SAN DIEGO RIVER WATERSHED
URBAN RUNOFF MANAGEMENT PLAN
– JANUARY 2003 –

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EXECUTIVE SUMMARY

The San Diego River is one of the eight major stream systems in San Diego County that drains to the Pacific Ocean. In recent years, there has been a growing concern that the San Diego River and its tributaries are being impacted by pollution associated with urban and storm water runoff. Controlling pollution in runoff is critical to preserving aquatic resources and the economic viability of the San Diego region. The San Diego River Watershed Urban Runoff Management Plan is intended to be one in a series of efforts to protect the natural resources within the watershed and ensure sustainability for future generations.

These are exciting times for the San Diego River and its watershed. Due to the efforts of non-governmental organizations, private citizens and elected officials there has been a tremendous surge of interest in the San Diego River and its watershed.

Earlier this year, the San Diego River Park Foundation (www.sandiegoriver.org), a non-governmental organization dedicated to enhancing the San Diego River and working toward the establishment of a river-long park, completed the San Diego River Park Conceptual Plan. The Plan outlines the guiding principles for the development of a San Diego River Park based on the vision expressed by community members.

The City of San Diego Mayor, Dick Murphy, has made it his goal to create the San Diego River Park, as envisioned in the San Diego River Park Conceptual Plan. To this end, Mayor Murphy has assembled the San Diego River Park Coalition, a committee that includes elected officials as well as representation from the San Diego River Park Foundation. The purpose of this effort is to address and coordinate river park issues across local jurisdictional boundaries. The San Diego River Park Coalition committee holds regular public meetings which are chaired by Mayor Murphy.

In September 2002, Governor Gray Davis signed into law the San Diego River Conservancy Act. The legislation (Assembly Bill 2156), introduced by Assembly Member Christine Kehoe and co-authored by Assembly Member Howard Wayne and Senator Dede Alpert, becomes effective on January 1st, 2003. The San Diego River Conservancy will have the ability to acquire, restore and manage land along the river's length and will help to bring together the various interests and jurisdictions working on creating this park, which will follow the 52-mile San Diego River.

In addition, the County of San Diego is leading an effort to develop a comprehensive San Diego River Watershed Management Plan in cooperation with watershed stakeholders, local jurisdictions, and other governmental agencies. The comprehensive plan will identify priorities and strategies for the protection and restoration of groundwater resources, native vegetation, water flows, riparian zones, beneficial uses of waters and overall water quality.

The San Diego River Watershed Urban Runoff Management Plan (San Diego River Watershed URMP) has been prepared by the City of San Diego, as lead agency, in collaboration with the cities of El Cajon, La Mesa, Poway, Santee and County of San Diego – all local agencies which have jurisdiction over the San Diego River watershed. The Plan meets the requirements of the National Pollutant Discharge Elimination System (NPDES) Municipal Storm Water Permit for San Diego Copermittees (Order No. 2001-01, NPDES No. CAS0108758). The Municipal Storm Water Permit requires the development and implementation of Watershed Urban Runoff Management Programs for each of nine watershed areas within San Diego County including the San Diego River watershed. This document represents the plan the jurisdictions and stakeholders have prepared to implement said Program.

The primary goal of this program is to positively affect the water resources of the San Diego River Watershed while balancing economic, social, and environmental constraints. The Program identifies four primary objectives to strive towards this goal: (1) develop and expand methods to assess and improve water quality within the watershed; (2) integrate watershed principles into land use planning; (3) enhance public understanding of sources of water pollution; and (4) encourage and develop stakeholder participation. To help reach these goals and objectives, the San Diego River Watershed Urban Runoff Management Plan identifies and prioritizes water quality related issues within the watershed that can be potentially attributed (wholly or partially) to discharges from the municipal storm drain systems and may be addressed through a cross-jurisdictional approach. Additionally, activities to abate sources of pollution and restore and protect beneficial uses are also identified.

During this initial year, the evaluation of watershed conditions, or water quality assessment, was based upon a very limited data set. As more data becomes available, it is important that the program be evaluated and allowed to evolve. Therefore, constituents and conditions of concern that have been identified as “high priority” water quality issues in this year’s assessment may be removed from the high priority list in future years. The reverse holds true for issues that were not identified as high priority water quality issues in this year’s assessment.

Data analyzed to date suggests that bacteria and diazinon are constituents of concern within this watershed. Additionally, eutrophication and benthic community degradation are identified as conditions of concern. Lastly, other issues that have the potential to negatively affect water supply have also been noted. The water quality assessment is discussed in detail in Chapter 3.

To address issues of concern, this Plan identifies a series of actions in Chapter 4, in addition to other ongoing and planned activities identified in the Land Use Planning, Watershed-Based Education, and Public Participation Strategy Chapters. Specifically, San Diego River Watershed Copermittees will implement the following projects (described in detail in Chapter 4): Bacterial Indicators Source Identification, Data Collection and Analysis, Integrated Pest Management Campaign and the Source Water Protection Guidelines.

As more data becomes available, it is important that the Program be evaluated and allowed to evolve. Participating agencies consider this point in time to be the beginning of a continuous long-term process, which will be further developed and refined over time. Consistent with the Municipal Permit, Program amendments and/or revisions will be submitted to the California Regional Water Quality Control Board – San Diego Region for review as part of the annual reporting process.

The San Diego River Watershed Urban Runoff Management Program has been developed with the input from a diverse set of stakeholders, who will also be an integral part of program implementation. 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. It should be noted that this plan has been written with the public in mind as a means to engage San Diego area residents in watershed issues and to facilitate public understanding of challenges related to the protection of our precious water resources.

The cities of San Diego, El Cajon, La Mesa, Poway, and Santee and the County of San Diego share the implementation responsibilities for the Program along with other stakeholders. Due to the commitments of these agencies, this watershed program is expected to extend beyond the Municipal Permit expiration date of February 21, 2006.

The San Diego River Watershed Urban Runoff Management Program signifies the beginning of long-term efforts to protect and enhance the water quality of the river and its tributaries at the watershed level. The Program was developed with stakeholder participation and will integrate where pertinent with other projects such as the San Diego River Park and the San Diego River Watershed Management Plan. In addition to obtaining additional understanding of the ecosystem, there is a desire to locate storm water Best Management Practices within creek and river sections where appropriate downstream of existing urbanized areas because of the long-term water quality benefits. Using the watershed approach, the cities of San Diego, El Cajon, La Mesa, Poway, and Santee and the County of San Diego aim to protect and enhance aquatic resources in a cost effective, environmentally sensitive, and collaborative manner.

REPORT ORGANIZATION

This report is organized in three major sections:

- Section I, “Introduction and Watershed Description,” provides general information about the San Diego River watershed and the regulatory context within which this program was developed;
- Section II, “Water Quality Assessment,” provides an assessment of the quality of the water of receiving bodies within the watershed and identifies and prioritizes related challenges; and,
- Section III, “Plan of Action,” outlines the activities the participating local jurisdictions will undertake in cooperation with others in order to address the water quality issues that have been identified.

1 PROGRAM FRAMEWORK

1.1 INTRODUCTION

Urban and storm water runoff discharged into streams, bays, and oceans from municipal storm drain systems has been identified under local, regional, and national research programs as one of the principal causes of water quality problems in most urbanized regions. Runoff reaching our waterways has the potential to contain a host of constituents like trash and debris, bacteria and viruses, oil and grease, sediments, nutrients, and metals. These pollutants can adversely affect receiving and coastal waters, associated biota, and public health.

The San Diego River watershed falls within the boundaries of the cities of San Diego, El Cajon, La Mesa, Poway, Santee and County of San Diego. These local jurisdictions are committed to finding creative and effective ways to improve the water quality of the receiving waters of the San Diego River watershed, such as the San Diego River and Pacific Ocean, while complying with the National Pollutant Discharge Elimination System Municipal Storm Water Permit (Order No. 2001-01), hereafter referred to as the Municipal Permit.

While the cities of San Diego, El Cajon, La Mesa, Poway, Santee and County of San Diego ("*San Diego River Watershed Copermittees*") have developed and are in the process of implementing broad water pollution prevention programs within their respective jurisdictions, the San Diego River Watershed Urban Runoff Management Program ("*San Diego River WURMP*") focuses specifically on water quality related issues within the San Diego River watershed that can be potentially attributed (wholly or partially) to discharges from the municipal storm water conveyance system (also referred to as the storm drain system) and may be addressed through a cross-jurisdictional approach.

The primary goal of this inter-jurisdictional effort is to positively affect the water resources of the San Diego River watershed while balancing economic, social and environmental constraints. The following objectives have been identified in order to achieve the program goal:

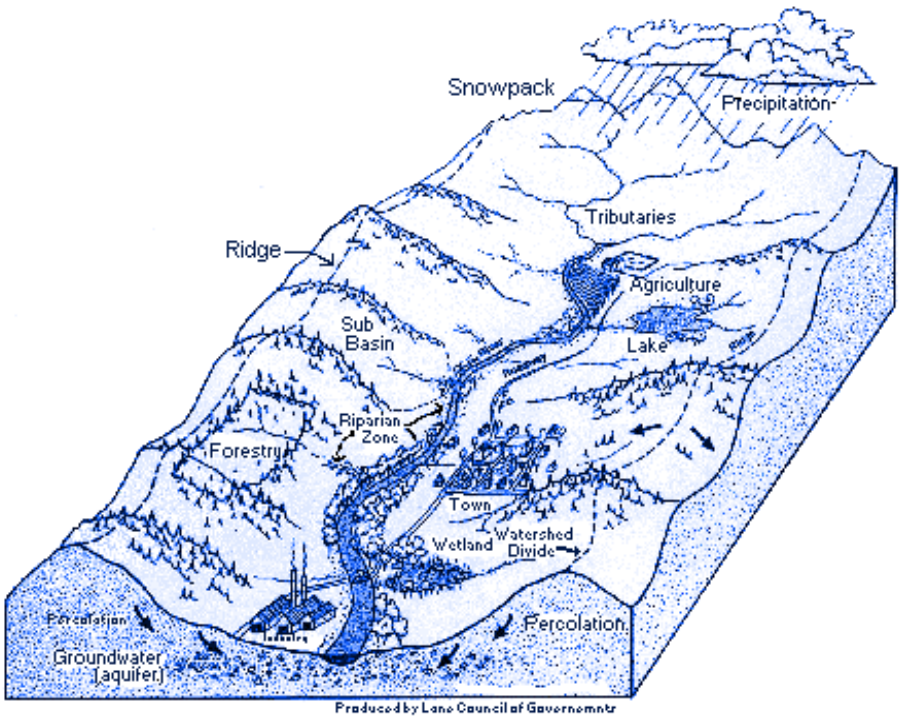
1) Develop/expand methods to assess and improve water quality within the watershed;
2) Integrate watershed principles into land use planning;
3) Enhance public understanding of sources of water pollution; and,
4) Encourage and develop stakeholder participation.

1.1.1 WHY A WATERSHED?

A watershed is defined as a contiguous area of land that drains to a particular water body. The term is not restricted to surface water drainage characteristics as it includes interactions with subsurface water. Watersheds come in all shapes and sizes and cross

county, state and national boundaries[1]. The delineation of a watershed, or drainage area, depends on the scale of reference and small watersheds are combined together to become larger watersheds. Watershed boundaries follow the major ridgelines around river channels and meet where the water flows out of the watershed, usually the mouth of a stream or river.

Figure 1-1. Typical Watershed



Source: U.S. EPA, Office of Wetlands, Oceans & Watersheds. http://www.epa.gov/OWOW/.

Most environmental management activities have been traditionally been based on the jurisdictional limits of participating agencies including cities, counties, and states. While logical from legal and budgetary perspectives, this geographic division of land has limited applications when considering environmental processes at large. Watersheds, on the other hand, make sense for water quality management as they represent geographic units of hydrological processes. Watersheds are "readily identifiable landscape units that integrate terrestrial, aquatic, geologic, and atmospheric processes[2]."

1.1.2 SAN DIEGO WATERSHEDS

San Diego County encompasses an area of over 4,000 square miles in the southwest corner of California. The northwest to southeast trending Peninsular Range divide two

[1] U.S. Environmental Protection Agency, 2002.
[2] Clements *et al.*, 1996.

hydrologic regions in the San Diego region. The San Diego Hydrologic Region drains in a westerly direction toward the Pacific Ocean and the Colorado Hydrologic Region drains in an easterly direction toward the Colorado River. There are a total of 11 major watersheds or *hydrologic units* in the San Diego Hydrologic Region encompassing a land area of nearly 3,000 square miles. Eight major stream systems originate on the western slope of the Peninsular Range and discharge into the Pacific Ocean. From north to south they are San Juan Creek, and the Santa Margarita, San Luis Rey, San Dieguito, San Diego, Sweetwater, Otay, and Tijuana Rivers. In addition, there are three hydrologic units whose headwaters are located between the Peninsular Range and the Pacific Ocean. These include the Carlsbad, Los Peñasquitos, and Pueblo San Diego units[3].

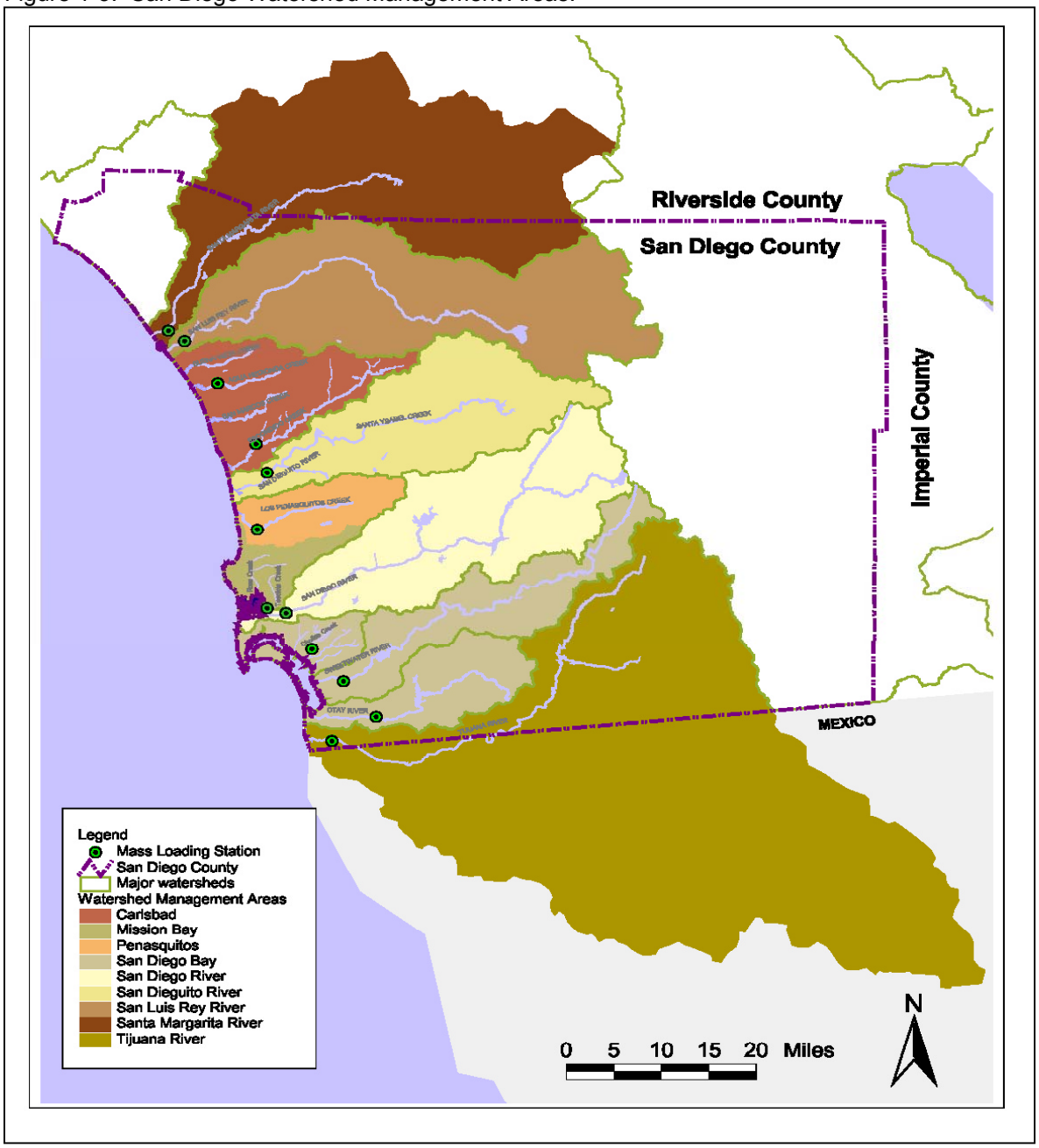
Figure 1-2. San Diego Hydrological Units

[3] Project Clean Water 2002.

In California, the State Water Resources Control Board (SWRCB) and its nine Regional Water Quality Control Boards have primary responsibility for the protection of water quality. This requires preventing and reducing water pollution in our rivers, streams, lakes, beaches, bays, and groundwater. Within this regulatory context, the San Diego Regional Board determines the appropriate scale to define watersheds in the region.

For regulatory purposes, the Regional Board has divided the San Diego region into 11 Watershed Management Areas as illustrated below:

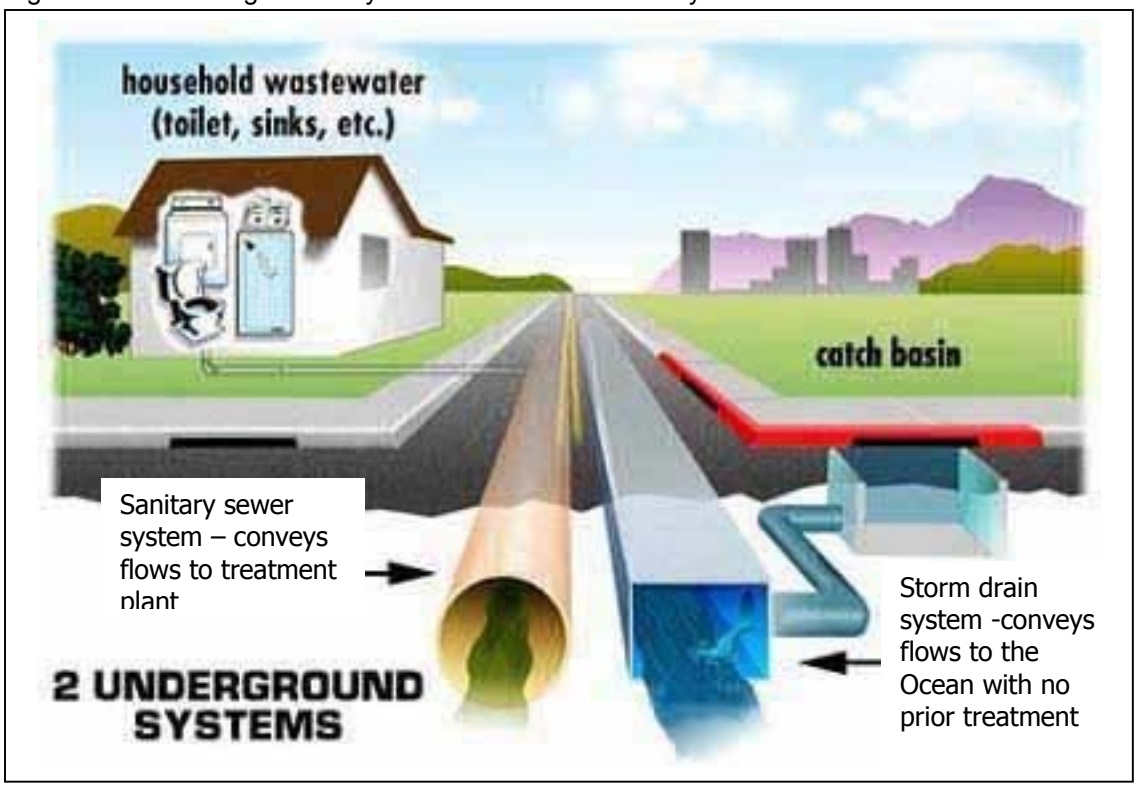
Figure 1-3. San Diego Watershed Management Areas.



1.2 BACKGROUND

Pollutant loads associated with urban and storm water runoff are considered one of the leading causes of water quality impairment in the San Diego region and nationwide. Pollutants carried in urban and storm water runoff, indiscriminate of dry or wet weather conditions, routinely find their way to our creeks, lagoons, bays, and ocean via the municipal storm drain systems. Unlike many other regions in the country, storm drain systems in San Diego are separate from sanitary sewer systems. The San Diego River watershed storm drain system, which collects urban runoff and rainwater from our streets, rooftops, driveways, parking lots, and other impervious areas, flows directly to the river and Pacific Ocean without receiving any form of treatment.

Figure 1-4. San Diego Sanitary Sewer and Storm Drain Systems



As noted above, urban and storm water runoff potentially contain a host of pollutants like trash and debris, bacteria and viruses, oil and grease, sediments, nutrients, metals, and toxic chemicals. These contaminants can adversely affect receiving and coastal waters, associated wildlife, and public health. Water pollution associated with runoff is not only a problem during rainy seasons, but also year-round due to many types of water use activities that discharge runoff into the storm drain system.

All storm water management activities within the region are primarily focused on improving the quality of the region's *receiving waters* in order to protect their *beneficial uses*. This objective translates into two fundamental goals for municipal storm water programs:

- to eliminate the discharge of pollutants into San Diego waters to the maximum extent practicable; and,
- to achieve sustainable water quality levels that lead to fishable and swimmable waters.

1.3 REGULATORY FRAMEWORK

1.3.1 MUNICIPAL STORM WATER PERMIT

The principal law governing pollution of the nation's surface waters is the Federal Water Pollution Control Act, more commonly known as the Clean Water Act. The Clean Water Act set the goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. The federal Clean Water Act was amended in 1987 to address urban and storm water runoff. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges from their storm water conveyance system. The National Pollutant Discharge Elimination System (NPDES) is a federal program established under the Clean Water Act to regulate discharges from any point source. A point source, as defined under the Clean Water Act is any "discernible, confined and discrete conveyance from which pollutants are or may be discharged." Discharge of urban and storm water runoff conveyed in the storm drain system is considered a point source. Section 402(p) of the Clean Water Act prohibits municipal storm water discharges without an NPDES permit. The discharge from any point source, except in compliance with an NPDES permit, is considered unlawful.

Residents, businesses and other uses within local jurisdictions contribute to discharges of storm water and urban runoff from their property into *receiving waters* of the San Diego region via municipal storm drain systems. These municipal storm water discharges are regulated under countywide requirements contained in Regional Board Order No. 2001-01. This Order serves as the NPDES Municipal Storm Water Permit (Municipal Permit) for the for the County of San Diego, the San Diego Unified Port District, and the 18 incorporated cities of San Diego County, referred to collectively as the *Copermittees*.

