatos and the City of Campbell

Objectives:

- Verify protection of the municipal storm drain system from non-storm water discharges originating from industrial/commercial facilities which have been identified as being significant contributors to storm water pollution

Proposed Activities:

- Conduct NPS inspections in combination with Hazardous Materials Storage inspections for facilities who conduct the following types of activities: auto repair, cleaners, machine shops, paint, pesticide, photo/print, or other categories

Current Activities:

- NPS inspections for Campbell and Los Gatos have been integrated into existing hazardous materials inspection program
- Stormwater Inspection Program includes the following components:
 - Training; record keeping and documentation; inspections; outreach; violation enforcement, referral and follow-up, and evaluation
- Information used to define NPS inspection components is maintained in a Central Fire database

e) Santa Clara County Pollution Prevention Program (SCC PPP)/Santa Clara Valley Water District (SCVWD), Water Quality Protection: Los Gatos Creek Park Ground Water Recharge Ponds Water Quality Protection Study [1]

Goal (SCC PPP):

Work with industry to introduce them to measures that will decrease pollution; focus on heavy metals, especially copper and zinc

Study Goals and Objectives:

Because 1) no centralized database containing information about activities in the LG Creek Park area exists; 2) recharge ponds are a critical public resource potentially impacted by the multiple use activities they support:

- Demonstrate benefits of combining environmental data from multiple agencies
- Test study concepts and develop a model which can be replicated for other areas
- Test capacity of GIS based systems to help identify potential risks to the aquifer and pollution prevention strategies to mitigate identified risks

Proposed Activities:

- Assess potential sources of contaminants to: water entering ponds, water in ponds, water percolating into water supply aquifer
- Assess potential impacts of: industrial operations, commercial operations, recreational uses, transportation routes
- Assess current water quality status
- Determine priority ranking of impacts
- Work with stakeholder team to identify/develop strategies to address priority impacts

Current Activities:

- Compiled information for 1995 Air Toxics Emissions for Campbell and Los Gatos
- Created a Stakeholder Review Summary which includes activities occurring in the study area, values of activities, impacts of activities, management strategies to mitigate impacts, other information needs about activities, additional potential management strategies
- Unknown availability of data on storm sewer system: surface drainage patterns, connection to Recharge Ponds; traffic volumes on transportation routes; data on So Pacific rail traffic
- Created maps using GIS to show potential contaminants, focused on point sources, such as sites generating hazardous wastes, hazardous materials storage facilities, fuel leak sites, well locations, etc.

SCC PPP/SCVWD (cont.)

Current Activities: (cont.)

- Tentative conclusions:
 - Substantial environmental data set are available from State, Regional, Local agencies
 - Combining data sets into comprehensive GIS system creates valuable tool for: resource vulnerability analyses, background to support public policy decisions, identifying pollution prevention opportunities and priorities
 - Los Gatos Park Recharge Pond GIS Model is easily replicable for other sensitive areas or entire watershed
 - No insurmountable technical problems to building a GIS system representing the entire watershed exists

f) Santa Clara Valley Water District (SCVWD): Watershed Management/Monitoring⁷ [4]

Mission Statement:

The District ensures the well-being of the valley by managing and providing a reliable, high-quality water supply for the benefit of residents, businesses and the environment, and by working to protect people and property from devastating floods

Goals and Objectives:

Priority issues:

- Environmental mandates and concerns: protect the natural environment and watersheds while continuing to fulfill public's water supply and flood protection needs
- Achieving integrated water resource management: balance competing water supply, water quality, flood control, environmental, and recreational issues

Proposed Activities:

- Environmental mandates/concerns: launch environmental policy development project; streamline mitigation and permit processes: support efforts that preserve integrity of the permit process but streamline procedures; use watershed management approach; help businesses and individuals with environmental compliance programs

⁷ From SCVWD 1996-1997 Annual Performance Report.

SCVWD (cont.)

Proposed Activities: (cont.)

- Integrated water resource management: develop strategies to provide County with reliable water supply that include all factors that could affect or be affected by water supply, i.e. economic and environmental impacts, watershed management issues, reservoir operations, recreational uses, water recycling

Current Activities:

- Environmental mandates/concerns: participate in district's own NPS Program; participate in Santa Clara Valley NPS Program; vegetation management/erosion protection program environmental impact report project; watershed stream inventory project; watershed management coordination project; fisheries/frogs surveys. Also reservoir and tributary monitoring: Twin Creeks, monitor bacterial factors for about 3 years; EROP (Emergency Reservoir Operation Plans), about 5 years; basinwide, goes along with EROP but on tributaries, for a couple of years; focus on upper watersheds
- Integrated water resource management: IWRP; water resources management strategic issues project; basic hydrology operation project; flood control 10-year zone plans project

4. Municipality programs

a) WV Municipalities:

1. City of Campbell [3]
2. Town of Los Gatos [3]
3. City of Monte Sereno [3]
4. City of Saratoga [3]
5. West Valley Clean Water Program [3]

1. City of Campbell [3]

Goals and Objectives:

- Directed by State to monitor and take action to reduce pollution
- Keep pollution from entering creek
- Identify illegal dumping/illicit connections

Current Activities:

- ***Industrial/Commercial Discharger Measures:*** industrial inspection program focuses on vehicle repair and related activities, retail food facilities
- ***Public Agency Activity Controls:*** focuses on storm drain operations and maintenance, storm drain stenciling, street sweeping, incident response, prevention of stormwater pollution from municipal crew activities
- ***Construction and Development Measures:*** pass information and BMP's on stormwater issues and construction to owners, developers, construction entities during planning, plan check phases; conduct inspections to ensure stormwater protection from other construction activities such as storage, material handling, waste disposal
- ***Public Information:*** distribute outreach materials and other BMP information to residents, businesses and makes information available at city facilities and community events
- General Plan incorporates natural resource/conservation regulations, goals, policies, and implementation measures: land development standards in the design/construction stage of projects; policy for San Tomas Area, Downtown Area
- Tree planting programs
- Follow up from pollution reports (i.e. from hikers on LG Creek Trail)

2. Town of Los Gatos [3]

Goals and Objectives:

- Pollution Prevention

Current Activities:

- *Industrial/Commercial Discharger Measures:* industrial inspection program focuses on vehicle repair and light manufacturing activities, retail food facilities
- *Public Agency Activity Controls:* focuses on storm drain operations and maintenance, storm drain stenciling, street sweeping, incident response, prevention of stormwater pollution from municipal crew activities
- *Construction and Development Measures:* give emphasis to construction/grading/erosion control, especially within hillside areas; conduct inspections to ensure stormwater protection from other construction activities such as storage, material handling, waste disposal; pass information and BMP's on stormwater issues and construction to owners, developers, construction entities during planning, plan check phases
- *Public Information:* distributes outreach materials and other BMP information to residents, businesses and makes information available at city facilities and community events
- General Plan incorporates natural resource/conservation regulations, goals, policies, and implementation measures: basic policy to preserve the distinctive and unique environment and maintain natural topography and vegetation historically found there; open space designation is provided to identify the location of public parks, private preserves and stream corridors

3. City of Monte Sereno [3]

Goals and Objectives:

- Pollution Prevention
- Watershed management

Current Activities:

- *Public Agency Activity Controls:* focuses on storm drain operations and maintenance, storm drain stenciling, street sweeping
- *Construction and Development Measures:* place emphasis on construction/erosion control, illegal dumping/discharge response based on construction/remodeling occurring within the City; some construction activity occurs within the hillside areas

City of Monte Sereno (cont.)

Current Activities: (cont.)

- ***Public Information:*** distribute outreach materials and other BMP information useful to residents
- **General Plan incorporates natural resource/conservation regulations, goals, policies, and implementation measures:** provisions to look at potential environmental impacts on the watershed, and preservation elements are included in development projects (to allow for habitat corridors, riparian vegetation); regulations for erosion, drainage, pollution from development projects;

4. City of Saratoga [3]

Goals and Objectives:

- Watershed management
- Pollution Prevention

Current Activities:

- ***Industrial/Commercial Discharger Measures:*** inspection program focuses on retail food facilities
- ***Public Agency Activity Controls:*** focuses on storm drain operations and maintenance, storm drain stenciling, street sweeping, incident response, prevention of stormwater pollution from municipal maintenance activities
- ***Construction and Development Measures:*** through plan check and inspection of construction activities, minimize NPS pollution from projects starting from the planning application phase; pass information and BMP's on stormwater issues and construction to owners, developers, construction entities during all phases; place emphasis on construction/grading/ erosion control, especially within hillside areas; conduct follow-up inspections to ensure stormwater protection from other construction activities such as storage, material handling, waste disposal
- ***Public Information:*** distribute outreach materials and other BMP information to residents, businesses and makes information available at city facilities and community events
- **General Plan incorporates natural resource/conservation regulations, goals, policies, and implementation measures:** specific creek policies designed to preserve, protect, and maintain creek corridors, riparian habitats; policies for erosion control to protect watersheds during development; protect watershed and water resources to ensure water supply, water quality

5. West Valley Clean Water Program [3]

Goals and Objectives:

- To realize effectiveness, efficiency, and cost benefits from collective efforts of the four WV communities
- To prevent and reduce stormwater pollution

Current Activities:

- Program administration for Campbell, Los Gatos, Monte Sereno, and Saratoga
 - Representation at Management Committee, other groups
 - Report generation and submittal
 - Liaison to SCV URPPP and RWQCB
 - Review and feedback of documents
 - Training, staff support
 - Contract management of industrial inspections
- Local projects
 - Creek assessment/monitoring strategy and implementation plan
 - Public information and Participation (PIP) (e.g., participation in BASMAA Ad Campaign, Annual Events, Brakepad Partnership, Watershed Action Fund; materials supply),
 - Educational materials on pollution prevention, informational brochures, videos
- b) Neighboring Cities
 1. City of Cupertino
 2. City of San Jose
 3. City of Santa Clara

1. City of Cupertino [4]

Goals and Objectives:

- Comply with stormwater permit
- Education

Proposed Activities:

- Monitor general parameters annually

Current Activities:

- Conducts debris clean-up (annually)
- Conducts visual pipe (outfalls) surveys (annually)
- Visually monitors erosion (annually)

2. City of San Jose⁸ [4]

Goals and Objectives:

- To provide data to establish link between pollutants and other existing programs in response to permit requirements for stormwater
- Learn what pollutant contributions are and indicate detection frequencies; certify, where no indication, that detection frequency is less
- Link monitoring with Illicit Connections/Illegal Dumping

