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Executive Summary

This "Watershed Chapter", Appendix D-5 of the Drainage Area Management Plan (DAMP) serves as the Watershed Urban Runoff Management Plan (WURMP) for the **San Juan Creek Watershed** in southern Orange County, California. This document was prepared to meet the requirements of, Section J and L of the municipal NPDES Stormwater Permit - Order R9-2002-0001.

The purpose of this document is to present a planning framework to identify the most significant water quality issues related to urban runoff sources that can addressed at a multi-jurisdictional watershed-scale, to focus jurisdictional pollution prevention and source control programs on local constituents of concern, to identify treatment control opportunities, to incorporate prior data from planning studies, to identify indicators to track progress, and ultimately to develop an integrated plan of action that results in meaningful water quality improvement in the San Juan Creek Watershed.

The San Juan Creek Watershed is located in southern Orange County, approximately 55 miles south of Los Angeles and 60 miles north of San Diego. A small western portion of the San Juan Creek Watershed extends into Riverside County. San Juan Creek drains a broad, fan-shaped, fairly steep watershed with much of its headwaters in the Cleveland National Forest and other public lands. The Creek ultimately discharges into the Pacific Ocean at Doheny Beach. The approximately 125-square-mile watershed includes portions of the cities of Dana Point, Laguna Hills, Laguna Niguel, Mission Viejo, Rancho Santa Margarita, and San Juan Capistrano. Major transportation arteries through the watershed include the San Joaquin Hills Transportation Corridor and Interstate 5. The Watershed Permittees include the County of Orange, the cities of Dana Point, Laguna Hills, Laguna Niguel, Mission Viejo, Rancho Santa Margarita, and San Juan Capistrano, and the Orange County Flood Control District.

Section 1.0 describes the environmental setting of the watershed, discusses program coordination between the Watershed Permittees, and outlines the approach taken in plan development. Section 2.0 provides an assessment of current water quality conditions and identifies issues and constituents of concern. Section 3.0 provides the plan of action for the watershed, relating specific constituents of concern to pollution prevention and source control BMPs. It also includes the plan of action for watershed-scale collaborative projects, and public education and participation. Section 4.0 describes the program effectiveness assessment and potential future revisions of the Watershed Chapter, including an implementation schedule.

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D-1.0 Introduction

The San Juan Creek Watershed encompasses portions of the cities of Dana Point, Laguna Hills, Laguna Niguel, Mission Viejo, Rancho Santa Margarita, and San Juan Capistrano, plus unincorporated areas within the County of Orange. For some time, residents of the watershed and the Watershed Permittees (the County of Orange, the cities of Dana Point, Laguna Hills, Laguna Niguel, Mission Viejo, Rancho Santa Margarita, and San Juan Capistrano, and the Orange County Flood Control District) themselves have recognized that San Juan Creek and the beach at the creek mouth were suffering from a variety of water-resource-related problems. They began a collaborative program of meetings, studies, and problem identification that led to the beginnings of the watershed-oriented program that exists today. The Watershed Permittees realized early on that the management of water resources was more appropriately dealt with within the hydrologic boundaries of the watershed, rather than on the jurisdictional basis of political boundaries alone.

Based on the experience of the Watershed Permittees, this San Juan Creek Watershed Chapter of the Drainage Area Management Plan has been developed to attain the following multiple objectives:

- To meet the requirements for a Watershed Urban Runoff Management Plan (WURMP) contained in the municipal National Pollution Discharge Elimination System (NPDES) stormwater permit (Order R9-2002-0001, Section J).
- To identify the most significant water quality issues and constituents of concern on a watershed scale and relate these to urban sources.
- To focus the pollution prevention and source control programs implemented at an individual jurisdiction level on the identified constituents of concern and to identify any jurisdiction-specific treatment control opportunities.
- To identify the water quality issues that are most appropriately addressed through a multi-jurisdictional watershed-scale approach.
- To incorporate information obtained from prior planning studies.
- To develop an integrated plan of action that results in meaningful water quality improvement in San Juan Creek at a watershed scale and balances economic, social and environmental constraints.
- To identify indicators to track progress.