The Municipal Permit is granted and administered by the State Water Resources Control Board through the San Diego Regional Water Quality Control Board ("Regional Board"). The State Water Resources Control Board (SWRCB) and its nine Regional Boards have primary responsibility in California for the protection of water quality. This responsibility translates into preventing and reducing water pollution in our rivers, streams, lakes, beaches, bays, and groundwater.

Municipal Permits seek to ensure that the *beneficial uses* of receiving waters are protected. Beneficial uses are defined as the uses of water necessary for the survival or well being of people, plants, and wildlife. Beneficial uses include surfing at a local beach, fishing in a creek or stream, or just taking a pleasurable walk along a scenic

waterfront. Municipal storm water NPDES permits contain requirements to achieve numeric and narrative *water quality objectives* that are established to protect beneficial uses. Water quality objectives are defined as constituent concentrations, levels, or narrative statements, representing a quality of water that supports the most sensitive beneficial uses that have been designated for a water body.

Each Copermittee is required to implement the requirements of the Municipal Permit across two broad levels of responsibility. Copermittees have responsibility for the water quality impacts of urbanization within (1) their jurisdiction and (2) their watershed(s). The Municipal Permit reflects these two broad levels of responsibility, in that it requires implementation of comprehensive urban runoff management programs, memorialized though Urban Runoff Management Plans, at both jurisdictional and watershed levels.

All San Diego River jurisdictions have completed their jurisdictional Urban Runoff Management Plans. In general, these plans outline actions that each of these agencies will undertake in order to protect and improve the water quality of the Pacific Ocean, as well as rivers, creeks and bays in the region while achieving compliance with the Municipal Permit.

Additionally, Copermittees have adopted local regulations based on the Model Standard Urban Storm Water Mitigation Plan (SUSMP) developed cooperatively at the regional level and adopted by the Regional Board on June 12, 2002. The goal of the SUSMP and associated local regulations is to ensure that new development does not result in long term increases of pollutants from a project site once this is developed and operational.

1.3.2 WATERSHED URBAN RUNOFF MANAGEMENT PROGRAMS

The Municipal Permit requires the development and implementation of Watershed Urban Runoff Management Programs (Watershed URMPs) for each of nine watershed management areas as defined below:

Table 1-1. Watershed Management Areas.

WATERSHED MANAGEMENT AREAS	RESPONSIBLE COPERMITTEE(S)	MAJOR RECEIVING WATER BODIES
Santa Margarita River	County of San Diego*	Santa Margarita River and Estuary, Pacific Ocean
San Luis Rey River	Escondido Oceanside* Vista County of San Diego	San Luis Rey River and Estuary, Pacific Ocean
Carlsbad	Carlsbad Encinitas* Escondido Oceanside San Marcos Solana Beach Vista County of San Diego	Batiquitos Lagoon, San Elijo Lagoon, Agua Hedionda Lagoon, Buena Vista Lagoon, Pacific Ocean

WATERSHED MANAGEMENT AREAS	RESPONSIBLE COPERMITTEE(S)	MAJOR RECEIVING WATER BODIES
San Dieguito River	Del Mar Escondido Poway City of San Diego* Solana Beach County of San Diego	San Dieguito River and Estuary, Pacific Ocean
Peñasquitos	Del Mar Poway City of San Diego* County of San Diego	Los Peñasquitos Creek, Los Peñasquitos Lagoon, Pacific Ocean
Mission Bay	City of San Diego*	Mission Bay, Pacific Ocean
San Diego River	El Cajon La Mesa Poway City of San Diego* Santee County of San Diego	San Diego River, Pacific Ocean
San Diego Bay	Chula Vista Coronado Imperial Beach La Mesa Lemon Grove National City City of San Diego San Diego Unified Port District* County of San Diego	San Diego Bay, Sweetwater River, Otay River, Pacific Ocean
Tijuana River	Imperial Beach* City of San Diego County of San Diego	Tijuana River and Estuary, Pacific Ocean

* Denotes *lead Copermittee*.

The City of San Diego is designated as the lead Copermittee for the San Diego River Watershed Urban Runoff Management Program (San Diego River WURMP). As such, the City is responsible for developing the San Diego River WURMP, producing associated documents, and coordinating overall implementation of the program. All San Diego River Watershed Copermittees are required to collaborate with other Copermittees within the watershed to "identify and mitigate the highest priority water quality issues/pollutants in the watersheds" (Municipal Permit, Section J1, pg 43). This WURMP serves as the vehicle for this cross-jurisdictional collaborative effort.

The San Diego River Watershed Urban Runoff Management Plan will be submitted to the Regional Board no later than January 31, 2003. Additionally, annual program reports will also be submitted to the Regional Board. Annual reports will include the following:

1. A comprehensive description of all activities conducted by the participating jurisdictions in accordance with the program;
2. An identification of water quality related improvements and/or degradation;
3. A description of the mechanism for public participation;
4. A description of the cross-jurisdictional watershed based land use planning efforts;
5. An assessment of program effectiveness;

6. Any proposed program revisions; and,
7. A summary of pertinent data not included in the annual monitoring report.

The first annual report will be submitted to the Regional Board by January 31, 2004. Subsequent annual reports are due every January 31st during the life of the current Municipal Permit, which expires on February 21st, 2006.

1.3.3 WATER QUALITY CONTROL PLAN FOR THE SAN DIEGO BASIN

The Water Quality Control Plan for the San Diego Region (more commonly referred to as the Basin Plan) was adopted by the Regional Board in 1994. This document serves to guide and coordinate the management of water quality within the region. According to the Basin Plan, "the most basic goal of the Regional Board is to preserve and enhance the quality of water resources in the San Diego Region for the benefit of present and future generations[4]." Specifically, the Basin Plan: (1) designates beneficial uses for inland surface waters, coastal waters, reservoirs and lakes, and ground water; (2) sets narrative and numerical water quality objectives that must be attained or maintained to protect the designated beneficial uses; (3) describes implementation programs to protect the beneficial uses of all waters in the Region; and, (4) describes surveillance and monitoring activities to evaluate the effectiveness of the Basin Plan. The Basin Plan incorporates by reference all applicable State and Regional Board plans and policies. Beneficial uses applicable to the waters of the state of California include contact water recreation (such as swimming and surfing), provision of habitat for freshwater, marine and wildlife species, and water supply.

The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) and the Federal Clean Water Act both mandate periodic review of water quality control plans. Section 303 (c)(1) of the Federal Clean Water Act requires, "… the water pollution control agency of such State shall from time to time (but at least once each three year period...) hold public hearings for the purpose of reviewing applicable *water quality standards*[5] and, as appropriate, modifying and adopting standards." Because the review mandated by the Clean Water Act takes place every three years, it is termed a "Triennial Review".

1.3.4 CLEAN WATER ACT SECTION 303(D) LISTED WATER BODIES

Section 303(d) of the federal Clean Water Act requires states to periodically identify all surface waters in the state that do not meet *water quality standards* as described in the Basin Plan. In California, the State Water Resources Control Board works with its Regional Boards to compile a draft list that is submitted to the U.S. Environmental Protection Agency for their review and approval. The list must include a description of the pollutants causing the violation of water quality objectives and a priority ranking of the water quality limited segments for the purpose of development of action plans aimed to

[4] San Diego Regional Water Quality Control Board (SDRWQCB), 1994.
[5] *Water Quality Standards* refer to both numeric and narrative water quality objectives and beneficial uses.

improve their water quality. These action plans are referred to as *Total Maximum Daily Loads* (TMDLs).

The State's most recent Section 303(d) List was approved in 1998 and contains 509 water bodies, many listed due to multiple pollutants. The mouth of the San Diego river at Ocean Beach is identified in the current 303(d) due to fecal coliform bacteria. Fecal coliform are non-pathogenic (do not cause sickness) bacteria that are used as indicators of potential risk of waterborne disease from bacteria or viruses. The 1998 303(d) list also identifies Famosa Slough, a tidal salt water marsh near the mouth of the San Diego River, as water quality limited due to euthrophication. Although eutrophication is a natural process in some estuaries, human activities can greatly accelerate this process by increasing the rate at which nutrients and organic substances enter aquatic ecosystems. These substances can over stimulate the growth of algae, creating conditions that interfere with recreational uses estuaries, and the health and diversity of fish, plant, and animal populations.

1.3.5 PROGRAM RESPONSIBILITIES

As described above, the San Diego River watershed falls within the boundaries of the cities of San Diego, El Cajon, La Mesa, Poway, and Santee as well as within unincorporated areas under the jurisdiction of the County of San Diego. While the City of San Diego has been identified as the program lead agency, all these local jurisdictions have participated in the development of this Watershed Urban Runoff Management Program and are responsible for its continued assessment and implementation.

The following section identifies which specific departments and/or divisions within each of the participating jurisdictions are responsible for storm water management activities as well as their primary functions and goals. Contact information for each agency is also provided.

CITY OF SAN DIEGO

Karen Henry - Deputy Director, (619) 525-8647
Watershed Programs: Andrew Kleis – Storm Water Specialist, (619) 525-8623
Storm Water Hotline: (619) 235-1000

The City of San Diego Storm Water Pollution Prevention Program, housed within the General Services Department, is the lead office in the City's efforts to reduce pollutants in urban runoff and storm water. Additionally, the Storm Water Pollution Prevention Program is responsible for achieving compliance with the Municipal Permit.

The City's Program is focused on protecting and improving the water quality of rivers, bays and the ocean for the citizens of San Diego and future generations by eliminating and reducing pollutants in urban runoff and storm water in an efficient, effective and cost-effective manner. The City and the Storm Water Program have the additional goal of achieving a 50 percent reduction in the number of beach postings and closures resulting from contamination by the year 2004.

The City of San Diego Urban Runoff Management Plan (available for download in the City's web page, (www.sandiego.gov/stormwater) represents the blueprint for the actions that the City will take in order to achieve its goals.

The City believes the key to cleaner ocean waters is public education. That's why the "Think Blue" educational campaign was created. "Think Blue" (www.thinkbluesd.org) seeks to educate residents, business, and industry about the causes of storm water pollution and the pollution prevention behaviors everyone can adopt to protect our water resources for now and for future generations of San Diegans.

The City of San Diego Storm Water Pollution Prevention Program receives policy direction from the Mayor's Clean Water Task Force. The Task Force is co-chaired by Mayor Dick Murphy and Council Member Scott Peters and is comprised of distinguished members of public agencies as well as representatives from the business, environmental, and academic communities. The Storm Water Pollution Prevention Program is organized into six work sections with primary responsibility for the watershed based programs assigned to the Program Development / Watershed Coordination Section. This section is responsible for the front-line development and implementation of the City's watershed urban runoff management programs. The section also leads a citywide effort to retool and reconfigure existing policies, procedures and development regulations to incorporate pro-active storm water pollution prevention strategies.

CITY OF SANTEE
Erik Steenblock - Stormwater Compliance Inspector, (619) 258-4100

The City of Santee Urban Runoff Management Program has been developed to minimize the impacts of human activities on receiving water bodies through reducing polluted discharge from entering the municipal storm drain system.

The City of Santee Urban Runoff Management Program focuses on reducing pollution in the three major areas of urban development: planning, construction, and existing development. Components of the program include storm drain monitoring, public reporting of illegal dumping activities, public outreach, as well as inspection and enforcement in residential, commercial, industrial, and construction sites.

CITY OF EL CAJON
Dennis Davies – Principal Civil Engineer, (619) 441-1661

The City of El Cajon Jurisdictional Urban Runoff Management Program has been developed to minimize the impact of human activities on receiving water bodies by preventing polluted discharge from entering the municipal storm drain system. Compliance is obtained through point source identification, implementation of Best Management Practices (BMPs), and public education and outreach. The program focuses on reducing pollution in the three major areas of urban development as follows:

- Planning

- Construction
- Existing development

Components of the Storm Water Management Program include:

- Storm drain monitoring
- Public reporting of illegal dumping
- Residential, commercial, industrial, and construction site enforcement and inspection activities
- Public outreach

The City of El Cajon Storm Water Management Program is implemented through citywide efforts coordinated by the Public Works Department.

CITY OF LA MESA
Driss Elwardi - Senior Civil Engineer, (619) 667-1152

The Department of Public Works of the City of La Mesa is responsible for the development and implementation of the National Pollutant Discharge Elimination System (NPDES) for storm water discharges as mandated by the Municipal Permit (Regional Board Order No. 2001-01).

The Engineering Division (Sanitation/Storm water Program Section) is responsible for the development, implementation, compliance and enforcement of all programs required by the Municipal Permit. In compliance with the permit requirements, the City has developed and implemented its Jurisdictional Urban Runoff Management Program (JURMP), the dry weather monitoring program during the summer of 2002, and public education programs.

The Operations Division (Maintenance) implements and enforces some of the Storm Water Best Management Practices (BMPs) such as controlling Sanitary sewer spills/overflow, storm drain system maintenance, street sweeping, litter collection and response to some public complaints regarding water pollution (sewage discharges, illegal dumping).

CITY OF POWAY
Dan Cannon - Public Works Operations Manager, (858) 679-5417

The City of Poway has a Storm Water Pollution Prevention Program in place to ensure compliance with the Municipal Storm Water Permit. The Program goals are to comply with Federal, State, and regional regulatory requirements. The City's Storm Water Program must ensure all public and private facilities, and existing and new development implement the City's Jurisdictional Urban Runoff Management Plan. The City of Poway Storm Water Program receives policy direction from the City Council. The administration of the Storm Water Pollution Prevention Program is shared by the Department of Public Works and the Department of Development Services.

The Department of Public Works is responsible for ongoing, enhanced maintenance of the City's storm drain system, illicit discharge detection and elimination, dry weather monitoring, and municipal and residential permit compliance. The Department of Development Services administers a vigorous Industrial and Commercial Inspection program to ensure the facilities and developers that operate in the City of Poway demonstrate compliance with the City's JURMP and Municipal Order 2001-01. The Department of Development Services Code Compliance Division investigates illegal discharges and illicit connections, maintains a database of compliance history for each facility, and enforces the Permit requirements. Both the Department of Public Works and the Department of Development Services create and conduct storm water pollution prevention education and outreach to the City's residents, municipal staff, businesses, and developers.

COUNTY OF SAN DIEGO

Don Steuer - Land Use and Environment Group Project Manager, (619) 685-2441

project clean water

The County of San Diego's Stormwater Management Program is designed to improve water quality through education, inspection, response and water monitoring. The objectives of the Stormwater Management Program are to provide guidance to the public on water quality issues and to act as a coordinating entity towards a cohesive regional storm water program.

Several departments within the County's Land Use and Environment Group (LUEG) implement the Stormwater Management Program. The County believes that the individual departments within the County each have a core competency, which are briefly discussed below. A Program Manager is designated in three County Departments to ensure program implementation.

Land Use Planning: The Department of Planning and Land Use, Watershed Planning Section is the lead for land use and watershed planning issues, which includes the General Plan, Costa-Machado Water Act of 2000 – Proposition 13 Watershed Management Plan Grants and Watershed Urban Runoff Management Program (WURMP). The Program Manager for the Watershed Planning Section is *Jeff Murphy, Regional Planner (858/694-3691)*.

Science and Monitoring: Department of Environmental Health is the lead for water quality and watershed science and monitoring issues, which includes computerized modeling applications to support water quality and watershed program development and assessment. The Program Manager for the Department of Environmental Health is *Jon VanRhyn (619/338-2203)*.

Structural Engineering: Department of Public Works is the lead on structural engineering aspects, including structural BMPs. The Program Manager for Department of Public Works is *Cid Tesoro, Senior Civil Engineer (858/694-3672)*.

Business Compliance: The Department of Environmental Health Program Manager is the lead on all aspects of commercial and industrial business compliance, including inspections and requiring monitoring as necessary.

Overall coordination for storm water program implementation is coordinated through the regularly scheduled Water Issues Core Group. This Group, which meets every Tuesday, is chaired by the County's Deputy Chief Administrative Office for Land Use and Environment.

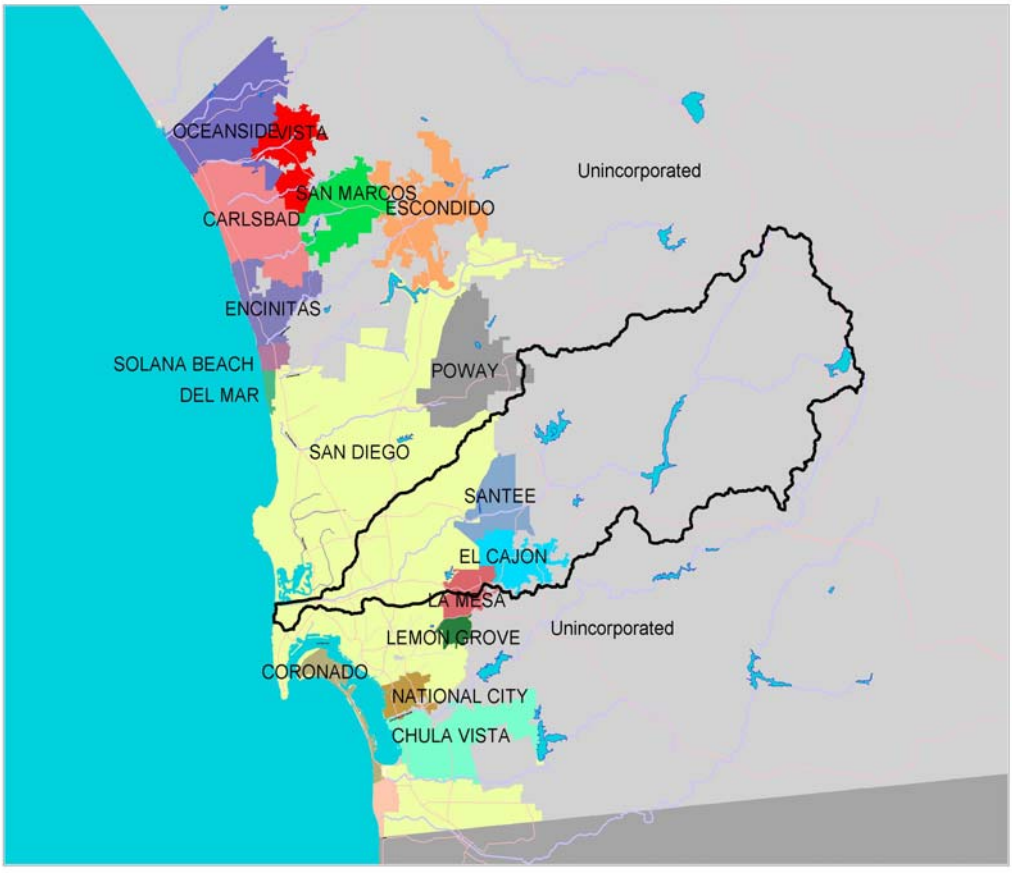
2 THE SAN DIEGO RIVER WATERSHED

2.1 GENERAL DESCRIPTION

The San Diego River Watershed is the fourth largest hydrologic unit in the San Diego region with a land area of approximately 434 square miles. Important hydrologic resources in the watershed include water storage reservoirs, a large groundwater aquifer, extensive riparian habitat and coastal wetlands. While the watershed has been considerably altered as a result of urbanization, agriculture and mining operations, it may still be considered rich in biological resources. The Cleveland National Forest and Mission Trails Regional Park are two important watershed resources that support a wide variety of habitats and sensitive species.

The watershed contains portions of the cities of San Diego, El Cajon, La Mesa, Poway and Santee as well as unincorporated areas within the jurisdiction of the County of San Diego as illustrated below (see additional maps of the watershed in Appendix B).

Figure 2-1. San Diego River Watershed: Jurisdictional Boundaries.



The following tables identify acreage within each local jurisdiction as well as estimated watershed population figures for years 2000, 2010 and 2020[6]. Also shown is the population density within each jurisdiction as well as within the watershed as a whole. It should be noted that the City of Poway has jurisdiction over less than one percent of land area within the watershed, and that there is no population identified within the City of Poway as the land area of the watershed that falls under the jurisdiction of the City is designated as open space.

Table 2-1. San Diego River Watershed: Acreage per Jurisdiction.

	LAND AREA (ACRES)	LAND AREA AS PERCENTAGE	YEAR 2000 POPULATION DENSITY (PERSONS/ACRE)
Unincorporated	207,358	74.70%	0.50
San Diego	46,778	16.85%	4.71
Santee	10,579	3.81%	5.00
El Cajon	9,247	3.33%	10.26
La Mesa	3,031	1.09%	9.72
Poway	587	0.21%	0
TOTAL	277,581	100.00%	1.81

Table 2-2. San Diego River Watershed: Population Estimates - Years 2000, 2010, and 2020.

	YEAR		
	2000	2010	2020
Unincorporated	105,586	117,557	139,310
City of San Diego	220,600	241,778	271,298
Santee	52,975	58,584	67,703
El Cajon	94,869	98,670	107,219
La Mesa	29,489	30,906	32,053
Poway	0	0	0
TOTAL	503,519	547,495	617,583

Table 2-3. San Diego River Watershed: 2000 - 2020 Population Trends by Jurisdiction.

	PERCENT OF POPULATION CHANGE		
	1990 - 2000	2000 - 2010	2010 - 2020
Unincorporated	14.18	11.34	18.50
City of San Diego	3.62	9.60	12.21
Santee	0.14	10.59	15.57
El Cajon	6.87	4.00	8.66
La Mesa	0.54	4.80	3.71
Poway	0	0	0
TOTAL	5.70	8.73	12.8

[6] All information in tables 2-1 through 2-3 was generated by SANDAG staff as a courtesy for the San Diego copermittees. Data sources: 1990 Population, housing and income from the 1990 Census; and 2000, 2010, 2020 and 2030 population, housing, income and land use data from the preliminary SANDAG 2030 Cities/County Forecast. Forecast data was accepted by the SANDAG Board of Directors in October 2002 for distribution, review, and use in planning and other studies. A final forecast will be prepared in fall 2003. This forecast may exceed the development potential of current general and community plans because it incorporates higher intensity and more mixed use development opportunities within smart growth areas identified by local agency staff. Smart growth areas were identified in part to support the expanded transit system envisioned for the region in the 2030 Regional Transportation Plan.

2.1.1 LAND USE

Each of the watersheds in the San Diego region is unique in size, terrain, and development pattern. Generally, as the amount of impervious pavement, rooftops, and other impervious surfaces increases in a watershed, the velocity and volume of surface water as well as pollutant loads are also increased. There is a strong correlation between the amount of imperviousness in a watershed and the health of its receiving water bodies.

Impervious surfaces collect and accumulate pollutants deposited from the atmosphere, leaked from vehicles or derived from other sources. During storms, accumulated substances are quickly washed off and rapidly delivered to aquatic systems. Even during extended periods of dry weather, constituents carried in water flows associated with landscape irrigation, car washing, hosing off sidewalks and driveways, and industrial discharges reach surface waters.