Proposed Activities:

Three stormwater monitoring programs, using LA County NDPES as guide to monitoring activities and parameters:

- First flush: collect samples from 30 major outfalls within San Jose; identify pollutants that are present in runoff from various types of land use; may offer a comparison between land use and pollutants
- Site characterization: deploy eight autosamplers capable of flow proportional composite sampling; compare data collected from various types of commercial activities; can be used to prioritize inspection and outreach efforts
- Industrial pilot program: follow the objectives of the General Industrial Storm Water Permit to characterize sources and develop site appropriate BMPs to reduce or eliminate pollutants in stormwater discharges

Current Activities:

- Runoff Characterization: monitoring conducted at six sites representing commercial and industrial activities within San Jose and at 25 major outfalls along Coyote Creek and Guadalupe River. Analyses are intended to assist in identifying areas where above-average pollutant loading may be occurring
- Stormceptor Effectiveness: monitoring runoff at an office complex prior to installation of a "Stormceptor" system. Additional monitoring next wet season will characterize runoff and effectiveness
- Industrial Monitoring: samples of runoff from two circuit board manufacturing facilities have been analyzed and data reviewed; SJ investigation determined that development of BMPs to control pollutants is not widely practiced and documented by industrial facilities in SJ
 - Follow up plan calls for expanded outreach and education to industrial discharges; larger sample of electroplaters, other facilities to determine representativeness of pilot program; collaboration with industry to identify controllable in-house sources of pollutants; evaluate need for new or improved BMPs

⁸ p.c. with Dave Grabiec, City of San Jose, July 1997; information on industrial monitoring follow up from SCV URPPP Executive Summary Cities of San Jose and Sunnyvale Industrial Monitoring

3. City of Santa Clara [4]

Goals and Objectives:

- Comply with stormwater permit
- Identify illicit connections/illegal dumping

Proposed Activities:

- Industrial storm water samplers
- Illicit connections inspection program (several years old)
- Storm drain maintenance and inspection

Current Activities:

- Stormwater samplers: put samplers in various locations at various times; set up a time of year to monitor them
- Focus on end of the pipeline; as part of inspection, will check creek for leaves, rip rap and investigate upstream if needed
- Illicit connections inspection program: one time per week, document what is found
- Storm drain division: year-round program; during certain times of year, clean out storm drain inlets; collects data on appearance of structure, flow, etc.

5. School/environmental education programs:

- a) Saratoga School District
- b) San Jose State University
- c) Westmont High School
- d) Youth Science Institute
- e) Walden West
- f) Los Gatos/Saratoga High School District: Nova Program
- g) Sierra Club-Loma Prieta Chapter
- h) Santa Clara Valley Audubon Society

a) Saratoga School District [1]

Goals and Objectives:

- Create stewards of Saratoga Creek, from the upper watershed to Alviso
- Educate children
- Make science as real as possible
- Share information between schools on website
- Teach children technical skills for future job opportunities

Proposed Activities:

- Saratoga Creek Education Project, a 1st through 8th grade curriculum which used Saratoga Creek as an integrating vehicle for art, social studies, language skills, math, technology, science, as part of the Integrated Community Involvement Program (ICIP) for Saratoga Creek during 1995-96
- Monitoring year round

Current Activities:

- Teachers and students from Argonaut, Foothill, Saratoga elementary and the 7th and 8th grades of Saint Andrews School participated in the Creek Education Project. In 1995-96, 904 students studied Saratoga Creek as part of the ICIP
- Creek monitoring on two sites weekly since January 1997, by Argonaut, Foothill and Saratoga schools; includes water quality parameters such as conductivity, pH, temperature; other schools are trying to get aboard, both in Saratoga and Santa Clara
- Data that is collected goes to their webpage for sharing with other schools; web page also contains information about types of riparian vegetation, maps, information on the current program, pictures of the creek at different points, creek poetry, etc.
- Planned activities include:
 - 1. Expanding their water quality monitoring parameters;

Saratoga School District (cont.)

Current Activities: (cont.)

2. Sixth grade class growing native plants from seeds collected by second graders as part of their creek activities; plans to give to creekside residents;
3. Plans to survey Saratoga creek for non-native plants;
4. Exploring community history starting with photographic record of Creek;
5. Developing social studies curriculum on how Native Americans/early settlers used Creek;
6. Third graders beginning to raise Pacific Tree Frogs from eggs; will release them back into watershed when they are frogs;
7. Also plans to rewrite sections of their teacher training guide to make it consistent with State volunteer monitoring protocols

b) San Jose State University (SJSU) [4]

Goals and Objectives:

- Determine whether coliform levels in an urban creek were unusually high
- Identify potential sources of coliforms and other pathogens

Proposed Activities:

- Review historical data
- Identify potential sources of coliforms/pathogens
- Summarize actions taken to reduce coliform/pathogen loadings
- Review health related impacts

Current Activities:

- A report was generated in Dec. 1996 which addressed the above issues; besides bacteriological data, the report includes some wildlife data, and a description of sites visited during site reconnaissance Jan 1996. Limited bacterial information on Los Gatos Creek and Calabazas Creek is also included.
- Currently, no monitoring is being conducted by SJSU for the WV watersheds

c) Westmont High School [1]

Goals and Objectives:

- Collect data to measure health of San Tomas Aquino Creek
- Provide kids with an opportunity to experience creek ecosystems after learning about them in the classroom

Westmont High School (cont.)

Proposed Activities:

- Classroom water curriculum
- Creek monitoring for water quality data and invertebrates
- Supposed to be getting materials starting w/ air quality equipment; eventually getting seismograph, and creek monitoring materials
- Future plans: MATH STEP Program w/ San Jose/San Francisco State to get students to become math/science teachers

Current Activities:

- Spring, summer classes collect data; summer class curriculum has a large focus on water
- Gather data from San Tomas Aquino Creek on water quality, such as air and water temperature, dissolved oxygen, turbidity, speed of flow, pH, salinity; also on invertebrates

d) Youth Science Institute [1]

Goals and Objectives:

- Private, non-profit organization dedicated to enhancing science education in local schools
- Vasona Nature Center (in Los Gatos) emphasizes water ecology and conservation; outdoor programs emphasize habitat awareness

Proposed Activities:

- Outreach programs and nature center programs for teachers and their students at Alum Rock, Sanborn, and Vasona (fees for programs)
- Summer science day camps, science safaris (fees for programs)

Current Activities:

- Creek exploration program, where 1st through 8th grade students can explore a real creek habitat and use nets to examine the diverse community of aquatic plants and animals (Alum Rock or Vasona)
- Creek biodiversity program, where 6th through 10th grade students participate in a unique hands-on pilot program where scientific equipment is used to examine, measure, and study the physical and biological characteristics of a creek ecosystem. Study areas include animals, plants, and the chemical/physical properties of the area (Alum Rock or Vasona).
- Other nature center programs such as Life in a Pond (an indoor program), nature walks, etc.

Youth Science Institute (cont.)

Current Activities: (cont.)

- Received Watershed Action Fund grant in 1998 for \$15,795 from the SCV URPPP and is in final process of developing curriculum for a creek awareness program
- Teachers and students can collect data during the programs.

e) Walden West [1]

Goals and Objectives:

- Educate children about creek processes through fun and games
- Long term: have kids be able to monitor condition of creeks in their neighborhoods

Proposed Activities:

- Outdoor environmental education school where children stay one week at a time
- Has spoken to SCVWD about working with them to monitor
- Could provide data for City of Saratoga, if interested

Current Activities:

- Kids are taken down to Saratoga Creek, possibly others to learn about creek ecosystems, erosion, water flow; compare riparian communities
- Interested in format to share data, possibly a website
- Involved in MATHSTEP, a program designed to produce better math and science teachers
- Wrote/received Watershed Action Fund grant and purchased meteorology and creek monitoring equipment in 1998
 - Monitor nitrogen levels-inorganic/organic, pH, alkalinity, CO₂, volume, turbidity, silt, temperature, hardness

Only limited information is available for the following program description:

f) Los Gatos/Saratoga High School District: Nova Program [3]

Goals and Objectives:

?

Proposed Activities:

?

Current Activities:

- Interested in learning about monitoring (for part of Los Gatos Creek?)
- One of staff attended a CCRS creek monitoring workshop for teachers (NOVA program is for education for high risk kids)

g) Sierra Club, Loma Prieta Chapter: Saturdays in the Creek

Program Goals and Objectives:

- "Saturdays in the Creek," part of San Mateo pollution prevention program, gives people a better understanding of their connection with creeks, street gutters, stormwater pollution sources and the Bay

Proposed Activities:

- Community groups (e.g. Boy Scouts) arrange with Sierra Club for four-hour field trip to San Mateo County creek of their choice

Current Activities:

- Sierra Club does not conduct monitoring, but they are willing to include information about monitoring in their newsletter
- Creek program (established with a grant) could be easily set up in other areas

h) Santa Clara Valley Audubon Society⁹

Goals and Objectives:

- To maintain, preserve and protect native animal and plant habitats and to foster a greater public awareness of our environment, with an emphasis on birds and their ecosystems, particularly in Santa Clara County and in the San Francisco Bay Area

⁹ From <http://www.scvas.org>, accessed 03/31/99

Santa Clara Valley Audubon Society (cont.)

Proposed Activities:

- Annual creeks group meeting
- Creeks information intended to be added to website
- Conservation activities
- Publications
- Education and Outreach
- Membership
- Bird Counts

Current Activities:

- Helping various creek groups on creek issues, goals
- Publishing **Creekside News**, an annual report on Santa Clara County creeks and the people who care about them
- Environmental advocacy on creek, riparian, habitat issues
- Tracking, reviewing and commenting on current projects affecting creeks, riparian corridors

6. Other programs:

- a) Friends of Calabazas Creek
- b) Guadalupe-Coyote Resource Conservation District
- c) San Jose Water Company
- d) United States Geological Survey
- e) Los Gatos Creek Streamside Park Committee
- f) West Valley Sanitation District (WVSD)

a) Friends of Calabazas Creek (FOCC) [3]

Goals and Objectives:

- Prevent destruction of natural habitat and environment from Miller Ave in Cupertino up into Saratoga
- Work with SCVWD in identifying problems and appropriate solutions regarding future work on Calabazas Creek

Proposed Activities:

- Concerned residents in the watershed come together for meetings
- Residents keep abreast of projects that may affect the watershed, such as flood control

Current Activities:

- About 10 people meet monthly. Activities include: taking organized walks on the Creek; inviting speakers to give ideas on how to achieve goals; attending SCVWD Board Meetings; volunteering time for Coastal Clean-ups; monitoring SCVWD activity; FOCC has walked up Creek and documented its state on video
- FOCC put together one page summaries on their history, what they are doing; FOCC wrote three newsletters; put together a handmade map with Creek indicated; have a video of their Creek walks; have a binder including maps, photos
- If the focus is on their neighborhoods and local projects, FOCC may be interested in volunteer monitoring, bird and other wildlife monitoring, and restoration projects

b) Guadalupe-Coyote Resource Conservation District (G-C RCD) [4]

Goals and Objectives:

- Restore river systems
- Protect natural resources

G-C RCD (cont.)