In order to achieve these objectives the San Juan Creek Watershed Permittees have utilized and built on the considerable work and studies that have been completed collaboratively over a multi-year period in the development of the San Juan Creek Watershed Chapter. These include the following initiatives:

- Since 1990, the Watershed Permittees have developed and implemented common water quality programs within their own jurisdictions in response to the requirements of the municipal National Pollutant Discharge Elimination System (NPDES) stormwater permit.

- In February 2003, an updated version of the Drainage Area Management Plan (2003 DAMP) was provided to the San Diego Regional Water Quality Control Board (Regional Board), including Local Implementation Plans (LIPs – 2003 DAMP Appendix A). The LIPs are detailed plans that focus on specific areas required by the NPDES permits including the legal authority to detect and eliminate pollutant discharges; public education; enhanced standards for new development/significant re-development; implementation of best management practices (BMPs) at municipal facilities, construction sites, and commercial and industrial facilities; and water quality monitoring. The BMPs can, in most cases, be focused on targeted constituents of concern to be identified through the monitoring program.

- Since 1997, a multi-jurisdictional effort has been taking place to develop solutions to the watershed-scale problems in San Juan Creek. The Corps of Engineers' (COE) watershed management study process and efforts by the County of Orange to establish water quality parameters for bacterial contamination were two of the key components of this effort. The result of this effort has been the development of a draft Watershed Management Plan (COE, 2002) that identified problems, opportunities, and ultimately identified a series of water quality improvement recommendations. Many of these recommendations are being pursued with the County or, in some cases, individual cities as lead agency.

The San Juan Creek Watershed Chapter borrows much of its organization, structure, and terminology from the 2003 DAMP of which it is an appendix:

- Section D-1.0 describes the watershed and environmental setting, the program management coordination between the Watershed Permittees and other stakeholders, and the approach taken to develop the plan.

- Section D-2.0 assesses the water quality information available and identifies the water quality issues and constituents of concern.
- Section D-3.0 provides the plan of action relating the constituents of concern to specific pollution prevention and source control BMPs at a jurisdictional level as well as any jurisdiction-specific treatment control BMPs. This section also includes the plan of action for watershed-scale collaborative projects. Section D-3.0 meets the permit requirement of inclusion of recommendations.
- Section D-4.0 describes the program effectiveness assessment to be undertaken and the future revision of the Watershed Chapter. Water quality outcomes may still be some years away from accurate prediction and achievement, as the state of source identification, pursuit, and treatment are still evolving. However, this section lays the foundation for that outcome and includes an implementation schedule. Section D-4.0 meets the permit requirement for the inclusion of conclusions, which will be forthcoming in future assessments.

In developing the San Juan Creek Watershed Chapter, the Watershed Permittees have addressed the specific permit requirements of the Regional Board. These include the expectation of the degree of future land-use changes (illustrated in **Figure D-5**); the assessment of water quality and identification and prioritization of major water quality problems (**Section D-2.0**); a time schedule of short- and long-term recommended activities (**Section D-3.0**); short- and long-term effectiveness assessment strategies (**Section D-4.0**); and a basis for facilitating collaborative "watershed-based" land use planning, which is discussed in Section D-3.0 and is essentially the purpose of this document.

The San Juan Creek Watershed Chapter is intended as a living document, one capable of being modified as new information becomes available and problems are addressed. The Watershed Chapter identifies the current state of knowledge on the issues facing the San Juan Creek Watershed and also sets the stage for future activities intended to address water quality issues in various reaches of the Creek and its tributaries. Figures enclosed represent available information in the GIS mapping format and some additional inventory information as supplied by the Watershed Permittees. The plan of action contained in this Watershed Chapter will be reviewed for effectiveness and applicability on a regular basis. As problems are addressed and the state of knowledge about sources and causes becomes better defined, it is expected that the process will become more streamlined and make more efficient use of limited resources.