Research has shown that impervious surfaces, a consequence of development, have a direct impact upon stream water quality. A watershed with impervious surface coefficient less than 10% is considered as protected area, 10% to 25% is considered as affected, and higher than 25% is considered as degraded[7]. The categories indicate a qualitative degree of stream deterioration due to urbanization, which is measured by the imperviousness coverage.

The lower portion of the San Diego river watershed is generally typical of urbanized coastal areas in Southern California and contains some of the more intensely urbanized areas of the county. Principal land uses within the San Diego River Watershed are identified below:

Table 2-4. San Diego River Watershed: Land Use[8].

	ACREAGE	AS PERCENTAGE OF WATERSHED
Residential	48,171	17.4
Commercial	4,221	1.5
Industrial	3,881	1.4
Public Facilities/Utilities	10,806	3.9
Parks and Recreation	41,496	15.0
Agriculture	6,591	2.3
Undeveloped	158,068	57.0
Water Bodies	4,384	1.5
Total	276,618	100

Different land uses impact watershed areas in different ways. Developed lands, whether residential or employment-related, result in increased runoff and associated pollutant loads. Other uses, such as agriculture, may not affect runoff quantities and rates as

[7] Schueler, 1994.
[8] Sources include SANDAG Year 2000 digital imagery and City of San Diego Water Utilities digital ortho photos, jurisdictional land use data and various secondary sources used to verity land use interpretations. Data tabulated by SANDAG as a courtesy to San Diego Copermittees.

significantly as urban uses but may generate pollutants such as pesticides and fertilizers that then flow through the watershed to other areas and water bodies.

According to *Watersheds of the San Diego Region* (SANDAG 1998), approximately 101,723 acres within the watershed are not suitable for development due to local policies and/or physical constraints. The majority of this undeveloped land is in the upper, eastern portion of the watershed. While a significant portion of the upper and eastern portion of the watershed remains undeveloped, the watershed faces considerable urbanization pressures typical of the Southern California region. The types of development that can be expected in the remaining developable acres in the watersheds include residential (59,096 acres), commercial and industrial (892 acres), public facilities and utilities (208 acres), and parks and recreation (89 acres)[9].

2.1.2 LAND OWNERSHIP

A substantial amount of the San Diego River is publicly owned. It is estimated that almost 40 percent of the watershed is owned by federal (63,830 acres), state (15,751 acres), and local agencies[10] (30,616 acres). Approximately 52 percent of the watershed (145,007 acres) is in private ownership and the remainder is under the ownership of Indian Reservations (22,377 acres).[11]

2.1.3 WATERSHED DRAINAGE CHARACTERISTICS

The San Diego River travels for approximately 52 miles from its source on Volcan Mountain, west of Julian, to the Pacific Ocean. The San Diego River and its many tributaries function as the main drainage channels for the watershed.

The headwaters of the river, located to the east of El Capitan Reservoir, contain pristine pockets of riparian habitat where amphibians and reptiles thrive. According to Dr. Hollingsworth, Curator of Herpetology with the San Diego Natural History Museum, "a good indicator of the relative health of these watercourses is the species diversity and abundance of amphibians and reptiles living there. Salamanders, frogs, garter snakes, and freshwater turtles rely on aquatic habitats for their livelihood. The remoteness of these headwater tributaries has contributed to their preservation. Many are surrounded by dense stands of chaparral, and roads are scarce. Boulder Creek, running from Cuyamaca Reservoir

Figure 2-2. Boulder Creek Area.

[9] Data as tabulated by SANDAG in their 1998 *Watersheds of the San Diego Region* INFO bulletin based on the land use elements of local jurisdictions current at that time.
[10] Includes Cities and County owned land as well as areas under the ownership of school, water, sanitation and other districts.
[11] Data tabulated by Sandag as a courtesy to the Copermittees based on Year 2000 land use data.

to the San Diego River, is a good example. Getting to remote sections of Boulder Creek requires a great deal of effort, but it's a relatively untarnished ecosystem provides a fabulous insight into the evolutionary diversity of this region and is worth the undertaking. Boulder Creek flows year-round and cuts through steep canyons. Granite basins have been eroded to form ponds and pools, some over 30 feet deep, but now filled with sediment. Stretches are choked with willows, while other sections are open and lined with live oaks and sycamores. Amphibians and reptiles flourish here, living in great abundance[12]."

As the river moves westward it is interrupted at El Capitan Reservoir, which stores water derived from local runoff as well as water imported into the region. When full, the reservoir consists of 1,562 surface acres, a maximum water depth of 197 feet, and 22 miles of shoreline.

Westward from El Capitan, the river is recharged by the San Vicente Creek and then flows through Lakeside and Santee prior to entering Mission Trails Regional Park, which houses diverse habitats including riparian, oak forests, coastal sage scrub, grasslands, and chaparral. The Park, established in 1974, encompasses nearly 5,800 acres of both natural and developed recreational acres. Mission Trails Regional Park has been called the third Jewel in the City of San Diego Park System. Along with Balboa Park and Mission Bay, it provides San Diego residents and visitors a way to explore the cultural, historical, and recreational aspects of San Diego.

For its last few miles, the river flows through intensely urbanized areas within Mission Valley prior to discharging into the Pacific Ocean at the community of Ocean Beach.

The hydrology of the river has been significantly altered over time. Before World War II, the only major channelization project on any U.S. river took place on the San Diego River with the construction of "Derby's Dike" (first built in 1853), built to prevent the river from flowing south and silting San Diego Bay. Today the river has been channelized in several segments including portions of Lakeside, Mission Valley and at its estuary adjacent to Mission Bay. The construction of the reservoirs within the watershed has affected the natural processes of the river, including its sediment transport function. Additionally, extensive sand, gravel and granite mining operations have been taking place along the river since 1873, when granite mines first appeared in Mission Gorge[13]. Rock materials extracted from these mines were used in the construction of roads, buildings, jetties, and dams.

Today, the water quality of the river and receiving coastal waters is affected by numerous factors, including pollutant loads associated with diverse land uses (residential, industrial, agriculture and transportation), significant loss of riparian habitat, and many other pressures associated with urbanization.

The San Diego River discharges north of Ocean Beach and ocean currents distribute bacterial contamination from urban runoff to the shoreline beaches. Surf-zone

[12] See http://www.sdnhm.org/research/herpetology/sdheadwaters.
[13] Ruth Alter, 2002.

monitoring of beaches close to the river mouth have indicated exceedances of indicator bacteria resulting in beach postings and closures.

2.1.4 WATER SUPPLY RESOURCES

The history of San Diego region revolves around a never-ending search for a safe, reliable water supply in this arid area of Southern California. According to historian Kevin Starr, "Old Mission Dam was the first irrigation and domestic water system ever built by Europeans in the Far West[16]," (1990). Mission Dam, which still exists in Mission Trails Regional Park, was only the first water development project in San Diego County.

Figure 2-3. Old Mission Dam.

Beginning with the native Americans and later the Spanish missionaries and early settlers, local water supplies provided sufficient water for the county until World War II, when a vastly expanded military and industrial presence doubled the local population. When water shortages threatened the area's wartime mission, President Franklin Roosevelt directed the Navy to build the area's first aqueduct connecting the region to the newly completed Colorado River Aqueduct. Additionally, the Navy directed and funded the construction of the San Vicente reservoir (located on a tributary to the San Diego River) to serve as a terminus of the aqueduct.

Imported water now accounts for up to 95 percent of the total water used in the county each year. Local reservoirs store the imported water until it is needed. Local reservoirs owned and operated by the City of San Diego Water Department supply about 10 to 15 percent of total demand in the region. The amount of water runoff into local reservoirs varies greatly from year-to-year due to weather and hydrology. During wet periods, abundant rainfall and runoff lead to greater local water supply. During dry periods, when rainfall and runoff is minimal, local water supply is severely reduced.

Generally, the City of San Diego purchases 80 percent of its water from the San Diego County Water Authority (CWA) and the remaining 20 percent is obtained from local runoff. The region served by the CWA imports 90 percent of its supply and 10 percent from local sources. CWA is a wholesale water agency that sold approximately 600,000 acre-feet[17] of imported water to its 23 member agencies in San Diego County in calendar 2001. The City of San Diego represents approximately 40% of the total water

[14] See http://www.sdnhm.org/research/herpetology/sdheadwaters.
[15] Ruth Alter, 2002.
[16] San Diego County Water Authority, 2002 (See www.sdcwa.org/about/who-history).
[17] A quantity of volume of water that covers one acre to a depth of one foot; equal to 43,560 cubic feet or 325,851 gallons. It is estimated that one acre-foot meets the yearly needs of two average families.

delivered by CWA. CWA, in turn, purchases its imported water from the Metropolitan Water District (MWD) of Southern California, which is comprised of 26 public water agencies. MWD obtains its water from the Colorado River and from Northern California. In calendar 2001, MWD delivered approximately 2.3 million acre-feet of imported water to its wholesale customers.

The San Diego River watershed is home to several water reservoirs: San Vicente, El Capitan, Cuyamaca, Lake Jennings, and Lake Murray further described in the table below. It should be noted that reservoirs are also considered *receiving waters* within the watershed.

Table 2-5. San Diego River Watershed: Reservoirs[18].

WATER RESERVOIR	OWNER	WATER SOURCE(S)
Lake Cuyamaca	Helix Water District	Natural Runoff
San Vicente	City of San Diego	First Aqueduct, natural runoff, transfers from Southerland reservoir
El Capitan	City of San Diego	First Aqueduct, natural runoff, upstream releases from Lake Cuyamaca
Lake Jennings	Helix Water District	First Aqueduct
Lake Murray	City of San Diego	Second Aqueduct, transfers from El Capitan and San Vicente reservoirs

Note: The difference between upstream release and transfer is that upstream release means the water is moved along the natural water course from one reservoir to a downstream reservoir within the same sub-basin, whereas a transfer means the water is moved via a man made conduit or pipeline from one reservoir to a second reservoir in a another sub-basin.

It should be noted that total projected demand for water within the San Diego County Water Authority service area is anticipated to increase from 673,7000 AF in 2001 to 813,000 AF by 2020[19]. The Authority intends to diversify supplies as one of several strategies to meet the increased demand. As population grows, there will be increased pressure on groundwater and surface waters as drinking water resources. Groundwater and surface waters, which currently count for approximately 11 percent of the annual needs are expected to meet 17 percent of the year 2020 demand[20].

[18] San Diego County Water Authority, 2002 (See www.sdcwa.org/manage/reservoirs-map).
[19] Friehauf, 2002
[20] Ibid.

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3 WATER QUALITY ASSESSMENT

3.1 OVERVIEW

Objective No. 1 of the San Diego River watershed program, as noted in the introduction section, is to "develop/expand methods to improve water quality within the watershed." Program components, as described in Chapters 3 and 4 have been developed in response to this objective.

It should be noted that interpretation of water quality information is critical to understanding the ecology and potential beneficial use limitations in the San Diego River watershed. This interpretation is the foundation of the water quality assessment for the San Diego River watershed. The challenge ahead includes integrating numerous water quality monitoring activities and related programs into a larger framework so that all data are useful. There are many potential data sources available such as that gathered for water supply purposes (i.e. groundwater and reservoirs), by public health agencies, by Copermittees (to assess the effects on urban runoff on receiving waters), by university studies, and by citizen monitoring programs. The effort is further complicated as the programs use a variety of methodologies to document the physical, chemical, and biological characteristics of streams, creeks, rivers, enclosed bays, lagoons, estuaries, and beaches. Only with a good understanding of the conditions can effective recommendations be made to protect and improve the water quality of the San Diego River and its tributaries. The process of assessing water quality data, prioritizing related issues, and identifying management actions provides an opportunity for each jurisdiction and other interested parties within the watershed to collaborate on these issues under the framework of the watershed program. It also provides an opportunity to focus limited resources in priority areas and ensure consistent approaches throughout the watershed.

This chapter is organized into three sections: Section 3.1 provides background information regarding the numerous monitoring programs being conducted by the Copermittees as well as other agencies and institutions within the region and denotes how these monitoring efforts complement one another. Section 3.2 describes the framework for conducting the water quality assessment at the watershed level. Data sources and factors considered in the assessment are identified in this section. Finally, Section 3.3 presents the data and analysis used in the assessment and leads to the identification of issues considered a priority in the 2002 watershed assessment.

3.1.1 BACKGROUND

Monitoring programs make use of a variety of methodologies to document the physical, chemical, and biological characteristic of streams, creeks, rivers, enclosed bays, lagoons, estuaries and beaches. The Copermittees have been required to implement a monitoring program to assess the effects of urban runoff on receiving waters since 1993, under the first Municipal Permit issued in 1990.

The initial Copermittee monitoring program generally called for the collection, analysis and reporting of water quality data at the countywide level. The approach taken was consistent with other Phase I storm water programs. URS Corporation, an environmental consulting firm, implemented the countywide monitoring program on behalf of the Copermittees until 2000 when MEC Analytical Systems assumed this role. No sampling occurred within the San Diego River watershed under the initial monitoring program.

In 2001, the newly issued Municipal Permit resulted in revisions to the countywide monitoring program. The current countywide monitoring program includes an assessment of the effects of urban runoff on receiving waters (as measured by water chemistry and toxicity tests) and the development of indicators of relative watershed health from an ecological perspective (rapid stream bioassessment). The monitoring program (i.e. collection, analysis, and reporting of water quality data) is expected to transition during the five-year permit period from the current countywide approach to a watershed-based approach.

While this initial watershed-based water quality assessment includes data collected as part of the countywide monitoring program, other monitoring programs conducted by individual Copermittees (such as the dry weather or the coastal storm drain monitoring programs) are yet to be considered. Participating jurisdictions intend to develop this watershed based water quality assessment as the mechanism that will link all this information together in a weight of evidence approach. Future year assessments, as time and resources permit, will include a review of data and information from several different sources, including (but not limited to) Copermittee programs, as well as data collected by other public agencies, research institutions, citizen programs or other available information that may be useful in assessing watershed-wide conditions.

The water quality prioritization is flexible and adaptive because the process is iterative and develops over time. For example, constituents and conditions of concern will be evaluated on an annual basis. While initial assessments will be hindered by data limitations, the long term goal is to integrate as much feasible and pertinent data into the analysis. Over time, the assessments will also be strengthen as the data collected annually by participating jurisdictions begin to allow for trend analysis. The iterative nature of the WURMP process allows for the revision of issues and priorities, as watershed Copermittees obtain more data.

3.1.2 MONITORING PROGRAMS

Issues concerning watershed health and ecological diversity, including water quality of receiving waters, span a variety of spatial and time scales. Many questions related to these issues are generally governed under the Municipal Permit and fall primarily within the realm of one of three categories of monitoring research programs as described below:

Regional Monitoring Programs encompass a large spatial area (e.g., Southern California Bight), and look at many elements potentially impacted by storm water runoff.

This type of monitoring includes the Regional Monitoring Program conducted by the Southern California Coastal Waters Research Project (SCCWRP) once every 5 years, and takes a longer-term view of the ultimate receiving waters, the coastal bays, lagoons, and the ocean. Regional monitoring is designed to answer questions concerning the ecological health of the entire Southern California coastline and encompass numerous components, including water and sediment quality, fish, benthos, birds, etc.

Core Monitoring refers to several long-term monitoring activities conducted by the Copermittees on an annual (or more frequent) basis. This is focused monitoring which concentrates on fewer parameters than Regional Monitoring efforts and serves to provide data to assess long-term trends within and across watersheds. The Copermittees designed these monitoring programs under an adaptive strategy that is subject to review as warranted by new data or information.

Process Studies supplement both the Core and the Regional Monitoring activities described above. Process Studies are short-term evaluations designed to answer specific questions. Some examples of Process Studies include evaluation of the link between storm water discharges and Toxic Hot Spots, conducting DNA-ribotyping for bacterial source identification in a watershed, and source identification studies used for the development of Total Maximum Daily Loads (TMDLs) for 303(d) listed bodies of water. The Regional Board, Copermittees, educational institutions and other agencies generally collaborate in proving funding, management, and technical support for these types of focused investigations.

3.2 CORE MONITORING

The Core Monitoring Program is designed to achieve an understanding of the impacts of urban runoff on the water quality and ecological health of receiving waters within and across San Diego watersheds through an evaluation of chemical, physical, and biological evidence.

The linkage between the components of the Core Program and the evaluation of these components allows for the long-term assessment of changes in water quality within the region. Components of the Core Program to be implemented during the life of the current Municipal Permit include:

1) Mass Loading Station Monitoring;
2) Urban Stream Bioassessment Monitoring;
3) Coastal Storm Drain Outfall Monitoring;
4) Dry Weather Monitoring;
5) Ambient Bay, Lagoon, and Coastal Receiving Water Monitoring; and,
6) Toxic Hot Spots Monitoring in San Diego Bay

The Core Monitoring program, currently conducted on a countywide basis, has been designed as a adaptive program and is scheduled to transition to a watershed-based program by the end of the life of the current Municipal Permit in early 2006.

3.2.1 CORE MONITORING PROGRAM: 2001-2002

The Core Monitoring Program implemented in October 2001 during 2001-2002 monitoring period includes the following activities further described below:

Table 3-1. Copermittee Monitoring Program.

MONITORING ACTIVITIES	WHERE?	SEASON	NUMBER OF SITES PER WATERSHED	ANALYTES
Mass Loading Monitoring	Rivers & Streams	Oct 1- April 30	1	Chemistry, Bacteria, Toxicity
Urban Stream Bioassessment	Creeks, Streams, Rivers	Spring and Fall	TBD	Chemistry, Biology
Coastal Storm Drain Monitoring	Coastal Storm Drain Outfalls and Ocean	Year Round	TBD	Bacteria
Dry Weather Monitoring	Storm Drains	Summer	TBD	Chemistry, Bacteria
Bay, Lagoon, and Coastal Receiving Waters Monitoring	Bays and Lagoons	Summer	TBD	Chemistry, Bacteria

3.2.2 MASS LOADING STATION MONITORING

Twelve regional mass loading stations (MLS) are scheduled to be monitored during the wet-weather season over three separate viable storm events. A viable storm event is considered a minimum of 0.1 inches of rainfall. However, the Otay River MLS and was not sampled due to insufficient flow. In addition, the MLS on the Santa Margarita River, located on Camp Pendleton, was only sampled during one viable storm event due to security reasons.

The 12 regional MLS are located within the following streams:

Santa Margarita River
San Luis Rey River
Agua Hedionda Creek
Escondido Creek
San Dieguito Creek
Peñasquitos Creek
Tecolote Creek
San Diego River
Chollas Creek
Sweetwater River
Otay River
Tijuana River

All sampling and analyses conducted for MLS is done in accordance with applicable U.S. EPA regulations and Regional Board staff guidance. One flow-weighted composite is collected along with one grab sample at each station during each storm.

The flow-weighted composite water samples are analyzed for the following parameters:

1) *Inorganic chemicals* – Ammonia, Chemical Oxygen Demand (COD), total and dissolved phosphorus, nitrate, nitrite, total hardness, Total Kjedahl Nitrogen, Total Dissolved Solids, Total Suspended Solids, Turbidity, MBAS (detergents).
2) *Metals* (Total and Dissolved Metals) – Antimony, arsenic, cadmium, chromium, copper, lead, nickel, selenium, zinc.
3) *Organophosphate pesticides* – Diazinon, chlorpyrifos.
4) *Toxicity Testing* - At each station using *Ceriodaphnia dubia*, *Selenastrum capricornutum*, and *Hyalella azteca*.

The grab samples are analyzed for the following parameters:

Temperature; pH; specific conductance; Biochemical Oxygen Demand (BOD); oil and grease; total coliform; fecal coliform; and, *enterococcus.*

Additionally, storm water runoff samples collected at mass loading stations are also subject to toxicity tests. Toxicity testing is performed to assess the potential impact of complex mixtures of unknown constituents on aquatic life according to U.S. EPA standards. Toxicity testing can provide information on potential short-term "acute" effects, as well as longer-term "chronic" effects.

Toxicity is tested using flow weighted composite samples that characterize the runoff into the stream throughout the storm. Laboratory test organisms are placed in small containers of effluent sample and monitored over time to compare the response of organisms placed in non-toxic control water to the sample water. The sample water is diluted (with control water) to several known concentrations before the test, and test organisms are added to each concentration. Acute, short-term effects, are tested using a freshwater amphipod (*Hyalella azteca*) and chronic, long term effects, are tested using both the freshwater cladoceran (*Ceriodaphnia dubia*) and algae (*Selenastrum capricornutum*). These species represent aquatic life that is sensitive to constituent(s) of concern such as metals, pesticides, nutrients and organic compounds.

Persistent toxicity is defined as a recurring toxic response by the test organisms during each of the three storm events monitored. If persistent toxicity is detected, specialized toxicity identification evaluations (TIE) may be used to help characterize and identify constituent(s) causing toxicity.

3.2.3 RAPID STREAM BIOASSESSMENT MONITORING

Biological assessments evaluate the condition of water bodies using surveys and other direct measurements of resident biological organisms (such as macroinvertebrates, fish, and plants). Biological assessment data are used to evaluate whether water bodies support survival and reproduction of desirable fish, shellfish, and other aquatic species (in other words, if the water bodies meet their designated aquatic-life beneficial uses).

Macroinvertebrate and fish communities are considered excellent indicators of water quality. The residents of a water body function as continual monitors of environmental quality. Biological, chemical and physical stresses imposed on an aquatic ecosystem manifest their impact on the biological organisms present in that ecosystem[21].

To date, the rapid stream bioassessment sites have been sampled in June and October of 2001 and May of 2002 as part of the Copermittee monitoring program. The assessment was undertaken utilizing a protocol that samples and analyzes population of *benthic macroinvertebrates*[22]. A total of 23 stream sites located throughout the County were assessed. Sampling and analysis of protocols followed the California Stream Bioassessment Procedure, as standardized procedure developed for California by the Department of Fish and Game. This approach yields an enumeration of a stream's benthic community and assesses the quality and condition of habitat. Over time, this information is useful to identify ecological trends.

Sampling of substrate samples for benthic infauna was conducted by MEC Analytical Systems (consultant team contracted by Copermittees) in June and October 2001 from each of 20 bioassessment monitoring stations and three reference stations (established in 2001) as shown in the figure below. Reference sites serve to provide data representative of generally undisturbed habitat within the watershed. Bioassessment data considered to date exclude the 2002 surveys. Analysis and findings from these data will be included in the 2002-2003 monitoring report. Field measures include pH, temperature, dissolved oxygen, conductivity, flow rate, percent gradient, sampling area physiography, and overall assessment of physical habitat (e.g., vegetative cover, bank stability) at each station.