Goals and Objectives (cont.)

- Use data to document that by taking out riparian vegetation and decreasing flow, fish can't be supported, as a result of flood control projects on Guadalupe River

Proposed Activities:

- Monitor air/water temperature, shade cover, flow as indicators of fish populations
- Fish sampling
- Photographs, video

Current Activities:

- Monitors Guadalupe River watershed (including one point on LG Creek) for temperature, fish, some riparian vegetation, shade cover
- Plans for additional loggers to be placed on LG Creek
- Fish sampling from fin clippings (1993, 1994)
- Also works with schools; trying to get Adopt-A-Watershed in schools

c) San Jose Water Company [1]

Goals and Objectives:

- To satisfy permit requirement for drinking water quality assessments

Proposed Activities:

- Monitor chemical, bacteria, physical parameters on Saratoga Creek

Current Activities:

- Parameters monitored: Chemical parameters: Ph, nitrate, phosphorous, alkalinity, TDS, metals, trace elements, conductivity; Bacteria parameters- coliform; Physical parameters: rainfall

d) United States Geological Survey (USGS): Benthic Invertebrates Study [4]

Goals and Objectives:

- Determine the natural/physical/geomorphic and anthropogenic processes that affect/influence the distribution of benthic invertebrates

USGS (cont.)

Goals and Objectives: (cont.)

- Look at where and why different species live in different areas, and assess relationships between biological, physical, and chemical factors, in order to separate out natural/anthropogenic factors that affect distribution
- Conducted as part of surface water component of National Water Quality Assessment Program to identify the status and trends of water quality in the nation

Proposed Activities:

- Looking at 85 sites on 14 streams and reservoirs in Santa Clara County, including Los Gatos Saratoga, Ross Creeks

Current Activities:

- Conducting riffle samples, habitat weighted multi-habitat samples
- Classifying 85 sites by benthic invertebrates and determining species compositions, relationships between upstream/downstream
- Collaborating with San Francisco State to develop food web models of streams; with UC Berkeley on variability in habitat; with a USGS hydrologist on stream temperature
- Collecting data on flow, temperature, chemical data, GIS system
- Continuing analysis
- Possible data report available by the end of 1998

e) Los Gatos Creek Streamside Park Committee [3]

Goals and Objectives:

- Advocacy for planning and development for Los Gatos Creek Trail

Proposed Activities:

- Meetings every other month

Current Activities:

- Remain active in plans to complete Los Gatos Creek Trail from Los Gatos to San Jose Arena

f) West Valley Sanitation District (WVSD) [1]

Goals and Objectives:

- Storm drain operations and maintenance, to reduce stormwater pollutants washed into creeks and the Bay via municipal storm drain systems

WVSD (cont.)

Proposed Activities:

- Collect data on catch basin cleanings, amount of manholes, inlets, debris, mapping, etc. and enter into a GIS
- Produce semi-annual report summaries of storm drain cleaning activities for WV municipalities

Current Activities:

- WV municipalities use WVSD to manage WV area as single storm drain district
- Clean, inspect storm drains, catch basins, curb/drop inlets, manholes, storm drain line, outfalls, etc. for Los Gatos, Campbell, Saratoga, Monte Sereno
- Notify Cities of illegal dumping and polluting, and investigate when necessary
- Sampling on own facility on what's visible: oil and grease on asphalt; dry/wet weather monitoring
- If sanitary sewer overflows, sample upstream/downstream to see how much overflow
- Placed storm drain plates during inspections for Campbell and Los Gatos
- Computerization of data expected to be completed over next three to four years

APPENDIX F:
NPDES Permit
Specific Monitoring Program Requirements

NPDES Permit Specific Monitoring Program Requirements*

a. Provisions for conducting and reporting the results of special studies conducted by the Program or Dischargers which are designed to determine effectiveness of best management practice or control measures, define a Performance Standard in accordance with Provision C.2, or assess the adverse impact of a <u>pollutant or pollutants on beneficial uses</u>;
b. Provisions for conducting watershed monitoring activities including; identification of major sources of pollutants of concern; evaluation of the effectiveness of control measures and best management practices; and use of physical, chemical, and biological parameters and indicators as appropriate;
c. Identification and justification of representative sampling locations, frequencies and methods, suite of pollutants to be analyzed, analytical methods, and quality assurance procedures. Alternative monitoring methods in place of these (special projects, financial participation in regional, state, or national special projects or research, literature review, visual observations, use of indicator parameters, recognition and reliance on special studies conducted by other programs, etc.) may be proposed with justification. Such proposed alternative monitoring methods shall be included as a component of the Program draft Workplan as required in Provision C.3.

* SCV URPPP's 1995 RWQCB NPDES permit

APPENDIX G:
WV Municipalities
Resource Contribution Data Sheets

City of Campbell: Resource Contribution Data Sheet

Staff Resources (including contracted services; see Campbell Public Agency Activity (PAA) Flow Chart in WV URMP)	Staff Monitoring Expertise (technical knowledge of what data to collect, how to interpret) None/Some/A lot	Computer Capabilities (i.e. GIS) None/Some/A lot	Data Analysis, Storage, Retrieval Capabilities None/Some/A lot	Monitoring Budget/Physical Resources (i.e. sampling equipment)	Current Pollution Prevention/Reduction Programs and Strategies (individual/collective)	Current Public Interest in Monitoring, Monitoring Activities
Environmental Programs Manager	None	Some: GIS capabilities	Some: MIS will be upgrading to increase capabilities	Proposed FY08-09: WV CWP Projects: \$14,449 out of \$47,500 total for all four municipalities	Industrial/Commercial Discharger Measures: industrial inspection program focuses on vehicle repair and related activities, retail food facilities	SCB WM: WV communities, via WV CWP, participate in WM monthly Core Group meetings, review and comment on watershed documents, and receive/review minutes for Watershed Assessment Subgroup; additional representation on subgroups through SCV URMP
Community Development (Planning) Department (project application review, environmental review)				Proposed FY08-09: SCV URMP Projects: \$34,363 out of \$97,865 total for all four municipalities (\$28,533 non-discretionary; \$6,851 discretionary)	Public Agency Activity Controls: focuses on storm drain operations and maintenance, storm drain stenciling, street sweeping, incident response, prevention of stormwater pollution from municipal crew activities	Creek Assessment/ Monitoring Strategy: WV strategy helps to better understand the extent of existing monitoring programs in WV communities' watersheds, ties in to regional efforts, and indicates when and how to participate in potential monitoring activities; intended as one component of WV URMP
Building Department (plan check, building and construction inspections)				No sampling equipment	Construction and Development Measures: pass information and BMP's on stormwater issues and construction to owners, developers, construction entities during planning, plan check phases; conduct inspections to ensure stormwater protection from other construction activities such as storage, material handling, waste disposal	SCC PPP: LG Creek Park Ground Water Recharge Ponds Water Quality Protection Study (Perc Ponds)
Engineering Department (plan check, grading and drainage inspections)					Public Information: distribute outreach materials and other BMP information to residents, businesses and make information available at city facilities and community events	Westmont High School: creek monitoring for water quality data and invertebrates (San Tomas Aquino)

City of Campbell: Resource Contribution Data Sheet

Staff Resources (including contracted services; see Campbell Public Agency Activity (PAA) Flow Chart in WV URMP)	Staff Monitoring Expertise (technical knowledge of what data to collect, how to interpret) None/Some/A lot	Computer Capabilities (i.e. GIS) None/Some/A lot	Data Analysis, Storage, Retrieval Capabilities None/Some/A lot	Monitoring Budget/Physical Resources (i.e. sampling equipment)	Current Pollution Prevention/Reduction Programs and Strategies (individual/collective)	Current Public Interest in Monitoring, Monitoring Activities
Public Works Superintendent: (litter pick up/contract; street sweeping by contract)					Collective participation in SCC-wide Household Hazardous Waste Program; administers mobile drop-off events for residents and some commercial businesses; drop-off sites (battery, oil, paint) located within WV communities	LG Shoreline Park Committee; Advocacy for planning and development for Los Gatos Creek Trail
WV CWP Program Manager (training, submittals)					Collective participation in SCC-wide Solid Waste Program; works with UC Extension to publish alternative product lists, commercial recycling facilities; hosts compost training workshops	
WV Sanitation District (sewer drain maintenance)					Collective participation in SCC Congestion Management Agency (CMA), through countywide joint powers agreement, working to ensure traffic improves, through capital improvements, land use planning, and demand management strategies	
Green Valley Disposal Company (refuse collection, recycling of non-hazardous materials)					Collective participation in WV Solid Waste Program, focusing on waste collection and recycling, and having a major curbside recycling component	
SCC Environmental Resources Agency (household hazardous waste disposal)					Collective participation in WV Animal Control Program, contracted with Humane Society for animal control services (e.g., animal pick up, medical, licensing)	
					SCV U/APP: coordinates collective activities of co-permittees; undertakes special studies (metals, parking lots, brake pads); develops new BMPs; WV municipalities participate on the Management Committee and other groups (through WV CWP); review, comment, and contribute to documents, studies, reports	
					WV CWP: cooperative NPS program representing the four WV communities; objective is to realize effectiveness, efficiency and cost benefits from collective efforts of the four WV communities; Program Manager provides program administration (e.g., representation on committees, report generation); reviews and comments on various documents and plans; manages local projects	

