SAN LUIS REY RIVER WATERSHED URBAN RUNOFF MANAGEMENT PROGRAM

Prepared for

California Regional Water Quality Control Board
San Diego Region 9

By the

City of Oceanside ● City of Vista ● County of San Diego

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EXECUTIVE SUMMARY

Since January 2003, the San Luis Rey (SLR) Watershed Copermittees have been actively implementing a Watershed Urban Runoff Management Program (WURMP). The City of Oceanside, as lead agency, in collaboration with the City of Vista and the County of San Diego – all local agencies which have jurisdiction within the San Luis Rey River Watershed Management Area (SLR WMA) – are continuing their efforts to develop and implement a watershed-based program in the SLR WMA. This document discusses the SLR Watershed Copermittees' efforts to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) Municipal Storm Water Permit (Municipal Permit) for San Diego Copermittees (Order No. 2007-0001, NPDES No. CAS0108758). More importantly, this document describes collaborative plans and efforts to reduce the impacts of urban activity on receiving water quality within the SLR WMA to the maximum extent practicable.

The goal of the WURMP is to positively affect the water quality of the SLR WMA while balancing economic, social, and environmental constraints. This goal will be pursued and ultimately achieved through the implementation of the following specific objectives:

- Objective #1: Develop and implement a strategic plan to assess and improve water quality within the SLR WMA, which responds to identifiable problems and reflects the beneficial uses of the watershed.
- Objective #2: Integrate watershed principles into land use planning that affects the SLR WMA.
- Objective #3: Enhance public understanding of watershed issues and pollution prevention within the SLR WMA.
- Objective #4: Encourage and enhance public involvement within the SLR WMA in activities related to urban runoff management.

To help reach these goal and objectives, the SLR Copermittees will work to identify, implement, and assess appropriate watershed water quality, education, and public participation activities, as well as watershed-based land use planning mechanisms, to properly target high priority water quality problems and their sources.

The SLR WMA is located along the northern border of the County of San Diego, California. It encompasses approximately 562 square miles and includes three Hydrologic Areas (HAs): Lower San Luis, Monserate and Warner Valley. The SLR River originates in the Palomar and Hot Springs Mountains, both over 6,000 feet above mean sea level (MSL), and extends over 55 miles across northern San Diego County before discharging to the Pacific Ocean in the City of Oceanside. Of the nine watersheds in the San Diego region, the SLR River Watershed is the third largest (SANDAG 1998).

Residential and agriculture serve as the dominant land uses in the watershed. The majority of the watershed has remained undeveloped with higher population concentrations in the Lower San Luis HA. Although the SLR River Watershed is the third largest of the San Diego region watersheds, its population is one of the smallest. The population of the SLR River Watershed was 146,383 according to the 2000 census and is forecasted to increase to 219,252 by 2020 and 249,673 by 2030. This growth is expected to occur mostly within vacant land in the unincorporated areas of the watershed.

The SLR WURMP is a continuation of a long-term effort to protect and enhance the water quality of the rivers and creeks at the watershed level. It is the goal of all participating jurisdictions to work cooperatively with other agencies, non-governmental organizations, and private citizens at the watershed level in order to positively affect the water resources of the region and achieve compliance with the Municipal Permit. This program provides a mechanism for coordination of existing water quality-related efforts in the watershed. The Program, where possible, will integrate its efforts with other projects such as those of the SLR Watershed Council.

Copermittees have developed a Model Watershed Urban Runoff Management Strategy to guide the selection and implementation of Watershed Activities that appropriately addresses each watershed Copermittees' contribution to the high priority water quality problems in their WMA. Data analyzed to date for the SLR Watershed suggests that bacteria and nutrients are high priority water quality problems in the Lower San Luis HA. The water quality assessment is discussed in detail in Section 3.

To address water quality problems, this Plan identifies a series of watershed water quality and education activities in Section 4, in addition to other ongoing and planned activities. Having used the watershed strategy as the basis for developing the activities, the Copermittees have focused activity efforts on the potential sources that are most likely to be contributing the pollutants that are causing the high priority water quality problems in the SLR WMA. Where receiving water conditions and pollutants sources are not clearly characterized, monitoring and source identification activities will be implemented.

The Cities of Oceanside and Vista and the County of San Diego share the implementation responsibilities for the WURMP along with other interested stakeholders. Due to the commitments of these agencies, this watershed program is expected to extend beyond the Municipal permit expiration of January 24, 2012. Using the watershed approach, the SLR Watershed Copermittees aim to positively affect the water quality of the SLR River Watershed in a cost effective, environmentally sensitive, and collaborative manner.

1.0 INTRODUCTION

This Watershed Urban Runoff Management Program for the San Luis Rey Watershed (SLR WURMP) describes the activities that the Copermittees within the San Luis Rey River Hydrologic Unit 903 (SLR River Watershed) are implementing or will implement to ensure compliance with the Waste Discharge Requirements of the San Diego Region of the California Regional Water Quality Control Board (SDRWQCB) Order R9-2007-0001 (Municipal Permit). More importantly, this document describes collaborative plans and efforts to reduce the impacts of urban activity on the water quality of receiving waters within the SLR River Watershed to the maximum extent practicable.

1.1 Program Framework

Preparation of this SLR WURMP is based on input from the three responsible Watershed Copermittees, as identified in the Municipal Permit. These Copermittees are the cities of Oceanside and Vista and the County of San Diego, and are referred to as the Watershed Copermittees. The WURMP is based on guidance and model documents prepared by the various Copermittee working groups to ensure regional consistency, yet tailored to address the specific needs and concerns associated with the SLR River Watershed. This WURMP includes material that describes the SLR River Watershed Copermittees' intended approach to meeting their watershed-related Municipal Permit obligations as specified under Sections E and J of the Municipal Permit. The following briefly summarizes the contents of each section of the document:

1.0 – Introduction

Section 1.1 Program Framework – This section provides a brief introduction to the WURMP and its organization; regulatory background and regulatory requirements of the Municipal Permit; and the purpose, goals and objectives of the WURMP.

Section 1.2 Watershed Description & Map – This section provides a description of the SLR Watershed including the topographical and drainage features, jurisdictional areas, various waterbodies, and the existing and planned land uses within the watershed.

2.0 – Collective Watershed Strategy

As required by section J.1.b.(4)(g) of the Municipal Permit, this section describes the Copermittees' model watershed strategy used to guide the selection and implementation of effective watershed water quality activities and watershed education activities.

3.0 - Water Quality and Pollutant Source Assessment

Section 3.1 Water Quality Assessment Approach – This section includes an assessment of all existing water quality data collected for the watershed and identification and prioritization of specific constituents targeted for improvement.

Section 3.2 Receiving Waters Condition – This section describes the condition of receiving waters within the watershed, including 303(d) listings for water quality impairments.

Section 3.3 Water Quality Problem(s) – This section identifies the watershed's water quality problems and discusses the SLR Watershed Copermittees' prioritization in addressing these problems.

Section 3.4 Likely Pollutant Sources - This section identifies possible pollutant sources, pollutant discharges, and/or other factors causing the SLR Watershed's high priority water quality problems. The sources are identified based on regional monitoring data and information specific to the SLR Watershed, as well as the threat-to-water-quality ratings presented in the Copermittees' Baseline Long Term Effectiveness Assessment (BLTEA).

4.0 - Five-Year Strategic Plan

Section 4.1 Proposed Watershed Water Quality Activities – This section describes the watershed water quality activities proposed for implementation as part of the five-year strategic plan and includes a Proposed Watershed Activity Summary Sheet for each watershed water quality activity planned for implementation.

Section 4.2 Proposed Education Activities – This section provides details on the watershed education activities proposed for implementation as part of the five-year strategic plan and includes a *Proposed Watershed Activity Summary Sheet* for each watershed education activity planned for implementation.

Section 4.3 Proposed Public Participation Activities –This section describes the mechanisms used to encourage public participation in the development, implementation, and assessment of the WURMP.

Section 4.4 Proposed Land Use Planning Activities – This section describes the mechanisms used to encourage collaborative, watershed-based, land-use planning among jurisdictional planning departments.

5.0 – Program Effectiveness Assessment

This section summarizes the objectives of the SLR River WURMP and the activities to be conducted towards meeting these objectives. The section also defines how achievement of the WURMP goal and objectives will be measured over the life of the Municipal Permit.

6.0 – Program Review and Modification

This section describes the process for reviewing and modifying the SLR WURMP. Changes to the WURMP (i.e., modified priorities, implementation schedule changes, map updates) will be described and justified in WURMP Annual Reports. Each WURMP Annual Report will serve as an appendix to the WURMP itself.

7.0 – Conclusions and Recommendations

This section provides a summary and conclusions of the SLR WURMP.

It is the intent of the SLR River Watershed Copermittees that the SLR WURMP be a “living document” which is periodically updated as the program evolves and additional needs are identified. Updates are anticipated to occur for the following reasons:

- To ensure compliance with the Municipal Permit.
- To address specific and targeted water quality issues within the SLR River Watershed.
- To improve collaboration among the SLR River Watershed Copermittees with respect to land use planning issues.
- To facilitate public involvement and ensure a consistent educational message.
- To assist the Watershed Copermittees’ staffs in understanding and implementing the WURMP.

1.1.1 Regulatory Requirements

In January 2007, Municipal Separate Storm Sewer Systems Permit Order No. R9-2007-0001 was issued to the Copermittees as a renewal permit for Order 2001-01. The Municipal Permit was issued to the following jurisdictions:

City of Carlsbad	City of Imperial Beach	City of San Marcos
City of Chula Vista	City of La Mesa	City of Santee
City of Coronado	City of Lemon Grove	City of Solana Beach
City of Del Mar	City of National City	City of Vista
City of El Cajon	City of Oceanside	County of San Diego
City of Encinitas	City of Poway	SD Regional Airport Authority
City of Escondido	City of San Diego	SD Unified Port District

Under the Municipal Permit, each Copermittee is required to address the following principal elements:

- Establish, maintain and enforce adequate legal authority to control pollutant discharges into and from its municipal separate storm sewer systems.
- Develop and implement a Jurisdictional Urban Runoff Management Program, which will reduce discharges of pollutants and runoff flow during each major phase of urban development (i.e., planning, construction, and use or operation phases) within its jurisdiction.
- Collaborate with other San Diego Copermittees within its watershed(s) to develop and implement a Watershed Urban Runoff Management Program, which identifies and addresses the highest priority water quality issues/pollutants in their respective watershed(s).
- Collaborate with all other San Diego Copermittees to address common issues, promote consistency, and plan and coordinate urban runoff activities.
- Develop and implement a Receiving Waters Monitoring Program, which shall focus on the collection of monitoring data to be used for the achievement of water quality policies and the protection of beneficial uses.
- Submit various reports describing the measures it is undertaking to meet the requirements of the Municipal Permit.

Section E of the Municipal Permit defines the Copermittees within the nine regional watersheds, as well as a Lead Copermittee for each watershed. The following Copermittees are included in the SLR River Watershed:

- City of Oceanside
- City of Vista
- County of San Diego

This section of the Municipal Permit designates the City of Oceanside as the default Lead Copermittee for the SLR River Watershed, and the City of Oceanside has agreed to continue to fulfill this role. The Municipal Permit requires that the Lead Watershed Copermittee be responsible for producing and submitting the WURMP. They are also responsible for coordinating meetings among watershed Copermittees to facilitate the implementation of watershed activities. The City of Oceanside continues to coordinate meetings quarterly (minimum frequency), to discuss and implement the various watershed activities and coordinate required regulatory submittals.

In accordance with Section E of the Municipal Permit, the Copermittees listed for each watershed must participate in the development and implementation of a WURMP. The requirements for the WURMP are listed in the Municipal Permit and include the following:

- Mapping the watershed and identifying all receiving waters, all impaired receiving waters, land uses, highways, jurisdictional boundaries, and inventoried commercial, industrial, construction, municipal sites, and residential areas.
- Assessing the water quality of all receiving waters in the watershed based on existing data, and eventually performing watershed-based water quality monitoring activities.
- Identifying and prioritizing major water quality problems in the watershed caused or contributed to by discharges from MS4s, including potential sources of the problems.
- Developing and implementing a strategy of water quality and educational activities needed to address the highest priority water quality problems.
- Identifying which Copermittees are responsible for implementing each recommended watershed activity.
- Developing and implementing a mechanism for public participation in watershed activities.
- Developing and implementing watershed-based education activities.
- Developing a mechanism to facilitate collaborative watershed-based land use planning with other Copermittees in the watershed.
- Developing a long-term strategy for assessing the effectiveness of the WURMP.
- Submitting annual WURMP reports which shall document the Copermittees' activities during the preceding year. At a minimum, the annual report must include:
    - A comprehensive description of all watershed activities conducted by the Watershed Copermittees for permit compliance.
    - Public participation mechanisms utilized during implementation.
    - Watershed-based land use planning mechanism description.
    - Effectiveness assessment of the WURMP.
    - Summary of watershed-related data not already included in the annual monitoring report.
    - Identification of water quality improvements or degradation.

1.1.2 Purpose, Goals and Objectives

In broad terms, the overall purpose of the SLR River WURMP is to ensure compliance with the requirements of the Municipal Permit and, more importantly, to address water quality issues and any degradation occurring within the SLR River Watershed. Fundamental to both, establishing specific WURMP goals and measuring achievement, is the understanding that long-term solutions to water quality problems will be more effective if the issues are correctly and comprehensively identified and characterized. Based upon the proper identification and targeted characterization, true "watershed-approach" solutions can then be applied. Consistent with the intent of the Municipal Permit, use of a "watershed-approach" considers the complex dynamics of the entire watershed as opposed to focusing on activities within specific jurisdictions. This approach will be attempted and implemented where feasible given existing and potential new frameworks and structures. However, jurisdictional constraints and variations in codes, regulations, and practices (which are not related to water quality, but rather political autonomy) must also be recognized.

This section provides an overview of the goal and objectives of the SLR WURMP. Section 5.0 of this document directly relates to the goal and objectives of this WURMP, because it identifies mechanisms for assessing the effectiveness of attaining the goal and objectives and the time frames associated with the long-term strategy.

The goal of the SLR River WURMP is to:
Positively affect the water quality of the SLR River Watershed while balancing economic, social, and environmental constraints.

This goal will be pursued and ultimately achieved through the implementation of the following specific objectives:

Objective #1: Develop and implement a strategic plan to assess and improve water quality within the SLR River Watershed, which responds to identifiable problems and reflects the beneficial uses of the watershed.

This objective is based on the overall purpose of a Jurisdictional or Watershed URMP, which is to ultimately improve the water quality of the watershed. However, it recognizes that for effective improvement of water quality, activities must be based on documented problems. Furthermore, identification of problems should take into account the beneficial uses of the watershed and particular attention to unique beneficial uses of the watershed, such as the agricultural and municipal water supply uses of the SLR River Watershed groundwater.

Objective #2: Integrate watershed principles into land use planning that affects the SLR River Watershed.

Urban runoff does not follow jurisdictional boundaries, and urban runoff flowing to receiving waters often originates in or flows through multiple jurisdictions. However, cities and counties have traditionally exercised their land use authority independently, with limited consideration of the chemical, biological, and physical processes that govern the generation, transport, and fate of contaminants and stressors at the watershed scale.

Land use policies of individual municipalities have the potential to affect water quality in water bodies well beyond their individual jurisdictional boundaries. One of the overriding purposes of the SLR WURMP is to integrate watershed-based planning principles into decision-making that is often fragmented and jurisdictionally focused.

Objective #3: Enhance public understanding of watershed issues and pollution prevention within the SLR River Watershed.

Education is the foundation of an effective WURMP and the basis for changes in behavior at the individual and societal levels. Therefore, an effective public education program is a cornerstone in positively affecting the water quality of the watershed.

Objective #4: Encourage and enhance public involvement within the SLR River Watershed in activities related to urban runoff management.

The public is a resource that should be utilized to the greatest extent possible to effectively implement a resource plan such as the SLR WURMP. Public support is necessary because of the impact the policies and project will have on the public. Furthermore, the public and their activities are the largest non-point source affecting the water quality of the watershed. To effectively improve water quality of the watershed, changes must occur at the public level.

1.2 Watershed Description and Map

The SLR River Watershed is located along the northern border of the County of San Diego, California (Appendix A, Figure 1-1). The watershed is bordered to the north by the Santa Margarita River Watershed and to the south by the Carlsbad and San Dieguito River Watersheds. The SLR River originates in the Palomar and Hot Springs Mountains, both over 6,000 feet above mean sea level (MSL), as well as several other mountain ranges along the western border of the Anza Borrego Desert Park. The river extends over 55 miles across northern San Diego County forming a watershed with an area of approximately 360,000 acres or 562 square miles. The river ultimately discharges to the Pacific Ocean in the City of Oceanside. Of the nine watersheds in the San Diego region, the SLR River Watershed is the third largest (SANDAG 1998).

Local jurisdictions occurring within the watershed include the cities of Oceanside, Vista, and Escondido, and the counties of San Diego and Riverside (Appendix A, Figure 1-2). A number of other governmental agencies also administer lands within the unincorporated areas of San Diego County. Federal government jurisdiction applies to military lands (predominately the Camp Pendleton Marine Corps Base), Forest Service lands (Cleveland National Forest), and miscellaneous Bureau of Land Management holdings. In addition, the State of California manages lands within the watershed including state parks, state roadways, and some miscellaneous holdings. A general breakdown of jurisdictional areas within the watershed is shown in Table 1-1.

Table 1-1. Watershed Acreages by Jurisdiction.

Jurisdiction	Acres	Percentage of Watershed (%)
Escondido	52	0.0
Oceanside	15,883	4.4
Vista	743	0.2
Unincorporated San Diego County	342,566	95.2
Riverside County	649	0.2
Total	**359,893**	**100**

Source: SANDAG 1998. (Note: Of the sources reviewed, values for total size of the watershed and the breakdown of the watershed by jurisdictions were similar but often different. Therefore, the values provided in this table are for general purposes only and should be verified if used for other purposes.)

About half (49%) of the land in the watershed is privately owned. Publicly owned land accounts for approximately 37% of the area, and the remaining 14% consists of numerous reservations in the watershed. In the western half of the watershed, private ownership dominates. Moving east through the watershed, public lands increase and dominate in the Warner Valley HA. The Vista Irrigation District (VID) is the single largest landowner in the watershed.

The SLR River Watershed or SLR Hydrologic Unit (Unit 903.00) is comprised of three Hydrologic Areas (HAs), which have been delineated by the SDRWQCB based on drainage patterns: Lower San Luis (HA 903.1), Monserate (HA 903.2), and Warner Valley (HA 903.3) (Appendix A, Figure 1-2). These HAs are described further in subsequent sections.

1.2.1 SLR River Watershed Land Uses

There are numerous land uses within the SLR River Watershed which are summarized in Table 1-2 and illustrated in Figure 1-3 in Appendix A. The majority of the watershed has remained undeveloped. Residential and agriculture serve as the dominant land uses in the watershed. The agricultural uses include cattle grazing, nurseries, citrus groves and avocado groves.