Sample data from all Rapid Stream Bioassessment Monitoring stations are analyzed to simultaneously evaluate all the populations of benthic invertebrates and develop a relative assessment of ecological health by comparing survey stations against pre-determined reference stations. A Benthic Macro Invertebrate (BMI) ranking score is calculated from varied metrics and standardized to a zero point to allow for comparability among stations. A ranking score greater than zero indicates better stream health relative to the other streams sampled, whereas a score less than zero indicates deteriorated stream health. Streams are said to have an above average rating when the score is positive, that is, stream health is better than the average; and a rating below average is an relative indication of poor stream health.

In order to provide a general characterization of benthic communities within each watershed, longer trend data sets than just the two surveys conducted by MEC in 2001are preferred. For this reason, historic information from prior California Department of Fish and Game (CDFG) surveys were reviewed and summarized to prepare the benthic community assessment for each watershed. Bioassessment monitoring results from CDFG surveys conducted between May 1998 and May 2001[23],

[21] Fox and Ashber 2002.
[22] Bottom-dwelling (benthic) animals without backbones (invertebrate) that are visible with the naked eye (macro).
[23] SDRWQCB 1999; SDRWQCB 2001; CDFG unpublished data.

and MEC surveys of June 2001 and October 2001 were considered to assess overall health of benthic communities of watersheds in the San Diego region.

Figure 3-1. Bioassessment Monitoring Sites

3.2.4 AMBIENT BAY AND LAGOON MONITORING PROGRAM

The Ambient Bay and Lagoon Monitoring Program (ABLM) has two main objectives. The first objective is to develop and implement environmental studies in order to assess the overall health of receiving bays and lagoons. The second objective is to monitor the impact of urban runoff on ambient water quality. The first step in fulfilling these objectives was to conduct a literature review to determine what information and data were available that could be used to design an appropriate monitoring ABLM program. As such, activities during the 2001-2002 monitoring season in relation to the Ambient Bay and Lagoon Monitoring Program were limited to research and development of the program for subsequent monitoring seasons.

The Ambient Bay and Lagoon Monitoring Program consists of sediment chemistry, toxicity, and benthic assemblage characterizations of 12 bays and lagoons (13 outfalls) in San Diego County. This program may also contribute information to the Southern California Coastal Waters Research Project Bight 2003 coastal survey. This program has been designed to allow the prioritization of storm drains outlets (into bays and lagoons) for additional investigation in subsequent years of the monitoring program.

The first year of the program is scheduled for implementation during the short term, within the life of the current Municipal Permit. Because this program is limited to applications within bays and lagoons, no data specific to the San Diego River watershed will be collected as part of this program.

3.2.5 COASTAL STORM DRAIN MONITORING

The overall objective of the Coastal Storm Drain Monitoring Program is to assess the effects of storm drain runoff on coastal (beach) recreational contact (e.g., surfing and swimming) through prescriptive paired sampling. Paired sampling consists of collecting a water sample at select storm drain outlets and a second sample from the surf-zone 75-feet down current where runoff water and ocean waves meet and mix. Paired samples are collected twice monthly between April 1st and October 30th, and once monthly between Nov 1st and March 31st. Samples are analyzed for three bacterial indicators: total coliform, fecal coliform, and *enterococcus*. If an exceedance of recreational use standards occurs, the coastal municipality contacts the County Department of Environmental Health so that a sign can be posted on the beach notifying bathers that the ocean water near the mixing zone does not meet applicable standards (as required under State Assembly Bill 411).

3.2.6 DRY WEATHER MONITORING

The overall objectives of the dry weather monitoring program are to identify sources of pollution reaching the municipal storm drain systems and abate them through strategic monitoring, sampling, and data collection. In an effort to find pollution sources, the dry weather monitoring program focuses on collecting samples at actual storm drain outlets and internal underground structures rather than collecting samples at creeks, streams, or receiving waters where pollutants are generally diluted and more difficult to track.

Dry weather monitoring is conducted between May 1st and September 30th during non-rainy periods when storm water runoff is negligible and sources of water are likely of typical urban origin (i.e. washing, hosing, irrigation). Additional information and data collected from monitoring activities provide baseline runoff characteristics over extensive spatial and temporal scales.

Data monitored and sampled include:

1) General observations such as color, clarity, odor, floatables, discharge (flow), and atmospheric conditions;
2) Field screening for pH, electrical conductivity, nitrate, phosphate, ammonia, temperature, and turbidity; and,
3) Analytical laboratory analysis for metals (cadmium, copper, lead, and zinc), grease and oil, detergents (MBAS), and pesticides (diazinon and chlorpyrifos).

3.2.7 MONITORING OF WATER SUPPLY SYSTEMS

Water agencies conduct regular monitoring programs in order to ensure the integrity of the domestic water supply. For example, the City of San Diego Water Department implements long-term monitoring programs at its water supply reservoirs and upstream or those reservoirs. The monitoring program includes sites at the three water supply reservoirs within the San Diego River watershed (El Capitan, San Vicente, and Murray Reservoirs) and at thirteen streams tributary to these reservoirs. The monitoring program has two main purposes. The first purpose is to assess the current state of water quality in the reservoirs and streams, specifically in the context of drinking water standards. These assessments are used to guide the day to day operation of the water supply system and are the foundation for decisions on water treatment options. The second purpose is to establish a long-term archive of water quality data for the reservoirs and tributary streams. This long-term data archive has been and will continue to be used to design in-reservoir water quality management projects and to assess the trends in water quality.

The El Capitan, San Vicente, and Murray Reservoirs reservoirs have been monitored weekly since 1989. Reservoir monitoring focuses on a suite of basic limnological parameters (e.g. profiles of temperature, pH, dissolved oxygen, etc.) plus nutrients, metals, regulated organic compounds, primary productivity, and enteric bacteria. Monitoring of the tributary streams, which began in 1999, occurs monthly when flow is present. Stream monitoring includes most of the same parameters as reservoir monitoring. All data is archived in the SDWD's Laboratory Information Management System.

3.3 WATER QUALITY ASSESSMENT

The current countywide monitoring program includes an assessment of the effects of urban runoff on receiving waters (as measured by water chemistry data and toxicity

tests) and the development of indicators of relative watershed health from an ecological perspective (rapid stream bioassessment).

While this initial watershed-based water quality assessment includes data collected as part of the countywide monitoring program, other monitoring programs conducted by individual jurisdictions (such as the dry weather or the coastal outfall monitoring programs) are yet to be considered. Participating jurisdictions intend to develop this watershed-based water quality assessment as the mechanism that will link all this information together in a weight of evidence approach.

There are limitations in the 2001-2002 water quality assessment. First, there is a limited wet weather monitoring data set in many of the watersheds because the 2001-2002 wet weather monitoring was the first of the countywide monitoring program that incorporated a mass loading station at 11 locations throughout the County (historical data from mass loading stations are only available for the Mission Bay, San Diego, and Carlsbad watersheds). Secondly, the stream bioassessment data are also limited in time. Given limitations on this initial assessment, additional data gathered in the next and subsequent years may support or refute early findings. This year's water quality assessment provides a framework and a guideline for how water quality will be assessed in future years as more data are collected and integrated into the process.

Future year assessments, as time and resources permit, will include a review of data and information from several different sources, including (but not limited to) Copermittee programs, as well as data collected by other public agencies, research institutions, citizen programs or other available information that may be useful in assessing watershed-wide conditions.

3.3.1 WATER QUALITY ASSESSMENT STRATEGY

As part of the watershed-based water quality assessment, the following steps are generally taken in the data evaluation and analysis:

1) Identify constituents of concern which have been found to exceed administrative water quality standards/objectives as well as the frequency, magnitude and duration of such exceedances;
2) Isolate constituents of concern shown to exceed applicable water quality standards and/or objectives in a persistent and/or recurrent manner;
3) As data permits, evaluate whether there are any potential effects which could be a result of co-mingling and/or bioaccumulation effects of recorded constituents and pertinent data/analysis related to source identification investigations or related efforts;
4) Examine how any of the constituents of concern identified in step (2) above, may contribute to water quality degradation which would negatively impact designated beneficial uses; and,
5) As a longer historical record is developed over multiple years of monitoring, assess constituent of concern data to see if there are any increasing or decreasing trends through time applying statistical analysis.

The triad of data (storm water chemistry, storm water toxicity and rapid stream bioassessment data) collected under the Core Monitoring program is also evaluated using the triad decision matrix. This triad of monitoring data is utilized in a 'weight of evidence' approach. Storm water chemistry and storm water toxicity data provide an indication of the pollutant loads during a storm event and potential aquatic impacts during storm events to organisms. The stream bioassessment provides information related to the ecological health of the watershed and an indication of stream health effects from urban runoff. Stream bioassessment data not only provide information about the benthic invertebrate community present in the watershed, but also the quality and condition of the physical habitat.

The triad decision matrix is primarily intended to direct changes in the monitoring program using a consistent and scientific approach. The triad decision matrix is used as one step in the process of identifying additional monitoring needs, such as performing a Toxicity Identification and Elimination (TIE) study to identify the constituents causing toxicity.

Two constituents of concern not considered in the triad approach are fecal coliform and total dissolved solids (TDS). The bacteria parameters are not considered in the triad because they are not believed to influence toxicity responses in bioassay test organisms. Water quality objectives which apply to bacterial indicators are associated with the protection of human health a water contact recreation or non-water contact recreation. Total dissolved solids are not considered because, while this parameter may exceed water quality objectives in the Basin Plan, the objectives were set for municipal drinking water supply and not ecological impacts.

Bacterial indicators and TDS are considered constituents of concern and assessed by looking at all applicable factors (303(d) listings, beneficial uses, public health considerations, jurisdictional goals, economic impact, etc.). Bacterial indicators and TDS are then included as appropriate in the prioritized strategy. Bacterial indicators and TDS may not have the benefit of the added evidence of benthic community and toxicity, yet they may lead to watershed activities when considered with all other stressors and constituents of concern in the watershed and their potential impact on beneficial uses.

3.3.2 HISTORICAL DATA TREND ASSESSMENT

Where longer-term data are obtained from the monitoring program, data can be evaluated for trends over time. The assessment of a long-term data set can be accomplished through two statistical tools, regression and power analyses. Because analytical data sets are inherently variable, determining if concentrations of a potential constituent of concern are significantly decreasing or increasing in a watershed requires statistical analysis of the data.

Linear regression analysis can be performed after applying appropriate data transformations to the data. This regression analysis determines the slope of the trend line to assess either a decreasing or an increasing trend. Care must be taken to

examine each data set for outliers or influential data points that unduly influence the results of the analysis.

In addition to determining whether there are significant trends for each of the potential constituents of concern, it is also important to know the power of the regression line, or in other words, the confidence one has in the regression results based on the slope of the regression and the number of data points (times) in the analysis. Typically, power estimates of 80% or greater (at an alpha level [error] of 0.05) are desired to be able to make strong statements about statistical results.

Future water quality assessments are expected to rely more on a historical record that allows for trends analysis using numerous data sources instead of individual seasonal data sets. In most watersheds, including the San Diego River watershed, data collected and considered to date represent a snap shot in time and limit the analysis that can be performed.

The statistical methods that may be used in future analysis may vary depending on the question or issue at hand. Scatter plots and trend analysis graphs of constituents of concern can be used as a starting point when comparing levels in different watersheds. It is anticipated that in future years, as the historical record for each mass loading station is built, watershed Copermittees will transition to using these and similar tools to assess water quality issues.

3.3.3 DATA SOURCES

Two comprehensive reports provided most of the water quality data and related information that was evaluated as part of this watershed assessment:

1) San Diego Regional Previous Storm Water Monitoring Review and Future Recommendations Report (MEC Draft August 20, 2001): This report contains a summary of significant findings from Copermittee monitoring programs implemented from 1993 to 2000. However, this report contains data and analysis pertinent to the historic monitoring sites (Chollas Creek, Tecolote Creek and Agua Hedionda Creek) and therefore only applies to the San Diego Bay Watershed, Mission Bay Watershed, and Carlsbad Watershed.

2) Urban Runoff Monitoring Report (MEC, October 2002): This report summarizes all data and findings associated with mass loading station and rapid stream bioassessment monitoring activities conducted during the 2001-2002 season. (This report applies to all watersheds.)

Additionally, the most current (Year 1998) and proposed (Year 2002) Clean Water Act Section 303(d) Lists of Water Quality Limited Segments and associated list of constituents of concern in the watershed were considered as data sources[24].

[24] SDRWQCB, 2002.

Generally, salient constituents of concern were identified from the data sources listed above and evaluated against water quality objectives and designated beneficial uses as identified under the San Diego Basin Plan.

3.3.4 STRATEGY FOR PRIORITIZATION OF WATER QUALITY ISSUES

As noted earlier, until the program evolves, only limited data will be available. The data set considered to date may be too limited to draw strong conclusions about high priority water quality issues and associated actions. Developing an effective list of activities that properly identifies and addresses significant water quality issues will require additional validation. Validation is pursued through the yearly watershed-based water quality assessment and program evaluation process that are part of this plan.

Once the constituents of concern are identified, the high priority water quality issues are identified using a qualitative process that considers watershed-specific conditions using the weight of the evidence approach as well as best professional judgment to interpret the relationships between exceedances, regulatory mechanisms, and beneficial uses. Factors considered include:

1) Availability of sufficient qualified data (may include detection levels, number of sample(s), spatial and temporal characteristics);
2) Opportunity to protect and preserve healthy water bodies;
3) Need to integrate additional data;
4) Ability to determine conditions at the sub-watershed level;
5) Current related concerns and/or priorities expressed by local jurisdictions;
6) Stakeholder input;
7) Grant funding opportunities; and,
8) Human and ecological health considerations.

Priority water quality issues are addressed by implementing actions that are designated as short and/or long-term activities. Short-term activities are completed within the life of the current Municipal Permit (years 2003-2005). Long-term activities extend beyond the life of the current permit (years 2006 and beyond). The high priority issues as well as other salient constituents of concern are tracked and reassessed through the yearly assessment and reporting process.

3.4 SAN DIEGO RIVER WATERSHED DATA REVIEW

3.4.1 OBSERVATIONS BASED ON BENTHIC BIOASSESSMENT

Analysis to date, which included data collected from 1997 through 2001 by California Department of Fish and Game in bioassessment monitoring sites within the San Diego River watershed yielded Benthic Macro Invertebrate (BMI) ranking scores that were average to well below average. Overall, bioassessment results of the San Diego River watershed indicate that the benthic communities are moderately to substantially impacted based on the conclusions of the 2001-2002 Monitoring Report.

3.4.2 OBSERVATIONS BASED ON MASS LOADING MONITORING

Figure 3-2. San Diego River MLS

As noted earlier, the mass loading station data set for the San Diego River watershed is very limited in the number of events monitored (three storms), and represents an unusual storm year in which rainfall was significantly below average for the San Diego Region.

The San Diego River watershed mass loading station (MLS) is located in the San Diego River within the City of San Diego. This mass loading station is located along a natural channel adjacent to the Fashion Valley Mall. The contributing runoff area consists of over 107,200 acres, which is approximately 39% of the San Diego watershed land area. The two major land uses within the contributing runoff area are open space (52%) and single family residential (24%). The contributing runoff area is representative of the total watershed, which is approximately 58% open space and 15% residential as shown in Figure 3-3 below.

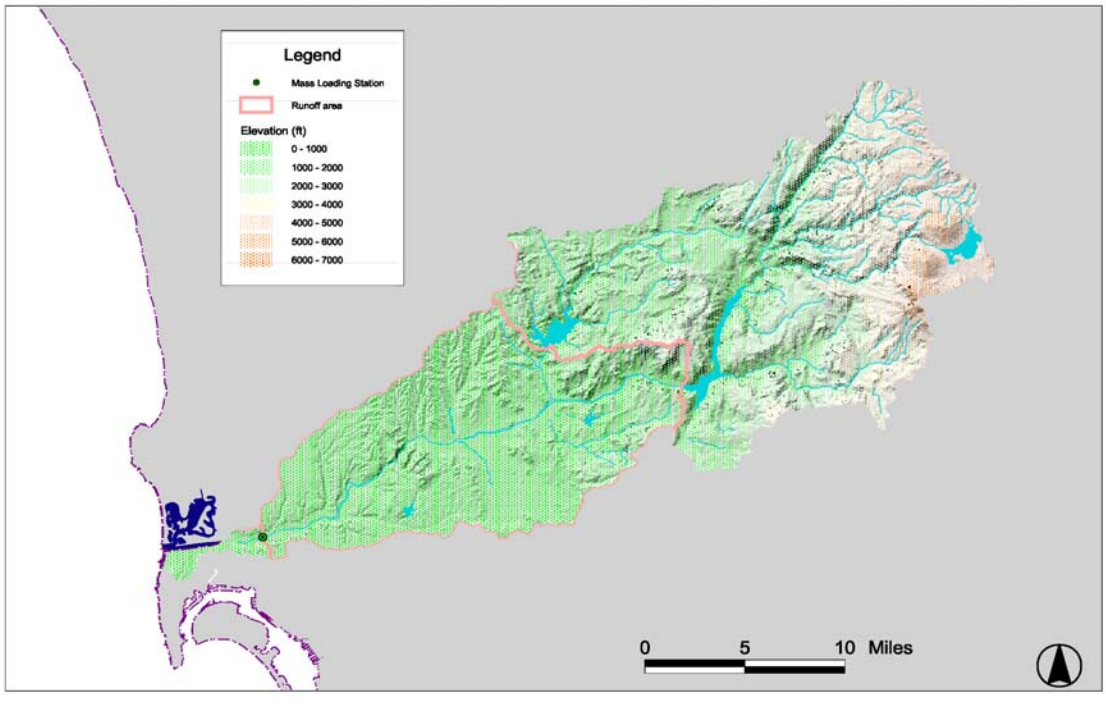

Figure 3-3. San Diego River MLS and Contributing Runoff Area.

This watershed mass loading station was monitored on November 29, 2001, and February 17 and March 17, 2002. Data collected are reviewed in relation to water

quality objectives in the San Diego Basin Plan or other applicable water quality criteria. Shaded cells denote parameter(s) that exhibit exceedance(s) of water quality objectives.

Table 3-2. 2001-2002 Mass Loading Station Data Collected in the San Diego River.

ANALYTE	UNITS	REFERENCE STANDARD	SOURCE	SAN DIEGO RIVER		
				11/29/01	02/17/02	03/17/02
General / Physical / Organic						
Electrical Conductivity	umhos/cm			1680	2230	2270
Oil And Grease[25]	mg/L	15	USEPA Multi-Sector General Permit	<1	4	<1
pH	pH Units	6.5-8.5	Basin Plan	7.3	7.6	7.5
Bacteriological						
Enterococci	MPN/100 mL	NA	NA	80	2,200	170
Fecal Coliform	MPN/100 mL	400	Basin Plan	130	**30,000**	170
Total Coliform	MPN/100 mL	NA	NA	2,300	80,000	3,000
Wet Chemistry						
Ammonia As N	mg/L	0.025 (a)	Basin Plan	0.9	0.7	0.2
Biochemical Oxygen Demand (BOD)	mg/L	30	USEPA Multi-Sector General Permit	12	**58.8**	3.4
Chemical Oxygen Demand (COD)	mg/L	120	USEPA Multi-Sector General Permit	28	**154**	54
Dissolved Phosphorus	mg/L	2	USEPA Multi-Sector General Permit	0.3	0.03	0.12
Nitrate As N	mg/L	45[26]	Basin Plan	0.9	0.8	0.3
Nitrite As N	mg/L	1	Basin Plan	0.12	0.07	<0.05
Surfactants (MBAS)	mg/L	0.5	Basin Plan	<0.5	**0.6**	<0.5
Total Dissolved Solids	mg/L	300-1500	Basin Plan by watershed	869	691	796
Total Kjeldahl Nitrogen	mg/L			2.7	2.9	1.7
Total Phosphorus	mg/L	2	USEPA Multi-Sector General Permit	1.21	0.4	0.28
Total Suspended Solids	mg/L	100	USEPA Multi-Sector General Permit	<20	24	20
Turbidity	NTU	20	Basin Plan	8.6	15.3	13.1
Pesticides						
Chlorpyrifos	µg/L	0.02	CA Dept. of Fish & Game	<0.03	<0.03	**0.03**
Diazinon	µg/L	0.08	CA Dept. of Fish & Game	**0.21**	**0.10**	**0.08**
Hardness						
Total Hardness	mg	NA	NA	429	399	490

[25] The standards identified in the USEPA Multi-Sector General Permit are discharge-quality objectives rather than in-stream water quality standards. These reference values are included for comparison and do not necessarily constitute a violation.

[26] The underlying water quality objective in the Basin Plan is "Inland surface waters…shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses." The Basin Plan also states a goal of 0.1 mg/L for total phosphorous to support this objective. The reference value for nitrogen/nitrates in this table entry is derived from this phosphorous goal, using a ratio suggested by RWQCB staff. This reference value is not a Basin Plan water quality objective.

ANALYTE	UNITS	REFERENCE STANDARD	SOURCE	SAN DIEGO RIVER		
				11/29/01	02/17/02	03/17/02
	$CaCO_3$/L					
Total Metals						
Antimony	mg/L	0.006	Basin Plan	<0.002	0.003	<0.002
Arsenic	mg/L	0.34/0.05	40 CFR 131/ Basin Plan	0.003	0.002	0.005
Cadmium	mg/L	0.0046	40 CFR 131	<0.001	<0.001	<0.001
Chromium	mg/L	0.016	CTR (Cr VI)	0.005	<0.005	0.007
Copper	mg/L	0.0135	40 CFR 131	0.007	**0.028**	0.011
Lead	mg/L	0.082	40 CFR 131	0.003	0.004	0.009
Nickel	mg/L	0.47/0.1	40 CFR 131/ Basin Plan	0.004	0.005	0.004
Selenium	mg/L	0.02	40 CFR 131	<0.002	0.002	<0.002
Zinc	mg/L	0.122	40 CFR 131	0.029	0.112	0.067
Dissolved Metals						
Antimony	mg/L	(e)	40 CFR 131	<0.002	<0.002	<0.002
Arsenic	mg/L	0.34 (c)	40 CFR 131	0.002	<0.001	0.002
Cadmium	mg/L	(b)	40 CFR 131	<0.001	<0.001	<0.001
Chromium	mg/L	(b)	40 CFR 131	<0.005	<0.005	<0.005
Copper	mg/L	(b)	40 CFR 131	0.006	0.015	<0.005
Lead	mg/L	(b)	40 CFR 131	0.002	<0.002	<0.002
Nickel	mg/L	(b)	40 CFR 131	0.003	0.005	0.002
Selenium	mg/L	0.2 (d)	40 CFR 131	<0.002	<0.002	<0.002
Zinc	mg/L	(b)	40 CFR 131	0.022	0.084	<0.02
Toxicity						
Ceriodaphnia 96-hr	LC_{50} (%)	100		>100	>100	>100
Ceriodaphnia 7-day survival/reproduction	NOEC (%)	100		100/100	100/100	100/100
Hyalella 96-hr	NOEC (%)	100		100	100	100
Selenastrum 96-hr	NOEC (%)	100		100	**25**	100

(a) Water Quality Objective is for unionized ammonia, insufficient information is available to calculate unionized ammonia.