Town of Los Gatos: Resource Contribution Data Sheet

Staff Resources (including contracted services; see LG Public Agency Activity (PAA) Flow Chart in WV URMP)	Staff Monitoring Expertise (technical knowledge of what data to collect, how to interpret) None/Some/A lot	Computer Capabilities (i.e. GIS) None/Some/A lot	Data Analysis, Storage, Retrieval Capabilities None/Some/A lot	Monitoring Budget/Physical Resources (i.e. sampling equipment)	Current Pollution Prevention/Reduction Programs and Strategies (Individual/collective)	Current Public Interest in Monitoring, Monitoring Activities
Director of Building & Engineering Services	None	Some: Have GIS capabilities, use it for other applications besides mapping	Some: More into GIS, depends on data stored	Proposed FY98-99: WV CWP Projects: \$16,345 out of \$47,500 total for all four municipalities	Industrial/Commercial Discharger Measures: Industrial inspection program focuses on vehicle repair and light manufacturing activities, retail food facilities	SCB WMI: WV communities, via WV CWP, participate in WMI monthly Core Group meetings, review and comment on watershed documents, and receive/review minutes for Watershed Assessment Subgroup; additional representation on subgroups through SCV URPPP
Building/Engineering Department (plan check, building, construction, grading inspections)				Proposed FY98-99: SCV URPPP Projects: \$31,825 out of \$97,865 total for all four municipalities (\$28,408 non- discretionary; \$5,417 discretionary)	Public Agency Activity Controls: focuses on storm drain operations and maintenance, storm drain sweeping, street sweeping, incident response, prevention of stormwater pollution from municipal crew activities	Creek Assessment/Monitoring Strategy: WV strategy helps to better understand the extent of existing monitoring programs in WV communities' watersheds, ties in to regional efforts, and indicates when and how to participate in potential monitoring activities; intended as one component of WV URMP
Planning Department (project application review, environmental review)				No sampling equipment	Construction and Development Measures: give emphasis to construction/grading control, especially within hillside areas; conduct inspections to ensure stormwater protection from other construction activities such as storage, material handling, waste disposal; pass information and BMP's on stormwater issues and construction to owners, developers, construction entities during planning, plan check phases	CCRS: Guadalupe River watershed study 1993-1995 contains data on Los Gatos Creek
Community Services					Public information: distributes outreach materials and other BMP information to residents, businesses and makes information available at city facilities and community events	SCWD: water quality monitoring for reservoirs (Lasington, Viscone) and downstream
Director of Parks, Forestry and Maintenance Services (street sweeping, litter pick- up/control)					Collective participation in SCC-wide Household Hazardous Waste Program: administers mobile drop-off events for residents and some commercial businesses; drop-off sites (battery, oil, paint) located within WV communities	SCWD: surveys on Los Gatos Creek: fish, frog, pond turtles, yellow legged frogs, CA Tiger Salmonsters, cats
WV CWP Program Manager (training, submittals)					Collective participation in SCC-wide Solid Waste Program: works with LG Extension to publish alternative product lists, commercial recycling facilities; hosts compost training workshops	LG Streamside Park Committee: advocacy for planning and development regarding LG Creek Trail

Town of Los Gatos: Resource Contribution Data Sheet

Staff Resources (including contracted services; see Campbell Public Agency Activity (PAA) Flow Chart in WV URMP)	Staff Monitoring Expertise (technical knowledge of what data to collect, how to interpret)	Computer Capabilities (i.e. GIS) None/Some/A lot	Data Analysis, Storage, Retrieval Capabilities None/Some/A lot	Monitoring Budget/Physical Resources (i.e. sampling equipment)	Current Pollution Prevention/Reduction Programs and Strategies (individual/collective)	Current Public Interest in Monitoring, Monitoring Activities
WVSD, coord. effort (storm drain maintenance)					Collective participation in SCC Congestion Management Agency (CMA), through countywide joint powers agreement, working to ensure traffic improves, through capital improvements, land use planning, and demand management strategies	SCG Parks and Recreation: would like to expand volunteer monitoring program currently for Ed Levin and Grant Parks to LG Creek and Vasona
Green Valley Disposal Company (refuse collection, recycling of non-hazardous materials)					Collective participation in WV Solid Waste Program, focusing on waste collection and recycling, and having a major curbside recycling component	Youth Science Institute (YSI): nature center with creek exploration and creek biodiversity programs for students
SCC Environmental Resources Agency (household hazardous waste disposal)					Collective participation in WV Animal Control Program, contracted with Humane Society for animal control services (e.g., animal pick up, medical, licensing)	LG/Saratoga High School District-NOVA Program: possible interest in monitoring portion of LG Creek
					WV Hillside Preservation Strategy: Joint hillside preservation strategy for western Hillside of Santa Clara Valley, by Los Gatos, Monte Sereno, Saratoga, City of Cupertino, Santa Clara County	USGS: Benthic Invertebrates study Looking at 85 sites on 14 streams and reservoirs in Santa Clara County, including Los Gatos Creek
					SCV URPPP: coordinates collective activities of communities; undertakes special studies (metals, parking lots, brake pads); develops new BMPs; WV municipalities participate on the Management Committee and other groups (through WV CWP); review, comment, and contribute to documents, studies, reports	
					WV CWP: cooperative NPS program representing the four WV communities; objective is to realize effectiveness, efficiency and cost benefits from collective efforts of the four WV communities; Program Manager provides program administration (e.g., representation on committees, report generation); reviews and comments on various documents and plans; manages local projects	

City of Monte Sereno: Resource Contribution Data Sheet

Staff Resources (including contracted services; see Organizational Chart Jan 1999; MS Public Agency Activity (PAA) Flow Chart in WV URMP)	Staff Monitoring Expertise (technical knowledge of what data to collect, how to interpret) None/Some/A lot	Computer Capabilities (i.e. GIS) None/Some/A lot	Data Analysis, Storage, Retrieval Capabilities None/Some/A lot	Monitoring Budget/Physical Resources (i.e. sampling equipment)	Current Pollution Prevention/Reduction Programs and Strategies (Individual/collective)	Current Public Interest in Monitoring, Monitoring Activities
City Manager, City Engineer	None	Some: GIS, databases, no plotter	Some: storage capabilities	Proposed FY98-99: WV CWP Projects: \$1,442 out of \$47,500 total for all four municipalities	Public Agency Activity Controls: focuses on storm drain operations and maintenance, storm drain stenciling, street sweeping	SCB WMI: WV communities, via WV CWP, participate in WMI monthly Core Group meetings, review and comment on watershed documents, and receive/review minutes for Watershed Assessment Subgroup; additional representation on subgroups through SCV URPPP
Building Official (litter pick-up/control)				Proposed FY98-99: SCV URPPP Projects: \$2,575 out of \$97,865 total for all four municipalities (\$2,125 non-discretionary, \$450 discretionary)	Construction and Development Measures: place emphasis on construction/erosion control, illegal dumping/discharge response based on construction/remodeling occurring within the City; some construction activity occurs within the hillside areas	Creek Assessment/Monitoring Strategy: WV strategy helps to better understand the extent of existing monitoring programs in WV communities' watersheds, ties in to regional efforts, and indicates when and how to participate in potential monitoring activities; intended as one component of WV URMP
Building/Engineering Department (plan check, building, construction, grading inspections)				No sampling equipment	Public Information: distribute outreach materials and other BMP information useful to residents	Place in Quarterly newsletter for volunteer opportunities
Planning Department (project application review, environmental review)					Collective participation in SCC-wide Household Hazardous Waste Program: administers mobile drop-off events for residents and some commercial businesses; drop-off sites (battery, oil, paint) located within WV communities	
WV CWP Program Manager (training, submittals)					Collective participation in SCC-wide Solid Waste Program: works with LG Extension to publish alternative product lists, commercial recycling facilities, hosts compost training workshops	
Town of Los Gatos (street sweeping)					Collective participation in SCC Congestion Management Agency (CMA), through countywide joint powers agreement, working to ensure traffic improves, through capital improvements, land use planning, and demand management strategies	
WV Sanitation District, McKenna Landscaping (storm drain maintenance)					Collective participation in WV Solid Waste Program, focusing on waste collection and recycling, and having a major curbside recycling component	

City of Monte Sereno: Resource Contribution Data Sheet

Staff Resources (including contracted services; see Campbell Public Agency Activity (PAA) Flow Chart in URMP)	Staff Monitoring Expertise (technical knowledge of what data to collect, how to interpret) None/Some/A lot	Computer Capabilities (i.e. GIS) None/Some/A lot	Data Analysis, Storage, Retrieval Capabilities None/Some/A lot	Monitoring Budget/Physical Resources (i.e. sampling equipment)	Current Pollution Prevention/Reduction Programs and Strategies (individual/collective)	Current Public Interest in Monitoring, Monitoring Activities
Green Valley Disposal Company (refuse collection, recycling of non-hazardous materials)					Collective participation in WV Animal Control Program, contracted with Humane Society for animal control services (e.g., animal pick up, medical, nutrition)	
SOC Environmental Resources Agency (household hazardous waste disposal)					WV Hillside Preservation Strategy: Joint hillside preservation strategy for western hillsides of Santa Clara Valley, by Los Gatos, Monte Sereno, Saratoga, City of Cupertino, Santa Clara County	
					SCV URP: coordinates collective activities of co- permittees; undertakes special studies (metals, parking lots, brake pads); develops new BMPs; WV municipalities participate on the Management Committee and other groups (through WV CWP); review, comment, and contribute to documents, studies, reports	
					WV CWP: cooperative NPS program representing the four WV communities; objective is to realize effectiveness, efficiency and cost benefits from collective efforts of the four WV communities; Program Manager provides program administration (e.g., representation on committees, report generation); reviews and comments on various documents and plans; manages local projects	