1.2.2 Warner Valley HA

The Warner Valley HA is furthest inland and contains the headwaters for the SLR River (Appendix A, Figure 1-2). Its drainage area consists mainly of unimproved brush land with forests at elevations over approximately 4,000 feet. This HA encompasses approximately 206 square miles that drain to Lake Henshaw, which was formed by the Henshaw Dam built in 1923. The HA is defined to the north by Palomar Mountain (6,140 feet) and the Aguanga Mountains, with elevations up to 5,600 feet above MSL and to the west by the Henshaw Dam which lies at an elevation of approximately 2,700 feet above MSL. South of Lake Henshaw is the Santa Ysabel Indian Reservation and east of the lake are the communities of Warner Springs and Ranchita, and the Los Coyotes Indian Reservations.

Table 1-2. Existing Land Uses in the SLR River Watershed.

Land Uses	1998 Acres[1]	Percent of Total[2]	2006 Acres	Percent of Total	Change (percent)
Residential	25,270	7.0%	54,842	15.2%	117%
Commercial/Industrial	12,321	3.4%	13,739	3.8%	12%
Schools	451	0.1%	567	0.2%	26%
Recreation	2,154	0.6%	3,325	0.9%	54%
Freeways/Roads[3]	12,698	3.5%	7,225	2.0%	-43%
Parks/Open Space	23,011	6.5%	31,854	8.9%	38%
Agriculture	85,548	23%	52,092	14.5%	-39%
Vacant/Undeveloped	197,790	55.0%	195,593	54.3%	-1%
County of Riverside *(data not available)*	649	0.2%	649	0.2%	0%
Total	**359,893**	**99.7%**	**359,885**	**100.0%**	**0%**

Source: SANDAG 1998 (taken from original WURMP) and SANDAG 2006 (raw data provided by County of San Diego). (Note: Of the sources reviewed, values for total size of the watershed and the breakdown of the watershed by land uses were similar but often different. Therefore, the values provided in this table are for general purposes only and should be verified if used for other purposes.)

[1] Due to rounding, values do not equal total.

[2] Due to rounding, values do not equal 100%.

[3] This category shows a significant reduction in area between 1998 and 2006. This reduction is likely due to changes in the categorization of land use and not a true reduction. Since it is overall less than 4% of the watershed the inconsistency is not considered consequential for this WURMP characterization.

The majority of this HA is undeveloped. There are scattered residences within the HA, however, open space and rangeland are the predominant land uses. Above Henshaw Dam the population is centered around the community of Warner Springs, and agriculture lands, which produce tree fruit, grapes and other crops. Cattle graze near Lake Henshaw on the surrounding VID property. Also located in this area are rural recreational uses, such as hiking trails, campgrounds and a glider port.

1.2.3 Monserate HA

Monserate HA begins below the Henshaw Dam and covers an area of approximately 383 square miles (Appendix A, Figure 1-2). This HA includes the communities of Rincon, Pauma Valley, and Pala. In addition, portions of the Pala, Pauma, La Jolla, Rincon and Yuima Indian Reservations are located within this HA. The river is paralleled to the north by mountains that rise from 2,200 feet to 5,300 feet above MSL, and to the south by mountains reaching from 2,000 to 3,300 feet above MSL. The proposed Gregory Canyon Landfill is located in this HA. As with the Warner Valley HA, a large portion of the Monserate HA is undeveloped. Agriculture is the dominant land use in this HA with small residential communities scattered throughout. Significant development is proposed for the western portion of this HA.

The communities of Pala and Pauma are located to the west of Lake Henshaw and are the primary population centers in the Monserate HA. Portions of the Rincon and San Pasqual Reservations are found in this area and also include the Pala Band of Mission Indians Reservation and Casino. The Gregory Canyon Landfill is proposed to be located in this HA. The Wilderness Gardens Preserve and several campgrounds and parks are also found in this area. The remainder of the area is primarily undeveloped with the exception of agricultural uses, which

occur adjacent to the SLR River and on the northeast and southwest facing hillsides near Pauma Valley.

The major industrial uses in this area involve extraction operations that consist of sand and gravel mining. At one time there were at least ten mining operations occurring in the watershed. Extraction mining has been a source of major disagreements in the watershed due to its impacts on watershed resources. Currently there are no active in-stream mining operations with two operations recently closing that were managed by Hanson Aggregates and Vulcan Materials. The Rosemary Mountain Quarry has received a land-use permit, issued by the County of San Diego in 2002, to mine “aggregate” which is a mix of sand and crushed rock that are key ingredients in asphalt and concrete. The total size of the project is 94 acres, but only 38 acres will be used for mining purposes.

1.2.4 Lower San Luis HA

The Lower SLR HA is the furthest downstream of the HAs, as well as the largest and most populated (Appendix A, Figure 1-2). The easternmost portion of this HA encompasses the community of Valley Center, which is located to the south of the Pala and Pauma Valley communities. West of Valley Center, the HA includes the communities of Hidden Valley, Bonsall, and Fallbrook, and further west the HA includes the City of Oceanside and the southern portion of Camp Pendleton. The SLR River flows through the northern portion of the City of Oceanside and discharges to the Pacific Ocean south of the Oceanside Harbor.

To the south of Pala and Pauma is the rapidly growing community of Valley Center, which is located in the Lower San Luis HA and drains to the west. Valley Center is a residential community dominated by large lot, low-density development with a minimum of two acres per dwelling unit. Limited commercial uses are located throughout the residential areas.

Agricultural uses still account for the majority of the developed land in this area and generally consist of perennial trees and ornamental crops. This community also contains several public and private parks, and recreational areas.

Further west in the watershed, residential uses increase with the communities of Fallbrook, Rainbow and Bonsall, and a small portion of the City of Vista. In general, agriculturally developed land is interspersed with residential development in this area. Residential development is generally at a density of less than one dwelling unit per acre.

Commercial developments are limited and occur in small quantities in Bonsall and Fallbrook and in the City of Vista. No major industrial centers have been developed in this area. The Fallbrook Community Airpark, numerous parks and recreation facilities are located in Fallbrook. The SLR River Park is proposed to be located in the eastern portion of the HA and will include passive and active recreational opportunities.

The westernmost portion of the watershed contains a portion of Camp Pendleton and the City of Oceanside. The portion of Camp Pendleton in the watershed is primarily undeveloped with the exception of two military residential areas and a golf course. The City of Oceanside, which is predominantly developed, is located south of Camp Pendleton. The primary agricultural area in

Oceanside (approximately 7,000 acres) borders the southeast side of Camp Pendleton. Commercial development is mostly located close to the coast, with additional commercial areas along Mission Avenue and State Route 76 (SR-76) near College Boulevard. Within the City of Oceanside, the SLR River has been channelized by levees for the purposes of flood control. The surrounding floodplain has been developed with numerous industrial uses including auto recycling, concrete batch plants and the Oceanside Municipal Airport.

1.2.5 Population and Growth

Although the SLR River Watershed is the third largest of the San Diego region watersheds, its population is one of the smallest. The population of the SLR River Watershed was 146,383 according to the 2000 census and is forecasted to increase to 219,252 by 2020 and 249,673 by 2030. This growth is expected to occur mostly within vacant land in the unincorporated areas of the watershed. Within the unincorporated areas of the watershed, the communities of Fallbrook, Bonsall, Valley Center, and Rainbow are anticipated to produce the greatest population increases (SLR Watershed Council 2002).

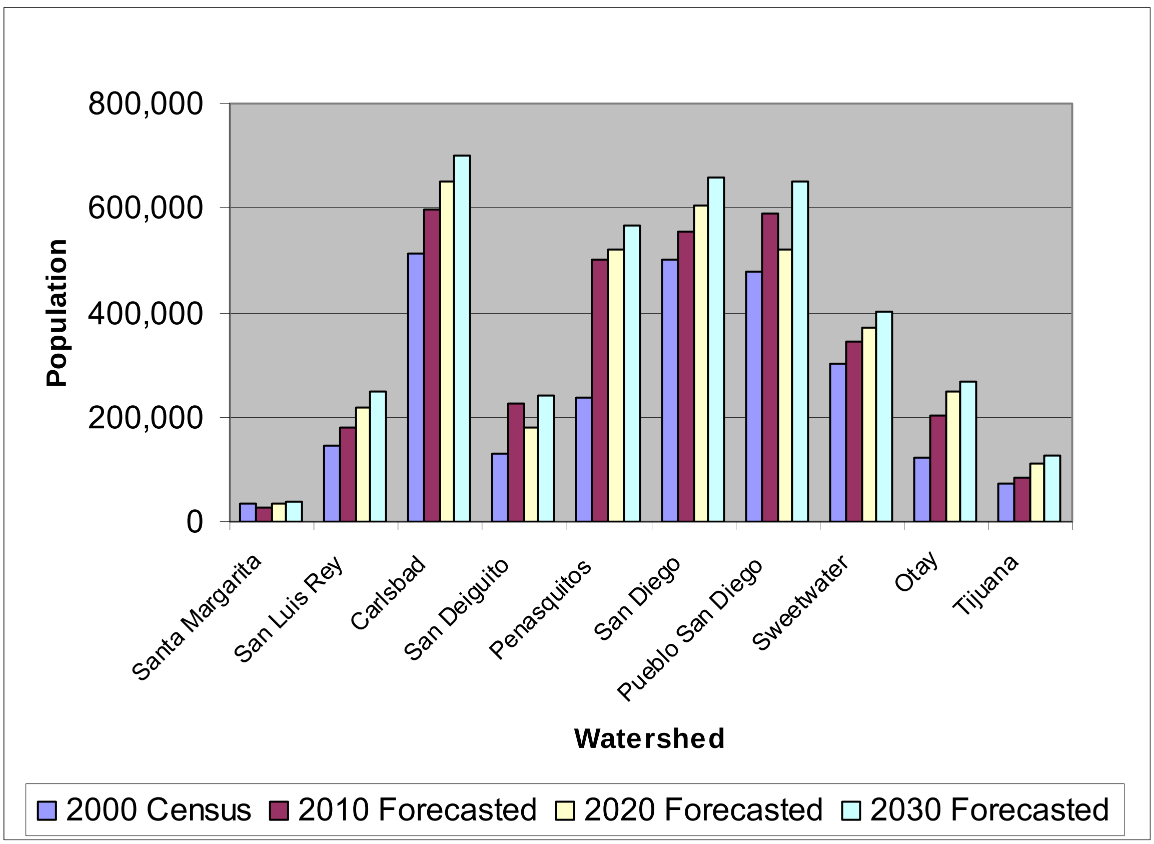


Figure 1-4. Population Increases in San Diego Watersheds.

1.2.6 Hydrology

Hydrology in the upper portion of the watershed is controlled by the Henshaw Dam and the Escondido Canal. Henshaw Dam forms Lake Henshaw, a reservoir with 55,000 acre-feet of storage capacity that is owned by the VID. VID provides water to much of northern San Diego County including the city of Vista, and portions of San Marcos, Escondido, Oceanside and unincorporated areas of the county. In order to transport water the to the City of Escondido, water from Lake Henshaw is released down the main channel of the SLR River and diverted into the man-made Escondido Canal. This diversion is just east of the La Jolla Indian Reservation, approximately seven miles downstream of Henshaw Dam. The Escondido Canal was constructed in 1895 for the purposes of supplying water to what is known today as the City of Escondido. The canal diverts up to 55 cubic feet per second (cfs) of water out of the SLR River and conveys it to Lake Wohlford, which is an intermediate storage and distribution reservoir located in the Escondido Creek drainage basin of the Carlsbad Watershed. Practically all of the flows are diverted from the river into the canal, typically leaving the river dry below the diversion. In addition, because the releases from the dam are driven by water demand, it is not uncommon for there to be extended periods when there is no water being released from the dam.

Furthermore, annual maintenance is performed on the Escondido Canal for a six- to eight-week period from October to December. No releases of water occur during this maintenance period. During these periods when water is not being released, it is not uncommon for the entire Monserate HA portion of the river to be dry down to the Monserate Narrows.

When water is being released from the dam, the river typically regains surface flows from the surrounding tributaries and surfacing groundwater in the area where Couser Canyon Creek combines with the SLR River. The remainder of the SLR River is intermittent through the Pauma and Pala areas and is a perennial river through Oceanside. Surface flows during dry weather are directly related to groundwater levels and this relationship is described further in Section 1.2.7.

Flood flow in the SLR River is limited to short durations. Flood discharges in the river are recorded throughout the basin at 32 United States Geological Survey (USGS) stream-gauging stations. The largest recorded flood occurred in January 1916 with a maximum discharge of 95,600 cfs recorded at Oceanside. Since the completion of Henshaw Dam, the largest flood event (estimated to be a 40-year flood) occurred in February 1980 with an estimated peak discharge of 25,000 cfs at Oceanside and 15,000 cfs at the Monserate Narrows.

1.2.7 Groundwater

Several shallow alluvial groundwater aquifers have been identified in the SLR River Watershed and groundwater is used throughout the watershed for agricultural, industrial, and municipal supplies. The aquifers consist of the Warner, Pauma, Pala, Bonsall, Moosa Canyon, and Mission Basins (Appendix A, Figure 1-5).

In general, surface water and groundwater exist within different physical and chemical systems. Due to these differences (e.g. evaporation rates, absorption, dispersion, diffusion, attenuation, flow velocities, temperatures, biological activity), the water quality in each system can be quite different. However, in the case of the SLR River Watershed, surface water and groundwater

have become an integrated system. Since groundwater provides base flow to the river for most of the year, groundwater quality will have an effect on surface water quality. In addition, because surface waters recharge the shallow alluvial groundwater basins, surface water quality affects groundwater quality.

The relationship between the surface water and the shallow, alluvial aquifer in the SLR River basin has evolved over time. Prior to the 1960s, the SLR River was considered ephemeral and only flowed on rare occasions when there was above normal precipitation. Also during this time, groundwater withdrawals from the SLR River basin generally exceeded recharge to the basin, which resulted in a lowering of groundwater levels. By 1956, groundwater levels in the Mission Basin had declined to approximately 43 feet below sea level, which allowed a trough of seawater to extend for a distance of two to six miles inland from the coast.

After the completion of the first San Diego Aqueduct in 1947, imported Colorado River water became available for use in the region. Since that time, the volume in the SLR River has increased significantly, and by the late 1960s, it was considered a perennial river in the vicinity of the City of Oceanside. For example, mean annual flow of the river at Oceanside from 1947 to 1967 was 0.6 cfs and from 1967 to 1990 the mean annual flow had increased to 84.0 cfs.

As the demand and availability of water for applied uses increased, so did the volume of imported water. Conversely, the volume of groundwater being pumped decreased, which had two general consequences. By 1970, the decrease in pumping coupled with percolation of storm water and irrigation flows allowed groundwater levels in the Mission Basin and elsewhere to recover to historical levels. This reestablished the natural seaward gradient of the aquifer and gradually diminished the effects of seawater intrusion. However, the salinity of the water in the aquifer continued to increase because of the salt load entering the groundwater from storm water and irrigation flows. As groundwater quality declined, so did the use of groundwater and the level of the water table continued to rise. As the depth of the groundwater has risen, perennial waters in the river have moved upstream (RECON 1996).

1.2.8 Geology and Soils

The soils within the SLR River Watershed range from excessively drained gravelly sands to well drained clays, and include areas of rough broken land, terrace escarpments, and steep gullied land. However, many of the soil series have characteristics that can have a significant effect on water quality related issues. There are many properties and qualities that affect soil erodibility. Factors include slope, surface layer texture, restricted permeability, and the grade of structure in the surface layer. Since severely erodible soils comprise 95% of the watershed, caution must be used when developing land use plans and implementing grading ordinances. Probable development areas, built on highly erodible soil, pose a potential threat to the water quality and sediment management of the watershed.

Other important soil characteristics include infiltration rate (the rate at which soil absorbs precipitation), and shrink-swell factor (the amount of water a soil can hold and how quickly water can be released). Both of these characteristics affect how quickly precipitation is transformed into surface runoff and how long subsurface flows will continue into the dry season. Soils that have a slow infiltration rate and a high shrink-swell factor are likely to generate surface

runoff sooner, but also continue to discharge subsurface flows longer than a soil with a fast infiltration rate and a low shrink-swell factor.

The predominant material on hillsides adjacent to the SLR River is decomposed granite. The bed material in the river below Lake Henshaw is a mixture of sand and gravel, with an insignificant amount of silt or other finer materials. The size of bed material decreases along the river channel but becomes fairly uniform from Pala to the ocean. The dominant material below Pala is median sand, which is highly transportable during floods (LMA 1995).

1.2.9 Biology

Historically, the SLR River Watershed was comprised of corridors of riparian forest, woodlands and scrub along the primary drainages, with grasslands along the valley bottoms and gently sloping hills transitioning into coastal sage and chaparral scrubs in the upland areas and groves of oak woodlands. Currently, there are 36 vegetation communities within the SLR River Watershed, with the coastal sage scrub, chaparral, and grassland communities being the most abundant. Wildlife habitats within the SLR River Watershed consist of six major types: shrublands, grasslands, woodlands/forest, rock outcrops/cliffs, wetlands, and open water (lacustrine). Three physiographically defined freshwater fish communities exist within the SLR River Watershed: upland (high gradient), lowland (low gradient), and coastal lagoons.

Numerous protected and otherwise designated sensitive species and vegetation communities occur throughout the watershed. The County of San Diego completed the development of the Multiple Species Conservation Program (MSCP) in 1997. The overall effect of the MSCP is that it provides for large, connected preserve areas that address a number of species at the habitat level rather than species by species, and area-by-area. This creates a more efficient and effective preserve system as well as better protection for the rare, threatened and endangered species in the region. The MSCP was the result of six years of planning and review by a diverse group including private conservationists, developers, and a number of public agencies, including the Wildlife agencies. The San Diego County Board of Supervisors approved the MSCP on October 22, 1997. The County of San Diego entered into an Implementing Agreement with the Wildlife Agencies for the MSCP on March 17, 1998. The County is currently working on a plan for the northern part of the unincorporated area (North County Subarea Plan) that extends from the area around the incorporated cities of Oceanside, Encinitas, San Marcos, Vista, and Escondido east to the Cleveland National Forest and north to the County line (County of San Diego 2008).

The Multiple Habitat Conservation Program (MHCP) is a comprehensive conservation planning process that addresses the needs of multiple plant and animal species in North Western San Diego County. The MHCP encompasses the cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista. Its goal is to conserve approximately 19,000 acres of habitat, of which roughly 8,800 acres (46 percent) are already in public ownership and contribute toward the habitat preserve system for the protection of more than 80 rare, threatened, or endangered species (SANDAG 2008).

The MHCP Subregional Plan and Final Environmental Impact Statement / Environmental Impact Report (EIS/EIR) were adopted and certified by the SANDAG Board of Directors on March 28, 2003. Subarea plans for the cities of Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, and Vista are being prepared and must be adopted by each City Council and implementing agreements with the California Department of Fish and Game and U.S. Fish and Wildlife Service must be signed before incidental take permits can be issued.