(b) Standards applied to dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.

(c) Standard applied to dissolved metal fractions are based on water effects ratios (WER) and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.

(d) Standard is based on the total recoverable form as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.

(e) USEPA has not published an aquatic life criterion value

[a] Exceeds the acute aquatic life criterion.

[b] Exceeds the chronic aquatic life criterion.

NA Not applicable. No water quality objective is applicable for this parameter in the watershed.

Sources:

USEPA National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities, 65 Federal Register (FR) 64746, Final Reissuance, October 30, 2000.

California Department of Fish and Game. Office of Spill Prevention and Emergency Response, Hazard Assessment and Water Quality Criteria documents for pesticides (various dates).

San Diego Regional Water Quality Control Board Basin Plan Water Quality Objectives.

USEPA National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities, 65 Federal Register (FR) 64746, Final Reissuance, October 30, 2000.

USEPA Federal Register Document 40 CFR Part 131, May 18, 2000.

This initial San Diego River MLS data set shows levels of Diazinon in the three storm events at or above the California Department of Fish and Game level of 0.08µg/L on November 29, 2001, and February 17 and March 17, 2002 with 0.21, 0.10, and 0.08µg/L respectively.

Bacteriological constituents of concern were not persistently above the Basin Plan water quality objective of 400 MPN/100ml with only one exceedance of Fecal Coliform levels at 30,000 MPN/100ml detected on February 17, 2002.

In a second grouping of constituents of concern and stressors there are several exceedances taking place on February 17, 2002: Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), surfactants and copper. These four analytes along with fecal coliform (as noted above), and nickel and zinc (the last two did not exceed the objectives, but are slightly higher than the other two events) are a potential indication of a sanitary sewage overflow or spill.

Lastly, only one incidence of toxicity was noted during this mass loading monitoring season. Toxicity to *Selenastrum* was observed during the storm event that took place on February 17, 2002. As noted earlier, under the current monitoring program, special investigations are carried out to aid in the characterization and identification of any specific constituents of concern causing toxicity. These investigations are triggered by weight of evidence approach through the triad decision matrix.

In general, few exceedances were noted during the 2001-2002 wet weather season at the mass loading station in the San Diego River watershed. Diazinon is an exception to this statement as the diazinon concentrations were equal to or exceeded the water quality objective in all three events monitored. Therefore, diazinon warrants further consideration as a constituent of concern. All other exceedances are potentially associated with isolated events and will not be considered constituents of concern at this time.

3.4.2.1 TRIAD DECISION MATRIX

The bioassessment data, chemical analysis and toxicity testing are combined in the triad decision matrix. That is, these data are collectively evaluated to determine whether the evidence suggests the need for additional monitoring efforts, such as development and implementation of a Toxicity Identification and Elimination (TIE) study to identify the constituents causing toxicity.

As shown below, the triad decision matrix for the San Diego River watershed indicate that a TIE would not provide useful information at this time.

Table 3-3. Triad Decision Matrix for the San Diego River Watershed, Year 2002.

CHEMISTRY DATA	TOXICITY TESTING	BENTHIC COMMUNITY	COMMENTS
Mass loading station data indicate persistent Diazinon above or at the water quality objective.	Mass loading station data do not show evidence of persistent toxicity	Indications of alteration	1) TIE would not provide useful information if there is no evidence of persistent toxicity 2) Continue monitoring and periodic review of related findings

3.4.3 CLEAN WATER ACT 303(D) LIST

The mouth of the San Diego River at Ocean Beach is identified in the 1998 Clean Water Act 303(d) list due to fecal coliform bacteria. Additionally, the 1998 list identifies Famosa Slough, a tidal salt water marsh near the mouth of the San Diego River, as water quality limited due to euthrophication. Eutrophication is also identified in the Famosa Slough and channel in the 2002 proposed list (extent of area identified is increased from 28 to 36 acres). Potential constituents of concern also include total dissolved solids (TDS) and other compounds associated with municipal and domestic water supply and/or eutrophication. Details of the 1998 listings and 2002 proposed listings are shown below.

Table 3-4. 1998 303(d) Listed Water Bodies in the San Diego River Watershed[27].

WATER BODY NAME	HYDROLOGIC SUB AREA	HAS #	POLLUTANT/STRESSOR	ESTIMATED AREA/SIZE	YEAR LISTED
Pacific Ocean at San Diego River Mouth (Dog Beach)	Lower San Diego	907.11	Bacterial Indicators	0.5 miles	1998
Famosa Slough and Channel	Lower San Diego	907.11	Eutrophication	28 acres	1998

Table 3-5. 2002 Proposed 303(d) Water Bodies in the San Diego River Watershed

WATER BODY NAME	HYDROLOGIC SUB AREA	HAS #	POLLUTANT/STRESSOR	ESTIMATED AREA/SIZE	YEAR PROPOSED
Famosa Slough and Channel	Lower San Diego	907.11	Eutrophic	36 acres	2002

[27] SDRWQCB, 2002.

WATER BODY NAME	HYDROLOGIC SUB AREA	HAS #	POLLUTANT/STRESSOR	ESTIMATED AREA/SIZE	YEAR PROPOSED
Pacific Ocean at Ocean Beach (Bermuda Ave)	Lower San Diego	907.11	Bacterial Indicators	16 miles	2002
Forrester Creek	Lower San Diego (Santee)	907.12	Fecal Coliform, pH, TDS	12 miles	2002
Lower San Diego River	Mission San Diego & Santee	907.11 907.12	Fecal Coliform, Dissolved Oxygen, Phosphorus, TDS	14 miles	2002

Additionally, a number of conditions and constituents of concern have been identified in a "watch" list by the Regional Board as part of the 2002 update to the 303(d) listings as shown below. This "watch" list is provided to assist Copermittees in long range planning efforts.

Table 3-6. Watch List by Hydrologic Sub-Area.

WATER BODY NAME	HYDROLOGIC SUB AREA (HSA)	HSA #	POLLUTANT/STRESSOR
Alvarado Creek	Lower San Diego	907.11	Benthic Community Degradation, Eutrophication, sedimentation/siltation, trash
Boulder Creek	Cuyamaca	907.4	Exotic vegetation, hydromodification, Eutrophication, sedimentation/siltation
Chocolate Creek/Canyon	El Capitan	907.3	Eutrophication, sedimentation/siltation
Forrester Creek	Lower San Diego	907.1	Eutrophication, trash
King Creek	El Capitan	907.3	Eutrophication
Murray Reservoir	Lower San Diego	907.10	Bromodichloromethane, chloride, chloroform dibromochloromethane, phosphorus, sodium, sulfate
Padre Barona Creek	Not specified[28]	Not specified	Eutrophication, incised channel
San Diego River	Not specified	Not specified	Benthic Community Degradation, benzene, trash chlordane, Eutrophication, exotic vegetation, MTBE,

[28] Not specified in listing by SDRWQCB. Sub-area designation is either 907.12 or 907.24.
Source: RWQCB 2001

WATER BODY NAME	HYDROLOGIC SUB AREA (HSA)	HSA #	POLLUTANT/STRESSOR
Sycamore Canyon Creek	Lower San Diego	907.12	Eutrophication, exotic vegetation, phosphorus, trash

Based on information reviewed from existing and proposed 303(d) listings, the following constituents of concern and stressors are identified for further consideration: bacterial indicators, total dissolved solids, pH, phosphorus, dissolved oxygen, and eutrophication.

3.4.4 BENEFICIAL USES

As stated earlier, beneficial use designations describe existing or potential beneficial uses of water bodies. Beneficial uses take into consideration the use and value of water for many purposes, including recreation in and on the water, protection and propagation of aquatic life and public water supplies. It is essential to review the beneficial uses identified within the watershed as part of the water quality assessment effort.

The beneficial uses designated for the entire watershed are summarized in Table 3-7 below. It should be noted that beneficial uses are defined more specifically for each water body segment or sub-watershed in the San Diego Basin Plan. The beneficial uses for the watershed can be affected when water quality is limited or altered by a variety of factors.

Table 3-7. Summary of Beneficial Uses within the San Diego River Watershed[29].

BENEFICIAL USES	INLAND SURFACE WATERS	COASTAL WATERS	RESERVOIRS AND LAKES	GROUND WATERS
Municipal and Domestic Supply	•		•	•
Agricultural Supply	•		•	•
Industrial Service Supply	•		•	•
Industrial Process Supply	•		•	•
Navigation				
Contact Water Recreation	•	•	•[30]	
Non-Contact Water Recreation	•	•	•	
Commercial and Sport Fishing		•		
Warm Freshwater Habitat	•		•	
Cold Freshwater Habitat	•		•	
Estuarine Habitat		•		
Wildlife Habitat	•	•	•	
Biological Habitats		•		
Rare, Threatened, or Endangered Species	•	•	•	
Marine Habitat		•		
Migration of Aquatic Organisms		•		
Aquaculture				
Shellfish Harvesting		•		

[29] SDRWCB, 1994.
[30] Shore and boat fishing only. Other REC-1 or Contact Water Recreation uses are prohibited.

BENEFICIAL USES	INLAND SURFACE WATERS	COASTAL WATERS	RESERVOIRS AND LAKES	GROUND WATERS
Spawning, Reproduction and/or Early Development				
Hydropower Generation			•	

The beneficial uses in this watershed that have the strongest link to potential constituents of concern identified in this assessment are associated with recreational activities, municipal and domestic water supply, and provision of habitat.

3.4.5 DATA ANALYSIS SUMMARY

In this section, constituents of concern are framed in terms of their potential impact on beneficial uses. These constituents are then evaluated to determine actions to be implemented in an effort to improve or sustain water quality and beneficial uses.

It is important to note that beneficial uses provide the context under which water quality issues are assessed. Under this framework, a single constituent of concern may lead to the identification of a water quality issue (limited recreation opportunities due to bacterial levels which exceed health standards); one or more constituents of concern may be associated with the same beneficial use or various beneficial uses. In general, the assessment provided here is related to a beneficial use for which attainment of sustainable water quality is the ultimate goal.

The benthic community assessment indicates that communities range from moderately to substantially impacted based on data review spanning three years.

The mass loading station data for 2001-2002 yields diazinon as a potential constituent of concern with three exceedances of water quality objectives.

The regulatory mechanisms yield several potential constituents of concern and/or stressors from the 303(d) adopted and proposed listings including bacterial indicators, total dissolved solids, pH, phosphorus, dissolved oxygen, and eutrophication.

The evaluation of identified constituents of concern in the watershed based on the data analyzed to date is presented in Table 3-8 below. Management actions are explained in detail in Chapter 4.

Table 3-8. Summary of Evaluation of Stressors and/or Constituents of Concern – Year 1 (2002)

POTENTIAL WATER QUALITY ISSUE(S)	CONSTITUENTS OF CONCERN, AND/OR STRESSORS ADDRESSED	HIGH PRIORITY?	COMMENTS AND PROPOSED MANAGEMENT ACTIONS
Limiting recreation opportunities in coastal waters due to potential for pathogens	Bacterial Indicators	Yes	Bacteria has been identified by Copermittees and the Regional Board as a priority in the region. Bacteria is identified as a pollutant in both the existing and proposed 303(d) lists. Addressing water quality issues which limit recreational opportunities is of paramount importance to all San Diegans both as a quality of life issue and to ensure the long term economic health of the region. *Action(s): Bacterial Indicators Source Identification Project & Data Collection and Analysis*
Limitation to habitat value of water bodies	Diazinon	No	Diazinon levels were exceeded in the first season of testing at the mass loading station. All three of the data points collected so far exceeded water quality standards, however, this is not enough evidence to define a course of action. The data collected in other watersheds indicates that Copermittees should consider addressing the use of pesticides in the region as an important component of proactive storm water runoff management activities. *Action(s): Integrated Pest Management Campaign*
Limitation to habitat value of water bodies	Eutrophication	No	The 2002 303(d) listing includes Famosa Slough and Channel for eutrophication. Eutrophication is detrimental to aquatic habitat due to changes in the levels of oxygen as nutrient levels fluctuate. Determining the cause(s) or source(s) leading to eutrophication by collecting and analyzing existing data. *Action(s): Data Collection and Analysis*
Limitation to habitat value of water bodies	Benthic Community Degradation	No	Benthic communities serve as indicators of ecological trends and aid in the evaluation of the appropriateness of watershed programs. The current assessment indicates moderately to substantially impacted conditions to be used as a baseline from which trends can be developed and the impact of watershed programs assessed. *Action(s): Data Collection and Analysis*

POTENTIAL WATER QUALITY ISSUE(S)	CONSTITUENTS OF CONCERN, AND/OR STRESSORS ADDRESSED	HIGH PRIORITY?	COMMENTS AND PROPOSED MANAGEMENT ACTIONS
Potential Impact on Municipal and Domestic Water Supply.	Total Dissolved Solids, pH, Phosphorus, Dissolved Oxygen	Yes	Municipal and domestic water supplies can be compromised by a variety of factors that include urban runoff, imported water sources, naturally occurring salinity and minerals. Integrating efforts with other partners in order to develop a better understanding of the constituents of concern to water supply issues will assist in efforts to address this water quality issue in the San Diego region. *Action(s): Data Collection and Analysis & Source Water Protection Guidelines Project*

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4 ACTIONS PLANNED IN RESPONSE TO ASSESSMENT

4.1 ACTIONS SELECTION PROCESS

Based on the yearly watershed assessment, participating jurisdictions will work together to address the issues that have been identified through this process.

It should be noted, as the water quality assessment is refined, that water quality issues may be identified at several levels: the jurisdictional (municipal, county or other governmental entity), cross-jurisdictional (watershed-wide), or regional levels (cross-watersheds). Generally, a water quality issue that is determined to be specific to a jurisdiction would be referred to the source agency and addressed through their existing program or Jurisdictional Urban Runoff Management Plan (Jurisdictional URMP). In other cases, the source(s) may be found to originate from two or more jurisdictions, in which case the problem would be addressed as part of the watershed based program. Lastly, the issue may be found at regional levels (impacting more than one watershed) and would be referred to the appropriate regional technical committee (Monitoring, Outreach, Budget, etc.) for their assessment and recommendations.

Updates to this program will be submitted as part of the annual report and will include the annual evaluation of water quality issues at the watershed level as well as pertinent revisions to the action plan.

Many of the activities addressing water quality problems across the watershed may be similar and applicable across jurisdictions. The watershed partners will likely work within their current programs (Jurisdictional URMPs) rather than creating a new program. The watershed-based program can focus efforts and bring consistency to jurisdiction specific approaches. It is anticipated that program actions will be developed and implemented at the jurisdictional, cross-jurisdictional, and regional levels. Participating agencies and partners will seek to maximize opportunities for regional cooperation and ensure that limited resources are allocated in the most cost effective manner. As time and resources permit, grant funding will be pursued wherever possible.

The general steps used to identify and implement activities to address water quality issues vary significantly, but may include the following as time and resources permit:

- Determining the extent of each water quality problem (spatial, temporal and magnitude) and identify unknowns.
- Determining the need for additional data or studies when data or information gaps are identified.

- Identifying existing activities in the watershed related to water quality issue and assessing extent and efficacy of current efforts
- Identifying potential mechanisms to reduce pollutant load and its concentration (structural and non-structural Best Management Practices including education and outreach).
- Assessing, as appropriate, the efficacy, economical impact, benefit to cost ratios, and technical feasibility of potential corrective actions.
- Identifying funding sources for actions under consideration.

The process of planning actual implementation and scheduling of corrective actions will be iterative, cooperative and likely to change over the course of time as the program develops.

The list of pertinent actions and implementation schedules will be updated and refined through the annual program reporting process. Short and long-term activities may be designated for consideration in future years and labeled as tentative projects. Short-term activities may in some cases, due to the ease of implementation, be scheduled within a year or two, but staggered to allow for ease of project and workload management.

As the program develops, participants will use and refine the approach described above to proceed with planning and implementation efforts.

4.2 PLANNED ACTIONS

The water quality assessment of the first year of this program, as described in the previous chapter, leads to four actions as described below. Parties responsible for implementation are identified in *italics*.

4.2.1 BACTERIAL INDICATORS SOURCE IDENTIFICATION PROJECT

City of San Diego

The City of San Diego is implementing a two-phased project to address bacterial contamination at the terminus of the San Diego River. Phase I of the Bacterial Indicators Source Identification Project will identify sources of bacteria and recommend appropriate management actions for abatement of those bacterial sources. Phase II of the Source Identification Project is expected to lead to the abatement of bacterial sources through the implementation of best management practices. The City has selected MEC Analytical Systems, Inc. to design and implement Phase I of this water quality improvement project. The following project objectives have been identified to accomplish the goal of reducing beach postings and closures at Ocean Beach:

1) Investigate the potential sources of bacterial contamination along San Diego River;

2) Recommend actions (based upon source investigation) to abate bacteria contamination in San Diego River, including best management practices, and,
3) Establish a water quality baseline against which to measure best management practices' effectiveness.

The purpose of these efforts is to significantly reduce the closures and postings at Ocean Beach, Mission Beach Strand, and particularly at Dog Beach. Phase I is expected to be completed by October 1, 2003. In subsequent years, the watershed Copermittees may identify additional short and/or long-term activities based on the results of Phase I and current monitoring efforts.

4.2.2 REGIONAL INTEGRATED PEST CONTROL MANAGEMENT CAMPAIGN

All San Diego River Watershed Jurisdictions

The San Diego Regional Water Quality Control Board has identified education as the single most effective best management practice (BMP) to address water quality degradation related to pesticide use[31]. While organophosphate pesticides have been identified as regularly exceeding water quality objectives in several watersheds throughout the region, education efforts in relation to pesticide use will focus on promoting responsible practices in irrigation and use of pesticides as well as providing information about alternative pest-control techniques.

A Pest Management Guide (such as the one produced by the City of Modesto Storm Water Program in cooperation with the University of California Statewide Integrated Pest Management Project) will be produced for use within San Diego County at the regional level at many diverse outreach events. Additionally, other targeted outreach opportunities such as Point of Purchase campaigns will be explored and integrated with other efforts as appropriate. The guide along with other general educational materials will be widely distributed to residents and businesses within the region regardless of jurisdictional boundaries. As part of the campaign, outreach efforts will be implemented through a series of public workshops and/or visits and presentations to existing stakeholders' meetings.

It is anticipated that the Pest Management Guide will be produced within the short term as a regional effort. Distribution and outreach is expected to occur over the long run and beyond the life of the current Municipal Permit. The County of San Diego will lead and coordinate development and implementation of the regional campaign in cooperation with interested stakeholders.

4.2.3 DATA COLLECTION AND ANALYSIS

All San Diego River Watershed Jurisdictions

Future data collection and management efforts should be concentrated in developing a better understanding of bacteria sources as well as compilation and

[31] SDRWQCB 2002b.

analysis of data relevant to this issue within the watershed and region at large. Further, as described earlier, there is a need to incorporate additional data into the yearly watershed based assessment which is a critical component of this program.

As additional data from a variety of jurisdictional programs and other monitoring efforts becomes available, it will be imperative to review the results and conclusions from these efforts to provide the most complete assessment possible of water quality related issues at the watershed level. The data generated from varied sources will be easier to manage if collected using pre-established protocols developed for the region at large. While this data collection standardization task may be fulfilled by existing efforts in the region, it will still require coordination at the watershed level. Data may be centralized for ease of management and analysis in the future.

Complementary programs generating significant amounts of data and information that may be used in the future (as time and resources permit) to achieve a more complete evaluation of watershed water quality in order to track or augment future review and assessment of water quality include:

- Copermittee dry weather monitoring reports;
- Lagoon and coastal storm drain monitoring data;
- Special Copermittee studies or monitoring information;
- Water quality related data collected by other agencies;
- Citizen monitoring programs; and,
- Research conducted by educational institutions.

A long-term benefit of centralized data collection and management is the identification of potential temporal and spatial data gaps for the watershed.

The County of San Diego has proposed to act as a countywide data repository for monitoring information. The Project Clean Water Monitoring Workgroup is working to establish a uniform reporting criteria for dry weather data so that information may be delivered to the County in a consistent format for data management and, ultimately, data assessment. This database can be combined with the wet weather monitoring data that is managed electronically by the monitoring consultant. Data stored in a common system would allow data to be extracted on a watershed basis for a variety of purposes. Common data storage would allow for flexibility in data evaluation and manipulation for statistical tests, including trend and relationship analyses.

It is anticipated that a regional data management system (with the ability to respond to queries at the watershed level) will be developed over the long term. Over the short term, participating jurisdictions are committed to working on identifying data management needs, developing a plan of implementation and

seeking funding for this action. Copermittees may coordinate these actions through the Project Clean Water Monitoring and Data Management Workgroups.

4.2.4 SOURCE WATER PROTECTION GUIDELINES PROJECT

City of San Diego

The City of San Diego has nine raw drinking water reservoirs. These reservoirs capture local rainwater and runoff to supply up to 20 percent of the City's water. The reservoirs also store imported water that is piped into the region through aqueducts. The reservoirs are critical components of the regional water supply system. However, the quality of water stored in these reservoirs is at risk because of pollutant loads associated with urbanization within the reservoirs' basins. Recent studies have identified runoff from urban land uses, construction projects, and related development activities in the watersheds as the largest sources of pollution to the reservoirs.

Currently, the City of San Diego Water Department evaluates and comments on developments proposed within the sub-watersheds that also house reservoirs on a case-by-case basis. The purpose of the Guidelines is to ensure that development within affected basins occurs in ways that protect the local source waters. City staff and possibly other local agencies will use the Guidelines as part of the development review, comment, and consideration process. Land developers may use the Guidelines in conceiving and designing projects located within basins that have the potential to affect water reservoirs. The County of San Diego is an active partner in this project, currently represented in the Technical Advisory Committee formed to guide this project.

The Guidelines will build upon existing land use, zoning, and building code regulations. The primary goal of the Guidelines is to identify water quality control measures that would specifically address potential sources of pollution associated with urban runoff within the basins of local raw drinking water reservoirs. The Guidelines will also include recommendations for the long-term maintenance of the control measures and effective monitoring techniques. Project implementation includes outreach and education components.

In order to develop a better understanding of pollutants of concern (associated with runoff) to local reservoirs, the project team will rely primarily on the experience of the San Diego Water Department staff, including water treatment plant operators, existing studies and reports on the reservoirs and associated sub-watersheds (e.g., Watershed Sanitary Surveys and 2001 Update), as well as other related water quality data. Other information to be considered include findings from a land use sensitivity model, scientific research and literature reviews, recreational use of the reservoirs, existing and planned future land use activities, as well as physical characteristics of the basins (e.g., topography, vegetation and soils).