City of Saratoga: Resource Contribution Data Sheet

Staff Resources (including contracted services; see Saratoga Public Agency Activity (PAA) Flow Chart in WV URPPP)	Staff Monitoring Expertise (technical knowledge of what data to collect, how to interpret) None/Better/A lot	Computer Capabilities (i.e. GIS) None/Better/A lot	Data Analysis, Storage, Retrieval Capabilities None/Better/A lot	Monitoring Budget/Physical Resources (i.e. sampling equipment)	Current Pollution Prevention/Reduction Programs and Strategies (Individual/collective)	Current Public Interest in Monitoring, Monitoring Activities
Director of Public Works	None	Data Gap	Data Gap	Proposed FY08-09: WV CWP Projects: \$15,264 out of \$47,500 total for all four municipalities	Industrial/Commercial Discharger Measures: Inspection program focuses on retail food facilities	SCS WW: WV communities, via WV CWP, participate in WMI monthly Cons Group meetings, review and comment on watershed documents, and receive/review minutes for Watershed Assessment Subgroup; additional representation on subgroups through SCV URPPP
Street Superintendent, Parks Superintendent (litter pick-up/contract; street sweeping (contractor) and storm drain maintenance (WVSD, contract))				Proposed FY08-09: SCV URPPP Projects: \$29,082 out of \$97,865 total for all four municipalities (\$24,131 non-discretionary; \$4,950 discretionary)	Public Agency Activity Controls: focuses on storm drain operations and maintenance, storm drain stenciling, street sweeping, incident response, prevention of stormwater pollution from municipal maintenance activities	Creek Assessment/Monitoring Strategy: WV strategy helps to better understand the extent of existing monitoring programs in WV communities' watersheds, ties in to regional efforts, and indicates when and how to participate in potential monitoring activities; intended as one component of WV URMP
Community Development (Planning) Department (project application review; environmental review)				No sampling equipment	Construction and Development Measures: through plan check and inspection of construction activities, minimize NPS pollution from projects starting from the planning application phase; pass information and BMP's on stormwater issues and construction to owners, developers, construction entities during all phases; place emphasis on construction/grading/erosion control, especially within hillside areas; conduct follow-up inspections to ensure stormwater protection from other construction activities such as storage, material handling, waste disposal	Saratoga School District: Saratoga Creek Education Project, creek monitoring
Building Department (plan check, building and construction inspections)					Public Information: distribute outreach materials and other BMP information to residents, businesses and makes information available at city facilities and community events	Walden Weel: outdoor environmental education camp; children learn about creek ecosystems, could monitor for various parameters
Engineering Department (plan check, grading and drainage inspections)					Collective participation in SCV-wide Household Hazardous Waste Program: administers mobile drop-off events for residents and some commercial businesses; drop-off sites (battery, oil, paint) located within WV communities	CCRS: Community Greenways Streamkeepers Program, Urban Creek Assessment Project (UCAP), Integrated Community Involvement Program (ICP)
Office of City Manager (public services)					Collective participation in SCV-wide Solid Waste Program: works with UC Extension to publish alternative product lists, commercial recycling facilities; hosts compost training workshops	San Jose Water Company: monitors chemical, bacteria, physical parameters on Saratoga Creek

City of Saratoga: Resource Contribution Data Sheet

Staff Resources (including contracted services; see Campbell Public Agency Activity (PAA) Flow Chart in WV Update)	Staff Monitoring Expertise (technical knowledge of what data to collect, how to interpret)	Computer Capabilities (i.e. GIS)	Data Analysis, Storage, Retrieval Capabilities	Monitoring Budget/Physical Resources (i.e. sampling equipment)	Current Pollution Prevention/Reduction Programs and Strategies (individual/collective)	Current Public Interest in Monitoring, Monitoring Activities
WV CWP Program Manager (training, submits)					Collective participation in SCG Congestion Management Agency (CMA), through countywide joint powers agreement, working to ensure traffic improves, through capital improvements, land use planning, and demand management strategies	SCWMD: surveys on Saratoga and Calabazas Creek fish, frogs, pond turtles, yellow legged frogs, CA Tiger Salamanders, cats
Green Valley Disposal Company (refuse collection, recycling of non-hazardous materials)					Collective participation in WV Solid Waste Program, focusing on waste collection and recycling, and having a major curbside recycling component	Friends of Calabazas Creek (FOCC): work to prevent destruction of natural habitat and environment from Miller Ave in Cupertino up into Saratoga
SCG Environmental Resources Agency (household hazardous waste disposal)					Collective participation in WV Animal Control Program, contracted with Humane Society for animal control services (e.g., animal pick up, medical, boarding)	City of Saratoga: Adopt-a-Park, Creek Clean-up programs
					WV Hillside Preservation Strategy: Joint Hillside preservation strategy for western Hillside of Santa Clara Valley, by Los Gatos, Monte Sereno, Saratoga, City of Cupertino, Santa Clara County	
					SCV URPPP: coordinates collective activities of co-permittees; undertakes special studies (metals, parking lots, brake pads); develops new BMPs; WV municipalities participate on the Management Committee and other groups (through WV CWP); review, comment, and contribute to documents, studies, reports	
					WV CWP: cooperative NPS program representing the four WV communities; objective is to realize effectiveness, efficiency and cost benefits from collective efforts of the four WV communities; Program Manager provides program administration (e.g., representation on committees, report generation); reviews and comments on various documents and plans; manages local projects	

APPENDIX H:
Application of Decision-Making Framework/Criteria
to WV Municipalities

City of Campbell:
Likely NPS Pollutant Classes And Appropriate Roles in Watershed Monitoring

Classes of Urban Runoff Pollutants	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class? (Yes/(N)/or/Unknown)	Should Additional Strategies/Activities be Considered? (Yes/(N)/or/Unknown)	Possible Resources/Community Interest/Forms of Participation
Vehicle Related (Commercial/Municipal)	Industrial/Commercial Discharger Measures: Industrial inspection program focuses on vehicle repair and related activities (annual NPS/Hazardous Materials Storage inspections); WV CWP complies auto-related commercial educational materials, e.g. six auto repair BMP tri-fold brochures, <i>Your Shop Can Make a Difference</i> booklet, that inspectors distribute to facilities WV/SCV URPPP participation in Common Ground for the Environment: funding and participation in special studies that further the technical and scientific understanding associated with pollutants of concern in the lower South SF Bay (e.g., copper in brakepads)	Yes	Yes	1. Continue participation in Common Ground for the Environment Brake Pad Partnership (funding, reviewing and commenting on documents, implementing actions via WV CWP); 2. Continue distribution of auto-related educational materials (via WV CWP); 3. Consider training inspectors to be familiar with materials and to convey information to facilities when distributing materials onsite, as well as to answer questions (via WV CWP); 4. Consider NPS training, certification/workshops for auto repair, auto detailing type facility owners, managers; 5. Consider recognizing businesses that convey NPS information to employees, keep parking lots clean as WV Clean Businesses, similar to Palo Alto's Clean Bay Business program
Litter	Storm drain operations and maintenance: e.g. routine cleaning/maintenance of catch basins, curb/drop inlets, manholes, storm drain line, outfalls; inspection of illicit connections; documentation of cleaning, maintenance; mapping (WVSD) Street sweeping and sidewalk/surface cleaning (contractor): aimed at collecting sediments, debris, and leaves from public streets and parking lots Collective participation in WV Solid Waste Program, SCC-wide Solid Waste Program	Yes	Yes	1. WV CWP could ask for, review, and track reports generated by WVSD and Campbell on the types and amounts of litter collected (quarterly or annually) and monitor for drastic changes

City of Campbell:
Likely NPS Pollutant Classes And Appropriate Roles In Watershed Monitoring

Classes of Urban Runoff Pollutants	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class?	Should Additional Strategies/Activities be Considered? (Yes/No/Unknown)	Possible Resources/Community Interest/Forms of Participation
Vehicle Related (Residential)	WV CWP distributes auto-related educational materials targeted at residents, e.g. <i>Keep it All In Tune</i> , to auto parts and hardware stores; at events; and through WV CWP materials request line. Collective participation in SCC Congestion Management Agency	Yes	Yes	1. Continue distribution of educational materials (via WV CWP); 2. Consider partnering with a school (e.g., Westmont) to monitor for auto related pollutants in storm drains and in San Tomas Creek such as oil sheen, antifreeze, soap and dirt (via either Environmental Program Manager or WV CWP); 3. Consider partnering with/training Adopt-a-Creek groups, bikers, joggers, and creekside residents along LG Creek Trail (and/or LG Creek Streamside Park Committee, SCC Parks and Recreation, Vasone) to monitor for auto related pollutants in reaches of LG Creek
Retail food facilities	Contract with SCC DEH who conducts NPS inspections of retail food facilities integrated with Health and Safety inspections; inspectors distribute restaurant BMP booklet to food facilities	Yes	Yes	1. Consider NPS training, workshops for restaurant facility owners/managers or alternatively, train inspectors to become familiar with BMPs, convey them to restaurant facilities during on site inspections, and answer questions; follow up to ensure implementation of BMPs, answer additional questions (via WV CWP)
Light Industrial/small commercial shops	Annual Integrated NPS/Hazardous Materials Storage Inspections; WV CWP compiles educational materials, e.g., <i>Best Housekeeping Practices for Commercial and Light Industrial Facilities</i> , that inspectors distribute to facilities	Yes	Yes	1. Consider NPS training, workshops for small NPS facility managers or alternatively, train inspectors to become familiar with BMPs, convey them to facilities during on site inspections, and answer questions; follow up to ensure implementation of BMPs, answer additional questions (via WV CWP)
Exterior surface/mobile cleaners/contractors	Distribution of Mobile Cleaning BMPs to contractors, BMP requirements for construction (educational material); support for regional training and certification program for mobile cleaners	Yes	No	

City of Campbell:
Likely NPS Pollutant Classes And Appropriate Roles in Watershed Monitoring

Classes of Urban Runoff Pollutants	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class?	Should Additional Strategies/Activities be Considered? (Yes/No/Unknown)	Possible Resources/Community Interest/Forms of Participation
Household chemicals	WV CWP distributes educational materials to residents via hardware stores, WV CWP request line: <i>Home Maintenance Tips</i> , <i>Clean It!</i> , <i>The Bay Begins at Your Front Door</i> . WV participation in SCC-wide HHW Program	Yes	Yes	1. Continue to distribute educational materials to hardware stores, etc. (via WV CWP); 2. Consider partnering with training Westmont school students for San Tomas Creek and/or concerned citizens (e.g. homeowner associations, creekside residents, Adopt-a-Creek groups) on LG Creek to monitor for household pollutants in storm drains and creeks, e.g. paints, detergents, solvents, etc.
Pool/spa maintenance	WV CWP distributes educational materials (pool/spa brochure) to pool supply stores, pool services; SCC DEH inspects public pools	Yes	No	
Bacteria/pathogens	Collective participation in WV Animal Control Program, contracted with Humane Society for animal control services (e.g., animal pick up, medical, licensing)	Unknown: data gaps on septic tanks	Unknown: data gaps on septic tanks	
Landscaping/gardening	WV CWP distributes educational materials to hardware stores, recreation classes, school garden projects, events: <i>Pests Bugging You</i> , <i>Grow It!</i> , <i>Streamside Planting Guide</i> , and through WV CWP request line	Yes	Yes	1. Continue distribution efforts (via WV CWP); 2. Consider sending BMP information pertaining to landscaping/gardening (e.g. WV CWP tri-fold) to landscape contractors, gardeners, lawn maintenance services; 3. Consider partnering with schools, SCC Parks, others to monitor for leaves, lawn clippings, yard trimmings; 4. Consider sending or making available Streamside Planting Guide to creekside residents (e.g. LG Creek); 5. Consider future participation (funding, direct participation) in Integrated Pest Management program
Erosion/Sedimentation	Construction and Development Measures: pass information and BMP's on stormwater issues and construction to owners, developers, construction entities during planning, plan check phases Conduct inspections to ensure stormwater protection from other construction activities such as storage, material handling, waste disposal	Yes	Yes	1. WV CWP could continue to update and supply Campbell with sets of Construction Tri-folds, BMP's for construction practices