Other agencies with jurisdiction over resources within the watershed include the United States Army Corps of Engineers (USACOE), the SDRWQCB, and the California Coastal Commission (CCC). Wetland issues fall under the jurisdiction the USACOE for placement of dredged or fill material within waters of the U.S. pursuant to the Clean Water Act (CWA), Section 404, the RWQCB for any action that may result in degradation of waters of the State pursuant to the CWA Section 401, and CDFG for alteration of a streambed pursuant to the California Fish and Game Code, Section 1603. The CCC regulates land and water uses located within the coastal zone consistent with the policies of the California Coastal Act (CCA).

1.2.10 Climate

The climate variations within the SLR Watershed are primarily the result of the degree of coastal influence and elevation. The average minimum temperatures within the watershed range from approximately 39° Fahrenheit (F) to 47°F in the winter, and from 51°F to 63°F during the summer months. The average maximum temperatures within the watershed range from approximately 65°F to 69°F in the winter and from 70°F to 91°F during the summer months. Precipitation records are available from 88 precipitation stations in and near the watershed. For the most part, precipitation rates decrease significantly from east to west. The annual average precipitation ranges from approximately 10 inches within the coastal areas to 45 inches within the more mountainous inland areas. Most of the precipitation falls as rain during the months from November to February with snow common only in the higher mountains.

1.2.11 Receiving Waters

The SLR River Watershed includes numerous receiving waters extending from Lake Henshaw and its tributaries to the Pacific Ocean. In the Water Quality Control Plan for the San Diego Basin, referred to as the Basin Plan, the SDRWQCB has provided a comprehensive list of the receiving waters in the watershed and the beneficial uses of those waters (SDRWQCB 1994). Table 1-3 provides the definitions of the applicable beneficial uses used by the SDRWQCB and Table 1-4 replicates the list of receiving waters in the Basin Plan with their designated beneficial uses. The remainder of this section provides a brief overview of some of the major receiving waters in the watershed.

Table 1-3. Beneficial Use Definitions.

Designation	Abbrev.	Definition
Municipal and Domestic Supply	MUN	Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Agricultural Supply	AGR	Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
Industrial Service Supply	IND	Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
Industrial Process Supply	PROC	Includes uses of water for industrial activities that depend primarily on water quality.
Freshwater Replenishment	FRSH	Includes uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).
Hydropower Generation	POW	Includes uses of water for hydropower generation.
Contact Water Recreation	REC-1	Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.
Non-contact Water Recreation	REC-2	Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Preservation of Biological Habitats of Special Significance	BIOL	Includes uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.
Warm Freshwater Habitat	WARM	Includes uses of water that supports warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
Cold Freshwater Habitat	COLD	Includes uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
Wildlife Habitat	WILD	Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, or wildlife water and food sources.
Rare, Threatened, or Endangered Species	RARE	Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.
Marine Habitat	MAR	Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).
Migration of Aquatic Organisms	MIGR	Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish.

Source: SDRWQCB 1994

Table 1-4. SLR River Watershed Receiving Waters.

Inland Surface Waters	Hydrologic Unit Basin Number	Beneficial Use														
		MUN	AGR	IND	PROC	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	MAR	MIGR
San Luis Rey River	3.32	●	●	●		●	●	●	●		●		●			
Johnson Canyon	3.32	●	●	●		●	●	●	●		●		●			
San Luis Rey River	3.31	●	●	●		●	●	●	●		●		●			
Canada Aguanga	3.31	●	●	●		●	●	●	●		●		●			
Dark Canyon	3.31	●	●	●		●	●	●	●		●		●			
Bear Canyon	3.31	●	●	●		●	●	●	●		●		●			
Cow Canyon	3.31	●	●	●		●	●	●	●		●		●			
Blue Canyon	3.31	●	●	●		●	●	●	●		●		●			
Rock Canyon	3.31	●	●	●		●	●	●	●		●		●			
Agua Caliente Creek	3.31	●	●	●		●	●	●	●		●		●			
Canada Agua Caliente	3.31	●	●	●		●	●	●	●		●		●			
Canada Verde	3.31	●	●	●		●	●	●	●		●		●			
Ward Canyon	3.31	●	●	●		●	●	●	●		●		●			
Lake Henshaw	3.31	●	●	●	●	●	●	●1	●		●		●	●		
West Fork San Luis Rey River	3.31	●	●	●		●	●	●	●		●		●			
Fry Creek	3.31	●	●	●		●	●	●	●		●		●			
Iron Springs Creek	3.31	●	●	●		●	●	●	●		●		●			
Buena Vista Creek	3.31	●	●	●		●	●	●	●		●		●			
Cherry Canyon	3.31	●	●	●		●	●	●	●		●		●			
Bertha Canyon	3.31	●	●	●		●	●	●	●		●		●			
Hoover Canyon	3.31	●	●	●		●	●	●	●		●		●			
Buck Canyon	3.31	●	●	●		●	●	●	●		●		●			
Bergstrom Canyon	3.31	●	●	●		●	●	●	●		●		●			
San Ysidro Creek	3.31	●	●	●		●	●	●	●		●		●			
Matagual Creek	3.31	●	●	●		●	●	●	●		●		●			
Carrizo Creek	3.31	●	●	●		●	●	●	●		●		●			
Carrista Creek	3.31	●	●	●		●	●	●	●		●		●			

Inland Surface Waters	Hydrologic Unit Basin Number	Beneficial Use														
		MUN	AGR	IND	PROC	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	MAR	MIGR
Kumpohui Creek	3.31	●	●	●		●	●	●	●		●		●			
San Luis Rey River	3.31	●	●	●		●	●	●	●		●		●			
San Luis Rey River	3.23	●	●	●			●	●	●		●	●	●			
Wigham Creek	3.23	●	●	●			●	●	●		●	●	●			
Prisoner Creek	3.23	●	●	●			●	●	●		●	●	●			
Lusardi Canyon	3.23	●	●	●			●	●	●		●	●	●			
Cedar Creek	3.23	●	●	●			●	●	●		●	●	●			
San Luis Rey River	3.22	●	●	●			●	●	●		●	●	●			
Bee Canyon	3.22	●	●	●			●	●	●		●	●	●			
Paradise Creek	3.22	●	●	●			●	●	●		●	●	●			
Hell Creek	3.22	●	●	●			●	●	●		●	●	●			
Horsethief Canyon	3.22	●	●	●			●	●	●		●	●	●			
Potrero Creek	3.22	●	●	●			●	●	●		●	●	●			
Plaisted Creek	3.22	●	●	●			●	●	●		●	●	●			
Yuima Creek	3.22	●	●	●			●	●	●		●	●	●			
Sycamore Canyon	3.22	●	●	●			●	●	●		●	●	●			
Pauma Creek	3.22	●	●	●			●	●	●		●	●	●			
Doane Creek	3.22	●	●	●			●	●	●		●	●	●			
Chimney Creek	3.22	●	●	●			●	●	●		●	●	●			
French Creek	3.22	●	●	●			●	●	●		●	●	●			
Lion Creek	3.22	●	●	●			●	●	●		●	●	●			
Harrison Canyon	3.22	●	●	●			●	●	●		●	●	●			
Jaybird Creek	3.22	●	●	●			●	●	●		●	●	●			
Frey Creek	3.22	●	●	●			●	●	●		●	●	●			
Agua Tibia Creek	3.22	●	●	●			●	●	●		●	●	●			
San Luis Rey River	3.21	●	●	●				●	●		●	●	●			
Marion Canyon	3.21	●	●	●				●	●		●	●	●			
Magee Creek	3.21	●	●	●				●	●		●	●	●			

Inland Surface Waters	Hydrologic Unit Basin Number	Beneficial Use														
		MUN	AGR	IND	PROC	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	MAR	MIGR
Castro Canyon	3.21	●	●	●				●	●		●	●	●			
Trujillo Creek	3.21	●	●	●				●	●		●	●	●			
Pala Creek	3.21	●	●	●				●	●		●	●	●			
Gomez Creek	3.21	●	●	●				●	●		●	●	●			
Couser Canyon	3.21	●	●	●				●	●		●	●	●			
Double Canyon	3.21	●	●	●				●	●		●	●	●			
Rice Canyon	3.21	●	●	●				●	●		●	●	●			
San Luis Rey River	3.12	+	●	●				●	●		●		●	●		
Keys Creek	3.12	+	●	●				●	●		●		●			
Moosa Canyon	3.15	+	●	●				●	●		●		●			
unnamed intermittent streams	3.16	+	●	●				●	●		●		●			
Moosa Canyon	3.14	+	●	●				●	●		●		●			
Moosa Canyon	3.13	+	●	●				●	●		●		●			
Turner Lake	3.13	●	●	●				○	●		●					
South Fork Moosa Canyon	3.13	+	●	●				●	●		●		●			
Moosa Canyon	3.12	+	●	●				●	●		●		●			
Gopher Canyon	3.12	+	●	●				●	●		●		●			
South Fork Gopher Canyon	3.12	+	●	●				●	●		●		●			
San Luis Rey River	3.11	+	●	●				●	●		●		●	●		
Pilgrim Creek	3.11	+	●	●				●	●		●		●	●		
Windmill Canyon	3.11	+	●	●				●	●		●		●			
Tuley Canyon	3.11	+	●	●				●	●		●		●			
Lawrence Canyon	3.11	+	●	●				●	●		●		●			
Mouth of San Luis Rey River	3.11							●	●				●	●	●	●

Source: SDRWQCB 1994.

[1] Fishing from shore or boat permitted, but other water contact recreational (REC-1) uses are prohibited.

● Existing Beneficial Use ○ Potential Beneficial Use + Excepted From MUN

In the upper watershed, Lake Henshaw is the primary receiving water. The lake is a water supply for VID and the lake is also used for boating and fishing. There are numerous tributaries to the lake with three major ones: Aqua Caliente Creek, Buena Vista Creek, and the West Fork SLR River.

Aqua Caliente Creek is located to the northeast of Lake Henshaw. The Aqua Caliente Creek drains the northern portion of the Los Coyote Indian Reservation, north of Warner Springs, west to SLR River and ultimately into Lake Henshaw. The surrounding land uses of this tributary include municipal land, undeveloped land, residential developments and parkland.

Buena Vista Creek (which is also the name of a creek in the Carlsbad Watershed) is located southeast of the lake and drains the southern portion of the Los Coyote Indian Reservation and the northern side of Pinyo Ridge, southeast of Warner Springs, west to Lake Henshaw. The surrounding land uses includes municipal land, undeveloped land, residential developments, and park and recreational uses.

The West Fork SLR River is located northwest of Lake Henshaw in the northern portion of the SLR Watershed. The West Fork SLR River drains the eastern side of Palomar Mountain and the Cleveland National Forest southeast to Lake Henshaw. The land uses surrounding this tributary include undeveloped land, park and recreational land and agriculture.

Other than the section of the river between Henshaw Dam and the Escondido Canal diversion, surface water in the river below Lake Henshaw is minimal. Use of the river is limited and the primary beneficial uses are wildlife related. Riparian habitats in these areas are home to numerous protected species, and maintenance of groundwater and adequate flow in the river is important for the protection of species.

Several major tributaries occur along the river from Lake Henshaw to the Pacific Ocean:

- Paradise Creek is located between the Rincon and La Jolla Indian Reservations in the southern portion of the SLR Watershed. Paradise Creek drains the west side of Rincon Indian Reservation, the north side of San Pasqual Indian Reservation and the east side of La Jolla Indian Reservation northwest to the SLR River. The surrounding land uses include undeveloped land, park and recreational land, municipal land, agriculture, and residential development.
- Pauma Creek is located north of the Pauma Indian Reservation in the northern portion of the SLR Watershed. Pauma Creek drains the west side of Palomar Mountain and the Cleveland National Forest southwest to the SLR River. The surrounding land uses include undeveloped land, park and recreational land, municipal land, agriculture and residential development.
- Pala Creek is located north of the Pala Indian Reservation and west of the Cleveland National Forest in the northern portion of the SLR Watershed. Pala Creek drains the west side of the Cleveland National Forest and the east side of Mount Olympus southwest to the SLR River. The surrounding land uses include undeveloped land, park and recreational land, agriculture, industrial and residential development.
- Couser Canyon Creek is located east of Interstate 15 (I-15) west of Pala Indian Reservation in the middle portion of the SLR Watershed. Couser Canyon Creek drains

the west side of the Pala Mountains and the east side of Lancaster Mountain area northwest to the SLR River. The surrounding land uses include undeveloped land, agriculture and residential development.

- Keys Canyon Creek is located west of Couser Canyon Creek and east of I-15 in the middle portion of the watershed south of SLR River. Keys Canyon Creek drains the west side of Lancaster Mountain northwest to the SLR River. The surrounding land uses include undeveloped land, agriculture and residential development.
- Rice Canyon Creek is located east of the Monserate Mountains west of Mount Olympus in the middle of the watershed, north of the SLR River. Rice Canyon Creek drains the Rainbow area south to the SLR River. The surrounding land uses include undeveloped land, agriculture, municipal land, and industrial and residential development.
- Moosa Canyon Creek is located east of I-15 northwest of Valley Center in the middle portion of the watershed south of SLR River. Moosa Canyon Creek drains the Valley Center area northwest to the SLR River. The surrounding land uses include undeveloped land, agriculture, municipal land, and residential development.
- Pilgrim Creek is located between Interstate 5 (I-5) and I-15 in the northwestern portion of the SLR Watershed. Pilgrim Creek drains the Fallbrook area southwest to the SLR River. The surrounding land uses include undeveloped land, agriculture, military land and residential development.
- Windmill Canyon Creek is located east of Pilgrim Creek and north of Windmill Lake in the northwestern portion of the SLR Watershed. Windmill Canyon Creek drains Camp Pendleton area southwest to Pilgrim Creek and ultimately into the SLR River. The surrounding land uses include undeveloped land, agriculture, military land and residential development.

In the lower watershed, the river is primarily channelized, a project sponsored by the USACOE. The channel, considered to be a grouted rip-rap flood control channel, has concrete covered boulder sides and a natural bed, allowing for some of the natural flow of the river through this area. Like the rest of the river, this lower section has limited surface flows and uses.

The SLR River eventually empties into the Pacific Ocean south of Oceanside Harbor. Prior to it’s confluence with the beach and ocean, the river has historically been routed under Pacific Street through an Arizona crossing. In the fall of 2008, the new Pacific Street Bridge will be completed and the old Arizona crossing removed to allow more natural flow at the mouth of the river. The beneficial uses of the coastal waters are predominantly recreational and include swimming, surfing, boating, fishing and other water sports.

1.2.12 Watershed Mapping Requirements

Section J.2.a of the Municipal Permit requires that the WURMP provide an accurate map of the watershed that identifies the following: All receiving waters (including the Pacific Ocean); Clean Water Act Section 303(d) impaired receiving waters (including the Pacific Ocean); land uses; MS4s; major highways; jurisdictional boundaries; and inventoried commercial, construction, industrial, municipal sites and residential areas. See Appendix A for Figure 1-3 SLR River Watershed Land Use Map and Figure 1-6 for the Municipal Separate Storm Sewer System (MS4) Map. Land use and facility source data have been examined and mapped for the entire watershed. See Section 3.4 for detailed information and map references.

2.0 WATERSHED STRATEGY

The Municipal Stormwater Permit requires the development of a collective watershed strategy to abate the sources and reduce the discharge of pollutants causing the WMA's high priority water quality problems. In response to this requirement, the Copermittees created a Model Watershed Urban Runoff Management Strategy (Model Strategy) to guide the selection and implementation of activities at the watershed scale. The Model Strategy provides a set of standard definitions for the types of watershed activities that are included in the WURMPs. As shown in Table 2-1, a distinction is made between watershed activities that receive WURMP compliance credit under the Permit and those that provide value to the watershed, but do not receive compliance credit. Each activity type is defined in Section 4.

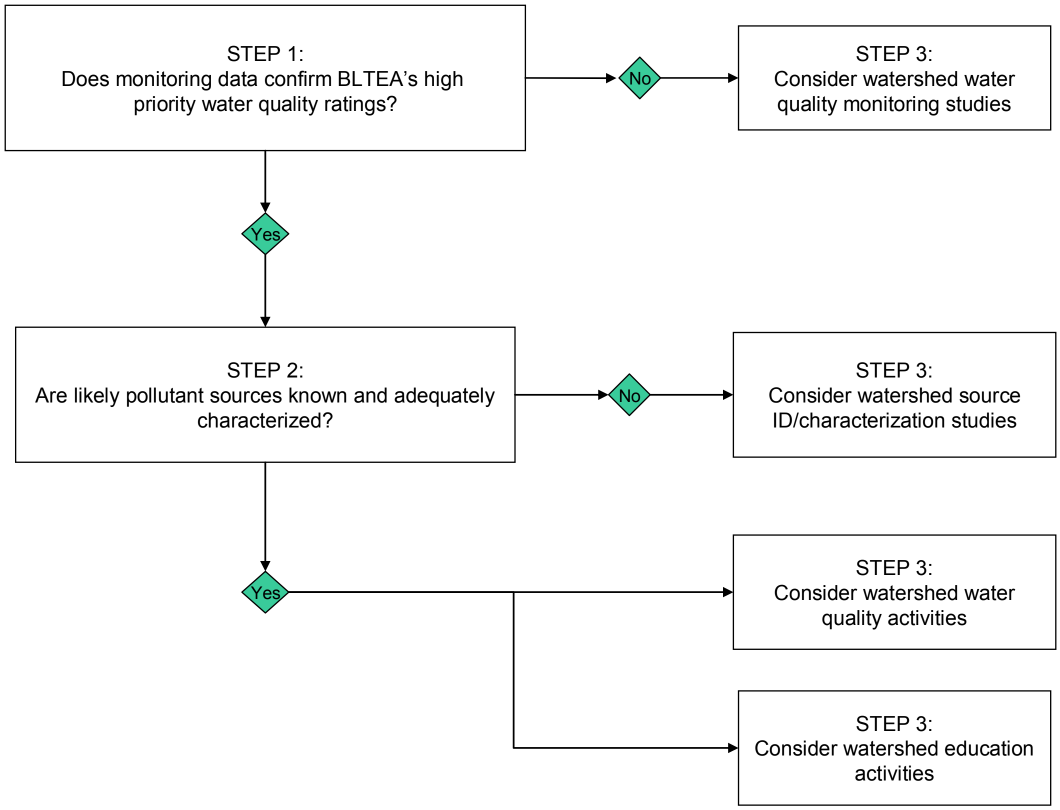
Table 2-1. Watershed Activity Types

Watershed Activity Types That Receive WURMP Compliance Credit	Watershed Activity Types That Do Not Receive WURMP Compliance Credit
Watershed Water Quality Activities	Watershed Water Quality Monitoring Activities
Watershed Education Activities	Watershed Source ID/Characterization Activities
Watershed Public Participation Activities	Watershed Data Management/Assessment Activities
Watershed-Based Land Use Planning Activities	Other Watershed Activities

The Model Strategy also outlines a process for selecting appropriate activities for implementation at the watershed scale. A three-step baseline evaluation of the watershed at the HA scale is recommended prior to proceeding with watershed activity selection. The baseline watershed evaluation (illustrated by the flow chart in Figure 2-1) focuses on assessing what is known about water quality and pollutant source data, then selecting appropriate watershed activities accordingly. It also addresses the effect of data gaps on the watershed activity selection process and takes into consideration the appropriate scale at which management actions should be implemented. The watershed water quality ratings presented in the Copermittees' Baseline Long-Term Effectiveness Assessment (BLTEA) are used as a starting point for performing the baseline watershed evaluation. The BLTEA water quality ratings are useful in that they represent the Copermittees' first attempt to identify pollutant-specific water quality priorities at the HA scale. The Copermittees believe that the HA is a more appropriate geographic scale for identifying watershed water quality problems and for planning watershed management actions, primarily because they are smaller and more manageable in size than WMAs. The Model Strategy also acknowledges that there are other important considerations that factor into the watershed activity selection process, not the least of which are total maximum daily loads (TMDLs) and other regulatory drivers.