Protecting existing local water sources is a critical, though often overlooked, component of planning for regional water supply reliability. Planning for drinking water protection by creating the Source Water Protection Guidelines will provide a road map for sensible development, will increase the reliability of the water supply system, and will likely reduce the cost of drinking water treatment.

4.3 OTHER PROJECTS

There are other projects planned within the watershed that will serve to support the goals and objectives of this program. One such project is the *Forrester Creek Improvement Project,* led by the City of Santee.

The *Forrester Creek Improvement Project* calls for the improvement of approximately 1.2 miles of the Forrester Creek, a tributary to the San Diego River. The project scope includes widening and revegetation of the channel throughout most of its reach within the City of Santee. Restoration and creation of wetland habitat will serve dual purposes. The wetlands will improve water quality by providing for flow retention, infiltration and pollutant load reduction. Studies have shown that wetlands reduce the pollutant loads associated with nutrients, organic compounds (organophosphate pesticides) and metals. Additionally, the biological function of the creek in terms of habitat provision will be improved by the newly created and restored wetland habitat.

The project is scheduled to begin in the summer of 2003, and is being funded primarily by the City of Santee, with support from other federal, state, and local agencies including the County of San Diego.

5 LAND USE PLANNING

The second objective of the San Diego River watershed program, as noted in the introduction section, is to "integrate watershed principles into land use planning." Program components, as described in this chapter, have been developed in response to this objective.

5.1 PLANNING CONTEXT

The California Government Code gives local governments the authority and the responsibility to exercise local land use planning and associated regulatory functions. Because they ultimately control the types and intensities of particular activities that may be allowed within specified geographic areas, land use decisions play a critical role in addressing *point and nonpoint sources* of pollution.

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 jurisdictional boundaries.

State law requires that each jurisdiction adopt a comprehensive, long-term General Plan to guide its physical development. The General Plan is the official document that outlines the long term plans and policies regarding the location of housing, business, industry, roads, parks, and other land uses. Additionally, the General Plan addresses broad issues such as provision of infrastructure and conservation of natural resources. The legislative body of each city (the city council) and each county (board of supervisors) adopts zoning, subdivision and other ordinances to regulate land uses and to carry out the policies of its General Plan. The General Plan can be described as the blueprint for future development. It represents the community's view of its future; a constitution made up of goals and policies upon which local decision makers (hearing officers, planning commissions, city councils and county board of supervisors) base their land use decisions.

California planning law establishes the minimum contents and scope of local general plans. State law requires planning agencies to "prepare, periodically review, and revise, as necessary, the general plan." Keeping the general plan current is important for good planning. State law gives counties and cities wide latitude in how they put a General Plan together, but there are fundamental requirements that must be met. These requirements include seven mandatory elements as described below:

Land Use Element: The land use element dedicates lands to particular purposes. It outlines how the jurisdiction will designate and separate various uses such as commercial, industrial, and residential. Natural resource, agriculture, timber production, and flood plain areas must also be delineated. A major intent of this element is to design areas for development that are compatible with one another.

Housing Element: This element required local governments to adequately plan to meet the existing and projected housing needs of all economic segments of the community.

Circulation: This element identifies the general location of existing and planned transportation routes and public utilities. It is actually an infrastructure plan that concerns itself with the circulation of people, goods, energy, water, sewage, storm drainage, and communications. Its provisions support the goals, objectives, policies and proposals of the land use element.

Conservation: This element describes how the jurisdiction intends to protect and conserve its natural resources. The element covers water resources, soils, forest, wildlife, and fisheries.

Open Space: This element designates areas for preservation and managed production of natural resources, outdoor recreation, and public health and safety. The Open Space element is related to the conservation element in some ways, and designated lands in either element could be actually or nearly the same. The important difference between the two elements is the very specific inclusion of the consideration of public health and safety concerns in open space zoning.

Safety Element: The safety element defines community protection measures in relation to fires, seismic hazards, and geological hazards. It must include provisions for evacuation routes, water supply, minimum road widths, and clearances around structures.

Noise Element : This element is designed to address overall levels of noise in the community by identifying the sources of noise, assessing its effects and establishing policies, criteria and standards to reduce excessive noise to acceptable limits.

5.2 CURRENT PLANNING EFFORTS

Cities and counties "plan" in order to identify important community issues, project future demand for services, anticipate potential problems, and establish goals and policies for directing and managing growth. Individual jurisdictions use a variety of tools in the planning process including the general plan and a number of different ordinances (e.g. zoning, subdivision, grading etc.) and departmental policies.

It should be noted that the County and City of San Diego are currently updating their General Plans through a highly participatory process in collaboration with many local and state agencies. The City and County are incorporating watershed protection principles in these efforts and intend to continue to pursue creative partnerships for the benefit of the region. The following provides a brief description of current and planned efforts within the San Diego River watershed in relation of General Plans.

5.2.1 CITY OF SAN DIEGO

The City of San Diego's Progress Guide and General Plan, which was adopted on February 26, 1979, contains 13 elements, addressing the following issues: housing, transportation, commercial, industrial, public facilities, services, and safety, open space, recreation, redevelopment, conservation, energy conservation, cultural resources management, seismic safety, and urban design. The basic goal of the plan is the "fostering of a physical environment in San Diego that will be most congenial to healthy human development." In relation to water quality, a stated sub-goal of the general plan is the "conservation of an urban environment that is in harmony with nature and retains strong linkages with it." The City's Progress Guide and General Plan is in the process of being amended as discussed below.

The City of San Diego has recently adopted the Strategic Framework Element, which constitutes the first step in comprehensively updating the City's General Plan since 1979. Several factors that influenced the timing of this update include:

- The City's population is anticipated to continue to increase in the near future;
- Less than 10 percent of the City's land is vacant and available for new development, meaning the City must shift from developing vacant land to reinvesting in existing communities;
- The City faces a significant shortfall in public facilities and services;
- The City needs to address traffic congestion and other quality of life concerns; and,
- Housing is increasingly unaffordable and unavailable.

The Strategic Framework Element provides the overall structure to guide the General Plan update, including future community plan amendments and implementation of a Five-Year Action Plan. The Strategic Framework Element contains a strategy called the City of Villages to direct future growth as San Diego shifts from an era of building upon abundant open land to one of reinvesting in existing communities. It represents the City's new approach for shaping how the City will grow while preserving the character of its communities and its most treasured natural resources and amenities. The development of the Strategic Framework Element represents a partnership between City staff, other

agencies, the Strategic Framework Citizen Committee, and many interested citizen groups and City residents.

The Five-Year Action Plan is a companion document to the Strategic Framework Element. It outlines the work program proposed to implement the City of Villages strategy with its major policy recommendations regarding urban form, neighborhood quality, public facilities and infrastructure, conservation and the environment, economic prosperity and affordable housing. The Action Plan is the guide to how, when, and who is responsible for implementing the goals. The Action Plan identifies actions to be taken, the "Lead Department(s)" to further the action, whether staff funding is available to work on the action, potential public and private sector partners who should be involved, and a monitoring program to assess progress in implementing the strategy. An important activity in the Five-Year Action Plan is the adoption of a new conservation element with significant policies devoted to water resources and habitat protection. A key City goal of this effort is to "take an active leadership role in promoting rural and open space preservation throughout the region."

The City of Villages strategy is designed to complement and support long-range growth management strategies throughout the region. The City coordinates and works closely with regional planning entities including the County, San Diego Association of Governments (SANDAG) and the Metropolitan Transit Development Board (MTDB). Two examples of the benefits of the regional coordination associated with the City of Villages are: 1) the real potential to limit sprawl in outlying areas of the county, and 2) a significantly superior transit system that can provide more choices for San Diegans to move about the City.

While the development of the Strategic Framework Element has been closely coordinated with many other local agencies, the City of San Diego continues to play a leading role in regional planning. This role includes working with other cities and agencies in refining the regional arterial transportation network, expanding transit services, developing a long-term airport solution for the region, assuring availability of adequate sources of water and utilities for urban needs, and achieving goals for a regional open space network. The City of San Diego is currently participating in the preparation of a Regional Comprehensive Plan (RCP), a countywide effort to identify and support smart growth development patterns, with all of the SANDAG member agencies.

5.2.2 CITY OF SANTEE

The City of Santee is currently undertaking a comprehensive update of its General Plan to serve as the City's policy document through 2020. The proposed General Plan update would accomplish several goals. The overall goal of the Update is to establish strategies that will ensure an appropriate balance between housing, employment, retail, recreation and open space within the City. A second goal is to bring the various Elements of the General Plan into conformance with

current State regulations and state of the art techniques for accommodating growth and maintaining a high quality of life. Lastly, the update is intended to take into account the current conditions within and around the City of Santee (e.g. traffic, housing/employment, biological resources, water and environmental quality, community character, etc.).

To accomplish these broad community objectives and smart growth goals, the City is proposing to establish several new land use designations that would allow higher densities and/or mixed uses. These higher density residential districts are being proposed along major transit corridors to take advantage of existing and planned transit services.

In response to changes in land use patterns, new freeway construction and establishment of the Trolley line, modifications are being proposed to the City's roadway system including the addition and deletion of planned roads, and changes in roadway classifications for both existing and planned streets. An emphasis is being placed on encouraging alternative transportation including transit, bicycle and pedestrian travel.

The element that deals most directly with water quality is the Conservation Element. The proposed element melds the previous Open Space and Conservation Elements into one element, dealing with open space issues as well as biological resources, water resources, land and mineral resources, cultural resources, and the City's draft Multiple Species Conservation Program Subarea Plan. This element will include an extensive discussion of local and regional watershed planning and water quality issues and will include specific policies and implementation measures intended to reduce pollutants in urban runoff and storm water discharges and improve overall water quality.

5.2.3 CITY OF EL CAJON

The City of El Cajon revised its General Plan to add storm water runoff policies and objectives to the General Plan text. The storm water runoff text was passed and adopted by the El Cajon City Planning Commission on December 9, 2002 and approved by the City Council on January 14, 2003. The amendment to the General Plan was consistent with the City's Jurisdictional Urban Runoff Management Program (JURMP) and overall objective to maintain and improve the health, safety, convenience and quality of life for the City's citizens and visitors.

Specifically, an objective was added to achieve and maintain a level of water quality, which protects affected watersheds by minimizing runoff that may cause erosion and pollution. Additionally, nine new policies were adopted to outline how the City would handle storm water runoff during the decision making process. An emphasis on new and redevelopment is consistent with the City's objective to minimize the symptom of erosion.

The City of El Cajon's planning efforts are concentrated on redevelopment activities as the City is currently built out with little vacant land available for development. The new policies adopted in the General Plan provide the ground-level support for implementing pollution prevention efforts and maintaining or reducing pollutant loads to the maximum extent practicable.

5.2.4 COUNTY OF SAN DIEGO

The Regional Land Use Element of the County of San Diego's existing General Plan sets as its overall goal a the requirement that planning in the County will "accommodate population growth and influence its distribution" in such a way as to "protect and use scarce resources wisely" and to "preserve the natural environment." The County's Regional Land Use Element also states that one of its Government Structure Goals (Goal 5.4) is to "coordinate planning efforts within the cities of the region… to develop compatible land use strategies."

Portions of the San Diego River Watershed lie within several community and sub-regional planning areas, including:

Alpine	Cuyamaca	Lakeside
Central Mountain	Descanso	Ramona
Crest/Dehesa/Harbison Canyon/Granite Hills	Julian	Valle De Oro

After reviewing community plans for these areas, it was found that while the existing plans had references to jurisdictional collaboration, water quality, watershed protection, and storm water pollution principles, they were scattered throughout the documents. In addition, the language was not standardized, and was included in some community plans, but not others. As such, efforts are currently underway to modify the General Plan (GP2020) to improve upon this jurisdictional collaboration to make the language more standardized and consistent. The proposed work plan with associated estimated due dates are included in the County's Jurisdictional URMP.

As part of the GP2020 update, the County of San Diego is developing land use goals and policies that are intended to maintain a built environment that is compatible with and sensitive to its natural setting and retains communities and country towns of unique local character. Appropriately sited land uses should enhance the community and protect natural resources as well as, enhance, serve, and contribute to an existing communities character with public safety and the protection of public and private property maintained.

Proposed developments are to be consistent with a community's character and meet the needs for a wide range of ages, income groups, abilities and diverse lifestyles. Watersheds, ground-water resources, dark skies, cultural and

historical resources, greenbelts, agriculture, natural floodplains, wetlands, environmentally sensitive lands, and natural resources, air quality, water quality, and wildlife corridors are to be protected and integrated into the overall development of the County. Also, in regard to natural resources, the County of San Diego's goals and polices are intended to preserve open spaces for conservation of natural resources, recreational and educational activities.

The ultimate goal of the County of San Diego's General Plan update is to allow for efficient, economical, coordinated, and timely provision of public facilities and services for water, sewer, roads, drainage and storm-water runoff, schools, parks, libraries, police, fire protection, and emergency medical.

As part of the update, the County is considering a Village Core concept, which is intended for existing and proposed community focal points, higher-density settlements, and retail or employment locations that serve the needs of the surrounding village. The village core should be pedestrian oriented and, where appropriate, serve as a transit node for the village. Village Support areas are designated for medium-density development around the Village Core to support commercial and business districts.

Semi-Rural lands serve as a transition area between Village development and Rural Lands. Policies would discourage the expansion of Semi-Rural Estates Regional Category west of County Water Authority Line (CWA) and prohibit their expansion east of CWA. Rural Lands consist of large, reasonably contiguous areas of land that contain biological resources, physical constraints, community buffers, and prime agricultural land. Rural Lands include areas that lack infrastructure to support development and/or are slated for backcountry preservation. Land use policies would prohibit the conversion of Rural Lands east of CWA within the life of GP2020.

5.3 CURRENT INTER-JURISDICTIONAL PLANNING EFFORTS

While there are ongoing collaborative efforts that cross jurisdictional boundaries in the region, State law requires that local governments hold public hearings prior to taking discretionary actions. At the hearing, generally staff and applicants present the proposal (whether a development proposal, ordinance amendment or general plan update), and the decision makers consider it in light of local regulations and environmental effects, and listen to testimony from interested parties.

Jurisdictions (as well as the public at large) have the opportunity to comment on and to participate in hearings relating to land use development and planning process. As part of the development process, and before a project can be approved by a jurisdiction, all discretionary projects require some form of environmental compliance pursuant to the California Environmental Quality Act (CEQA), with related public notice and comment opportunities. The

consideration of projects by any of the jurisdiction's hearing bodies involves public hearing and notification procedures.

As part of many of the individual jurisdiction's Standard Urban Storm Water Management Plan (SUSMP), discretionary projects are required to fully and adequately characterize the project's site drainage, develop effective post-construction storm water protection and ensure the effectiveness of the Best Management Practices (BMP) through proper maintenance and long-term fiscal responsibility. Prior to being approved by a hearing body, the environmental documents that are prepared for the project will be available to interested members of the public and adjacent jurisdictions for review and comment on development-related storm water issues.

5.4 WATERSHED-BASED LAND USE PLANNING MECHANISMS

While there are many cooperative planning efforts at work, the San Diego River watershed jurisdictions will utilize a combination of practices to facilitate the integration of watershed data and information into their land use decision-making processes in order to ensure the protection of the watershed and receiving water bodies.

The mechanisms used to facilitate cross-jurisdictional land use planning to ensure consideration of the health of the watershed are described below. The degree to which each will be used will be determined as appropriate based on the specific characteristic of each jurisdiction within the watershed.

5.4.1 WATER QUALITY ASSESSMENT

As illustrated in the figure below, the annual watershed-based water quality assessment conducted collaboratively by the storm water programs in each jurisdiction will form the informational basis for all watershed activities and programs later initiated by jurisdictions, including land use planning. Jurisdictional storm water programs will consider the role of land use planning during the development of their overall control strategies for specific issues and problems identified as priorities for the watershed. On an annual basis, as appropriate, specific data, information, and/or recommendations will be developed or compiled during the water quality assessment process and distributed to each jurisdiction's respective planning departments for consideration by land use planners and other decision makers to ensure adequate consideration of watershed-level problems and solutions.

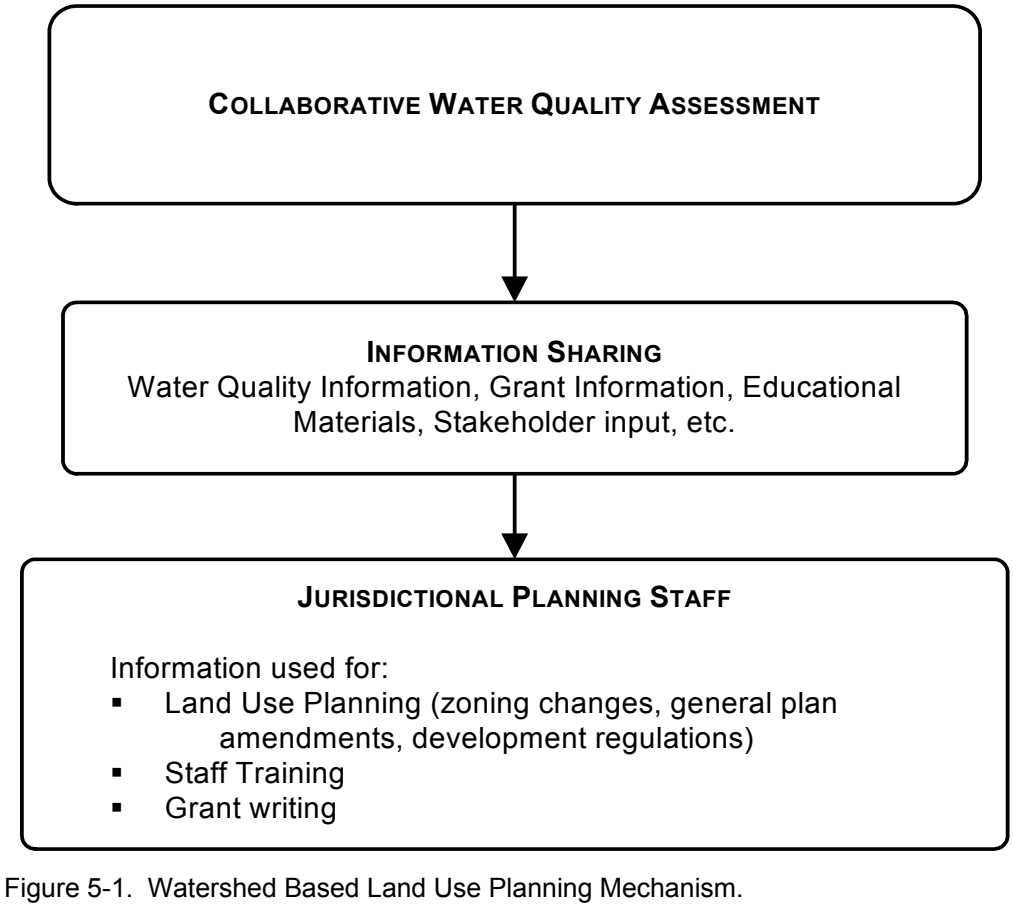

Figure 5-1. Watershed Based Land Use Planning Mechanism.

5.4.2 INFORMATION SHARING

For watershed issues to be successfully integrated into the land use planning process, effective dialogue must be established between the jurisdiction's storm water programs, planning staff, and other stakeholders. To this end, participation jurisdictions will establish mechanisms, such as meetings, as they determine necessary to ensure effective communication with planning staff both jurisdictionally and on a watershed basis. In both instances, the purpose of the meetings will be to facilitate the exchange of pertinent watershed-specific information and to explore the collaborative development of planning strategies between storm water managers and planners. The meetings will provide a general forum for discussions regarding projects that may impact water quality within other watershed jurisdictions, as well as collaborative opportunities for grant fund applications, coordination of natural resource planning, and mitigation within watersheds. Watershed land-use planning groups will periodically evaluate the effectiveness of these and other mechanisms of collaborative land-use planning to enhance their effectiveness.

Continued collaboration on the development of Watershed Urban Runoff Management Plans will necessarily result in the identification and/or generation of various written and/or electronic forms of data and information (data, reports, etc.) relevant to land use planning. As appropriate, participants will ensure that such materials are shared with land use planning staff within their individual jurisdictions as well as other jurisdictions within a particular 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 (such as projects approved with SUSMP waivers) or large development projects, monthly meeting notices, and information on various other activities such as mitigation or structural BMP efforts, educational activities, and grant proposals. Where appropriate, Copermittees will consider the development of standardized materials such as worksheets or letters that can be distributed to other watershed jurisdictions directly or via the Lead Copermittee.

5.4.3 JURISDICTIONAL PLANNING

As additional watershed information and data is shared with each jurisdiction's planning department, planning staff will meet with their jurisdiction's storm water program staff to discuss potential land use planning changes, training and grant opportunities that may be appropriate for the issues identified in the water quality assessment. For example, in addition to providing general education on water quality and watershed issues during their existing training programs for staff with land use planning and project approval responsibilities, information gathered during the water quality assessment phase described above will form the basis of watershed-specific training elements developed either individually or collaboratively by the jurisdictions. Planning staff may also be encouraged to participate in grant writing and program development and implementation with watershed stakeholders. In addition, relevant water quality data and findings generated through the water quality assessment may be used to determine whether new development regulations, zoning regulations, or land use policies are needed to address specific water quality issues.

Additionally, the jurisdictions within the San Diego River Watershed have now assembled the San Diego River Watershed Urban Runoff Management Plan Workgroup. The group, which consists of representatives from the of the cities of San Diego, El Cajon, La Mesa, Poway, Santee and County of San Diego is currently tasked with developing this program. Once the document has been submitted to the Regional Board, the group will continue to meet on a periodic basis and communicate via e-mail to coordinate the implementation of the short and long term strategies outlined in this document.

5.5 THE SAN DIEGO RIVER WATERSHED MANAGEMENT PLAN

The County of San Diego is leading an effort to develop a comprehensive San Diego River Watershed Management Plan by March of 2005 in cooperation with watershed stakeholders, local jurisdictions and other governmental agencies. The County was awarded $197,500 in Proposition 13 funds for this project. This comprehensive plan will identify priorities and strategies for the protection and restoration of natural systems of groundwater recharge, native vegetation, water flows, riparian zones, beneficial uses of waters and overall water quality.

Many stakeholders participated and supported efforts to write the successful proposal, including representatives of the County of San Diego, the cities of San Diego, Santee, El Cajon and La Mesa, San Diego County Water Authority, San Diego Stream Team, San Diego State University, Iron Mountain Conservancy, Ramona Water District, San Diego County Flood Control District, Friends of Famosa Slough, San Diego Audubon Society, The Environmental Trust, Padre Dam, Helix Water District, and San Diego River Coalition.