¹ NPS inspections, conducted by SCC Fire Department, consist of visual inspection of outdoor areas and onsite catch basins for evidence of discharge/debris, distribution of NPS materials (WV URMP 1997, 11)

**Town of Los Gatos:
Likely NPS Pollutants And Appropriate Roles in Watershed Monitoring**

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class? (Yes/(N)/Unknown)	Should Additional Strategies/Activities be Considered? (Yes/(N)/Unknown)	Possible Resources/ Community Interest/ Forms of Participation
<i>Landscaping/gardening</i>	WV CWP distributes educational materials to hardware stores, recreation classes, school garden projects, events: <i>Pests Bugging You</i> , <i>Grow It!</i> , <i>Streamside Planting Guide</i> , and through WV CWP request line	Yes	Yes	1. Continue distribution efforts (via WV CWP); 2. Consider sending BMP information pertaining to landscaping/gardening (e.g. WV CWP tri-folds) to landscape contractors, gardeners, lawn maintenance services; 3. Consider partnering with schools, SCC Parks, Adopt-a-Creek groups to monitor for leaves, lawn clippings, yard trimmings; 4. Consider sending or making available Streamside Planting Guide to creekside residents (e.g. LG Creek); 5. Consider future participation (funding, direct participation) in Integrated Pest Management program
<i>Erosion/Sedimentation</i>	Construction and Development Measures: give emphasis to construction/ grading/erosion control, especially within hillside areas Conduct inspections to ensure stormwater protection from other construction activities such as storage, material handling, waste disposal Pass information and BMP's on stormwater issues and construction to owners, developers, construction entities during planning, plan check phases WV Hillside Strategy	Yes	Yes	1. WV CWP could continue to update and supply Los Gatos with sets of Construction Tri-folds, BMPs for construction practices; 2. LGWV CWP could consider partnering with SCC Parks and Recreation, YSI, hikers, or LG Streamside Park Committee, to monitor for trail and streambank erosion along LG Creek from Lexington Reservoir to Campbell

**Town of Los Gatos:
Likely NPS Pollutants And Appropriate Roles In Watershed Monitoring**

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class?	Should Additional Strategies/Activities be Considered? (Yes/(N)o/Unknown)	Possible Resources/ Community Interest/ Forms of Participation
<i>Vehicle Related (Commercial/Municipal)</i>	<p>Industrial/Commercial Discharger Measures: Industrial inspection program focuses on vehicle repair and related activities (annual NPS/Hazardous Materials Storage Inspections¹); WV CWP complies auto-related commercial educational materials, e.g. six auto repair BMP tri-fold brochures, <i>Your Shop Can Make a Difference</i> booklet, that inspectors distribute to facilities.</p> <p>WV/SCV URPPP participation in Common Ground for the Environment; funding and participation in special studies that further the technical and scientific understanding associated with pollutants of concern in the lower South SF Bay (e.g., copper in brakepads)</p>	Yes	Yes	<p>1. Continue participation in Common Ground for the Environment Brake Pad Partnership (funding, reviewing and commenting on documents, implementing actions via WV CWP);</p> <p>2. Continue distribution of auto-related educational materials (via WV CWP);</p> <p>3. Consider training inspectors to be familiar with materials and to convey information to facilities when distributing materials onsite, as well as to answer questions (via WV CWP; consider NPS training, certification/workshops for auto repair, auto detailing type facility owners, managers;</p> <p>4. Consider recognizing businesses that convey NPS information to employees, keep parking lots clean as WV Clean Businesses, similar to Palo Alto's Clean Bay Business program (via WV CWP)</p>

**Town of Los Gatos:
Likely NPS Pollutants And Appropriate Roles in Watershed Monitoring**

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class?	Should Additional Strategies/Activities be Considered? (Yes/(N)/or/Unknown	Possible Resources/ Community Interest/ Forms of Participation
<i>Vehicle Related (Residential)</i>	WV CWP distributes auto-related educational materials targeted at residents, e.g. <i>Keep it All in Tune</i> , to auto parts and hardware stores; at events; and through WV CWP materials request line Collective participation in SCC Congestion Management Agency	Yes	Yes	1. Continue distribution of educational materials (via WV CWP); 2. Consider partnering with a school (e.g., Los Gatos High School, NOVA Program, YSI) to monitor for auto related pollutants in storm drains and in LG Creek such as oil sheen, antifreeze, soap and dirt (via either Environmental Program Manager or WV CWP); 3. Consider partnering with/training hikers, bikers, joggers, and creekside residents along LG Creek Trail (and/or LG Creek Streamside Park Committee, SCC Parks and Recreation, Vasona) to monitor for auto related pollutants in reaches of LG Creek
<i>Household chemicals</i>	WV CWP distributes educational materials to residents via hardware stores, WV CWP request line: <i>Home Maintenance Tips</i> , <i>Clean It!</i> , <i>The Bay Begins at Your Front Door</i> WV participation in SCC-wide HHW Program	Yes	Yes	1. Continue to distribute educational materials to hardware stores, etc. (via WV CWP); 2. Consider partnering with/training schools, SCC Parks and Recreation, LG Streamside Committee, and/or concerned citizens (e.g. homeowner associations, creekside residents) on LG Creek to monitor for household pollutants in storm drains and creeks, e.g. paints, detergents, solvents, etc.

Town of Los Gatos:
Likely NPS Pollutants And Appropriate Roles in Watershed Monitoring

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class?	Should Additional Strategies/Activities be Considered? (Yes/No/Unknown)	Possible Resources/Community Interest/Forms of Participation
<i>Retail food facilities</i>	Contract with SCC DEH who conducts NPS inspections of retail food facilities integrated with Health and Safety inspections; Inspectors distribute restaurant BMP booklet to food facilities	Yes	Yes	1. Consider NPS training, workshops for restaurant facility owners/ managers or alternatively, train inspectors to become familiar with BMPs, convey them to restaurant facilities during on site inspections, and answer questions; follow up to ensure implementation of BMPs, answer additional questions (via WV CWP)
<i>Light industrial/small commercial shops</i>	Annual integrated NPS/Hazardous Materials Storage inspections; WV CWP complies educational materials, e.g., <i>Best Housekeeping Practices for Commercial and Light Industrial Facilities</i> , that inspectors distribute to facilities	Yes	Yes	1. Consider NPS training, workshops for small NPS facility managers or alternatively, train inspectors to become familiar with BMPs, convey them to facilities during on site inspections, and answer questions; follow up to ensure implementation of BMPs, answer additional questions (via WV CWP)
<i>Exterior surface/mobile cleaners/contractors</i>	Distribution of Mobile Cleaning BMPs to contractors, BMP requirements for construction (educational material); support for regional training and certification program for mobile cleaners	Yes	No	
<i>Pool/spa maintenance</i>	WV CWP distributes educational materials (pool/spa brochure) to pool supply stores, pool services; SCC DEH inspects public pools	Yes	No	
<i>Bacteria/pathogens</i>	Collective participation in WV Animal Control Program, contracted with Humane Society for animal control services (e.g., animal pick up, medical, licensing)	Unknown : data gaps for septic tanks	Unknown: data gaps for septic tanks	

**Town of Los Gatos:
Likely NPS Pollutants And Appropriate Roles In Watershed Monitoring**

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class?	Should Additional Strategies/Activities be Considered? (Yes/No/Unknown)	Possible Resources/ Community Interest/ Forms of Participation
Litter	Storm drain operations and maintenance: e.g. routine cleaning/maintenance of catch basins, curb/drop inlets, manholes, storm drain line, outfalls; inspection of illicit connections; documentation of cleaning, maintenance; mapping (WVSD) Street sweeping and sidewalk/surface cleaning (contractor); aimed at collecting sediments, debris, and leaves from public streets and parking lots Collective participation in WV Solid Waste Program, SCC-wide Solid Waste Program	Yes	Yes	1. WV CWP could ask for, review, and track reports generated by WVSD and Los Gatos on the types and amounts of litter collected (quarterly or annually) and monitor for drastic changes

¹ NPS inspections, conducted by SCC Fire Department, consist of visual inspection of outdoor areas and on-site catch basins for evidence of discharges/debris, distribution of NPS materials (WV URMP 1997, 11)

**City of Monte Sereno:
Likely NPS Pollutants And Appropriate Roles In Watershed Monitoring**

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate In Addressing Pollutant Class? (Yes/(N)/Unknown)	Should Additional Strategies/Activities be Considered? (Yes/(N)/Unknown)	Possible Resources/ Community Interest/ Forms of Participation
Household chemicals	WV CWP distributes educational materials to residents via hardware stores, WV CWP request line: <i>Home Maintenance Tips, Clean It!, The Bay Begins at Your Front Door</i> WV participation in SCC-wide HHW Program	Yes	Yes	1. Continue to distribute educational materials to hardware stores, etc. (via WV CWP); 2. Consider partnering with/training schools, e.g., Daves Avenue Elementary, and/or concerned citizens (e.g. homeowner associations, creekside residents) on San Tomas Aquino or Daves Creek to monitor for household pollutants in storm drains and creeks, e.g. paints, detergents, solvents, etc.
Landscaping/gardening	WV CWP distributes educational materials to hardware stores, recreation classes, school garden projects, events: <i>Pests Bugging You, Grow It!, Streamside Planting Guide</i> , and through WV CWP request line	Yes	Yes	1. Continue distribution efforts (via WV CWP); 2. Consider sending BMP information pertaining to landscaping/gardening (e.g. WV CWP tri-folds) to landscape contractors, gardeners, lawn maintenance services; 3. Consider partnering with schools, other volunteers to monitor for leaves, lawn clippings, yard trimmings; 4. Consider sending or making available Streamside Planting Guide to creekside residents (e.g., along San Tomas Aquino Creek)