The remainder of the Model Strategy consists of a series of templates and tools intended to assist watershed groups in selecting appropriate activities to abate the sources and reduce the discharge of pollutants causing the WMA's high priority water quality problems. The Model Strategy is included as an attachment to the Regional Urban Runoff Management Plan (RURMP). Results from applying the Model Strategy to the SLR WMA are discussed in Section 4.

Figure 2-1. Baseline Watershed Evaluation Flow Chart



3.0 WATER QUALITY AND POLLUTANT SOURCE ASSESSMENT

3.1 Water Quality Assessment Approach

The Municipal Storm Water Permit requires annual assessments of receiving water quality by watershed and outlines specific elements and analyses to be included.[1] The water quality assessment approach outlined below is subject to change based on the outcome of ongoing efforts to improve the content, structure, and presentation of the Copermittees' regional monitoring reports.

3.1.1 Data Sets

As shown in Table 3-1, watershed water quality assessments will rely on applicable water quality data, reports, and analysis generated from the Copermittees' Receiving Waters Monitoring Program as well as applicable information available from other public and private organizations. Data sets that are applicable to the SLR River Watershed are described in further detail in Section 3.2.

Table 3-1. Data Sets To Be Considered in Watershed Water Quality Assessment.

DATA SET	REFERENCE
RECEIVING WATERS MONITORING PROGRAM	
- Mass Loading Station (MLS) Monitoring	3.2.1
- Temporary Watershed Assessment Station Monitoring	3.2.8
- Bioassessment Monitoring	3.2.2
- Ambient Bay and Lagoon Monitoring (ABLM)	3.2.3
- Coastal Storm Drain Monitoring	3.2.4
- Pyrethroids Monitoring	3.2.1
URBAN RUNOFF MONITORING PROGRAM	
- MS4 Outfall Monitoring	3.2.8
- Source Identification Monitoring	3.2.8
- Dry Weather Field Screening and Analytical Monitoring	3.2.5
REGIONAL MONITORING PROGRAM	
- Bight '08	3.2.8
SPECIAL STUDIES	3.2.7
THIRD-PARTY DATA	3.2.6

[1] Permit Section E.2.c. and Section III.A.2 of the Permit's *Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2007-0001*

[1] Permit Section E.2.c. and Section III.A.2 of the Permit's *Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2007-0001*

3.1.2 Core Management Questions

Watershed water quality assessments will attempt to answer each of the following core management questions specific to conditions in the SLR River Watershed:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to receiving water problems?
- What are the sources of urban runoff that contribute to the receiving water problems?
- Are conditions in receiving water getting better or worse?

To answer these questions, data will be segregated according to whether they are representative of receiving water conditions or urban runoff inputs. Additional segregation of data by season (i.e., wet weather and dry weather conditions) or sub-watershed will be considered as appropriate. Importantly, the watershed water quality assessment will clearly identify areas of the watershed where data gaps exist.

3.1.3 Identification of Priority Watershed Water Quality Problems

The watershed water quality assessment will also serve as the foundation for identifying priority watershed water quality problems. Building upon minimum Permit requirements[2], the SLR Watershed Copermittees have identified the following criteria for identifying priority watershed water quality problems:

- All Clean Water Act Section 303(d) listings within the County's portion of the watershed will be considered priority watershed water quality problems.
- Watershed data will be analyzed to identify persistent violations of water quality standards, toxicity, impacts to beneficial uses, and other pertinent conditions. All such findings will be considered priority watershed water quality problems. The following steps are generally taken to analyze and evaluate water quality data on an annual basis:
    - Identify the constituents of concern (COCs) that have been found to exceed administrative water quality reference standards and Basin Plan water quality objectives as well as the frequency, magnitude, and duration of such exceedances;
    - Isolate the COCs that are shown to exceed reference values in a persistent and/or recurrent manner;
    - Consider bioassessment rankings and toxicity results;
    - Examine how COCs may contribute to water quality degradation which would negatively impact designated beneficial uses;
    - Compare COCs with third-party data that do not meet the quality control/quality assurance standards of the regional monitoring program and were therefore not included in the steps above;
    - As a longer historical record is developed over multiple years of monitoring, assess COC data to determine whether there are any increasing or decreasing trends through time applying statistical methods.

[2] Permit Section E.2.c

- To better identify the scale of watershed water quality problems, the WURMP will make use as necessary of the methodology presented in the Copermittees' 2005 Baseline Long-Term Effectiveness Assessment (BLTEA) (Weston 2005). The BLTEA methodology assigns water quality priorities at the sub-watershed, or hydrologic area, level. The BLTEA methodology is imperfect and based on limited data, so priority rankings must be interpreted with great care. All BLTEA rankings of "A" at the hydrologic area level will be added to the list of priority watershed water quality problems.

- From the list of watershed water quality problems, high priority water quality problems will be identified at the discretion of the SLR Watershed Copermittees. At a minimum, high priority watershed water quality problems will include those that most significantly exceed or impact water quality standards. Pollutants for which TMDLs have been approved will also be considered high priority watershed water quality problems.

3.2 Receiving Water Conditions

This section describes the data sets that will be utilized to conduct watershed water quality assessments in the SLR River WURMP and summarizes available information about the condition of receiving waters. Some of the data sets identified are from existing monitoring programs; others will become available when implementation of new monitoring programs begins during this Permit cycle.

3.2.1 Mass Loading Station

3.2.1.1 Description

The historical mass loading station (MLS) in the SLR River is located in Oceanside, under the Benet Road Bridge, along a natural channel north of Highway 76 (Latitude: 33° 13.239', Longitude: 117° 21.494') (Appendix A, Figure 3-1). This station is co-located with a USGS stream gauging station allowing both MLS flow data and flow data collected from the USGS station to be utilized. The channel consists of a shallow, wide, sandy bottom area with a significant amount of cobble and boulder comprising the substrate. The contributing runoff area to the MLS consists of more than 224,000 acres, which covers over 62% of the SLR River Watershed. The area above Lake Henshaw does not contribute flows to the MLS because there is no direct hydrologic connection due to municipal water supply diversions. The major land uses in the MLS drainage area are undeveloped, residential, and agriculture.

3.2.1.2 Results to Date

Annual storm water monitoring has been performed at the SLR River MLS since the 2001-2002 wet weather monitoring season. An evaluation of wet weather monitoring data collected at the SLR River MLS over the past six years was performed as part of the Regional Monitoring Program (Weston 2008a). This evaluation compares the frequency of constituents measured above water quality objectives (WQOs), statistical trend analyses, and comparison of the magnitude of exceedance. The following is a summary of MLS results over the period of record.

- **Conventional Constituents:** Total Dissolved Solids (TDS) results have been measured above the WQO in each of the 18 storms sampled. Conventional constituents that have

only occasionally had concentrations detected above their WQO include pH, Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), and turbidity. BOD shows a statistically significant increasing trend and has been measured above the WQO two times over the past six monitoring seasons (Figure 3-2). BOD has between 15% and 35% non-detected values for the period of record and does not lend itself to determining a Sen's slope.

- **Bacteria:** Fecal coliform results have been detected at levels above the WQO in 11 out of 18 storms sampled since 2001 (61%). Fecal coliform is the only bacteriological indicator with a WQO for wet weather monitoring. Total coliform and enterococci are generally higher during the first storms of the season. A review of the trend analysis for bacteriological constituents indicates statistically significant increasing trends for total coliform, fecal coliform and enterococci over the monitoring period. The magnitudes of the trends are flat at 0.308 MPN/100mL/yr, 0.218 MPN/100mL/yr, and 0.173 MPN/100mL/yr, respectively (Figure 3-2).

- **Nutrients** have not been detected above their WQO over the past six years of wet weather monitoring. Nitrate shows a statistically significant increasing trend with a magnitude of the trend of 0.333 mg/l/yr (Figure 3-2). At the current observed rate of increase, it does not appear that nitrate will exceed the WQO during the 2007-0001 permit cycle.

- **Pesticides:** Chlorpyrifos, Diazinon, and Malathion have not been detected at levels above their respective WQO since a single exceedance of Diazinon was detected in November 2001. It should be noted that during the 2001-2002 and 2002-2003 monitoring seasons the reporting limit for Chlorpyrifos was higher than the WQO.

- **Metals** have remained at low concentrations and have not been detected at levels above their respective WQOs since monitoring began in 2001.

- **Toxicity:** There is no evidence of persistent toxicity in the SLR River. Toxicity to Ceriodaphnia reproduction was detected once in storms in 2001/02 and 2003/04 and toxicity to Selenastrum was detected once in 2003/04. In 2006/07, toxicity to Hyalella azteca was detected during the first storm of the season with a no observed effect concentration (NOEC) of 50%. Toxicity was not observed to Ceriodaphnia dubia or Selenastrum capricornutum during any of the three monitoring events or to Hyalella azteca during the remaining two monitoring events.

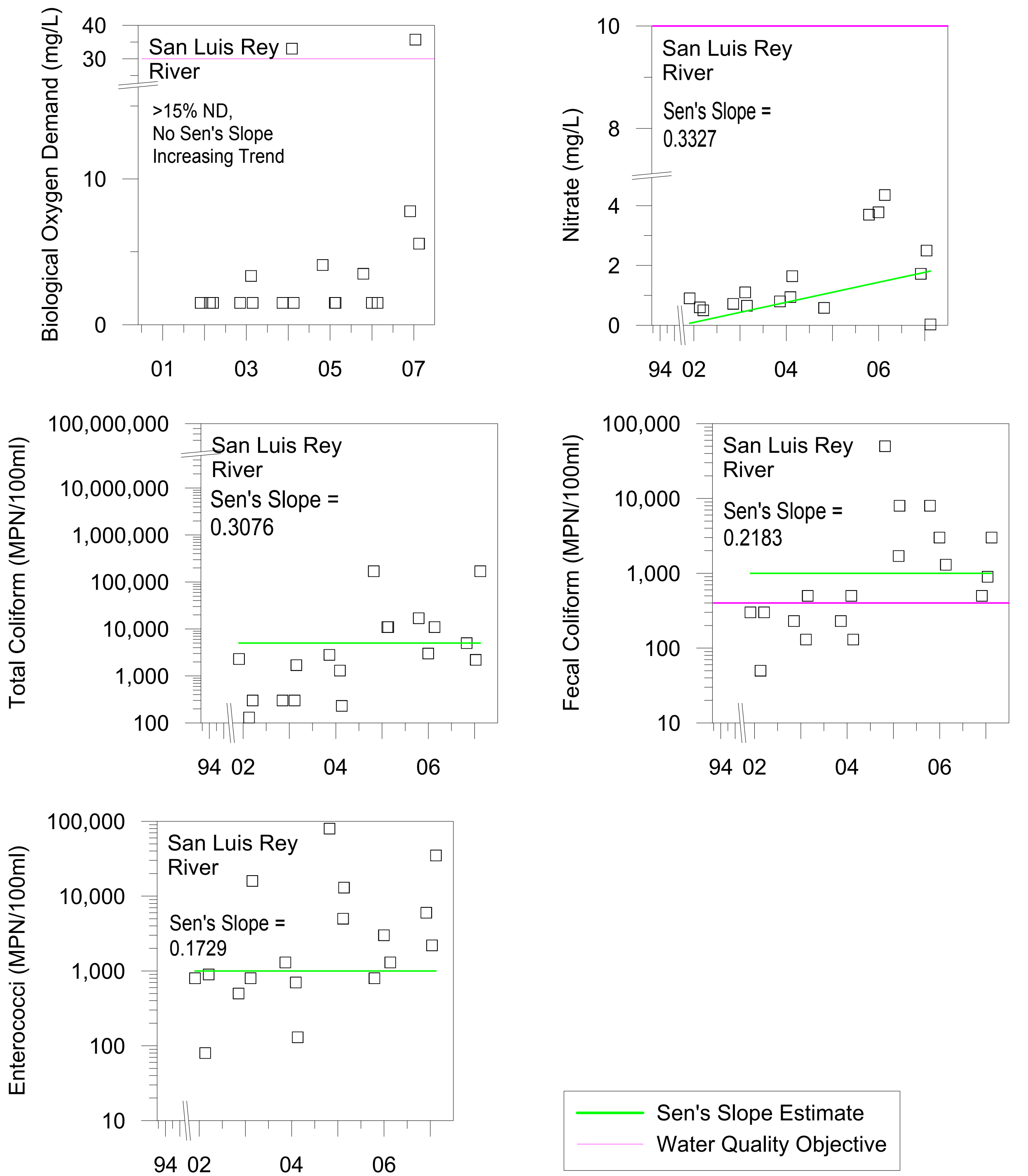


Figure 3-2. Scatterplots of Constituents with Significant Trends & Sen's Estimate of Slope.

NOTE: Sen's estimate of slope is shown on the graphs to illustrate the median trend of the data per constituent unit per year. This is not a predictive slope, but rather the median true slope observed to date (change per unit time).

3.2.1.3 Future Monitoring

Beginning in the 2007-08 monitoring year, MLS sampling will be conducted on a rotating-watershed basis. Sampling of two storms and two dry weather events at the SLR River MLS is scheduled to occur during both the 2007-08 and 2010-11 monitoring years. One storm will be sampled at the MLS during the 2008-09 monitoring year when most of the region's monitoring resources will be directed toward participation in the Southern California Bight Monitoring Program.

In addition to measuring flow rates and volumes, MLS samples will be analyzed for the constituents identified in Table 2 of the Permit's *Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2007-0001*. Toxicity testing is also performed on MLS samples to assess the potential impact of complex mixtures of unknown pollutants on aquatic life in receiving waters. If persistent toxicity is detected, specialized toxicity identification evaluations (TIE) may be used to help characterize and identify constituent(s) causing toxicity. Beginning in the 2007-08 monitoring season, trash assessments will also be conducted at the MLS in accordance with the *Monitoring Workplan for the Assessment of Trash in San Diego County*. Finally, sediment samples will be collected within two weeks of the first storm of the season. The sediment samples will be analyzed for synthetic pyrethroids, total organic carbon, and grain-size distribution in accordance with the *Monitoring Workplan for the Assessment of Synthetic Pyrethroids in San Diego County*.

3.2.2 Bioassessment Monitoring

3.2.2.1 Description

The Permit requires rapid stream bioassessment monitoring at various sites in the SLR River Watershed. The Copermittees' bioassessment monitoring program utilizes the California Department of Fish and Game's Stream Bioassessment Procedure to sample and analyze populations of benthic macroinvertebrates (BMIs). The program also involves an assessment of the quality and condition of physical habitat at each monitoring location. To assess the quality of the BMI communities at each site, biological metrics are calculated as well as two summary indices. The summary indices include a multi-metric Index of Biotic Integrity (IBI) and an Observed-to-Expected (O/E) ratio, both of which are specific to Southern California ecological conditions. The IBI is the cumulative score (0-70) of seven biological metrics, with the final score divided into five quality rating categories ranging from Very Poor to Very Good. An IBI score above 26 is presumed to represent unimpacted conditions. O/E is the ratio of organisms observed at a site (O) to the organisms expected to occur at a site (E). An O/E ratio of greater than 0.8 indicates unimpacted conditions, and represents a 20 percent loss of expected taxa (i.e. 0.8 is 20 percent below 1.0). While the IBI and O/E ratio are useful for broadly identifying impairment, analysis of individual metrics and taxa present (often in low numbers) may provide signals of benthic community quality that are too weak to be represented by summary indices.

Stream bioassessment in the SLR River Watershed includes two urban-affected sites. The upper site is located at the Mission Road (Highway 76) overcrossing near Bonsall, and the lower site is at the USGS gauging station downstream of the MLS near the Benet Road Bridge in Oceanside.

A reference site is sampled in Doane Creek in Palomar Mountain State Park (Appendix A, Figure 3-1).

3.2.2.2 Results to Date

The sites have been sampled twice annually, once during spring and once during fall, since the 2001-02 monitoring year. IBI scores from bioassessment monitoring at both sites within the SLR River Watershed have been rated Very Poor throughout the monitoring period. These results indicate that there is evidence of benthic alteration.

Mission Road: The Mission Road site has been sampled 13 times since the beginning of the program. The mean IBI scores have been seasonally similar, with values of 6.8 for October surveys and 6.6 for May surveys. The site has shown consistency, and all but one survey had IBI scores between two and eight points. The October 2001 survey had a significantly higher IBI score than all other surveys with a score of 22, and several uncommon and/or sensitive taxa were collected in that survey that have not been collected since (MEC 2003).

The mean O/E ratios for the site have been 0.53 for October surveys and 0.47 for May surveys. The October 2001 survey had an O/E ratio well above the impairment threshold. Interestingly, the 2004 surveys had the highest average O/E rating while the IBI scores for that year had the lowest average rating. Additionally, the May 2007 O/E ratio was very low (due to high dominance by *Gammarus*) while the IBI was similar to other survey results.

Benet Road: The Benet Road site has been sampled 11 times since the beginning of the program. The mean IBI scores have shown moderate seasonal variability, with mean values of 7.8 for October surveys and 2.1 for May surveys, with an overall mean of 4.7). The site has shown consistency for May surveys and October surveys have declined since October 2004, but all IBI scores for the site have consistently been in the Very Poor range.

The mean O/E ratios for the site were 0.35 for October surveys and 0.44 for May surveys, with an overall mean of 0.39. The May 2006 survey had the highest O/E ratio with a value of 0.68 although the IBI score for that survey was quite low. The October 2006 and May 2007 O/E ratios and IBI scores were in agreement and both indicated a high level of impairment. This was likely due to a very high dominance by the amphipod, *Gammarus*, which had not been seen at this site before October 2006.

Doane Creek Reference Site: The Doane Creek Reference Site has been sampled 7 times since the beginning of the program. Six of the 7 scores have been rated Very Good and one, in October 2005 was Good. The mean IBI score for the site was 58 indicating excellent biotic integrity. The same was true for the O/E ratios that were 1.07 in May 2007, 0.99 in October 2006 and 0.71 in May 2006. Overall, the biotic community at Doane Creek was most dynamically functioning of all sites sampled throughout the County with substantially more EPT and highly sensitive taxa present.