D-1.1 Watershed Setting

The San Juan Creek Watershed is located in southern Orange County, approximately 55 miles south of Los Angeles and 60 miles north of San Diego (**Figure D-1**). A small western portion of the San Juan Creek Watershed extends into Riverside County and is not shown on any of the figures provided. San Juan Creek drains a broad, fan-shaped, fairly steep watershed with much of its headwaters in the Cleveland National Forest and other public lands. The Creek ultimately discharges into the Pacific Ocean at Doheny Beach. The approximately 125-square-mile watershed includes portions of the cities of Dana Point, Laguna Hills, Laguna Niguel, Mission Viejo, Rancho Santa Margarita, and San Juan Capistrano (**Figure D-2**).

Major transportation arteries through the watershed include the San Joaquin Hills Transportation Corridor and Interstate 5. **Figure D-3** shows the major transportation routes within the watershed.

The San Juan Creek Watershed is approximately 40 percent developed, with ongoing future development of most remaining privately held land. **Figure D-4** shows the existing land use in the San Juan Creek Watershed and **Figure D-5** shows the future planned land use.

Figure D-1 Location Map

Figure D-2a Unified School Districts

Figure D-2b City Boundaries

Figure D-2c Water Providers

Figure D-2d Parks & Open Space

Figure D-3 Major Transportation Routes

Figure D-4 Land Use - Existing

Figure D-5 Land Use - Future

D-1.2 Water Quality Control Plan for the San Diego Region

Beneficial Uses

The San Juan Creek Watershed is within the jurisdiction of the San Diego Regional Water Quality Control Board. The San Diego Regional Board has placed San Juan Creek under the Laguna subunit of the San Juan Hydrologic Basin. The Water Quality Control Plan (Basin Plan) also lists the San Juan Creek, Bell Canyon Creek, Cañada Gobernadora, Arroyo Trabuco (Trabuco Creek), and Oso Creek tributaries to San Juan Creek as receiving waters. The following existing beneficial uses are designated in the Basin Plan for San Juan Creek, Morrell Canyon, Decker Canyon, Long Canyon, Lion Canyon, Hot Spring Canyon, Cold Spring Canyon, Lucas Canyon, Aliso (not Creek) Canyon, Verdugo Canyon, Bell Canyon, Fox Canyon, Dove Canyon, Crow Canyon, Trampas Canyon, Cañada Gobernadora, Cañada Chiquita, Horno Creek, Trabuco (Arroyo Trabuco) Creek, Holy Jim Canyon, Falls Canyon, Rose Canyon, Hickey Canyon, Live Oak Canyon, Tijeras Canyon, Oso Creek, and La Paz Creek:

AGR – agricultural supply
COLD – cold freshwater habitat
IND - Industrial
REC1 – contact water recreation
REC2 – non-contact water recreation
SPWN – spawning habitat
WARM – warm freshwater habitat
WILD – wildlife habitat

The following designations apply to the mouth of San Juan Creek:

RARE – rare, threatened, or endangered species
REC2 – non-contact water recreation
MAR – marine habitat
MIGR – migratory habitat
SHELL – shellfish habitat
WILD – wildlife habitat

The following is a description of the relevant beneficial use designations:

Agricultural (AGR) – Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Cold Freshwater Habitat (COLD) – Includes uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Contact Water Recreation (REC1) – Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, white water activities, fishing, or use of natural hot springs.

Industrial Services Supply (IND) – Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to mining, cooling water, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

Marine Habitat (MAR) – Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (marine mammals, shorebirds).

Migration of Aquatic Organisms (MIGR) – Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water or other temporary activities by aquatic organisms, such as anadromous fish.

Non-Contact Water Recreation (REC2) – Includes uses of water for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beach combing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Spawning, Reproduction, and/or Early Development (SPWN) – Includes uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. This use is applicable only for the protection of anadramous fish.

Shellfish Harvesting (SHELL) – Includes uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.