The following is a summary of the tasks required for the completion of the Plan:

1) Identify the needs and expectations of watershed stakeholders;
2) Assess data and information needs;
3) Complete a watershed evaluation which includes including identification of watershed resources and their condition; and,
4) Plan development and implementation.

The Watershed Management Plan will be finalized and submitted for consideration by the appropriate governmental authorities. Additionally, a list of potential projects will be developed to encourage stakeholders to collaborate in the future. Finally, a process will be established for continued discussion with watershed stakeholders to measure progress and identify additional changes needed over time.

Parties interesting in participating in this planning process should contact Liz Giffen at County of San Diego, Watershed Planning Section by phone at (858) 694-3482 or by email at Elizabeth.Giffen@sdcounty.ca.gov. More information is also available on the online at the Project Clean Water site (www.projectcleanwater.org).

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6 WATERSHED BASED EDUCATION

The third objective of the San Diego River watershed program, as noted in the introduction section, is to "enhance public understanding of sources of water pollution." Program components, as described in this chapter, have been developed in response to this objective.

Participating jurisdictions recognize that due to the very nature of non-point source pollution, public education is an essential strategy to protect every watershed. In order to reduce pollution, all those who live, visit and conduct business within our watersheds must become informed and involved.

Making all San Diegans aware of the importance of individual actions in protecting our water resources and promoting watershed stewardship are crucial components for the success of this program.

6.1 CURRENT EDUCATION ACTIVITIES

Currently, storm water education activities within the region are conducted on two levels: the countywide and the jurisdictional levels. Some examples of ongoing educational activities at each of these levels are identified in below:

Table 6-1. Current Storm Water Education Activities.

ACTIVITY SCOPE	ACTIVITY (PARTICIPATING AGENCIES)	COMMENTS
Countywide	Project Clean Water (All jurisdictions under the leadership of County of San Diego)	County initiated effort provides the forum for information sharing to promote regional collaboration and consistency in outreach. The Education and Resource Development Technical Advisory Committee (TAC) has been meeting since November 1, 2000. This TAC, which broadly encompasses a variety of outreach topics, works closely with the Copermittees' Education Technical Workgroup on the development and implementation of storm water and urban runoff outreach activities.
	Think Blue Media Campaign (City of San Diego, County of San Diego, San Diego Unified Port District and Caltrans – District 11)	Bilingual (English/Spanish) television and radio Public Service Announcement advertising campaign airing on 32 local broadcast outlets. Campaign developed and administered by the City of San Diego with financial support from the County and Port of San Diego as well as the California Department of Transportation – District 11.

	Industrial/Commercial Workshops (All jurisdictions)	Series of industry specific workshops scheduled throughout the region under the leadership of the County of San Diego Department of Environmental Health. Featured speakers and panelists provide attendees with the most up-to-date information about storm water requirements and Best Management Practices. To date, automotive, landscaping and restaurant industries have been targeted.
Jurisdictional	Storm Water Public Presentations (Participating Jurisdictions)	Presentations are made on a regular basis to community planning groups and other interested groups. Presentations content consists of general information about the municipal storm drain system, sources of non-point pollution as well as good housekeeping practices.
	Other Public Presentations (Participating Jurisdictions)	Presentations are made on a regular basis to community business associations and other community and industry based groups. Content of presentations is tailored to meet the needs of the audience and specific Best Management Practices are identified.
	San Diego School District – Water Cycle Curriculum Integration (City of San Diego)	City of San Diego is working with the San Diego School District to develop a K-12th grade water cycle education module for integration into the schools curriculum. The goal of this effort if to foster stewardship of San Diego's unique marine environment among school age children.
	School Presentations (County of San Diego)	Bilingual (English/Spanish) water quality educational program for grades K-6 : Participation at the High School level is accomplished through presentations made in school-wide Environmental Wellness Fairs

Education practices within the region are generally coordinated among jurisdictions to ensure that the messages are consistent and no conflicting information reaches the public. Additionally, an aggressive program to educate municipal staff has been undertaken by each jurisdiction in the region.

6.2 EDUCATION STRATEGY

The main objective of the education strategy is to capture audience attention, impart messages that are understood, retained, and ultimately prompt behavioral changes. Establishing key messages – or succinct, attention grabbing, easily understandable and motivational information – is crucial to program success. It is important to note that successful communication campaigns begin with key, core messages, which are repeated often and given time to become "common knowledge" with target audiences. As time evolves, these core messages are built upon with new and more detailed information. In this manner, multiple

messages are not disseminated into the public arena simultaneously, possibly causing confusion and resulting in a lack of attention and recognition. This staged approach will be particularly important under the watershed based program given the extensive amount of information required to be covered and the long term need to address watershed-specific issues as the program evolves.

While core program messages remain consistent throughout all communication vehicles, where appropriate, these messages are tailored for individual target audiences. For example, an overall message to "identify and isolate potential flows to a storm drain" is refined for homeowners to identify typical flow sources around the house. For the business community, the message is focused on typical commercial and industrial activities that result in potential flow to storm drains. These messages provide a baseline from which watershed concepts can be threaded into current educational efforts as appropriate.

A strong watershed stewardship element will be important in the long term for establishing ownership in the minds of the target audience. Residents are more likely to respond to education when they understand the impacts of upstream activities on downstream areas. Participating jurisdictions will refine current baseline education programs (developed and implemented at both regional and jurisdictional scales) to integrate watershed-based components as described below.

6.3 WATERSHED EDUCATION STRATEGY

Watershed education will be generally focused in order to meet the needs of different sub-regions and associated land uses within the watershed. For example, the areas within the San Diego River watershed under the jurisdiction of the County of San Diego contain primarily very low density residential development with limited industrial and commercial uses. Meanwhile, areas within the cities of San Diego, El Cajon, La Mesa and Santee are generally intensely developed with a wide variety of land uses. As such, the County will generally focus its efforts in order to address rural areas and associated very low density residential communities within the watershed. On the other hand, the cities would target all land uses by incorporating watershed specific principles into their existing jurisdictional education programs.

It should be noted that in a recent residential survey conducted within the City of San Diego, two-thirds of respondents (68 percent) said they were not familiar with the concept of a watershed. Further, less than one third (28.2 percent) said that they live in a watershed[32]. As such, over the short and long terms, the watershed education strategy will focus on three basic principles:

- What is a watershed?
- We all live in a watershed

[32] JD Franz Research Inc., 2002.

- Watershed stewardship (all individual actions within our watersheds add up in a cumulative way to influence the health of our water resources)

Suitable Best Management Practices (BMPs) will be incorporated into the education efforts as determined appropriate to the target audience. Additionally, it is widely recognized that California creeks and rivers are being contaminated with pesticides, primarily *diazinon* and *chlorpyrifos*. Within the San Diego region, available data indicates that pesticide pollution is a widespread challenge and will be addressed under the watershed education strategy at the regional level.

In the future, the watershed message may be further developed to address other specific constituents of concern within the watershed based on the yearly water quality assessment performed as part of the annual reports associated with the overall program. The watershed education strategy will be built as a multi-phased approach that is driven by achievement of milestones as determined through the annual assessment.

6.3.1 ACTION PLAN

The following table identifies the actions that participating jurisdictions will undertake over the short and long term in order to further develop and implement their education programs to include watershed principles:

Table 6-2. Watershed Education – Action Plan.

Tasks	Description	Target Audience(s)	Responsible Party	Schedule[33]
Public Presentations and Media – Watershed Element	Incorporate general watershed concepts and principles into jurisdictional education activities including public presentations and media opportunities. Where appropriate incorporate watershed specific components including identification of receiving waters.	General public including residents and business community	All jurisdictions[34]	ongoing
San Diego School District – San Diego Watersheds	Incorporate watershed principles including hands on activities in local waterways into water cycle element being developed for integration into the San Diego School District curriculum.	K – 12th children	City of San Diego	Sep 02 – Jan 05

[33] All proposed activities are subject to change based on budgetary and staffing constraints - Proposed activities will be reviewed as needed on an annual basis.
[34] Within this context, "all jurisdictions" refer the jurisdictions participating in this program.

Tasks	Description	Target Audience(s)	Responsible Party	Schedule[33]
Integrated Pest Management Campaign	Educational materials will be developed and widely distributed. Additional, other targeted outreach opportunities such as Point of Purchase campaigns will be explored and integrated with existing efforts as appropriate.	Single family homes and related businesses (landscaping, nurseries, agriculture)	All jurisdictions	7/03 – 12/05 (guide development) Distribution would be a subsequent, ongoing task
Which is my watershed?	Develop region-wide poster that identifies watersheds and receiving waters to be used in outreach events.	General public; children in particular	All jurisdictions	Jan 04 – Jan 05
Watershed[35] brochure	Tailor watershed messages based upon data/information gathered from water quality assessment, surveys and feedback, and create (or, where available replicate) a unified information piece, such as a brochure which includes a map and highlights targeted messages. Jurisdictions can highlight programs, services, and regular activities as well as identify appropriate every-day practices which address the most critical needs in receiving waters associated with the watershed.	General Public	All jurisdictions	2004 - beyond (brochure development) Distribution would be a subsequent and ongoing task
Project Clean Water	Expand and further develop the regional website to include bulletin boards for each watershed that provide up to date information about the region's watersheds and related activities including volunteering opportunities.	General Public	County of San Diego assisted by all jurisdictions.	2004 - beyond
Partners in Clean Water	Identify and evaluate efforts by others in the region which support the goals of the storm water program (e.g., water conservation, citizen monitoring efforts, clean-up events) and pursue partnerships for educational opportunities as appropriate.	General Public	County of San Diego and City of San Diego	2004 – beyond

[35] In instances where there are existing brochures of the watershed, local jurisdictions may choose to participate in those efforts as pertinent (rather than creating a new information piece).

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7 PUBLIC PARTICIPATION STRATEGY

The fourth objective of the San Diego River watershed program, as noted in the introduction section, is to "encourage and develop stakeholder participation." Program components, as described in this chapter, have been developed in response to this objective.

Broad participation is critical to the success, further development and implementation of the watershed program. While participating jurisdictions aim to improve coordination among their own agencies, the watershed approach calls upon these agencies to engage diverse stakeholders in this process, including other regulatory agencies, environmental groups, educational institutions, landowners, and private citizens. Further, the participating jurisdictions recognize that no single agency has the capacity to address water quality issues on its own and broad partnerships are essential to positively affect the water resources in our region. It is only through a collaborative approach, that we will develop a better understanding of the issues and processes affecting water quality in our watersheds and subsequently select and address priorities.

7.1 PUBLIC PARTICIPATION TO DATE

The current watershed program, as described in this document, has been developed based on a set of model guidelines that were produced with public input. All San Diego Copermittees held a series of meetings which were open to the public and noticed through the County of San Diego Project Clean Water website beginning in early 2002. Additional notice was also provided by the County of San Diego and all other Copermittees via e-mail and personal communication to numerous stakeholders. The County has provided leadership in outreach efforts by compiling a list of interested stakeholders which currently contains over 700 names. All other jurisdictions have also identified other stakeholders and submitted contact information to County staff for inclusion in their master distribution list. To further encourage public participation, related meeting agendas and minutes were also promptly made available through the County's website. Lastly, the model guidelines were also posted online in early August of 2002 along with contact information for each watershed.

To ensure further participation during program development, the draft watershed plans have also been made available for public review through the County's web site. Notice of their availability has taken place via e-mail communication (using the County's master distribution list) as well as through other numerous means, including announcements at public meetings and personal phone calls.

7.2 FUTURE PUBLIC PARTICIPATION

Participating jurisdictions will continue to pursue a strategy to actively encourage the participation and input of diverse stakeholders. The County's Project Clean Water has been identified as the principal forum for future public participation. Other mechanisms identified to foster public participation include public meetings and community workshops as well as regular interaction with stakeholders as described below.

7.2.1 PROJECT CLEAN WATER

Project Clean Water, initiated in July 2000, established a framework for the broad-based and collaborative development of solutions to local water quality problems. The relationship of Project Clean Water objectives to permit compliance is important. An underlying tenet of this effort is that Permit compliance alone cannot achieve clean water. As such, Project Clean Water seeks to actively involve a multitude of stakeholders in exploring water quality problems, their causes, and their solutions. This significantly broadens the base of stakeholder input available to consider issues directly related to Permit compliance. As with Copermittee meetings, all Project Clean Water meetings are open to the public and participation is encouraged through a variety of means including a website, electronic notifications and personal phone calls.

Project Clean Water is generally organized according to two types of working bodies, Technical Advisory Committees (TACs) and Technical Workgroups[36]. Technical Advisory Committees are responsible for the overall coordination and exploration of four broad subject areas crucial to water quality management; (1) Comprehensive Planning, (2) Legislative and Regulatory Issues, (3) Science and Technology, and (4) Education and Resource Development. Each TAC compiled a baseline inventory and initial assessment of activities and issues for its respective subject area during the first phase of the project, and is now conducting a more intensive issues characterization and implementing specific action items identified in the June 2001 Clean Water Strategic Plan. Technical Workgroups generally explore more focused issues. During 2001, Technical Workgroups emphasized storm water permit compliance, and developed a model program guidance and other work products intended to ensure public input during the development of these programs. Technical Workgroups will continue to deal with specific focused issues.

To provide information on meetings (including agendas and meetings' minutes), work products, and other valuable links to the public and interested parties, a Project Clean Water website (www.projectcleanwater.org) was launched in January 2001. To date, interested parties have extensively utilized the site to

[36] During 2001, all Copermittees and SDRWQCB staff participated in one or more Project Clean Water TACs or Technical Workgroups.

post various work products for review and comment. It is the goal of the program to establish this site as a centralized source of water quality information for the San Diego region.

In November 2002, a draft copy of the San Diego River Watershed Urban Runoff Management Plan was placed on the website. Project Clean Water stakeholders were notified via e-mail, announcements at public meeting and through other means of the availability of the draft document and were encouraged to review and provide comments. San Diego River watershed Copermittees will continue to use Project Clean Water as a vehicle to update stakeholders and encourage feedback as the workgroup continues to develop and implement the program and other watershed related management plans.

Technical Advisory Committees and Technical Workgroups of particular interest to those interested in the watershed- and/or jurisdictional-based urban runoff management programs are listed below:

7.2.1.1 Monitoring Workgroup

This workgroup is responsible for the regular assessment and implementation of the Copermittee Monitoring Program including overseeing the compilation of annual reports. This group also provides a forum for the collaborative development of standards and/or programs for monitoring activities. The group may also consider and recommend the funding of special studies not explicitly required under the Municipal Permit.

7.2.1.2 Education and Outreach Committee

This group is responsible for providing to the Budget Subcommittee a recommended annual budget and scope-of-work for shared regional outreach activities and programs. Additionally, this group provides coordination of outreach activities, which are jointly conducted by the Copermittees. Examples of activities that may be addressed include workshops and informational materials for businesses, measurement of program effectiveness, and the development of consistent outreach themes and training tools. The purpose of this group is generally to oversee educational efforts conducted at cross-jurisdictional scales and ensure that associated activities and messages are consistent and effective. This committee also provides an ongoing forum for identification of opportunities for shared resources, creative partnerships and the development of collaborative programs.

7.2.1.3 Watershed Urban Runoff Management Workgroup

This workgroup began meeting in January 2002 and was originally tasked with developing guidance documents to ensure consistency in the development of individual watershed urban runoff management programs. While its original task

has generally been completed, the workgroup will continue to meet to serve as an ad hoc forum for the future development, evolution and assessment of the watershed based programs.

7.2.2 CITY OF SAN DIEGO CLEAN WATER TASK FORCE

In April 2001, the *City of San Diego Clean Water Task Force* was established by City of San Diego Mayor Dick Murphy to advise the Mayor and City Council on water quality issues. "Cleaning up our beaches and bays" is one of the Mayor's top ten goals. The Task Force, co-chaired by Mayor Murphy and San Diego City Councilmember Scott Peters, consists of elected officials (including the County and Port of San Diego), academics, environmentalists, business interests, professionals, John Robertus, Executive Director of the Regional Board, and other agency representatives.

The Task Force meets routinely provides ample opportunities to obtain input from community stakeholders and government agencies. Thus far, the Clean Water Task Force has reviewed and provided input in the updated City of San Diego Storm Water Ordinance (and related revisions to the Land Development Code), the Model Standard Urban Storm Water Mitigation Plan (SUSMP), and various water quality projects. The Task Force has also advocated for state funding for specific water quality projects.

7.2.3 CROSS-JURISDICTIONAL COLLABORATION

The San Diego River Watershed workgroup, which consists of representatives from the Regional Board, City of San Diego, County of San Diego, El Cajon, La Mesa, Poway, Santee will collaborate as needed to foster public input and participation on activities related to the watershed program.

In addition, an annual workshop will be held to present updates, revisions, and/or solicit comments in order to actively engage stakeholders affected or potentially affected by program development and its implementation. The watershed Copermittees will utilize various local media to advertise such meetings and efforts will be made to hold each workshop in a centrally located facility.

7.2.4 INTEGRATION AND PARTICIPATION IN LOCAL PLANNING ACTIVITIES

Planning at the watershed scale has become an issue of increasing importance over the past few years. As part of the watershed program, jurisdictions will participate in and support associated efforts which provide opportunities to learn about concerns raised by the public and publicize efforts related to this program. Development and subsequent implementation of the San Diego River Watershed Management Plan and the San Diego River Park Coalition are important examples of these efforts.

7.2.5 DIRECT INTERACTION

In addition to those methods already described, participating jurisdictions rely heavily on the interaction of their staff with members of the public during their job duties. This facet of jurisdictional programs will provide an additional avenue for obtaining direct feedback from watershed stakeholders.

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8 PROGRAM EFFECTIVENESS ASSESSMENT STRATEGY

In order for a plan to be successful, clear goals and objectives must first be established, agreed to and implemented. Otherwise, program activities and tasks are adopted without an understandable purpose or clear direction. As discussed in the introduction and echoed throughout the body of the document, participating jurisdictions have identified a program goal and four underlying objectives that will guide decision-making as the watershed program is developed and implemented.

To reiterate, the primary goal of this inter-jurisdictional effort is to positively affect the water resources of the San Diego River watershed while balancing economic, social and environmental constraints. The following objectives have been identified in order to achieve the program goal:

1) Develop/expand methods to assess and improve water quality within the watershed;
2) Integrate watershed principles into land use planning;
3) Enhance public understanding of sources of water pollution; and,
4) Encourage and develop stakeholder participation.

The purpose of this section is to establish an evaluation strategy to determine the effectiveness of these objectives.

8.1 EVALUATION STRATEGY

The strategy to evaluate the effectiveness of the watershed program includes developing objectives that are measurable, have an expected outcome, and an established preliminary performance standard as an indicator of meeting or exceeding expectations. According to the Environmental Protection Agency, "for a watershed management plan to be effective, it should have measurable goals describing desired outcomes and methods for achieving those goals"[37]. Therefore, on an annual basis, participating jurisdiction will assess data collected for each of the objectives listed above to assist in the annual watershed program assessment.

In addition, annual results from the water quality assessment will be integrated into the program as appropriate as well as program effectiveness evaluation where practical. This will provide meaningful feedback to the participating jurisdictions as to whether or not programmatic activities are useful in meeting the overriding goal of the program– to positively affect the water resources of the watershed.

In each future year, the program effectiveness evaluation strategy will consider linkages between water quality and programmatic activities, and the results will be

[37] Environmental Protection Agency, 1993.

used to alter program delivery, operations, goals, objectives, expected outcomes or other programmatic actions where possible. As the water quality assessment is expanded, the results will be used to develop targeted remedial actions and may also result in a revision of stated objectives, where and when appropriate. Therefore, the objectives outlined herein are considered to be dynamic, and may be updated in subsequent iterations. It must be noted that the ability of the Cities of San Diego, El Cajon, La Mesa, Poway, Santee and the County of San Diego to meet or exceed stated objectives, activities, and performance indicators does not in itself suggest that the program is effective. Rather, the question that must ultimately be answered in evaluating the effectiveness of the program is *"Are program activities an effective method to improve water quality?"*

In order to answer that question, water quality monitoring data must be collected over a long period of time- longer than the life of the current Municipal Permit. Although the stated purpose of the program effectiveness evaluation strategy is to address the long-term effectiveness of selected program activities and elements; intermediate, or short-term activities will also be tracked and assessed. This will provide important feedback on more frequent intervals, allowing participating jurisdictions to make adjustments each year as warranted. For this reason, both short-term and long-term activities are discussed together throughout the remainder of this section.

The long-term goal of the program effectiveness evaluation will be to develop and refine programmatic activities that have a positive affect on improving water quality. However, the first few years of the program effectiveness evaluation strategy will examine several key "first steps" (short-term activities) toward meeting this long-term goal. Thereafter, objectives and activities will be assessed annually and modified when linkages to water quality are developed or when modification is appropriate.

The short-term activities will be addressed in each annual report and will answer the following questions:

1. Are the participating jurisdictions able to develop and implement new methods for working together as a watershed group?

2. Are the participating jurisdictions able to implement an outreach program and facilitate a mechanism for broad participation?

3. Are the participating jurisdictions able to determine the effect, if any, of programmatic activities on water quality?

The answers to these questions, coupled with the water quality assessment, will provide one way to assess the program through a continuous feedback-loop of implementation, assessment, and evaluation.

Other direct and indirect assessment measures considered for programmatic evaluation are more fully discussed below:

Direct measures: Direct measures are those that focus on characterizing the quality of water bodies receiving discharges from the storm drain system or on assessing other parameters with an immediate or well-established nexus to changes in the quality of receiving waters. Examples of direct measurement include receiving waters monitoring, estimation of pollutant loadings from specified areas (catchments, municipalities, watersheds, etc.), and focused evaluations of structural Best Management Practices (BMPs). Direct measures generally include actual measurement or quantification of pollutants (e.g., reductions in concentrations of chemicals of concern, etc.) or of the amount of materials extracted or diverted by a BMP (e.g., through household hazardous waste collection, etc.).

Indirect measures: Because direct measures can be difficult and expensive to obtain and often require long assessment periods, a variety of indirect measures are generally used to evaluate storm water program effectiveness. Indirect measures are based on the assumption that specific program activities are effective in decreasing storm water pollution and therefore in protecting water quality. They are typically used to assess the performance of non-structural source control BMPs such as storm drain stenciling and public education programs. Indirect measures typically focus on degrees of implementation or comparison to standards or goals rather than actual water quality assessment or measures of pollutant loading. By measuring the degree or success of implementation of these types of BMPs, it may therefore be possible to make *inferences* about water quality benefits. Inferences, however, are assumptions and should not be given the same weight as direct measures, which provide direct-impact data. Indirect measures should be pursued in combination with more broadly focused direct measures to allow participating jurisdictions to prioritize limited resources, conduct meaningful assessments on intermediate time frames, and focus their efforts on particular management actions and program elements.