3.2.2.3 Future Monitoring

Beginning in 2007-08, monitoring will be conducted on a rotating-watershed basis. Stream bioassessment will not occur in fall 2007. Instead, the Copermittees will participate in the sampling of seven or eight sites using the protocols of the Southern California Storm Water

Monitoring Coalition Regional Bioassessment Program. Stream bioassessment will resume at the stations identified above during spring 2008. Periphyton (algae) monitoring will be conducted in accordance with the EPA's Rapid Bioassessment Protocols for use in Streams and Wadeable Rivers. Ash-free dry mass (AFDM) and chlorophyll-A analysis will also be conducted. No additional bioassessment monitoring is scheduled until the 2010-11 monitoring season.

3.2.3 Ambient Bay & Lagoon Monitoring

3.2.3.1 Description

The SLR River empties into the SLR River Estuary in the City of Oceanside, just south of Oceanside Harbor. The Copermittees implemented the Ambient Bay and Lagoon Monitoring (ABLM) program from 2003 through 2005 in compliance with RWQCB Order 2001-01. ABLM monitoring consisted of the collection of sediment samples from the SLR River Estuary to assess the potential for adverse effects from the watershed and to compare sediment quality with other coastal embayments in San Diego County. Three sites were sampled within the SLR River Estuary: one in the lower portion south of the railroad crossing; one in the middle portion south of Interstate 5; and one in the upper portion east of Interstate 5. In Phase I of each year, a stratified random approach was used to identify the three sites where COCs were most likely to be found (i.e., those with the highest total organic carbon and smallest grain size). Each site was sampled in Phase II of the assessment and analyzed for sediment chemistry, toxicity, and benthic community structure. It should be noted that the ABLM Program utilized the association between small grain size, high total organic carbon levels, and contaminants to spatially target areas in each embayment where contaminants were most likely to be found. Therefore, it is considered to represent a worst-case scenario.

3.2.3.2 Results to Date

The ABLM program used the weight-of-evidence Triad approach to examine sediment contaminant conditions, benthic community health, and toxicity using the amphipod *Eohaustorius estuarius*. These results were then compared to the Triad results used to examine freshwater conditions at upstream MLS stations, along with benthic community health and toxicity test data. The results presented are based on three years of data collection. In addition to the Triad approach, a multivariate analysis was completed to determine if benthic infaunal communities are closely related between years within lagoons, if communities are similar between lagoons, if there is a detectable difference between open, closed, and intermittently open lagoons, and what physical or chemical characteristics may be driving these relationships.

- **Sediment Chemistry.** Sediments were analyzed for four categories of constituents: metals, PCBs, PAHs, and pesticides. Of these, six metals were detected above the detection limit in the SLR River Estuary in all three years: arsenic, chromium, copper, lead, nickel, and zinc (Table 3-2). However, none exceeded their respective ERL or ERM sediment quality value. There were no PAHs found above the detection limit in the SLR River Estuary. For pesticides, 6.91 µg/kg of 4,4'-DDE were detected at this site. This concentration exceeds the ERL value of 2.2 µg/kg for 4,4'-DDE but is below the respective ERM value of 27 µg/kg. The mean ERM-Q value, which is a measure of the cumulative effects of the COCs for which ERM sediment quality values are available,

Table 3-2. Summary Results in SLR River Estuary.

CHEMISTRY*					TOXICITY*	BENTHIC COMMUNITY						
Analyte	**ERL**	**ERM**	**Result**	**ERM-Q**	**Percent Survival**	**Index**	**1R-3**	**2L-3**	**3M-5**	**Mean**	**St. Dev.**	**Total**
METALS (mg/kg)						Abundance	246	24	591	320	242	961
Antimony	NA	NA	<1.04	NA		Richness	30	3	16	19.67	9.07	34
Arsenic	8.2	70	1.63	0.02		Diversity	2.46	.93	1.75	2.05	0.37	NA
Cadmium	1.2	9.6	<0.174	0.01	**90%** Not Significantly different from Control	Evenness	0.72	.75	0.63	0.70	0.06	NA
Chromium	81	370	15.2	0.04		Dominance	6	4	3	4.33	1.53	NA
Copper	34	270	10.2	0.04								
Lead	46.	218	4.4	0.02								
Nickel	20.	51.6	6	0.12								
Selenium	NA	NA	<1.04	NA								
Zinc	150	410	33.6	0.08								
Mean ERM-Q				0.05								

* Analysis performed on composite samples from the three sites.
Bold – exceeds ERL or ERM value

was 0.05. This value did not exceed the threshold of 0.10. During the 2003 ABLM Program, the mean ERM-Q value was also very low (0.06), which was one of the three lowest embayments during that program. In contrast, the 2004 mean ERM-Q value for was higher, 0.12. Sediments with mean ERM-Q values above the 0.10 threshold have a higher probability of producing adverse biological effects than those with mean ERM-Qs below the threshold (Long et al. 1998).

- **Toxicity.** The mean percent survival of E. estuarius exposed to the SLR River Estuary sediments in a 10-day acute toxicity test was 90% and not significantly different from that of the Control (97%), suggesting that SLR River Estuary sediments were not toxic to the test organisms. Unlike in 2004 and 2005, toxicity was observed in the samples collected in 2003.

- **Simultaneously Extracted Metals (SEM)/Acid-Volatile Sulfides (AVS) Ratio.** In the SLR River Estuary sediment, the SEM:AVS ratio was 1.76, indicating that the concentration of SEM was slightly higher than the concentration of AVS in this sediment sample. These results indicate that not all of the metals in the SLR River Estuary sediment were bound by AVS and therefore may be bioavailable and potentially toxic to benthic organisms. No toxicity was observed in the 10-day solid phase toxicity test using E. estuarius; survival of E. estuarius was not significantly different in the SLR sediment (90%) as compared to in control sediment (97%). This indicates that bioavailable metals found in the SLR River Estuary sediment were not toxic to the amphipod E. estuarius.

- **Benthic Community Structure.** A total of 961 organisms were collected from the SLR River Estuary, representing 34 taxa. The benthic infauna were more diverse in species richness in 2005 than in 2003 (11 taxa) or 2004 (16 taxa) while abundances were similar (1,153 and 1,251 respectively). Among the three sites assessed in 2005, Site 1R-3 had the greatest species diversity, dominance and richness, while Site 3M-5 had the greatest abundance.

Unlike the 2003 and 2004 ABLM Programs where the gammarid amphipod *Grandidierella japonica* dominated the benthic community in the SLR River Estuary, the benthic infauna community collected in the 2005 sampling was dominated by polychaetes, with *Polydora cornuta* and *Scolelepsis sp*. SD1 making up the majority. Another polychaete, *Capitella capitata* Complex was the third most abundant taxa represented in the Estuary samples. For comparison, in the 2004 ABLM sampling of the Estuary, *Polydora nuchalis,* accounted for 31.5% of the benthic community, while the mollusk, *Tryonia imitator,* was the third most abundant, accounting for 9.5% of the total abundance.

Lagoons were analyzed using the Benthic Response Index (BRI) and Relative Benthic Index (RBI) scores as a primary indicator of lagoon health. The BRI is the abundance-weighted average pollution tolerance score of organisms occurring in a sample and is most applicable to marine environments (Smith et al., 2001; Smith et al., 2003; Ranasinghe et al., 2004). The RBI is the weighted sum of three measures of abundance: 1) total number of species, number of crustacean species, number of crustacean individuals, and number of mollusk species; 2) abundance of three positive and 3) two negative indicator organisms (Hunt et al. 2001). The RBI is less dependent on marine benthic species, and more applicable to lagoons. The two indices combined provided some differences in benthic community health. Overall, for the SLR River Estuary, the benthic community health was assessed at poor to fair (7) a lower BRI score indicates better conditions, while a higher RBI score relates to better conditions (Table 3-3).

Table 3-3. Indices of Sediment Biological Health in SLR River Estuary.

Index	2003	2004	2005
BRI	58	50	35
RBI	0.29	0.26	0.37
* BRI-Good <31, Fair 31-53, Poor >53 RBI-Good >0.61, Fair 0.31-0.60, Poor <0.30			

- **Triad Relationships.** The Triad method was used to assess the relationships between chemistry, biology, and toxicity for the lagoon sediments. This method is an integrated approach that depends on "weight of evidence" (Chapman 1996) and integrates chemistry, biological observation, and toxicity endpoints. The results for the SLR River Estuary are presented in Figure 3-3 for the 2003, 2004 and 2005 ABLM Monitoring Programs. For the 2005 ABLM sampling, the SLR River Estuary scored good for toxicology, fair for biology, and good for chemistry. Correspondence between the three legs of the triad was inconsistent over the program

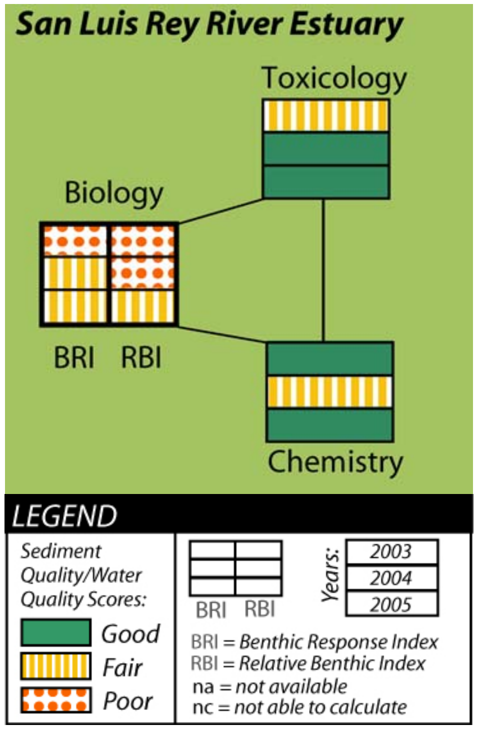


Figure 3-3. Triad Relationships for the SLR River Estuary.

3.2.3.3 Future Monitoring

Implementation of the ABLM Program will be described in the Copermittees' annual monitoring scope of work submitted to the RWQCB by September 1 of each year.

3.2.4 Coastal Storm Drain Monitoring Program

3.2.4.1 Description

The Coastal Storm Drain Monitoring (CSDM) Program has been monitoring bacteria levels in urban runoff from coastal and lagoon outfalls, and evaluating the relationship between storm drain discharges and exceedances of bacteriological water quality standards in the coastal receiving waters. This program includes sampling of both storm drains and adjacent receiving waters. As part of this regional monitoring program, twelve outfall sites were monitored at the coast in the SLR River Watershed. Eight of these outfall sites were located in Oceanside Harbor, while the remaining four were located at beach outfalls.

3.2.4.2 Results to Date

The majority of the CSDM Program outfalls within the SLR River Watershed do not have flow during dry weather. However, the outfall in Oceanside Harbor, near the small boat ramp that drains the boat wash area and RV pump-out (Coast 8) flows daily when boaters, jet-skiers, and RVers use this Harbor resource. The outfall has had reoccurring exceedances and occasional receiving water standards exceedances during the last several monitoring years. In FY 2005-06, an anti-microbial product was installed in the marina vault. While there was an initial reduction in bacteria levels, the product did not display long-term effectiveness. In FY 2006-07 storm drain cleaning was increased from quarterly to once a month beginning in February of 2007. There was not another exceedance until late June 2007, when use of the boat ramp and the RV

sewage dump increased for the high use summer months. After a July exceedance, the Harbor increased storm drain cleaning in August, and for the remaining summer months, to twice a month. Visual observations of the outlet toward the end of the high use months showed a grey algae/film build up when not cleaned. After the drain is cleaned, the algae/film is gone and bacteria levels are generally reduced. The City of Oceanside continues to work on identifying other BMPs that may be useful in reducing bacterial loads to the harbor.

3.2.4.3 Future Monitoring

The new Permit requires monitoring at every outfall and therefore adds approximately 40 sites to the monitoring program within the Harbor. Monitoring will continue monthly at all sites, except for Coast 8, the Harbor boat wash. This site will be visited twice a month for ongoing monitoring.

3.2.5 Dry Weather Monitoring Program

3.2.5.1 Description

The Permit requires each Copermittee to implement a dry weather field screening and analytical monitoring program as part of its Jurisdictional Urban Runoff Management Program (JURMP). The Dry Weather Monitoring Program is designed to identify water quality problems that may be the result of non-storm water discharges to or from the municipal separate storm sewer system (MS4). Dry weather monitoring data also provide useful information for the purposes of watershed assessment. However, it should be noted that the Dry Weather Monitoring Program is targeted toward identification and elimination of illicit connections and illegal discharges (IC/ID) and are not necessarily representative of receiving water conditions. In some cases, Copermittees have conducted monitoring in the receiving waters. These sites are identified in Table 3-4.

The City of Oceanside, City of Vista, and the County monitored 53 sites in 2006 (Appendix A, Figure 3-1), 58 sites in 2005, 57 sites in 2004, 36 sites in 2003, and 15 sites in 2002. Over the years, sites were removed or relocated from the dry weather monitoring program due either to safety and accessibility or inclusion in a special monitoring program.

3.2.5.2 Results to Date

A summary of the Action Level exceedances for the past four years is shown in Table 3-4. The action levels that are applied to dry weather monitoring results are established by the Copermittees and trigger investigations upstream of the sampling location to identify and eliminate IC/IDs. Action levels are not necessarily established compliance levels or standards, but are trigger levels set by the Copermittees for program management. In comparing the exceedances in 2003 through 2006, indicator bacteria and nutrients were the most common parameters exceeding action levels in this watershed (Table 3-4).

3.2.5.3 Future Monitoring

The SLR River Copermittees will continue implementation of their Dry Weather Monitoring Program in accordance with Permit requirements over the course of this Permit cycle. Beginning in FY 2007-08, the number and locations of individual Copermittee monitoring sites will be

adjusted based on program and data review, as well as compliance with the new Municipal Permit requirements.

Table 3-4. Summary of Action Level Exceedances in SLR River Watershed.

Station ID	HSA	Primary Land Use	Sample Location	Sampled by	Action Level Exceedances from 2003-2006			
					2003	2004	2005	2006
S105	903.11	Agricultural	MS4 Outfall	Oceanside	NS	NS	NS	NS
S106	903.11	Agricultural	MS4 Outfall	Oceanside	Ammonia; Nitrate[1]	Ammonia; Total Coliform	Nitrate Total Coliform	Nitrate; Total Coliform
S107	903.11	Agricultural	MS4 Outfall	Oceanside	NS	NS	None	Orthophosphate
S108	903.11	Agricultural	MS4 Outfall	Oceanside	Ammonia; Nitrate[1]; Reactive Phosphorous	Total Coliform Enterococcus	Orthophosphate	None
S047	903.11	Commercial	MS4 Outfall	Oceanside	NS	NS	NS	None
S048	903.11	Commercial	MS4 Outfall	Oceanside	NS	NS	NS	None
S025	903.11	Industrial	MS4 Outfall	Oceanside	NS	NS	NS	NS
S013	903.11	Landfill	MS4 Outfall	Oceanside	NS	NS	NS	NS
S052	903.11	Parks	MS4 Outfall	Oceanside	Ammonia; Nitrate[1]	Ammonia	NS	NS
S006	903.11	Residential	MS4 Outfall	Oceanside	Ammonia	Ammonia	Total Coliform	None
S018[2]	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	NS	NS
S032	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	NS	NS
S035	903.11	Residential	MS4 Outfall	Oceanside	Nitrate[1]	NS	None	None
S041	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	NS	NS
S043	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	None	NS
S044	903.11	Residential	MS4 Outfall	Oceanside	Ammonia	Ammonia	NS	None
S045	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	None	None
S065	903.11	Residential	Receiving Waters	Oceanside	Ammonia	NS	Total Coliform Fecal Coliform Enterococcus	Enterococcus Total Coliform
S072	903.11	Residential	MS4 Outfall	Oceanside	Ammonia; Reactive Phosphorous	NS	NS	None
S075	903.11	Residential	MS4 Outfall	Oceanside	Ammonia; Nitrate[1]	NS	Phosphate	None
S077[2]	903.11	Residential	MS4 Outfall	Oceanside	Ammonia	Ammonia; Total Coliform	None	None
S085	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	NS	None
S088	903.11	Residential	MS4 Outfall	Oceanside	Ammonia; Nitrate[1]	Ammonia; Total Coliform	None	None
S102[2]	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	NS	None
S103	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	NS	NS
S104[2]	903.11	Residential	MS4 Outfall	Oceanside	Ammonia	NS	NS	None
S110	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	None	Ammonia Orthophosphate

Station ID	HSA	Primary Land Use	Sample Location	Sampled by	Action Level Exceedances from 2003-2006			
					2003	2004	2005	2006
S111	903.11	Residential	MS4 Outfall	Oceanside	Ammonia	NS	NS	pH
S112	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	NS	NS
S113	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	NS	Ammonia Orthophosphate
S114	903.11	Residential	MS4 Outfall	Oceanside	NS	NS	NS	NS
SLR04	903.11	Rural Residential	Receiving Waters	County	Nitrate	Nitrate	Nitrate Total Coliform	Nitrate
G-1	903.11	Residential	MS4 Outfall	Vista	None	NS	NS	NS
G-2	903.11	Residential	MS4 Outfall	Vista	New in 2005	New in 2005	New in 2005	NS
G-3	903.11	Residential	MS4 Outfall	Vista	Nitrate	None	Orthophosphate	NS
G-4	903.11	Residential	MS4 Outfall	Vista	New in 2005	New in 2005	New in 2005	pH
GC-1	903.11	Residential	Receiving Waters	Vista	New site in 2003	Total Coliform Fecal Coliform	None	None
SLR12	903.12	Agriculture	Receiving Waters	County	Oil & grease Total Coliform Fecal Coliform	Nitrate	Total Coliform	None
SLR29	903.12	Agriculture	Receiving Waters	County	New site in 2004	None	Nitrate	None
SLR30	903.12	Agriculture	Receiving Waters	County	New site in 2004	Nitrate	Nitrate	Nitrate
SLR16	903.12	Open	Receiving Waters	County	Oil & grease	None	None	None
SLR17	903.12	Open	Receiving Waters	County	None	Total Coliform	Total Coliform	None
SLR01	903.12	Parks	Receiving Waters	County	Oil & grease	None	None	None
SLR06	903.12	Parks	Receiving Waters	County	None	Total Coliform	Nitrate, Total Coliform	Nitrate
SLR02	903.12	Rural Residential	Receiving Waters	County	Oil & grease	None	Nitrate	Nitrate
SLR27	903.12	Rural Residential	Receiving Waters	County	NS	NS	NS	NS
SLR10	903.13	Open	Receiving Waters	County	NS	NS	NS	NS
SLR11	903.13	Parks	Receiving Waters	County	None	None	None	Total Coliform
SLR15	903.13	Rural Residential	Receiving Waters	County	None	Nitrate	None	None
SLR08	903.14	Parks	Receiving Waters	County	Nitrate	None	None	None
SLR18	903.21	Agriculture	Receiving Waters	County	None	Ammonia	Ammonia	None
SLR20	903.22	Agriculture	Receiving Waters	County	NS	NS	NS	NS
SLR21	903.22	Agriculture	Receiving Waters	County	NS	NS	NS	NS

NS= Not Sampled. May not have been visited or was dry.
[1] Results may have been reported as NO_3^- instead of NO_3-N and thus were identified as exceeding action levels, when they may not have been.
[2] Indicates storm drain had a variation in sampling. e.g. the storm drain sampled in 2005 was a different drain sampled in 2003, 2004, and 2006.