Warm Freshwater Habitat (WARM) – Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Wildlife Habitat (WILD) – Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Impaired Waters

Under section 303(d) of the 1972 Clean Water Act, states, territories, and authorized tribes are required to develop a list of water quality limited segments. These waters do not meet water quality standards, 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 water quality impairment on the list and develop action plans, referred to as Total Maximum Daily Loads (TMDL), to improve water quality.

The State Water Resources Control Board (SWRCB) and the Regional Board staff have evaluated each addition, deletion, and change to section 303(d) based on all the data and information available for each water body and pollutant. These recommendations are based upon "all existing and readily available data and information" (40 CFR 130.7(b)(5)). In developing the recommendations, the SWRCB staff used the recommendations and analysis of the Regional Board as the basis of its analysis. Each recommendation to the SWRCB was an independent assessment of each water body and pollutant. SWRCB staff took into account both general considerations (e.g., what factors the SWRCB should consider) and facts relating to individual water bodies and pollutants (e.g., how the Regional Board looked at certain data or the significance of a particular water quality impairment in the region) (SWRCB, 2003).

Some data, for purposes of developing the section 303(d) list, were sufficient by themselves to demonstrate standards attainment. Examples of these listing factors are (1) numeric data exceeding numeric water quality objectives, maximum contaminant levels, or California / National Toxics Rule water quality criteria and (2) use of numeric evaluation values focused on protection of consumption of aquatic species. Other data types required that multiple lines of evidence be used for listing and de-listing. The listing factors that required multiple lines of evidence were (1) toxicity, (2) health advisories, (3) nuisance, (4) beach postings, (5) adverse biological response, and (6) degradation of aquatic life populations or communities.

Activities within this group have a potential effect on the coastal nearshore zone, which has been identified as having bacterial problems. Beach closure due to exceedance of bacterial standards is a cause of concern to jurisdictions within this group, as well as the residents of the watersheds.

The first river mile of San Juan Creek beginning at the mouth is listed as impaired for bacteria indicators on the 2002 303(d) list. In addition, the Pacific Ocean shoreline at the mouth of San Juan Creek is also listed as impaired for bacteria indicators. The listings were based on the following information:

- Bacteria indicators – Analyses of sampling data collected between 1998 and 2002 along San Juan Creek and in several tributaries indicated elevated bacteria concentrations.

The 2002 303(d) list of impaired waters approved by the State Water Resources Control Board, which could potentially be affected by activities occurring within the San Juan Creek Watershed, is shown in **Table D-1**.

Table D-1 2002 303(d) List and TMDL Priority Schedule – San Juan Creek Watershed

Type	Name	Hydro Unit	Pollutant/Stressor	Source	Priority	Estimated Size Affected	Proposed TMDL Completion
R	San Juan Creek	1.13	Bacteria Indicators	Nonpoint / Point Source	Medium	1 Mile	
E	San Juan Creek (mouth)	1.13	Bacteria Indicators	Nonpoint / Point Source	Medium	6.3 Acres	
C	Pacific Ocean Shoreline, Lower San Juan HSA	1.13	Bacteria Indicators *Impairment located at North Beach Creek, San Juan Creek (large outlet, Capistrano Beach, South Capistrano Beach at Beach Road*	Nonpoint / Point Source	Medium	1.2 Miles	

(Note: R – Rivers; E – Estuary; C – Coastal Shoreline / Beaches)

D-1.3 Watershed Program Management

Program management of various water quality improvement programs within the San Juan Creek Watershed occurs at two distinct levels: (1) activities conducted by the Watershed Permittees individually in implementing jurisdictional programs in their LIPs based on the model programs in the DAMP in compliance with the municipal NPDES stormwater permits and (2) activities conducted by the Watershed Permittees and others collectively to address specific water quality issues on a watershed scale identified through the Water Quality Planning Process (see **2003 DAMP Section 3** and **Section D-1.4**).

The Watershed Permittees coordinate the program management of the San Juan Creek Watershed through the program agreements and coordination meetings, which are described below.