Whether using direct or indirect measures of effectiveness, baseline conditions must be defined. All future comparisons showing improvements could then be made relative to these baseline conditions. In the absence of a well-defined baseline, improvements cannot be adequately measured. A suite of measures that allows for assessment on a variety of levels and time frames will be developed if resources and time permit.

Because program requirements are being implemented and the effectiveness strategies formulated prior to the establishment of a nexus between expected outcome (improved water quality) and program activities, measures of program effectiveness during the first few years will be limited to an accounting of program implementation.

It is expected that the program objectives and management actions will be revised as the program evolves and matures. The objectives outlined in this section represent the first attempt to establish a feedback-loop program evaluation process that addresses both Municipal Permit-compliance and water quality impacts at this very early stage of program evaluation.

In summary, the best measure of program effectiveness is improvement in the quality of receiving waters. Where possible, measurement of such changes will be pursued. However, three important limitations should be acknowledged here.

1) Measuring the "quality" of any receiving water is not a straightforward exercise. In many cases, baseline conditions have yet to be reliably established, and considerably more time may be required to do so;
2) Water quality changes in response to program implementation are likely to be very slow and not measurable within this or other near-term Municipal Permit cycle; and,
3) Establishing a nexus between targeted program activities and water quality conditions as documented by field data is difficult working at the geographic scale covered by this program.

The following sections describe the objectives and expected outcomes (based on program elements and actions) for the first annual program effectiveness strategy in an effort to evaluate the effectiveness of their program on water bodies within the watershed.

8.2 REVIEW OF GOAL AND OBJECTIVES

Each objective, the justification for selecting the objective, how the objective ties back to the program goal and the expected outcome is discussed in more detail below.

Annually, each objective and the ability of the participating jurisdictions to meet the stated activities/tasks that were assigned to each objective will be evaluated for effectiveness in terms of impact on water quality when data for the assessment is available and reliable. This will allow a mechanism for review and improvement of the program.

The process for assessing program effectiveness will be a multivariate approach integrating direct and indirect measures, jurisdictional activities, statistical analysis (when data are available) and performance measures. The overall effectiveness of the entire program will be addressed in the annual report using all relevant information and examining the ability of the participating jurisdictions to meet or exceed the stated goals and performance indicators. It is not likely that direct measures of the watershed program effectiveness on water quality will be available within the life of this permit cycle; however the participating jurisdictions

remain hopeful that the program as developed will move the evaluation a step closer with each annual assessment.

OBJECTIVE #1: Develop/expand methods to improve water quality within the watershed.

Justification

The justification for this objective is obvious in that the purpose of a jurisdictional or watershed storm water program is to ultimately improve the quality of the water in the watershed. In order to accomplish this, we must expand upon existing methods or develop new methods to improve our understanding of the processes and issues that affect receiving waters. By developing and expanding methods to improve water quality, stakeholders will be able to validate preliminary water quality concerns and identify constituents of concern within the watershed.

Expected Outcome

Over time, the expected outcome of this objective will be multi-faceted:

1) Develop an understanding (characterization) of water bodies within the watershed;
2) Identify and/or verify constituents of concern and/or stressors within the watershed;
3) Prioritize the constituents of concern and/or stressors within the watershed;
4) Develop an action plan to mitigate harmful effects of constituents of concern and/or stressors;
5) Transition to watershed-based monitoring program; and,
6) Using the *weight of evidence* approach, measure changes on water quality.

Performance Measure

It cannot be overstated that direct measures are the most definitive way of determining an objective's (as well as program's) overall effectiveness. However, as echoed previously, establishing useful direct measures may not be feasible at this time.

As noted earlier, much of the relevant water quality information has yet to be collected and/or reviewed as part of this program. Several activities are proposed to obtain this additional water quality data and validate this initial assessment. Once more data are gradually integrated into the watershed

program, a baseline can be established. This baseline characterization will support the long term goal of achieving meaningful measures of program effectiveness.

OBJECTIVE #2: Integrate watershed principles into land use planning.

Justification

Urban runoff does not follow jurisdictional boundaries and often travels through many jurisdictions while flowing to receiving waters. Land use policies of individual municipalities have the potential to affect water quality in water bodies well beyond jurisdictional boundaries. One of the overriding purposes of program is to ensure that watershed protection principles are integrated into long range land use planning activities in a consistent and cost-effective manner.

Expected Outcome

The expected outcome of this objective and related tasks is to improve collaborative efforts among participating jurisdictions. While this outcome is not expected to measurably improve water quality in the near term, increased cross-jurisdictional coordination within watersheds will likely have a synergistic effect on water quality efforts, thereby indirectly making positive contributions towards water quality.

Performance Measure

As discussed in Section 6, several activities and tasks have been established for this objective. However, trying to measure program effectiveness on activities or tasks that are not easily quantifiable is virtually impossible. As such, participating jurisdictions will track and report as part of the annual report the various activities/tasks that have been identified for this objective.

OBJECTIVE #3: Enhance public understanding of sources of water pollution within the watershed.

Justification

Education is the foundation of an effective urban runoff management program and the basis for changes in behavior at the individual and societal levels. Storm water quality topics can be very focused (identification of the types of source control BMPs) or general (answering the question: What is a watershed?) and

can target many audiences to inform them of how individual actions impact water quality and how these impacts can be avoided.

Expected Outcome

The long-term outcome expected from this objective is to improve water quality through a change in human behavior and increased knowledge among San Diego residents and business owners. The short-term expected outcome is the delivery of a consistent message regarding watershed concepts, urban runoff and pollutant-causing activities with the assumption that (over time) the educational program will produce a change in human behavior which leads to sustainable clean waters.

Performance Measure

Surveys are an effective performance measure to determine a population's knowledge or understanding of water quality issues. Under this approach, however, an inference must be made that an increase in awareness translates into a change in public behavior. Through the use of surveys, the effectiveness of program activities can be assessed within a shorter period of time (2-3 years), allowing the Copermittees to adjust the activities/tasks accordingly to maximize program effectiveness. The Copermittees will conduct a baseline assessment that targets the residential population. A survey or other measurement tool will assess current levels of knowledge relating to water pollution issues within the watershed.

Participating jurisdictions have also established an extensive list of activities/tasks that are to be completed as part of this objective. An inference must be made that completing the activities/tasks will indirectly impact water quality within the watershed. Implementation of the various activities/tasks that have been identified to meet this objective will be tracked and reported as part of the annual reporting process.

OBJECTIVE #4: Encourage and enhance stakeholder involvement within the watershed.

Justification

In order to develop an effective plan, the importance of stakeholder input cannot be overstated. There are three important reasons for the need of stakeholder involvement.

1) Stakeholders can a different perspective on watershed issues. Because stakeholders have varying backgrounds and experience levels, they are

sometimes able to identify issues and solutions not previously identified by jurisdictions.
2) Water quality data is collected by a number of different stakeholders for a number of different reasons. Participating jurisdictions can work with stakeholders to pull their data together in an attempt to develop a useful water quality database that helps identify and validate water quality problems as well as possible solutions.
3) It is a prudent planning principle to involve the public in comprehensive plan development as a watershed plan ultimately impacts stakeholders. As such, it is imperative that stakeholders are clear on the intent and purpose of the plan as well as the activities being identified.

Expected Outcome

The short-term expected outcome is to increase the amount of current stakeholder involvement in watershed related issues. It is assumed that an increase in stakeholder involvement will ultimately lead to improved water quality, which is the long-term expected outcome for this objective. While we will be able to measure the short-term outcomes, the long-term outcome will be difficult, as measurable changes in water quality are not expected within the life of the Permit.

Performance Measure

As discussed in Section 7, several activities and tasks have been established for this objective. To measure this objective, an inference must be made that completing the activities and tasks will indirectly impact water quality within the watershed. Participating jurisdictions will track and report on an annual basis the various activities/tasks that have been identified for this objective.

8.2.1 PERFORMANCE INDICATORS

Standard performance indicators for achieving the objectives would commonly include percent-changes in pollutant loading, water quality field data, community knowledge, etc. Performance indicators are typically established based upon baseline level data, which is not available at this time. Without baseline data, it would be premature to set the performance markers at this time. However, participating jurisdictions have agreed on the following standard performance indicators:

By the end of 2003:

1) Year 2 assessment completion incorporation of dry weather data collected in 2002 and other data as time and resources permit;
2) Evaluation of prioritization of constituents of concern and/or watershed stressors as outlined in initial Year 1 assessment; and,

3) Implementation of planned actions as presented.

2003 and on-going:

4) Use of iterative method for evaluation of objectives and management actions;
5) Continued watershed workgroup meetings and increased public participation in process,
6) A measurably and statistically significant change by the year 2005 regarding San Diegan's general knowledge of what a watershed is.

CONCLUSION

Participating jurisdictions consider this watershed based effort to be in its infancy and expect this program will be refined and augmented over the long term as we develop a better understanding of the complex issues affecting our watersheds and learn to identify and pursue joint opportunities to positively affect the water resources in the San Diego River watershed and the region.

In order to further build on this initial watershed program, the program has been developed as an iterative process of watershed assessment, priority setting, monitoring, and implementation. At the conclusion of each yearly cycle, the process begins anew, allowing participants to respond to changing conditions or adjust strategies that have not performed as anticipated. This framework establishes mechanisms for the participants to evaluate priorities, improve coordination, assess program goals, and allocate finite in an cost-effective manner.

Adaptive management is a key requirement for the process to work. Adaptive management allows adjustments in the management direction as new information becomes available. The combination of natural variability in the hydrologic cycle and the uncertainty associated with a complex system requires that watershed managers be flexible enough to modify implementation approaches based on progress and available information. Watershed characteristics, sources of pollutants, and management approaches are unique, and therefore, management efforts may not proceed exactly as planned. Adaptive management does not mean that the watershed's water quality goals would be modified based upon lack of progress, but that the results would be used to modify management policies, strategies, practices, and operation and maintenance procedures to reach goals.

Even though priorities will be targeted in a focused manner, it will take time for management activities to produce a quantifiable improvement in water quality. As such, the program includes performance measures and a review mechanism. Performance data collected in subsequent cycles will be used to determine the effectiveness of previous management activities.

As already stated, the San Diego River Urban Runoff Management Program signifies the beginning of long-term efforts to protect and enhance the water quality of the river and its tributaries under a cross-jurisdictional approach. The Program was developed with stakeholder participation and will integrate with other projects such as the San Diego River Park and the San Diego River Watershed Management Plan. In addition to obtaining additional understanding of the ecosystem, there is a desire to locate storm water Best Management Practices within the creek and river sections where appropriate downstream of existing urbanized areas because of the long-term water quality benefits. Using the watershed approach, the cities of San Diego, El Cajon, La Mesa, Poway, and

Santee and the County of San Diego aim to protect and enhance aquatic resources in a cost effective, environmentally sensitive, and collaborative manner.

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Appendix A – Glossary

Aquifer - A permeable geological stratum or formation that can both store and transmit groundwater in significant quantities.

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals. "Beneficial Uses" of the waters of the State that may be protected against pollution include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Table A-1. California Waters Beneficial Uses and Definitions

BENEFICIAL USES	DESCRIPTION
Contact Water Recreation	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	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, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Warm Freshwater Habitat	Warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
Cold Freshwater Habitat	Cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
Inland Saline Water Habitat	Inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.
Estuarine Habitat	Estuarine ecosystems including, but not limited to, preservation or enhancement of esturarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).
Marine Habitat	Marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, o wildlife (e.g. marine mammals, shorebirds) MAR Marine Habitat.
Wildlife Habitat	Terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g. mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food resources.

BENEFICIAL USES	DESCRIPTION
Preservation of Biological Habitats of Special Significance	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.
Rare, Threatened, or Endangered Species	Habitats necessary, at least in part, for the survival and successful maintenance of plant and animal species established under state or federal law as rare, threatened, or endangered.
Migration of Aquatic Organisms	Habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish.
Spawning, Reproduction and/or Early Development	High quality habitats suitable for reproduction and early development of fish. This use is applicable only for the protection of anadromous fish.
Shellfish Harvesting	Habitats suitable for the collection of filter-feeding shellfish (e.g. clams, oysters, and mussels) for human consumption, commercial, or sport purposes.
Municipal and Domestic Supply	Community, military, or individual water supply systems including, but not limited to, drinking water supply.
Agricultural Supply	Farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
Industrial Process Supply	Industrial activities that depend primarily on water quality.
Industrial Service Supply	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.
Groundwater Recharge	Natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
Freshwater Replenishment	Natural or artificial maintenance of surface water quantity or quality (e.g. salinity).
Navigation	Shipping, travel, or other transportation by private, military, or commercial vessels.
Hydropower Generation	Hydropower generation.
Commercial and Sportfishing	Commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
Aquaculture	Aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes

Source: Water Quality Control Plan for the San Diego Basin, California Regional Water Quality Control Board, San Diego Region, 1994.

Benthic Infauna - Benthic animals are those associated with the bottom of seas, rivers, lakes, etc. Infauna describes animals found buried within the sediment. Macrofauna is larger and meiofauna smaller.

Best Management Practices - Best Management Practices (BMPs) are defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements,

operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.

Bioassessment - The use of biological community information to evaluate the biological integrity of a water body and its watershed. With respect to aquatic ecosystems, bioassessment is the collection and analysis of samples of the benthic macroinvertebrate community together with physical/habitat quality measurements associated with the sampling site and the watershed to evaluate the biological condition (i.e. biological integrity) of a water body.

Biota – The flora and fauna specific to a region.

California Environmental Quality Act (CEQA) – Environmental policy in California with the overarching goal of developing and maintaining a high-quality environment now and in the future, while the specific goals of CEQA are for California's public agencies to: (1) identify the significant environmental effects of their actions; and, as feasible, (2) either avoid those significant environmental effects; or, mitigate those significant environmental effects.

Catchments – A structure or land area that catches and contains water. Stormwater managers often use this term to refer to a watershed or BMP.

Chlorpyrifos – also known as Lorsban for agricultural uses and Dursban for home and urban applications, is the most heavily used insecticide in the United States. It is used on agricultural crops and against termites, cockroaches and other insect pests in homes, apartment buildings, schools and other structures. EPA's risk assessment for chlorpyrifos cites a recent Minnesota study that found the chlorpyrifos metabolite TCP in the urine of over 90 percent of tested children.

Clean Water Act (Section 303(d)) - Under section 303(d) of the 1972 Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters. These impaired waters do not meet water quality standards that states, territories, and authorized tribes have set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop TMDLs for these waters.

Constituents of Concern (COC) – Different pollutants that result from the land activities in a watershed. One finds these constituents in water sampled from mass loading stations in each watershed.

Constructed Wetland - A vegetated area that has been deliberately modified to provide or enhance habitat, to provide water quality benefits, or to moderate water flow rates or velocities, that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of

vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

Copermittees – Jurisdiction which owns or operates a municipal separate storm sewer system (MS4), through which it discharges urban runoff into waters of the United States within the San Diego Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States. There are 20 copermittees (see table below) responsible for implementing the Municipal Permit.

Table A-2. Municipal Copermittees

1.	City of Carlsbad	11.	City of National City
2.	City of Chula Vista	12.	City of Oceanside
3.	City of Coronado	13.	City of Poway
4.	City of Del Mar	14.	City of San Diego
5.	City of El Cajon	15.	City of San Marcos
6.	City of Encinitas	16.	City of Santee
7.	City of Escondido	17.	City of Solana Beach
8.	City of Imperial Beach	18.	City of Vista
9.	City of La Mesa	19.	County of San Diego
10.	City of Lemon Grove	20.	San Diego Unified Port District

Diazinon - Diazinon is an organophosphate insecticide; common trade names include SpectracideTM, KnoxoutTM, BasudinTM. It is the fifth most commonly used pesticide used by homeowners, with two to four million pounds applied annually.

Ecosystems - Community of organisms interacting with one another and with the chemical and physical factors making up their environment. The chemical and physical factors include sunlight, rainfall, soil nutrients, climate, salinity, etc.

Enterococcus - Bacteria normally found in the intestine of warm-blooded animals; often used as an indicator of fecal contamination; may cause illness when found in other parts of the body.

Estuaries – Semi-enclosed bodies of water where seawater mixes with fresh water.

Eutrophication - The process of surface water nutrient enrichment causing a water body to fill with aquatic plants and algae. The increase in plant life reduces the oxygen content of the water. Eutrophic water bodies are often not suitable for recreation and may not support normal fish populations.

Event Mean Concentration – A calculation for determining the pollutant concentration during storm events. The calculation is total pollutant load divided by the total runoff volume per storm event.

Fecal Coliform Bacteria - Bacteria found in the intestinal tracts of mammals and, therefore in, fecal matter. Their presence in water is an indicator of pollution and possible contamination by pathogens.

Impervious Cover or Impervious Surface - means constructed or modified surfaces that cannot effectively infiltrate rainfall. The term includes but is not limited to building rooftops, pavement, sidewalks, and driveways.

Impervious Surface Area - means the ground area covered or sheltered by an impervious surface, measured in plan view (i.e., as if from directly above). For example, the "impervious surface area" for a pitched roof is equal to the ground area it shelters, rather than the surface area of the roof itself.

Jurisdictional Urban Runoff Management Plan (JURMP)– Document designed to establish a programmatic framework for the continued development and implementation of specific programs and activities to meet or exceed the regulatory obligations established in the Municipal Permit. Each of the 20 Copermittees is required to have its own specific JURMP said permit.

Mass Loading Stations – Water sampling sites selected to directly measure pollutant loading in a watershed for a typical storm event.

Mitigation - Any action taken to permanently eliminate or reduce the long-term risk to human life, property, and ecological function from hazards.

Municipal Storm Drain Systems (MS4s) - MS4 is an acronym for Municipal Separate Storm Sewer System. A Municipal Separate Storm Sewer System is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, natural drainage features or channels, modified natural channels, man-made channels, or storm drains): (i) Owned or operated by a State, city town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

Historic and current development makes use of natural drainage patterns and features as conveyances for urban runoff. Urban streams used in this manner are part of the municipalities MS4 regardless of whether they are natural, man-made, or partially modified features. In these cases, the urban stream is both an MS4 and a receiving water.

Multivariate Assemblage Analysis – A statistical data analysis technique that looks at the pattern of relationships between several variables simultaneously.

Nonpoint Source Pollution - Nonpoint source (NPS) pollution comes from many diffuse sources and is caused by rainfall, irrigation, street and sidewalk washing, or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water. These pollutants include:

- Excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
- Oil, grease, and toxic chemicals from urban runoff and energy production;
- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks;
- Salt from irrigation practices and acid drainage from abandoned mines; and,
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems;

Atmospheric deposition and hydromodification are also sources of nonpoint source pollution.

Nonpoint source refers to diffuse, widespread sources of pollution. These sources may be large or small, but are generally numerous throughout a watershed. Nonpoint sources include but are not limited to urban, agricultural, or industrial areas, roads, highways, construction sites, communities served by septic systems, recreational boating activities, timber harvesting, mining, livestock grazing, as well as physical changes to stream channels, and habitat degradation. NPS pollution can occur year round any time rainfall, snowmelt, irrigation, or any other source of water runs over land or through the ground, picks up pollutants from these numerous, diffuse sources and deposits them into rivers, lakes, and coastal waters or introduces them into ground water.

Physiography – Physical geography or geography that deals with the exterior physical features and changes of the earth.

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to; industrial discharge pipes, publicly owned treatment works discharge pipes, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container,

rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged.

Pollution - As defined in the Porter-Cologne Water Quality Control Act, pollution is "the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses." Pollution may include contamination.

Pollutant - A pollutant is broadly defined as any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control, treatment, or disposal.

Receiving Waters - means all waters that are "Waters of the State" within the scope of the State Water Code, including but not limited to natural streams, creeks, rivers, reservoirs, lakes, ponds, water in vernal pools, lagoons, estuaries, bays, the Pacific Ocean, and ground water.

Riparian - Relating to or living or located on the bank of a natural watercourse (as a river) or sometimes of a lake or a tidewater area.

Runoff - Runoff is precipitation or water originating from other sources and activities (such as irrigation and car washing) that does not infiltrate but flows over the land surface toward a surface drain, eventually making its way to a river, lake or an ocean.

Source Identification – Any type of process used to locate the cause of a particular pollutant or stream of pollutants in a water body.

Standard Urban Stormwater Mitigation Plan (SUSMP) – Plan to reduce pollutants and runoff flows from all new development and significant redevelopment projects falling under the priority project categories or locations. Significant redevelopment is defined as the creation or addition of at least 5,000 square feet of impervious surfaces on an already developed site. Significant redevelopment includes, but is not limited to: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. Within 180 days of approval of the model SUSMP in the public process by the SDRWQCB, each Copermittee shall adopt its own local SUSMP, and amended ordinances

consistent with the approved model SUSMP, and shall submit both (local SUSMP and amended ordinances) to the SDRWQCB.

Stormwater Management Plan - means a plan, submitted in connection with an application for permit or other municipal approval, identifying the measures that storm water managers will use for storm water and non-storm water management during the permitted activity.

Substrate - Any combination of materials that provide support, water retention, aeration, or nutrient retention for plant growth.

Total Dissolved Solids (TDS) – Minerals dissolved in waters that may consist of carbonates, bicarbonates, sulfates, phosphates, nitrates, magnesium, sodium, iron, manganese, or other substances. Water imported into San Diego County often contains high levels of TDS.

Total Maximum Daily Loads (TMDL) - A TMDL specifies the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and allocates pollutant loadings among point and nonpoint pollutant sources. By law, EPA must approve or disapprove 303(d) lists and TMDLs established by states, territories, and authorized tribes. If a state, territory, or authorized tribe submission is inadequate, EPA must establish the list or the TMDL. EPA issued regulations in 1985 and 1992 that implement section 303(d) of the Clean Water Act - the TMDL provisions. In California, the state's Porter Cologne Water Control Act requires that the Regional Boards adopt TMDL's as basin plan amendments.

Water Quality Objectives - Numerical or narrative limits on constituents or characteristics of water designed to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans.

As stated in the Porter-Cologne Requirements for discharge (CWC 13263): "(Waste discharge) requirements shall implement any relevant water quality control plans that have been adopted, and shall take into consideration the beneficial uses to be protected, the water objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Section 13241."

A more comprehensive list of legal authority containing water quality objectives applicable to this Order can be found in Finding 37 and in Section VII Directives Discussion Underlying Broad Legal Authority for Order 2001-01 pp. 61-63.

Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in receiving waters and

still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the Clean Water Act.)

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Appendix B – San Diego River Watershed Maps

Figure B-1: San Diego River Watershed - Land Use

Figure B-2: San Diego River Watershed - Water Features