**City of Monte Sereno:
Likely NPS Pollutants And Appropriate Roles in Watershed Monitoring**

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class? (Y)es/(N)o/Unknown	Should Additional Strategies/Activities be Considered? (Y)es/(N)o/Unknown	Possible Resources/ Community Interest/ Forms of Participation
<i>Erosion/Sedimentation</i>	Construction and Development Measures: place emphasis on construction/erosion control, illegal dumping/discharge response based on construction/ remodeling occurring within the City; some construction activity occurs within the hillside areas WV Hillside Preservation Strategy	Yes	Yes	1. WV CWP could continue to update and supply Monte Sereno with sets of Construction Tri-folds, BMPs for construction practices; 2. Monte Sereno/WV CWP could consider partnering with creekside residents or interested citizens to monitor for streambank erosion along San Tomas Aquino Creek
<i>Vehicle Related (Residential)</i>	WV CWP distributes auto- related educational materials targeted at residents, e.g. <i>Keep It All In Tune</i> , to auto parts and hardware stores; at events; and through WV CWP materials request line Collective participation in SCC Congestion Management Agency	Yes	Yes	1. Continue distribution of educational materials (via WV CWP); 2. Consider partnering with a Monte Sereno or Los Gatos school to monitor for auto related pollutants in storm drains and in San Tomas Aquino or Daves Creek such as oil sheen, antifreeze, soap and dirt (via either Environmental Program Manager or WV CWP)
<i>Pool/spa maintenance</i>	WV CWP distributes educational materials (pool/spa brochure) to pool supply stores, pool services	Yes	No	
<i>Exterior surface/mobile cleaners/contractors</i>	Distribution of Mobile Cleaning BMPs to contractors, BMP requirements for construction (educational material); support for regional training and certification program for mobile cleaners	Yes	No	

**City of Monte Sereno:
Likely NPS Pollutants And Appropriate Roles in Watershed Monitoring**

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class? (Yes/(N)/Unknown	Should Additional Strategies/Activities be Considered? (Yes/(N)/Unknown	Possible Resources/ Community Interest/ Forms of Participation
Bacteria/pathogens	Collective participation in WV Animal Control Program, contracted with Humane Society for animal control services (e.g., animal pick up, medical, licensing)	Unknown : data gaps for septic tanks	Unknown: data gaps for septic tanks	
Litter	Storm drain operations and maintenance: e.g. routine cleaning/maintenance of catch basins, curb/drop inlets, manholes, storm drain line, outfalls; inspection of illicit connections; documentation of cleaning, maintenance; mapping (WVSD) Street sweeping and sidewalk/surface cleaning: aimed at collecting sediments, debris, and leaves from public streets and parking lots Collective participation in WV Solid Waste Program, SCC- wide Solid Waste Program	Yes	Yes	1. WV CWP could ask for, review, and track reports generated by WVSD on the types and amounts of litter collected (quarterly or annually) and monitor for drastic changes

**City of Saratoga:
Likely NPS Pollutants And Appropriate Roles in Watershed Monitoring**

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class? (Yes/(N)/Unknown)	Should Additional Strategies/Activities be Considered? (Yes/(N)/Unknown)	Possible Resources/Community Interest/Forms of Participation
<i>Landscaping/gardening</i>	WV CWP distributes educational materials to hardware stores, recreation classes, school garden projects, events: <i>Pests Bugging You, Grow It!, Streamside Planting Guide</i> , and through WV CWP request line	Yes	Yes	1. Continue distribution efforts (via WV CWP); 2. Consider sending BMP information pertaining to landscaping/gardening (e.g. WV CWP tri-folds) to landscape contractors, gardeners, lawn maintenance services; 3. Consider partnering with Saratoga schools, Friends of Calabazas Creek, Adopt-a-Creek groups to monitor for leaves, lawn clippings, yard trimmings; 4. Consider sending or making available Streamside Planting Guide to creekside residents (e.g. Saratoga Creek, Calabazas Creek); 5. Consider future participation (funding, direct participation) in Integrated Pest Management program
<i>Erosion/Sedimentation</i>	Construction and Development Measures: through plan check and inspection of construction activities, minimize NPS pollution from projects starting from the planning application phase Pass information and BMP's on stormwater issues and construction to owners, developers, construction entities during all phases Place emphasis on construction/grading/ erosion control, especially within hillside areas Conduct follow-up inspections to ensure stormwater protection from other construction activities such as storage, material handling, waste disposal WV Hillside Strategy	Yes	Yes	1. WV CWP could continue to update and supply Saratoga with sets of Construction Tri-folds, BMPs for construction practices; 2. Saratoga/WV CWP could consider partnering with Saratoga School, Walden West, Friends of Calabazas Creek, Adopt-a-Creek groups to monitor for streambank erosion along Saratoga Creek, Calabazas Creek

**City of Saratoga:
Likely NPS Pollutants And Appropriate Roles In Watershed Monitoring**

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate in Addressing Pollutant Class? (Yes/(No)/Unknown	Should Additional Strategies/Activities be Considered? (Yes/(No)/Unknown	Possible Resources/ Community Interest/ Forms of Participation
<i>Retail food facilities</i>	Contract with SOC DEH who conducts NPS inspections of retail food facilities integrated with Health and Safety inspections; inspectors distribute restaurant BMP booklet to food facilities	Yes	Yes	1. Consider NPS training, workshops for restaurant facility owners/ managers or alternatively, train inspectors to become familiar with BMPs, convey them to restaurant facilities during on site inspections, and answer questions; follow up to ensure implementation of BMPs, answer additional questions (via WV CWP)
<i>Household chemicals</i>	WV CWP distributes educational materials to residents via hardware stores, WV CWP request line: <i>Home Maintenance Tips, Clean It!, The Bay Begins at Your Front Door</i> WV participation in SOC-wide HHW Program	Yes	Yes	1. Continue to distribute educational materials to hardware stores, etc. (via WV CWP); 2. Consider partnering with/training Saratoga schools, Friends of Calabazas Creek, and/or other Adopt-a-Creek groups, citizens (e.g. homeowner associations, creekside residents) on Saratoga and Calabazas Creek to monitor for household pollutants in storm drains and creeks, e.g. paints, detergents, solvents, etc.
<i>Exterior surface/mobile cleaners/ contractors</i>	Distribution of Mobile Cleaning BMPs to contractors, BMP requirements for construction (educational material); support for regional training and certification program for mobile cleaners	Yes	No	

**City of Saratoga:
Likely NPS Pollutants And Appropriate Roles In Watershed Monitoring**

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Addressing Pollutant Class? (Yes/(N)/Unknown)	Should Additional Strategies/Activities be Considered? (Yes/(N)/Unknown)	Possible Resources/ Community Interest/ Forms of Participation
<i>Pool/spa maintenance</i>	WV CWP distributes educational materials (pool/spa brochure) to pool supply stores, pool services; SCC DEH inspects public pools	Yes	No	
<i>Vehicle Related (Residential)</i>	WV CWP distributes auto-related educational materials targeted at residents, e.g. <i>Keep it All in Tune</i> , to auto parts and hardware stores; at events; and through WV CWP materials request line Collective participation in SCC Congestion Management Agency	Yes	Yes	1. Continue distribution of educational materials (via WV CWP); 2. Consider partnering with Saratoga schools, Friends of Calabazas Creek, Adopt-a-Creek groups to monitor for auto related pollutants in storm drains and in Saratoga Creek, Calabazas Creek such as oil sheen, antifreeze, soap and dirt (via either Director Public Works, or WV CWP)
<i>Bacteria/pathogens</i>	Collective participation in WV Animal Control Program, contracted with Humane Society for animal control services (e.g., animal pick up, medical, licensing)	Unknown : data gaps for septic tanks	Unknown: data gaps for septic tanks	
<i>Light Industrial/small commercial shops</i>	Annual NPS inspections; ¹ WV CWP compiles educational materials for small businesses, e.g., <i>Best Housekeeping Practices for Commercial and Light Industrial Facilities</i>	Yes	Yes	1. Consider NPS training, workshops for small NPS facility managers or alternatively, train inspectors to become familiar with BMPs, convey them to facilities during on site inspections, and answer questions; follow up to ensure implementation of BMPs, answer additional questions (via WV CWP)

**City of Saratoga:
Likely NPS Pollutants And Appropriate Roles In Watershed Monitoring**

Classes of Urban Runoff Pollutants/Transport Mechanisms	Current Monitoring/Pollution Prevention Programs & Efforts	Current Programs Adequate In Addressing Pollutant Class? (Yes/(No)/Unknown)	Should Additional Strategies/Activities be Considered? (Yes/(No)/Unknown)	Possible Resources/Community Interest/Forms of Participation
Vehicle Related (Commercial/Municipal)	WV/SCV URPPP participation in Common Ground for the Environment: funding and participation in special studies that further the technical and scientific understanding associated with pollutants of concern in the lower South SF Bay (e.g., copper in brakepads)	Yes	No	
Litter	Storm drain operations and maintenance: e.g. routine cleaning/maintenance of catch basins, curb/drop inlets, manholes, storm drain line, outfalls; inspection of illicit connections; documentation of cleaning; maintenance; mapping (WVSD) Street sweeping and sidewalk/surface cleaning: aimed at collecting sediments, debris, and leaves from public streets and parking lots Collective participation in WV Solid Waste Program, SCC-wide Solid Waste Program City of Saratoga: Adopt-a-Park, Creek Clean-up programs	Yes	Yes	1. WV CWP could ask for, review, and track reports generated by WVSD and Saratoga on the types and amounts of litter collected (quarterly or annually) and monitor for drastic changes

¹ NPS inspections, conducted by Saratoga Fire District, consist of visual inspection of outdoor areas and on-site catch basins for evidence of discharges/debris, distribution of NPS materials (WV URMP 1997, 11)

APPENDIX I:
Monitoring Participation Guidelines: List of Items
Municipalities Should Consider
When Applying Criteria And Steps

Items Municipalities Should Consider When Applying Criteria and Steps:

- ***Points in the process that could be decision points***
 - After applying Level 1 criteria
 - After applying Level 2 criteria
 - After asking/responding to questions
- ***How Level 1 and Level 2 criteria should affect decision making***
 - Should an activity have to meet all of Level 1 and Level 2 criteria to be supported?
 - Number of steps (1-4) that should be undertaken before a decision could be made
 - Order of steps and criteria
 - Should steps/criteria always be applied chronologically?
 - If proposed activity has no relation to WV Municipalities and SCV URPPP goals and objectives (Step 1), should additional steps (2-4) still be taken?
- ***Prioritization of activities considered***
 - If more than one activity meets all applicable criteria, how should activities be prioritized (i.e. costs versus benefits)?
- ***Number of activities considered by municipalities in a fiscal year***
 - Should there be a minimum/maximum number considered?