NPDES Coordination

The Orange County Stormwater Program is underpinned by an Implementation Agreement between the County of Orange, the Orange County Flood Control District, and the 34 cities of Orange County. The Agreement provides a funding formula and budgeting process for shared countywide costs and monitoring costs by Regional Board area.

The Orange County Stormwater Program also has an extensive committee structure that is described in the DAMP (**2003 DAMP Section 2**) and in the LIPs of the Watershed Permittees (**2003 DAMP Appendix A-2**). Each of the Watershed Permittees participates in the General Permittee meeting and, selectively, in the other oversight and technical committees.

Corps of Engineers Watershed Management Study

The County of Orange entered into an agreement with the Corps of Engineers in 1998 to conduct a Watershed Management Study. Subsequently, the County entered into individual agreements with each of the Watershed Permittees as well as other agency stakeholders (such as water/sewer districts) to cost-share the multi-year study.

The Watershed Permittees and agency stakeholders have held meetings for more than five years in an effort to better define problems, opportunities, and roles and responsibilities within the study process and follow its completion. During that time, a broad range of problems has been addressed, only one of which is water quality.

An important component of the study management process was participation from the public, many of who attended a number of meetings in an effort to provide input into the direction of

study and addressing of problems. While the meetings were announced in a variety of media, continued public participation was also assured through maintenance of an e-mail list/address list through which many of the participants were contacted on a systematic basis.

The meetings included presentations on a wide variety of issues related to improvement of the entire watershed ecosystem. Subjects included the effects of development on various watershed attributes, ecosystem damage and restoration, water quality assessment and improvement, flood damage reduction, coastal issues, alternative development and selection, the development of the Watershed Management Plan, prioritization and inclusion of alternatives in the Plan, and the progress of the Corps of Engineers study process. Feedback from the participants actively guided the direction of future study efforts, and provided valuable input into the issues related to each and every potential outcome. In addition, the presenters were often educated by the public on issues that may not have been anticipated by the technical team.

Watershed Management Framework

With the imminent completion of the Corps of Engineers' Watershed Management Study, current County-led efforts are focusing on the establishment of a long-term Watershed Management Framework. The entity evolving from this framework will be necessary to take the many plans and projects developed collaboratively by the Corps of Engineers and its watershed stakeholders and bring them to fruition. In the event of additional studies being undertaken, it may also be necessary to develop detailed plans for ecosystem restoration, flood damage reduction, recreation, and incidental water quality and water supply benefits. The Watershed management entity could take many forms, among them a Resource Conservation District or a Committee with select powers. Because the process of watershed management is new and differs so much from watershed to watershed, there is no standard structure for this entity. Therefore, responsibilities, and powers must be carefully worked out before its organization and mandate can be established. Currently, the County of Orange is leading the transition to this new management structure with active input from the watershed stakeholders.

It is expected that the watershed management group will continue to engage the public in a manner similar to that of the Corps of Engineers' Watershed Management Study and that many of those participants will transition to this new format. Given the strong implementation orientation of the governance group, it is expected that members of the public may choose to participate on an advisory basis, or in sub-committees formed for specific tasks, rather than as regular members of the group. It is also expected that continued media dissemination on the meeting times and locations of the group will be a standard feature.