3.2.6 Third Party Data

The SLR River Copermittees will consider incorporating data obtained from third parties as determined appropriate in its assessment of watershed water quality. Third-party data may be considered if they meet the acceptance criteria outlined in Section 3.1.1 of the Watershed Data Assessment Framework (MEC/Weston 2004).

3.2.6.1 Surface Water Ambient Monitoring Program

Third party data were collected from the SLR River Watershed under the Surface Water Ambient Monitoring Program (SWAMP) in 2004-2005. Sampling was conducted in three general areas of the watershed (upper, middle, and lower). The Iron Springs Creek 2 and SLR River 2 sites were located in the upper watershed area away from urbanized areas. The Gird 1, Gird 2, Moosa Creek 2, and Keys Creek 3 sites were located in various tributaries in the middle urbanized area of the watershed. The SLR River 8 site was the furthest downstream site in the watershed. The data from the SLR River 8 site provides a snapshot of the ambient conditions near the current MLS site in this watershed. As previously mentioned, the upper watershed is hydraulically disconnected from the lower watershed due to diversions related to municipal water supplies. A full suite of constituents was analyzed including organochlorine pesticides, triazine herbicides, PAHs, and PCBs in addition to metals, inorganics, and physical measurements.

Turbidity was observed at a level above the benchmark WQO at the upstream SLR River 2 site and the Keys Creek 3 site in the middle watershed. An estimated value was above the benchmark WQO for turbidity in the Lower SLR River 8 site. Sulfate was observed above the basin plan WQO (250 mg/l) in the downstream SLR River site and the middle tributary sites, and was below the basin plan WQO in the upper watersheds. This suggests that the middle watershed tributaries may be a source of elevated sulfate. Manganese was above the basin plan WQO (50 mg/l) at the downstream and upstream SLR River sites but was highest in the downstream sites. Only three single exceedances occurred for manganese (during 3/1/05), just above the WQO, in the middle watershed tributary sites. Nitrate was above the benchmark WQO (10 mg/l) during 3 of 3 monitoring events in the Gird Creek tributary and during 1 of 3 events at the Keys Creek tributary (both sites in the middle watershed). Pesticides, PAH, and PCB concentrations were primarily below detection limits with a few trace level detections of atrazine, oxidiazon, simazine, terbuthylazine, dibenzothiopene, naphthalene C1, naphthalene C2, and benzo(g,h,i)perylene. Trace levels of oxadiazon were more commonly detected and were limited to the lower and middle watershed areas.

3.2.7 Special Studies

The SLR Watershed Copermittees have led or participated in several special studies in the SLR River Watershed that provide data useful for evaluating water quality conditions. In addition to the special studies described below, the Watershed Copermittees will conduct and participate in additional special studies as determined appropriate over the course of this Permit cycle.

3.2.7.1 Joint Water Quality Sampling Program

In March 2004, the County of San Diego and the City of Oceanside initiated a Joint Water Quality Sampling Program. A total of 15 sites in the SLR River Watershed have been monitored as part of this program; seven sampling sites are located along the SLR River and eight in tributaries. Data are collected to better characterize levels of bacterial indicators and other

constituents of interest in the SLR River located west from I-15. Data analysis of bacterial indicators, TDS, and chloride has been conducted and results are described below.

3.2.7.2 Bacteria Results from Joint Water Quality Monitoring Program

Throughout the study period (March 2004 through June 2007) *Enterococci* exceeded the State single sample standard more often than total coliform and fecal coliform in both the SLR River and its tributaries. Similarly, while the geometric mean of total coliform and fecal coliform indicators remained below their corresponding AB411 single sample standards, the geometric mean for *Enterococcus* in the SLR River and its tributaries generally exceeded that standard. The ANOVA results showed that location along the river had some significant effect on the bacterial concentration. In the tributaries, only the results for fecal coliform bacteria were statistically significant (City of Oceanside and County of San Diego 2006a).

Pacific Street Crossing at the mouth of SLR River is an estuarine environment influenced by the Pacific Ocean (as indicated by high chloride concentration and high conductivity). Survival rates of indicator bacteria are lower in salt water as opposed to fresh water environments (Anderson et.al., 2005 and Lisle et. al., 2004). As expected, the concentrations of *Enterococcus* and total coliform bacteria were significantly lower at Pacific Street than at the freshwater sites upstream. However, this was not true for the fecal coliform bacteria that did not show a significantly lower concentration at this site.

The design of the current study does not address, in detail, these confounding factors of differing bacteria decay and regrowth rates or the possible influence of local bird populations on fecal indicator bacteria concentrations in the water. Since single grab samples were employed in the current study, the results may have been affected by short-term localized changes in bacterial concentrations that may not always have been representative of the true concentrations at the sampled sites over the time periods considered.

The results of paired comparisons of bacterial concentrations at the Pacific Street Crossing to those along the Pacific shoreline nearby showed higher bacterial concentrations in the river. This result, however, was only statistically significant for the Total Coliform and Fecal Coliform bacteria. Due to the small sample size (10 pairs), these results are only preliminary and more samples will need to be collected in the future to further evaluate the relationships. Moreover, many factors may have contributed to the observed difference in bacterial counts between the river and the shoreline samples. Bacterial re-growth rates are expected to be higher in the river than in the open ocean while bacterial die-off rates have been shown to increase with salinity, UV light (decreased shading), and mixing; all three variables bound to be higher at the shoreline site. For this reason, a direct comparison between the two sites based on fecal indicator bacteria may not be helpful in determining whether the increased bacterial counts along the Pacific shore are significantly affected by the river. In future studies the use of specific genetic markers pinpointing the source of the bacteria may prove to be helpful in providing additional insight to answer this question.

In general, the source of bacterial contamination at the mouth of the SLR River remains undetermined. Due to the small sample size (10 pairs) as well as confounding factors (salinity, mixing, re-growth rates and UV light), the relationship between bacterial counts in the river and

the adjacent shoreline was difficult to evaluate. It is likely that the contamination does not originate from the River and/or its tributaries but from local sources such as shorebird feces. This, however, must be investigated further. Future sampling should include flow measurements at all sites so that mass loading can be determined. New technologies such as the use of genetic markers specific to the bacteria originating from the river may prove helpful in future studies. The sampling design should also address the effect of localized, short-term variation in bacterial concentrations due to differences in weather (i.e. sunlight and temperature), canopy cover, and other factors.

3.2.7.3 TDS & Chloride Results from Joint Monitoring Program

Surface water samples were collected and analyzed for TDS and chloride as well as other constituents including dissolved nutrients, dissolved metals, and minerals. A preliminary data evaluation was conducted using two-way ANOVAs and correlation analysis (City of Oceanside and County of San Diego 2006b).

The results indicate that TDS concentrations in the SLR River from the area in the vicinity of Interstate 15 west to Douglas Street exceeded the water quality objective of 500 mg/L. The TDS concentration at Shearer Crossing, the site located furthest east along the main stem of the river, was significantly lower than that of the remaining sites but still higher than 500 mg/L. The chloride concentration in the river significantly exceeded the water quality objective of 250 mg/L at all sampling sites except for Shearer Crossing. The chloride concentration in the SLR was highest at the westernmost location upstream of tidal influence, Benet Bridge.

A wet and dry season comparison of the TDS and chloride data indicate that neither the TDS nor chloride concentrations varied significantly between the seasons for any of the sites along the main stem of the river. A review of groundwater data support previous studies that the baseflow of the SLR River is most likely to be primarily composed of locally derived groundwater, which exceeds the surface water quality objectives for TDS and chloride.

Within the tributaries, Pilgrim Creek (the westernmost tributary) had significantly higher TDS and chloride levels than the remaining locations. Both chloride and TDS concentrations were above the Basin Plan Objectives at all the sampled tributaries. A wet to dry season comparison of the TDS and chloride data indicate that the TDS concentration at Pilgrim Creek varied significantly with wet/dry season but the difference was mostly due to significantly higher TDS level at Pilgrim Creek during the dry season. Chloride concentration was also significantly higher in Pilgrim Creek during the dry season while there were no significant differences among locations and between seasons for the remaining tributaries. Sodium concentration in Pilgrim Creek was approximately three orders of magnitude higher than in the remaining tributaries which suggests that, at that specific location, salt water intrusion may have contributed to the elevated TDS and Chloride levels especially during the dry season. Another factor in this area is the historical presence of Foss Lake, one of the only inland salt water wetlands in San Diego County. Foss Lake has been altered dramatically in the last 50 years, but has been historically present in the Pilgrim Creek watershed. Although now only 75 acres in size, the historical alkali marsh did extend into the present day golf course and it may still have an effect on the tributary.

Based on the preliminary data evaluation, TDS and chloride continue to be water quality concerns for the SLR River and its tributaries. There are too few data points to make strong conclusions and determine trends; therefore, additional data are needed for further assessment.

3.2.7.4 Guajome Lake Water Quality Monitoring Program

The County also developed a monitoring program to assess the contribution of urban runoff to the eutrophication of Guajome Lake. The 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments identifies Guajome Lake as impaired due to eutrophication. On January 7, 2005, DPW conducted a joint reconnaissance of the Guajome Lake area with the City of Oceanside, the County Department of Agriculture, Weights, & Measures (AWM), and the County Department of Parks and Recreation (DPR). All drainages into and out of Guajome Lake were characterized and it was concluded that only the flows from the northern subbasin enter the lake. From February through April 2005, seven locations in the northern subbasin were monitored and two of those were selected as long-term monitoring sites. They included the East Channel Creek at Hutchison Street and Hidden Lake Lane (GUL02) and the East Channel Creek at Hitching Post Drive (GUL07). GUL2 is located in the middle of the subbasin and is co-located with the County of San Diego's dry weather monitoring site SLR04. GUL07 is located in the East Channel Creek and represents the bottom of the drainage. The 2005 preliminary monitoring of the East Channel Creek indicated that nutrients do enter Guajome Lake and may contribute to the existing eutrophic conditions. Data collected from the two sites of the East Channel Creek during FY 2005-06 indicated that concentrations of nutrients continue to enter Guajome Lake. Preliminary investigations into land uses have identified potential sources to include residential, commercial nurseries, commercial horse facilities, and residential horse facilities (City of Oceanside and County of San Diego 2006c)

Data collected from the two sites of the East Channel Creek indicate that concentrations of nutrients do in fact enter the Guajome Lake and may contribute to the existing eutrophic conditions. Even though the total phosphorus concentration at both sampling locations has remained higher than the 0.1 mg/L limit throughout the sampling period, the mean orthophosphate-P concentration has decreased significantly at GUL2 over time. The mean nitrate-N concentration has also shown a significant decrease from FY 2005-06 to FY 2006-07 and there is evidence of some assimilation of the nitrate-N between the two sampling sites. The N:P ratio, however, has mostly remained above the 10:1 Basin Plan objective. Preliminary investigations into land uses have identified potential phosphorus and nitrogen sources to include residential areas, commercial nurseries, commercial horse facilities, and residential horse facilities. Further monitoring and investigation of potential sources will continue.

3.2.8 Future Data Sets

Temporary Watershed Assessment Station (TWAS)

Beginning with the 2007-08 wet season a new monitoring station will be installed in the upper SLR River Watershed in the Bonsall HSA (903.12) near Camino Del Rey. Monitoring at this site will include sampling during two storms and two dry weather periods. This sampling will be performed every other year during the upcoming Municipal Permit cycle.

Bight '08

The San Diego Copermittees will participate in the Bight '08 regional monitoring program being coordinated by the Southern California Coastal Water Monitoring Project (SCCWRP). Bight '08 could potentially provide data useful for assessing the condition of receiving waters as part of this WURMP. The details of the Bight '08 program are still being determined at the time of this writing.

MS4 Outfall Monitoring

The Permit requires the development and implementation of a new MS4 Outfall Monitoring Program. At the time of this writing, Copermittees are still in the process of defining the scope of this program. A workplan will be developed by July 2008. The goal of the MS4 Outfall Monitoring Program will be to assess the quality of MS4 discharges countywide and their relative contribution to receiving water conditions within each watershed. Analysis of discharges from MS4 outfalls to receiving waters will address the management question: "What is the relative urban runoff contribution to the receiving water problem(s)?" The MS4 outfall monitoring design will be based on a combination of both random and targeted sampling, during both dry weather and wet weather conditions.

Source Identification Monitoring Program

The Permit requires the development and implementation of a new Source Identification Monitoring Program. At the time of this writing, Copermittees are still in the process of defining the scope of this program. A workplan will be developed by July 2008. The goal of the Source Identification Monitoring Program is to identify and assess pollutant sources that may be impacting receiving water conditions. Collection and analysis of urban runoff within MS4 conveyances during both dry and wet weather periods will address the management question: "What are the sources of urban runoff that contribute to receiving water problems?" The main purpose of the question is to identify pollutant sources so that appropriate management actions can be applied to eliminate the source from entering receiving waters.

Bacteria Source Tracking Study in the Lower San Luis Rey River

The City of Oceanside has been awarded a Proposition 50 Clean Beaches Initiative grant to track sources of bacteria in the Lower San Luis Rey River. The objective of this study is to identify the sources and quantify the loading of bacterial contamination in the Lower SLR River and River Mouth using a multi-tiered approach and to recommend appropriate actions and activities to eliminate the input of those sources. Dry and wet weather monitoring will occur throughout 2008 and 2009 with a final report completed by April 2010.

3.3 Watershed Water Quality Problems

Utilizing the criteria defined in Section 3.1, the tables below identify the priority water quality problems in the SLR River Watershed.

3.3.1 Priority Watershed Water Quality Problems

The 2006 303(d) list was adopted by the SWRCB on October 25, 2006 and finalized by the U.S. EPA on June 28, 2007. Waterbodies in the SLR River Watershed that have been placed on the SWRCB 2006 303(d) list are presented in Table 3-5.

Table 3-5. Waterbodies on the 2006 SWRCB 303(d) List in the SLR River Watershed.

Waterbody	Hydrologic Subarea (HSA)	Pollutant or Stressor	Estimated Area Affected
Pacific Ocean Shoreline	Mission 903.11	Indicator Bacteria	0.49 miles (at river mouth)
San Luis Rey River	Mission 903.11	Chloride, TDS	19 miles
Guajome Lake	Mission 903.11	Eutrophic	33 acres

All of the COCs identified in Table 3-6 below are considered priority watershed water quality problems since they have been observed to exhibit at least some degree of persistence in MLS and/or dry weather sampling (Weston 2008). As noted in Section 3.2.1 above, there is no evidence of persistent toxicity in the SLR River.

Table 3-6. Frequency of Occurance for COCs in SLR River Watershed.

	Bact. Indicators/ Fecal Coliform	Bact. Indicators/ Total Coliform	Ammonia / Nitrate	Total Dissolved Solids	Turbidity
San Luis Rey River 2007	♦♦♦	♦	♦	♦♦♦	♦

♦♦♦- Higher frequency of occurrence ♦♦- Medium frequency of occurrence ♦- Lower frequency of occurrence

Several “A” ratings were identified in the Lower San Luis HA (903.1), including dissolved minerals, nutrients, and bacteria (Table 3-7). Benthic alteration was also an “A”-rated constituent in this HA based primarily on the stream bioassessment findings. The ratings for bacteria and nutrients are dictated by 303(d) listings focused on two localized areas within the Mission HSA (903.11): bacteria at the mouth of the SLR River and nutrients in Guajome Lake.

Table 3-7. 2001-2006 Water Quality Priority Ratings for the SLR River WMA.

Watersheds/ Sub-watersheds	*Percentage of Total Area*	*Priority Ratings**										
		Constituent Groups									*Stressor Groups*	
		Heavy Metals	*Dissolved Minerals*	*Organics*	*Oil and Grease*	*Sediments*	*Pesticides*	*Nutrients*	*Gross Pollutants*	*Bacteria/ Pathogens*	*Benthic Alterations*	*Toxicity*
San Luis Rey WMA	***100%***	***D***	***B***	***D***	***D***	***C***	***D***	***C***	***D***	***B***	***B***	***C***
Lower San Luis HA (903.10)	*33%*	*D*	*A*	*D*	*D*	*C*	*C*	*A*	*D*	*A*	*A*	*C*
Monserate HA (903.20)	*30%*	*C*	*C*	*D*	*D*	*C*	*D*	*C*	*C*	*C*	*B*	*C*
Warner Valley HA (903.30)	*37%*	*D*	*C*	*D*	*D*	*D*	*D*	*D*	*D*	*B*	*B*	*C*

Notes:
** = Rating Calculated Based on Area Weighted Averages of Score Value from the sub-watershed areas.*
*** = Priority Level (Highest-A to Lowest-D)*
High Priority Level Based on Data
303d listing

3.3.2 High Priority Watershed Water Quality Problems

Utilizing the criteria defined in Section 3.1, the Table 3-8 below identifies the high priority water quality problems in the SLR River Watershed.

Table 3-8. High Priority Water Quality Problems in the SLR River Watershed.

Water Quality Problem	Priority	Scale	Explanation
Bacteria	High	Mission HSA (903.11)[3]	- Proposed TMDL for bacterial indicators at the mouth of the SLR River - 303(d) listing for bacterial indicators at the Pacific Coast Shoreline - Persistent exceedances of fecal coliform WQO at the historical MLS - Dry weather data indicate exceedances of the established criteria in approximately 50% of samples taken in the Mission HSA (903.11)
Nutrients	High	Mission HSA (903.11)[4]	- 303(d) listing for Eutrophication at Guajome Lake - Dry weather data indicate exceedances of the established criteria in approximately 60% of samples taken in the Mission HSA.

[3] Data in the remaining sub-areas of the Lower San Luis HA, either are not adequate or do not support a high priority designation. There are no 303(d) listings or wet weather MLS data available. A significant amount of dry weather data is available and bacteria indicators only exceed the established criteria approximately 20% of the samples in the Bonsall HSA and 10% in the remaining HSAs (Moosa, Valley Center, Woods, and Rincon).

[4] Dry weather data indicate exceedances of the established criteria in 40% of the samples in the Bonsall HSA and less than 20% in the remaining HSAs (Moosa, Valley Center, Woods, and Rincon). This would lead to a B rating in the Bonsall HSA and a C in the remaining areas.

3.4 Likely Pollutant Sources

Land use and facility source data have been examined and mapped for the entire watershed in order to identify the potential pollutant sources contributing to the watershed's high priority water quality problems (Appendix A, Figure 3-4). Table 3-9 presents an overview of the land use distribution for major land use categories and potential sources within each HSA. This table supports the Watershed Copermittees' focus on activities in the Lower SLR Hydrologic Area. The Monserate and Warner Valley HAs consist of over 70% vacant land, open space, and preserve. Urban pollutant sources and anthropogenic influences appear to be very limited in the upper portions of the watershed. Moreover, there are only a few monitoring stations in these areas and very few exceedances have been observed to date (Appendix A, Figure 3-1).