APPENDIX J:
Criteria Applied to
Proposed Monitoring Activities

Criteria Applied to Proposed Monitoring Activities

APPENDIX K:
Napa County Resource Conservation District,
Friends of The Corte Madera Watershed
Monitoring Program Descriptions

**Monitoring Program Descriptions for
Napa County Resource Conservation District &
Friends of Corte Madera Creek Watershed**

1. Napa County Resource Conservation District

Mission Statement:

- Encourage and assist acceptance of individual responsibility for watershed management

Goals and Objectives:

- RCD acts as resource exchange to facilitate interaction among urban and rural land users, citizen groups, private, and public agencies
- RCD uses education and partnerships as major tools for implementation of District goals:
 - Enhancement of wildlife habitat
 - Reduction of soil erosion
 - Protection and enhancement of water quality
 - Promotion of land stewardship and sustainability agriculture

Proposed Activities:

- Napa River Watershed Owner's Manual
- Watershed education projects
- Volunteer watershed monitoring program, bird monitoring
- Watershed volunteer stewardship groups
- Napa RCD watershed stewardship training workshops

Current Activities:

- RCD prepared a Napa River Watershed Owner's Manual that is a collection of recommendations intended for use as a technical and educational resource for landowners and managers in the watershed who want to ensure long-term protection of the soil, water, and other natural resources, free to all residents of Napa County¹

¹ The Owner's Manual encourages partnerships, alliances, and cooperation between groups to meet various objectives. One recommendation (p. 29): proposes that "...sharing interests and concerns on a regular basis can result in positive community building. Regular efforts to communicate interests promote greater creativity in planning and more flexibility in management options for watershed protection." The Manual includes various policy or implementation options to meet recommendations, such as: fostering private or public partnerships with agencies and groups such as local chapters of national and regional organizations; local public interest groups; trade associations; school district support organizations, and individuals (p. 29).

Napa County RCD (cont.)

Current Activities: (cont.)

- Watershed monitoring program
 - Volunteers collect data on water quality; bird use of riparian areas; rainfall patterns; riparian vegetation; creek or river channel characteristics; streambank erosion; surface permeability. Data will be used to enable stakeholders to develop sustainable management priorities.
 - Stewardship group activities: fish habitat surveys; RCD staff and volunteers: floodplain surveying
- Related watershed monitoring programs with volunteer needs:
 - Adopt-a-Watershed for K-12 students who participate in hands-on activities that make watershed education directly applicable and relevant to students' lives

2. Friends of Corte Madera Creek Watershed

Goals and Objectives:

- Non-profit group of volunteers concerned with the health of the watershed, which stretches from Fairfax to Larkspur and Corte Madera in Marin County
- Increase public awareness and knowledge of the creek's ecosystem; encourage responsible stewardship of the watershed; further scientific understanding of the creek and use this knowledge to improve creek's condition; improve water quality; assure an adequate freshwater flow to restore and maintain a clean, healthy creek; preserve and restore creek's wetlands; restore a healthy population of indigenous fish and wildlife; promote healthy native riparian vegetation

Proposed Activities:

- Public services
- Hands-on projects
- Informational and planning programs

Current Activities:

- Public services: publication of newsletter Creek Chronicles and creek care brochures; speakers program for general public; educational walks in the watershed, led by specialists; advising and referring residents regarding problems on their creek; commenting upon proposed developments affecting creeks; notifying public agencies of specific problems
- Hands-on projects: revegetation projects on public land; creek clean-ups

Friends of Corte Madera Creek Watershed (cont.)

Current Activities: (cont.)

- **Informational and planning programs:** cooperative development of creek-care plan; general survey of creek conditions, including erosion, storm drains, vegetation, wildlife habitat; photographic surveys; water quality monitoring by schools in the watershed; "Creekwatchers" record pollutants and note wildlife seen in assigned sections of creek; contract with specialists in hydrology, fisheries to assess creek's problems
- **Watershed Plan,** a resource and a tool to improve the health of creeks; to balance needs of land owners, recreational users, environment; to prioritize problems affecting communities and creeks; identify beneficial uses of watershed
- **Re: water quality monitoring by schools:** In 1995-96 Friends conducted workshops for K-12th grade teachers from 8 schools, for 5 water quality parameters in the Creek. The tests are part of a watershed-wide monitoring and education program. While students learn the importance of each parameter, Friends will be using the data to monitor the long-term success of efforts to improve the creek
 - **Stewardship groups,** volunteers who gather and explore nearby creek and surrounding watershed; often a group decides to monitor the creek, vegetation, wildlife, and other aspects of their watershed to learn more about its health
 - **"Mike 11" Napa River Model,** computer model that requires detailed information about the river and tributaries
 - **Napa River Watershed Data Sharing,** data collected by volunteers around the watershed are stored and summarized at the RCD office and available to the public; eventually accessible through internet home page
 - **Creek clean-ups**

APPENDIX L:
Advantages/Disadvantages
of Partnerships/Volunteer Monitoring

Potential Advantages/Disadvantages to Forming Partnerships, Using Volunteer Monitors

Forming local partnerships:

1. Fulfills desire of volunteer groups to help inform local government planning and decision making and to promote environmental stewardship;
2. Fosters a greater understanding of environmental processes and planning efforts (e.g. land use and watershed planning);
3. Fosters student awareness of local stewardship;
4. Assists agencies in monitoring efforts used for NPS pollution assessment, beneficial use assessment, stormwater management, enforcement, baseline determination of resources and ecological condition, resource planning, watershed planning, etc. (Issue Paper, p. 12);
5. Builds trust and cooperation between local governments and the communities, which can be the basis for solving future problems

Some potential disadvantages to partnerships may be:

1. Lack of effective citizen participation due to under-developed working relationships between non-governmental organizations and government agencies (Issue Paper, p. 5);
2. Lack of effective use of resources due to inexperience of participants;
3. Lack of statistically comparable data due to the lack of appropriate, standardized protocols for data collection, coordinated training of volunteers, and frameworks for effective data management and quality assurance;
4. Lack of consensus among interested parties as to what parameters to monitor and why

Volunteer Monitoring

Advantages and benefits of volunteer monitoring include:

1. Educating communities in water quality, aquatic resources, and pollution prevention;
2. Helping to control discharges of pollutants from urban runoff by providing information to communities to identify pollution sources and to take responsibility by not dumping or discharging;
3. Providing information to assess the effectiveness of pollution prevention measures;

4. Educating the community as to the health of watershed and the community's role in managing watersheds (stewardship);ⁱ
5. Obtaining valuable information on watershed resources in a cost effective and efficient manner;ⁱⁱ
6. Contributing information on local beneficial uses, other local watershed data (serving as feeders) to regional programs, activities (such as SCB WMI, BASMAA)

Some potential disadvantages/obstacles to volunteer monitoring include:

1. Volunteers need to be recruited, properly trained, and once on board, need to be kept active and committed;
2. Currently, no standardized Quality Assurance/Quality Control plan exists for volunteer monitoring, although QA/QC plans are being developed by the State for existing monitoring protocols;
3. Technical and scientific expertise may be required to train volunteers and to analyze and interpret results of data;
4. Currently, no standards for data forms, storage, and formats exist

ⁱ Further benefits of volunteer monitoring include: establishing baseline conditions and/or trends of creek's water quality, riparian habitat and species; characterizing the distribution of important biological species or key indicators of riparian health; mapping land uses, land use classifications, water quality, temperature, flow testing, macroinvertebrates, sampling.

ⁱⁱ Alameda County has used volunteers well in San Leandro Creek; they have received good repeatable, reliable data at less cost than public agency (i.e. one year's monitoring @ 4 stations for \$1000 with volunteers versus \$6000 with public agencies) (Volunteer Monitoring Conference 1997, notes from speaker Robert Hale, Stormwater Manager, Alameda Countywide Clean Water Program).

Appendix M
Figure 2

Santa Clara Basin Watershed Management Initiative

Cities

- CAMPBELL
- CUPERTINO
- GILROY
- LOS ALTOS
- LOS ALTOS HILLS
- LOS GATOS
- MILPITAS
- MONTE SERENO
- MORGAN HILL
- MOUNTAIN VIEW
- PALO ALTO
- SAN JOSE
- SANTA CLARA
- SARATOGA
- SUNNYVALE

Santa Clara Valley Water District
5750 ALMADEN EXPRESSWAY
SAN JOSE, CA 95118-3886

NORTHWEST ZONE

NORTH CENTRAL ZONE

NO ZONE

G

A

J

I

B

F

H

D

K

WATERSHEDS

A	Adobe
B	Calabazas
C	Coyote
D	Guadalupe River
E	Llagas
F	Permanente
G	San Francisquito
H	San Tomas
I	Sunnyvale East
J	Sunnyvale West
K	Uvas

CENTRAL ZONE

SOUTH ZONE

LINE DESIGNATION

FLOOD CONTROL ZONES AND WATERSHEDS

Santa Clara Valley Water District
5750 ALMADEN EXPRESSWAY
SAN JOSE, CA 95118-3686

North Central Zone 1% Flood Limits

Location

One Percent
Flood Area

Santa Clara Valley Water District
2150 ALMAZEN EXPRESSWAY
SAN JOSE, CA 95119-3005

Not to Scale

Santa Clara Valley Water District

9750 ALAMADEN EXPRESSWAY
SAN JOSE, CA 95118-3600

WEST VALLEY COMMUNITIES WATERSHEDS & SUB-WATERSHEDS

Calabazas Watershed

- Calabazas Creek
- Prospect Creek
- Rodeo Creek

San Tomas Watershed

- Page Ditch
- San Tomas Aquino Creek
- Saratoga Creek
- Smith Creek
- Wildcat Creek

Guadalupe River Watershed

- East Ross Creek
- Guadalupe Creek
- Guadalupe River
- Los Gatos Creek
- Short Creek
- Ross Creek