Table 3-9 shows the contrast between the lower and upper watershed. Residential and agriculture land uses make up the highest percentage in the lower watershed whereas open space and vacant land make up most of the upper watershed.

Table 3-9. Overview of Major Land Uses for SLR River Watershed.

Hydrologic Sub Area	Major Land Use Categories[1]												
	Residential		Commercial / Industrial		Agriculture		OS/Preserve		Vacant		Military		Total Area Accounted for
	acres	%	acres	%	acres	%	acres	%	acres	%	acres	%	%
Mission HSA (903.11)	7,700	26	1,000	3	3,900	12	2,500	8	2,000	7	9,600	32	88
Bonsall HSA (902.12)	24,000	37	1,800	3	20,900	32	1,100	2	14,000	21	400	<1	8
Moosa HSA (903.13) Valley Center (903.14) Woods HSA (903.15) Rincon HSA (903.16)	8,400	38	600	3	5,400	21	500	2	6,600	28	0	0	92
Monserate HA (903.2)	9,200	9	800	1	18,300	17	14,000	13	64,200	59	0	0	99
Warner Valley HA (903.3)	4,300	3	400	<1	3,600	3	14,200	9	108,600	82	0	0	98
Total Land Area	53,600				52,100		32,300		195,400				

1. Source: County of San Diego based on SANDAG 2006 data, land use categories have been grouped for demonstration purposes.

3.4.1 Potential Bacteria Sources

The BLTEA represented the Copermittees' first attempt to identify sources of bacteria in the SLR River Watershed. Table 3-10 presents the BLTEA's list of "Likely" and "Unknown" bacteria sources that were identified based on the development of source loading potential (SLP) ratings (WESTON, LWA, & MOE 2005). Table 3-11 lists the number of potential bacteria sources by HSA in addition to relevant land uses with the greatest potential to generate bacteria. Potential bacteria sources for which facility inventories have been developed are shown on maps in Appendix A, Figures 3-5 through 3-10.

Table 3-10. Potential Bacteria Sources for the SLR River Watershed (From BLTEA).

Potential Bacteria Sources	Number of Sources	Source Loading Potential
Botanical or zoological gardens and nurseries/greenhouses	315	Likely
Eating or drinking establishments	277	Likely
Animal Facilities	47	Likely
POTWs (water and wastewater)	17	Likely
Landscaping - parks, golf courses, cemeteries, etc.	15	Likely
Home automobile associated activities, home and garden care activities, waste disposal	-	Likely
Roads, streets, highways, and parking facilities	-	Likely
Sites for disposing and treating sewage sludge	-	Likely
Development subject to SUSMPs	115	Unknown
Active or closed municipal landfills	5	Unknown
Automobile wholesale	5	Unknown
Motor Freight	2	Unknown
Auto parking lots and storage facilities	-	Unknown
Pest Control Services	49	Unknown
Flood management projects and flood control devices	-	Unknown
MS4s	-	Unknown
Park and Recreational facilities	-	Unknown

"-" signifies that no inventory information is available
Inventory data provided by the County of San Diego – 2005

Table 3-11. Potential Bacteria Sources by Hydrologic Sub-Area.

HSA	Potential Bacteria Source	Number of Facilities or % Land Use
Mission HSA 903.11	Food Establishments	198
	Commercial Animal Facilities	66
	Auto Facilities	7
	Nurseries	54
	% Residential	26%
	% Agricultural	12%
Bonsall HSA 903.12	Food Establishments	48
	Commercial Animal Facilities	168
	Auto Facilities	34
	Nurseries	15
	% Residential	37%
	% Agricultural	32%
Moosa HSA 903.13 Valley Center HSA 903.14 Woods HSA 903.15 Rincon HSA 903.16	Food Establishments	20
	Commercial Animal Facilities	47
	Auto Facilities	4
	Nurseries	15
	% Residential	38%
	% Agricultural	21%
Monserate HSA 903.20	Food Establishments	9

HSA	Potential Bacteria Source	Number of Facilities or % Land Use
	Commercial Animal Facilities	34
	Auto Facilities	1
	Nurseries	4
	% Residential	9%
	% Agricultural	17%
Warner Valley HSA 903.30	Food Establishments	7
	Commercial Animal Facilities	0
	Auto Facilities	1
	Nurseries	2
	% Residential	3%
	% Agricultural	3%

There is currently only one location within the watershed where an adequate source identification study has been performed to characterize the bacterial pollutant source: the Oceanside Harbor Boat Wash outfall. The City of Oceanside performs routine sampling at the harbor boat wash and recreational vehicle sewage pump out area as part of its Coastal Storm Drain Monitoring Program. This monitoring has revealed high levels of bacteria in samples collected from the boat wash outfall. The outfall drains a short storm drain system where the only influence is from the public boat wash area which borders the sewage dump area for recreation vehicles. (Weston 2008b).

To identify the other source of bacteria, specifically related to beach closures at the mouth of the SLR River, the City of Oceanside was awarded a Proposition 50 Clean Beaches Imitative grant. With matching funds from the County of San Diego and City of Vista, the bacteria source tracking project will:

- Identify point and non-point sources of bacteria contamination in the lower SLR River and at the River mouth during dry and wet weather.
- Estimate the dry, wet, and annual bacterial loading in the lower SLR River and at the River mouth.
- Recommend Best Management Practices (BMP) to reduce and eliminate bacterial sources.

The project will include dry and wet weather monitoring during 2008 and 2009. A final report will be completed in April 2010.

3.4.2 Potential Nutrient Sources

The BLTEA represented the Copermittees' first attempt to identify sources of nutrients in the SLR River Watershed. Table 3-12 presents the BLTEA's list of "Likely" and "Unknown" sources that were identified based on the development of source loading potential (SLP) ratings (WESTON, LWA, & MOE, 2005). Table 3-13 lists the number of potential nutrient sources by HSA in addition to relevant land uses with the greatest potential to generate nutrients. Potential nutrient sources for which facility inventories have been developed are shown on maps in

Appendix A, Figures 3-11 through 3-16. Preliminary investigations into land uses in the Guajome Lake drainage area have identified potential sources of nutrients to include residential, commercial nurseries, commercial horse facilities, and residential horse facilities. Further investigation of potential sources in this drainage area will continue as described in Section 4 of this plan.

Table 3-12. Potential Nutrient Sources for the SLR River Watershed (From BLTEA).

Potential Nutrient Sources	Number of Sources	Source Loading Potential
Botanical or zoological gardens and nurseries/greenhouses	315	Likely
Commercial Animal Facilities	47	Likely
Landscaping - parks, golf courses, cemeteries, etc.	15	Likely
Home automobile associated activities, home and garden care activities, waste disposal	-	Likely
Roads, streets, highways, and parking facilities	-	Likely
Park and Recreational facilities	-	Likely
Eating or drinking establishments	277	Unknown
Development subject to SUSMPs	115	Unknown
Auto mechanical repair, maintenance, fueling, or cleaning	57	Unknown
POTWs (water and wastewater)	17	Unknown
Active or closed municipal landfills	5	Unknown
Automobile wholesale	5	Unknown
Corporate yards (incl. maintenance/storage yards)	4	Unknown
Fabricated metal	4	Unknown
Equipment mechanical repair, maintenance, fueling, or cleaning	3	Unknown
Chemical and allied products	2	Unknown
Airfields	2	Unknown
Motor Freight	2	Unknown
Primary metal	1	Unknown
Auto parking lots and storage facilities	-	Unknown
Mobile carpet, drape, or furniture cleaning	76	Unknown
Pool and Fountain cleaning	60	Unknown
Sites for disposing and treating sewage sludge	-	Unknown

"-" signifies that no inventory information is available
Inventory data provided by the County of San Diego - 2005

Table 3-13. Potential Nutrient Sources by Hydrologic Sub-Area.

HSA	Potential Nutrient Source	Number of Facilities or % Land Use
Mission HSA 903.11	Commercial Animal Facilities	7
	Nurseries	66
	% Residential	26%
	% Agricultural	12%
	% Open Space	8%

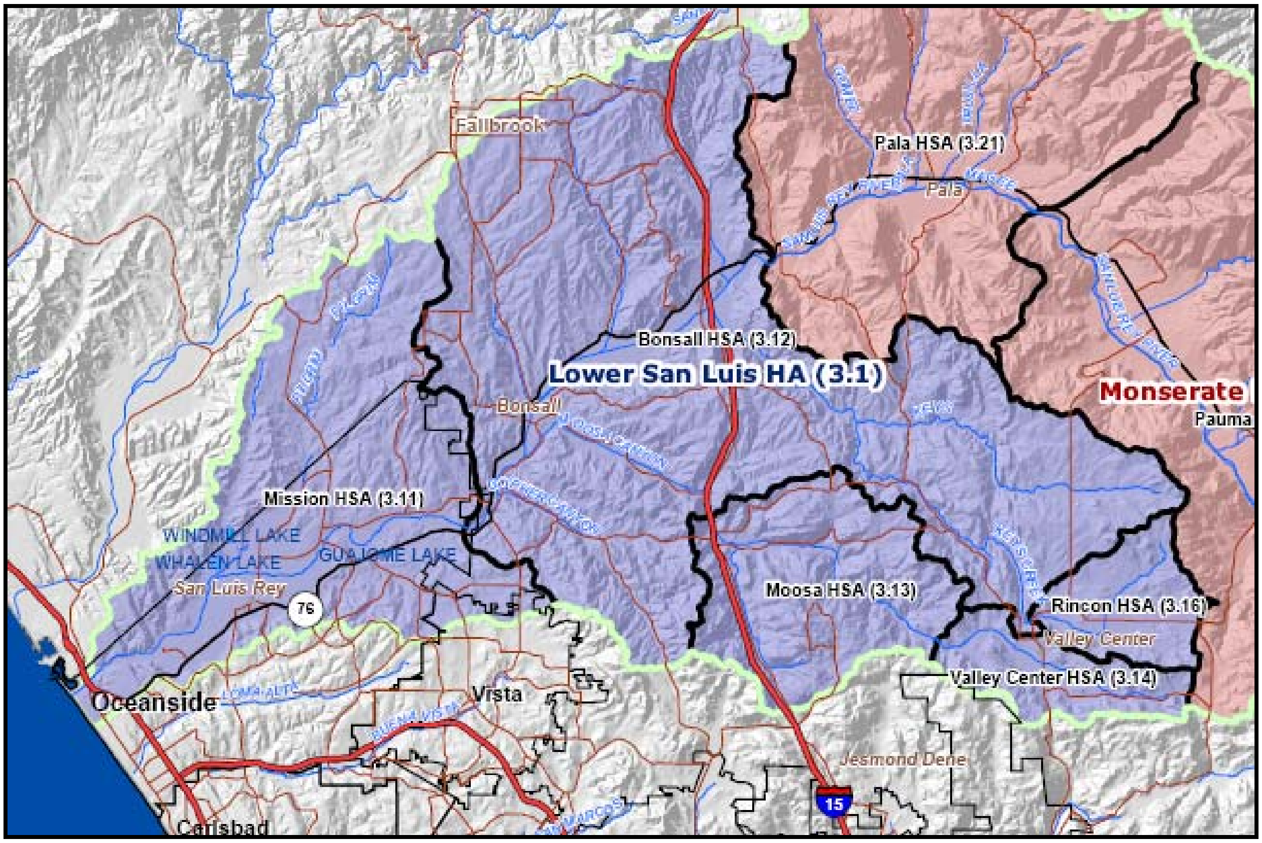
HSA	Potential Nutrient Source	Number of Facilities or % Land Use
	% Industrial/Commercial	3%
Bonsall HSA 903.12	Commercial Animal Facilities	34
	Nurseries	168
	% Residential	37%
	% Agricultural	32%
	% Open Space	2%
	% Industrial/Commercial	3%
Moosa HSA 903.13 Valley Center HSA 903.14 Woods HSA 903.15 Rincon HSA 903.16	Commercial Animal Facilities	4
	Nurseries	47
	% Residential	38%
	% Agricultural	21%
	% Open Space	2%
	% Industrial/Commercial	3%
Monserate HSA 903.20	Commercial Animal Facilities	1
	Nurseries	34
	% Residential	9%
	%Agricultural	17%
	%Open Space	13%
	% Industrial/Commercial	1%
Warner Valley HSA 903.30	Commercial Animal Facilities	1
	Nurseries	0
	% Residential	3%
	%Agricultural	3%
	%Open Space	9%
	% Industrial/Commercial	<1%

3.4.3 Other Potential Pollutant Sources

In addition to the potential pollutant sources discussed in the preceding sections, there are other likely pollutant sources that contribute to water quality degradation in the SLR River Watershed. These sources include naturally occurring groundwater, imported water supply, aerial deposition, wildlife impacts, natural erosion, transportation corridors, and military facilities and activities. These potential sources present very unique and difficult challenges in their identification, quantification and assessment of either degradation or improvement. Also noteworthy is the Copermittees' jurisdictional and regulatory inability to control these sources or regulate their impacts and contribution to water quality degradation in the watershed.

4.0 FIVE-YEAR STRATEGIC PLAN

The Watershed Copermittees utilized the strategy summarized in Section 2.0 to develop a Five-Year Strategic Plan for implementation of the SLR River WURMP. Individual baseline watershed evaluations (BWEs) were conducted for each of the following hydrologic areas (HAs) and sub-areas (HSAs) within the SLR WMA: Mission HSA (903.11); Bonsall HSA (903.12); Moosa, Valley Center, Woods, and Rincon HSAs (903.13 – 903.16)[5]; Monserate HA (903.2); Warner Valley HA (903.3). These areas are shown in Appendix A, Figure 1-2 and below in Figure 4-1.



* These four HSAs were grouped together due to their small size and because of their similarities.

Figure 4-1. Lower San Luis Rey Hydrologic Area (Source PBS&J 2003).

In general, the Monserate and Warner Valley HAs are not adequately characterized in terms of water quality to enable the selection of appropriately targeted watershed water quality and education activities. Moreover, as described in Section 3.4, there appear to be relatively few potential pollutant sources in these upstream HAs. As a result, the Five-Year Strategic Plan for this watershed emphasizes actions in the Lower SLR HA (903.1) where both water quality data and potential pollutant sources are more prevalent, and where urbanization is most significant.

Water quality monitoring data collected by the Watershed Copermittees confirm the existence of two water quality problems identified on the Clean Water Act Section 303(d) List: 1) bacterial

[5] These four HSAs were grouped together due to their small size and because of their similarities.

indicators at the Pacific Ocean shoreline (SLR River mouth), and 2) eutrophication in Guajome Lake. While some work has already been conducted to identify the sources of these problems, follow up investigations have yielded little definitive information. Upcoming projects will intensify water quality monitoring, source identification, inspection, education, and enforcement as determined necessary.

One goal of conducting the BWEs was to identify areas where additional monitoring or source identification studies were needed to properly target load reduction and source abatement activities. The Watershed Copermittees have determined that most areas of the watershed would benefit from additional monitoring or source identification studies since the relationship between observed water quality problems and potential pollutant sources is rarely clear. Priority monitoring projects at this time include:

- Bacteria source tracking and identification in the Lower SLR HA;
- Nutrient monitoring in the Lower SLR HA to identify problem areas and contributing sources; and,

Despite much uncertainty about the extent and source of the watershed's high priority water quality problems, there are several land use types and pollutant source categories that Watershed Copermittees agree would benefit from increased attention over the next five years. These include:

- *Agriculture*: The SLR River Watershed has a high percentage of agricultural land use. Agriculture is a likely source of nutrients throughout the watershed due to widespread fertilization and irrigation, particularly for crops such as avocados and tomatoes which are common in the watershed. Since nutrients, including nitrates, have been identified as a water quality concern in various parts of the watershed during dry weather, a focus on agriculture as a likely pollutant source appears to be justified. It should be noted, however, that traditional agricultural operations are not subject to regulation by the Watershed Copermittees under the Municipal Storm Water Permit.

- *Nurseries*: As a subset of agriculture, nurseries are considered by the Copermittees to be a potentially significant source of nutrients and worthy of special focus. As described in Section 3.4, there are a significant number of nurseries throughout the watershed. Moreover, several clusters of nurseries have been identified that appear to coincide with nitrate exceedances in Copermittee dry weather monitoring programs. As presented in the Five-Year Strategic Plan, two clusters in particular are targeted for immediate action: 1) upstream of Guajome Lake, and 2) along Sleeping Indian Road in the northeastern section of Oceanside. The Watershed Copermittees will continue to identify additional problem areas throughout the course of the Permit cycle.

- *Residential Areas*: Residential areas are considered to be potentially significant sources of nutrients and bacteria, two of the high priority water quality problems in the SLR River Watershed. Specific residential activities of concern include: 1) over irrigation, 2) improper disposal of pet waste, 3) maintenance and cleaning of outdoor areas, 4) lawn and garden care, and 5) trash and litter management. Residents will be the focus of a regional, cross-watershed, educational program to measurably increase awareness and

reduce harmful behaviors. To the extent possible, this WURMP emphasizes the implementation of activities that complement the Copermittees' Regional Residential Education Program while focusing on specific residential areas identified as problem areas in the watershed. Because both the Mission and Bonsall HSAs include over 20% residential land use, these areas are considered to be appropriate locations for WURMP activity implementation.

- *Restaurants*: There are nearly 200 restaurants in the lower portion of the Mission HSA. Restaurants have been identified as potentially significant sources of bacteria due to sewer overflows from poor grease management, poor trash management, and outdoor cleaning practices. Because bacteria have been identified as a high priority in the Mission HSA, this WURMP encourages efforts to improve BMP implementation at restaurants in the lower watershed.

- *New Development*: The SLR River Watershed is anticipated to grow significantly in population over the next ten years. Much of that growth is projected to occur in the rural communities of Fallbrook, Bonsall, Valley Center, and Rainbow. As mandated by the Municipal Storm Water Permit, low impact development (LID) techniques will be required on all significant development and redevelopment projects, regardless of location. There may be opportunities during this Permit cycle to implement WURMP activities that complement the LID provisions now required as part of each Watershed Copermittee's Jurisdictional Urban Runoff Urban Runoff Management Program (JURMP).

Table 4-1 in Appendix B summarizes the Five-Year Strategic Plan for the SLR River Watershed. The proposed activities are detailed in Attachment B as Watershed Activity Summary Sheets. The Watershed Copermittees anticipate that changes to this plan will be necessary over the course of the Permit cycle due to unforeseen barriers to implementation, identification of new activities, or other factors. Any updates made to this Five-Year Strategic Plan will be described in the annual reports submitted to the RWQCB each January.

4.1 Proposed Watershed Water Quality Activities

The Municipal Storm Water Permit imposes the following restrictions on the number and types of WWQAs to be considered for implementation by the Watershed Copermittees:

- WWQAs are activities other than education that address the high priority water quality problems in the WMA.

- WWQAs may be implemented individually or collectively, and may be implemented at the regional, watershed, or jurisdictional level. However, a WWQA implemented on a jurisdictional basis must be organized and implemented to target a watershed's high priority water quality problems or must exceed the baseline jurisdictional requirements established by Section D of the Municipal Storm Water Permit.

- For each Permit year, no less than two WWQAs shall be in an active implementation phase. A WWQA is in an active implementation phase when significant pollutant load

reductions, source abatement, or other quantifiable benefits to discharge or receiving water quality can reasonably be established in relation to the watershed's high priority water quality problem(s).

- WWQAs that are capital projects are in active implementation for the first year of implementation only.

The WWQAs described below are consistent with the collective watershed strategy described elsewhere in this report. In short, the Watershed Copermittees determined that immediate load reduction and source abatement projects are necessary in the Mission HSA to address two well established problems: 1) bacteria at the Pacific Ocean shoreline at the SLR River mouth, and 2) eutrophication in Guajome Lake. Most other areas of the watershed require additional monitoring or source identification prior to moving forward with activity implementation. Existing and planned monitoring studies are described in activity summary sheets below. Independent of the results of these additional studies, the Watershed Copermittees agree that the following pollutant sources would benefit from increased attention over the course of this Permit cycle: agriculture, nurseries, residential areas, restaurants, and development projects.

4.2 Proposed Watershed Education Activities

The Municipal Storm Water Permit imposes the following restrictions on the number and types of WEAs to be considered for implementation by the Watershed Copermittees:

- WEAs are outreach and training activities that address the high priority water quality problems in the WMA.

- WEAs may be implemented individually or collectively, and may be implemented at the regional, watershed, or jurisdictional level.

- For each Permit year, no less than two WEAs shall be in an active implementation phase. A WEA is in an active implementation phase when changes in attitudes, knowledge, awareness, or behavior can reasonably be established in target audiences.

The WEAs described in Appendix B are consistent with the collective watershed strategy described elsewhere in this report. Target audiences associated with agriculture, nurseries, residential areas, restaurants, and significant new development will be the focus of most WEAs.

4.3 Proposed Public Participation Activities

This section describes the mechanisms that will be used to encourage public participation in the development and implementation of the SLR River WURMP. In accordance with Section E.2.h of the Municipal Storm Water Permit, Watershed Copermittees are required to implement a watershed-specific public participation mechanism and to encourage participation from other organizations within the watershed. While the Watershed Copermittees aim to improve coordination among there own agencies, the watershed approach requires participation from a diverse group of stakeholders, including other regulatory agencies, environmental groups, educational institutions, landowners, and private citizens. The Watershed Copermittees

recognize that no single agency has the capacity to address water quality issues on its own and that broad partnerships are essential to positively affect watershed conditions.

The Watershed Copermittees plan to use multiple avenues to engage their residents and businesses in the WURMP process. As a first step, the Watershed Copermittees have established WURMP Objective #4: "To encourage and enhance public involvement within the SLR River Watershed in activities related to urban runoff management." Public participation is also an important element in many of the education activities described in section 4.2 above. Specific public participation initiatives will vary from year to year depending on events that are planned by other stakeholders (e.g., cities, county, NGOs, civic groups), and the assessment of existing activities. A general list of existing and potential public participation activities includes:

- Cleanup events for the SLR River, beaches, and targeted neighborhoods.
- Booths at community events such as Pepper Tree Day at Mission SLR and the Avocado Festival in Fallbrook.
- Workshops targeting specific industries (agriculture, restaurants, etc.) or municipal staff and advisory groups, including planners, engineers, architects, and citizen advisory groups.
- Presentations at public forums such as city council meetings, community planning group meetings, civic meetings, conferences, and other public venues.
- Collaboration and information sharing with established groups in the watershed, including the SLR Watershed Council (SLRWC) and the Mission Resource Conservation District.
- Use of the Project Clean Water website to post important WURMP program documents, including the SLR River WURMP itself and subsequent annual reports.

4.4 Proposed Land-Use Planning Activities

This section describes the mechanisms to be used to encourage collaborative, watershed-based, land-use planning. In accordance with Section E.2.d of the Municipal Storm Water Permit, Watershed Copermittees are required to develop, implement, and modify, as necessary, a program for encouraging collaborative, watershed-based land use planning in their jurisdictional planning departments. Cities and counties generally exercise their land use planning authorities independently. As a result, the land use policies of individual municipalities have the potential to impact water quality in areas beyond their jurisdictional boundaries. The goal of encouraging watershed-based land use planning is to ensure that jurisdictional land use policies and decisions do not negatively affect upstream or downstream uses within shared watersheds.

The Watershed Copermittees plan to use multiple avenues to encourage watershed-based land use planning during this Permit cycle. As a first step, the Watershed Copermittees have established WURMP Objective #2: "To integrate watershed principles into land use planning

that affects the SLR River Watershed." Existing and potential activities to encourage watershed-based land activities are described in the sections below.

4.4.1 Existing Inter-Jurisdictional Planning Efforts

State law requires that local governments hold public hearings prior to most planning actions. Jurisdictions, as well as the public at large, have the opportunity to comment on and to participate in hearings related to land use development. Also, discretionary development projects subject to review under the California Environmental Quality Act (CEQA) that may affect downstream water resources are studied to determine the potential effects of such projects, and affected jurisdictions or agencies are notified of such projects. Each Watershed Copermittee accepts comments from affected jurisdictions or agencies concerning watershed impacts, and implements the recommendations of such affected parties whenever feasible. As part of jurisdictional Standard Urban Storm Water Mitigation Plans (SUSMP), discretionary projects are required to prepare a Storm Water Management Plan (SWMP) or similar document for review and approval. The purpose of the SWMP is to provide the information needed to fully and adequately characterize the existing water quality, analyze the drainage, develop effective post-construction storm water protection, and ensure the effectiveness of best management practices (BMPs) through proper maintenance and long-term fiscal responsibility. Prior to being approved by a hearing body, environmental documents prepared for the project (including the SWMP) are made available to interested members of the public and adjacent jurisdictions for review and comment on development-related storm water issues.

4.4.2 Potential Watershed-Based Land Use Planning Mechanisms

In addition to the processes described above, the Watershed Copermittees will consider additional watershed-based land use planning mechanisms as appropriate. Each jurisdiction will determine the degree to which each of these mechanisms will be employed.

Forums for Watershed-based Collaboration

For watershed issues to be successfully integrated into the land use planning process, effective dialogue must be established between the responsible parties. To this end, storm water managers within the SLR River Watershed, the Copermittee staff with primary responsibility for completion and implementation of the WURMP, have begun to establish forums to ensure effective communication with planning staff, both jurisdictionally and on a watershed basis. In both instances, the purpose of the meetings is to facilitate the exchange of pertinent watershed-specific information and to explore the collaborative development of planning strategies between storm water managers and planners. Through enhanced communication and strong relationships, jurisdictions can better address watershed needs as a whole. Potential pollutant load reductions may be realized through cooperative planning and creating cross jurisdictional awareness.

Staff Training

In addition to providing general education on water quality and watershed issues, land use planning information gathered during water quality assessments will form the basis of watershed-specific training elements developed either individually or collaboratively by the SLR River Watershed Copermittees. One main focus of this training will be promoting the implementation of Low Impact Development (LID) for new development and redevelopment projects. The SLR River Watershed is anticipated to grow significantly in population over the

next ten years, particularly in unincorporated County areas. The Copermittees will educate land use planners and advisory groups on how to incorporate LID principals during the planning phase to reduce the impact of development and redevelopment on water quality in the watershed.

Information and Material Sharing

Continued collaboration on WURMP development will result in the identification or generation of various written and electronic forms of data and information relevant to land use planning. Utilizing electronic distribution systems (e-mail) to the extent practical, the Watershed Copermittees will ensure that such materials are shared with land use planning staff within their individual jurisdictions as well as other jurisdictions within the watershed.

Examples of relevant information, materials, or work products, which may be shared periodically, include:

- Grant proposals.
- Restoration or BMP development projects.
- Approvals for unique (e.g. projects approved with SUSMP waivers) or large development projects.
- Monthly meeting notices.
- Information on various other activities such as mitigation or structural BMP efforts, educational activities, and grant proposals.

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5.0 EFFECTIVENESS ASSESSMENT

This section describes how the SLR River WURMP addresses the requirements of Section I.2. of the Municipal Storm Water Permit. WURMP effectiveness assessments will be based on the concepts first identified and described in the San Diego Copermittees' October 2003 document *A Framework for Assessing the Effectiveness of Jurisdictional Urban Runoff Management Programs* (Framework). The reader is encouraged to become familiar with the concepts described in the Framework to better understand the remainder of this section. To summarize, Table 5-1 describes the six outcome levels identified in the Framework along with potential measures and methods for measuring effectiveness.

Table 5-1. Targeted Outcomes and Potential Assessment Measures and Methods.

Outcome Type	Potential Assessment Measures and Methods
Level 1: Compliance with Activity-based Permit Requirements	Verification that required activities were implemented (Yes / No) Quantification of activity outputs
Level 2: Changes in Knowledge / Awareness	Changes in a targeted audience's knowledge and awareness potentially through the use of pre- and post-surveys and/or direct observations
Level 3: Behavioral Change / BMP Implementation	Changes in a targeted population's behavior or BMP implementation potentially through the use of direct observations (i.e., inspections)
Level 4: Load Reductions	Measured or estimated pollutant load reductions from a project, site, or group of sites. Measurements may be supported by water quality data and calculations may be supported by information and data related to the pollutant-generating activities.
Level 5: Changes in Discharge Quality	Historical and statistically supported trends in the level of pollutants in discharges from the MS4. This can be assessed using the results of water quality monitoring data.
Level 6: Changes in Receiving Water Quality	Historical and statistically supported trends in the level of pollutants in receiving waters. This can be assessed using the results of water quality monitoring data.

The Permit requires two general types of effectiveness assessment in the WURMP: 1) assessment of each watershed activity, and 2) assessment of overall WURMP effectiveness. The approach for complying with each requirement is described below.

5.1 Watershed Activity Assessment

The effectiveness of each Watershed Water Quality Activity and Watershed Education Activity will be assessed on an annual basis. Other watershed activities types (i.e., Watershed Water Quality Monitoring Activities, Watershed Source Identification/Characterization Activities) will

be assessed as determined appropriate. Data are typically collected during or after activity implementation to assess effectiveness in achieving targeted outcomes.

Each watershed activity is unique, and its impacts on water quality are equally distinctive. The activity summary sheets included in Section 4 identify specific targeted outcomes (Levels 1–6) as well as the measures and methods that will be used to gauge activity effectiveness. Measurable outcomes do not always follow a linear path (i.e., assessing effectiveness at each of the six outcome levels). For example, a capital project may result in pollutant load reductions (Level 4), but may have no bearing on changes in the awareness or behavior of a targeted population (Levels 2 and 3). It is also unlikely that implementation of an individual watershed activity would be measurable at Levels 5 or 6. Level 5 and Level 6 Outcomes are typically measurable through cumulative assessments as described in the following section.

5.2 Overall WURMP Assessment

The assessment of overall WURMP effectiveness will focus on the cumulative impacts of program implementation and will include the following elements: 1) an assessment of how well Watershed Copermittees have collectively complied with minimum Permit requirements; 2) an assessment of the cumulative impact of watershed activity implementation; and 3) an integrated assessment of discharge and receiving water quality.

To assess how well Watershed Copermittees have collectively complied with minimum Permit requirements, Table 5-2 provides the Level 1 Outcomes that will be tracked on an annual basis:

Table 5-2. Level 1 Outcomes for Assessing Compliance with Minimum Permit Requirements.

Targeted Outcome	Measure
Update watershed map	Completion (Yes / No)
Update watershed water quality assessment, including identification of the watershed's water quality problems and high priority water quality problem(s) during the reporting period.	Completion (Yes / No)
Identify the likely sources, pollutant discharges, and/or other factors causing the high priority water quality problems within the watershed.	Completion (Yes / No)
Update list of potential Watershed Water Quality Activities.	Completion (Yes / No)
Identify and describe the Watershed Water Quality Activities implemented by each Copermittee during the reporting period.	Completion (Yes / No)
Update list of potential Watershed Education Activities.	Completion (Yes / No)
Identify and describe the Watershed Education Activities implemented by each Copermittee during the reporting period.	Completion (Yes / No)

Targeted Outcome	Measure
Describe the public participation mechanisms used during the reporting period and the parties that were involved.	Completion (Yes / No)
A description of Copermittee collaboration efforts	Completion (Yes / No)
Minimum quarterly meetings of the SLR WURMP Workgroup	# Meetings
Describe the efforts implemented to encourage collaborative, watershed-based, land-use planning.	Completion (Yes / No)
When applicable, describe TMDL activities implemented (including BMP Implementation Plan or equivalent plan activities) for each approved TMDL in the watershed.	Completion (Yes / No)

Assessing the cumulative effectiveness of watershed activity implementation is challenging. The results of individual activities are typically difficult to aggregate at the watershed level. Nevertheless, the Watershed Copermittees will strive to conduct activity-specific assessments in a way that allows for an assessment of cumulative watershed impacts when possible. This may involve the use of consistent methods to assess similar activity types or the use of consistent units of measure to aggregate the results of disparate activity types.

Finally, the Watershed Copermittees will attempt to improve their ability to conduct integrated assessments over the course of this Permit cycle. Integrated assessments aim to identify the relationship between program implementation and resulting effects on discharge and receiving water quality. Integrated assessments, therefore, attempt to draw links between the activity-specific assessments described above and water quality monitoring data collected at the regional, watershed, and jurisdictional levels. The Watershed Copermittees will use available data and information to determine what impacts, if any, WURMP implementation is having at Outcome Levels 5 and 6. It must be recognized, however, that urban runoff management takes place at many scales. For example, jurisdictional and regional urban runoff programs also result in watershed benefits, and a state-of-the-art does not exist to isolate the effect of each.

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6.0 PROGRAM REVIEW AND MODIFICATION

The SLR Watershed Copermittees will meet on a regular basis, at least quarterly, to review the status and progress of cooperation within the WMA. These meetings will be designed to ensure adequate collaboration between the various jurisdictions and departments as needed to implement this WURMP. The Watershed Copermittees will review the progress of the watershed program and coordinate their activity planning, implementation and effectiveness evaluations. The Watershed Copermittees will also cooperate in the preparation of WURMP annual reports.

The Watershed Copermittees will review the overall watershed program annually and make modifications as necessary to improve the overall effectiveness of Copermittee activities. Future reviews will generally follow the same process used in this WURMP, but will primarily be concerned with consistency between the data collected that year and the data used to support the assumptions and conclusions described in this WURMP. If the data collected and evaluated each year continues to support the current conclusions regarding the priority pollutants and targeted land uses in the WMA, then the Strategic Goals for the WMA will not be modified. Conversely, if the data calls into question the assumptions and conclusions supporting the current Strategic Goals, appropriate modifications will be made as necessary so that the Strategic Goals continue to address the top watershed level priorities. Any changes to the Strategic Goals will also result in changes to the selection and implementation of the activities supporting those Strategic Goals. Changes to the WURMP will be described in the WURMP Annual Reports.

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7.0 CONCLUSIONS

Since January 2003, the SLR Watershed Copermittees have been actively implementing a Watershed Urban Runoff Management Program (WURMP). The City of Oceanside, as lead agency, in collaboration with the City of Vista and the County of San Diego – all local agencies which have jurisdiction within the San Luis Rey River Watershed Management Area (SLR WMA) – are continuing their efforts to develop and implement a watershed-based program in the SLR WMA. This document discusses the SLR Copermittees' efforts to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) Municipal Storm Water Permit (Municipal Permit) for San Diego Copermittees (Order No. 2007-0001, NPDES No. CAS0108758). More importantly, this document describes collaborative plans and efforts to reduce the impacts of urban activity on receiving water quality within the SLR WMA to the maximum extent practicable.

The goal of the WURMP is to positively affect the water quality of the SLR WMA while balancing economic, social, and environmental constraints. This goal will be pursued and ultimately achieved through the implementation of the following specific objectives:

- Objective #1: Develop and implement a strategic plan to assess and improve water quality within the SLR WMA, which responds to identifiable problems and reflects the beneficial uses of the watershed.
- Objective #2: Integrate watershed principles into land use planning that affects the SLR WMA.
- Objective #3: Enhance public understanding of watershed issues and pollution prevention within the SLR WMA.
- Objective #4: Encourage and enhance public involvement within the SLR WMA in activities related to urban runoff management.

To help reach these goal and objectives, the SLR Copermittees will work to identify, implement, and assess appropriate watershed water quality, education, and public participation activities, as well as watershed-based land use planning mechanisms, to properly target high priority water quality problems and their sources.

The SLR WMA is located along the northern border of the County of San Diego, California. It encompasses approximately 562 square miles and includes three Hydrologic Areas (HAs): Lower San Luis, Monserate and Warner Valley. The SLR River originates in the Palomar and Hot Springs Mountains, both over 6,000 feet above mean sea level (MSL), and extends over 55 miles across northern San Diego County before discharging to the Pacific Ocean in the City of Oceanside. Of the nine watersheds in the San Diego region, the SLR River Watershed is the third largest (SANDAG 1998).

Residential and agriculture serve as the dominant land uses in the watershed. The majority of the watershed has remained undeveloped with higher population concentrations in the Lower San Luis HA. Although the SLR River Watershed is the third largest of the San Diego region watersheds, its population is one of the smallest. The population of the SLR River Watershed was 146,383 according to the 2000 census and is forecasted to increase to 219,252 by 2020 and 249,673 by 2030. This growth is expected to occur mostly within vacant land in the unincorporated areas of the watershed.

The SLR WURMP is a continuation of a long-term effort to protect and enhance the water quality of the rivers and creeks at the watershed level. It is the goal of all participating jurisdictions to work cooperatively with other agencies, non-governmental organizations, and private citizens at the watershed level in order to positively affect the water resources of the region and achieve compliance with the Municipal Permit. This program provides a mechanism for coordination of existing water quality-related efforts in the watershed. The Program, where possible, will integrate its efforts with other projects such as those of the SLR Watershed Council.

Copermittees have developed a Model Watershed Urban Runoff Management Strategy to guide the selection and implementation of Watershed Activities that appropriately addresses each watershed Copermittees' contribution to the high priority water quality problems in their WMA. Data analyzed to date for the SLR Watershed suggests that bacteria and nutrients are high priority water quality problems in the Lower San Luis HA. The water quality assessment is discussed in detail in Section 3.

To address water quality problems, this Plan identifies a series of watershed water quality and education activities in Section 4, in addition to other ongoing and planned activities. Having used the watershed strategy as the basis for developing the activities, the Copermittees have focused activity efforts on the potential sources that are most likely to be contributing the pollutants that are causing the high priority water quality problems in the SLR WMA. Where receiving water conditions and pollutants sources are not clearly characterized, monitoring and source identification activities will be implemented.

The Cities of Oceanside and Vista and the County of San Diego share the implementation responsibilities for the WURMP along with other interested stakeholders. Due to the commitments of these agencies, this watershed program is expected to extend beyond the Municipal permit expiration of January 24, 2012. Using the watershed approach, the SLR Watershed Copermittees aim to positively affect the water quality of the SLR River Watershed in a cost effective, environmentally sensitive, and collaborative manner.

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