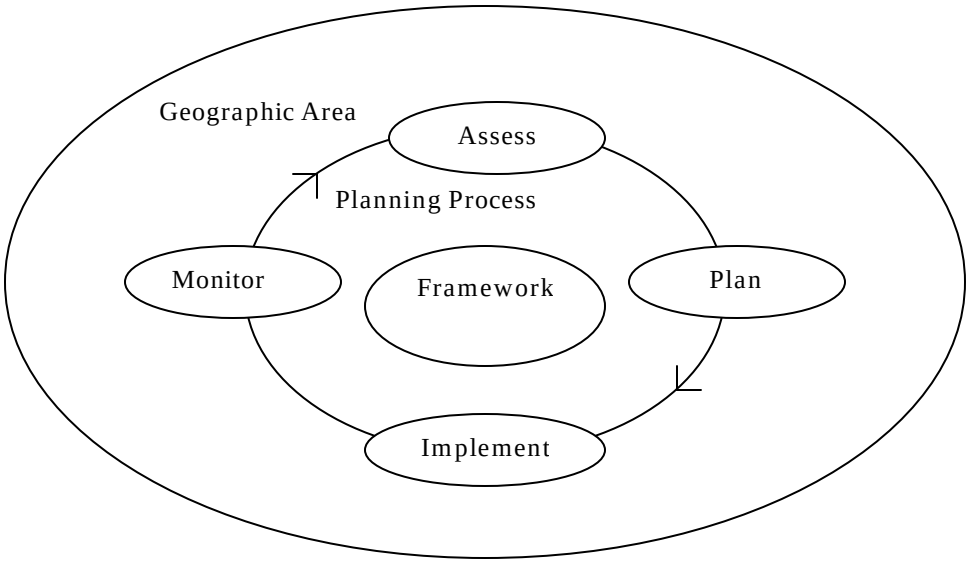
The formation of special task groups or continued participation of individuals in the process is vital to the long-term viability of the water quality improvement process (and by extension, watershed management) in the San Juan Creek Watershed. Consideration of protection of environmental resources, and not only water quality issues, needs to be constantly integrated into this process. The interdependency of many resources requires that public understanding of potential issues related to single-purpose projects must be sought and integrated into the planning process.

It is expected that one of the functions of the management group will be the continued education of the participants and general public on the progress of water quality improvement efforts. The means by which to disseminate information may take the same form as that established by the Corps of Engineers Watershed Management Study. Depending on the nature of the information, a suitable venue may take the form of general public education meetings, presentations at the regularly scheduled meetings of the group, or distribution by other means such as newspapers, television, or ad campaigns. This will be up to the group to determine and may change dramatically during the course of future efforts.

D-1.4 Plan Development

The approach taken to develop the San Juan Creek Watershed Chapter recognizes that the Local Implementation Plan and this Watershed Chapter represent the principal planning documents for two separate but nonetheless similar and highly interdependent water quality planning processes targeting the control of pollutants in urban runoff. These iterative processes can be represented in each case as shown in the figure below.

Figure D-6 Water Quality Planning Process



The processes are characterized as indicated below:

Table D-2 Watershed Management Process

	Local Implementation Plan	Watershed Chapter
Geographic Area Covered by Plan	Defined by political (city/county) boundaries	Defined by hydrologic boundaries
Planning Process	Focused on reducing discharges of pollutants in urban runoff and stormwater pollution on a uniform countywide basis. Directed by DAMP/LIP in conformance with NPDES permits requirements	Focused on improving local receiving water quality where it is adversely impacted by urban runoff and stormwater pollution. Directed by NPDES permit requirements and 303(d) list/TMDLs
Framework	Directed by Orange County Stormwater Program committee structure and Regional Board review. Public consultation principally through CEQA process/Regional Board review	Directed by municipal and public agency stakeholders. Characterized by public participation.
Assessment	Based on information from countywide municipal and regional cooperative investigations of stormwater and receiving water quality. Assessments are undertaken on an annual and 5 year basis.	Based on information from watershed specific investigations. Assessments are undertaken on an annual basis.
Planning	Broad based approach with emphasis on well established pollution prevention and source control measures	Pollutant specific approach with emphasis on treatment controls and consideration of innovative regional solutions
Implementation	Individually by the Watershed Permittees	Individually and collaboratively by Watershed Permittees and other agencies
Monitoring	Considers pollutant load reduction	Considers beneficial use attainment

Based upon the annual watershed assessment, the Watershed Permittees and other participating jurisdictions will work together to address the priority water quality issues identified through this watershed planning process. It is anticipated that water quality issues that are determined to be specific to a jurisdiction would be referred to that jurisdiction and thereafter be addressed as a jurisdictional program initiative through the City LIPs. Alternatively, the issue may originate from multiple jurisdictions within the watershed. In this instance, the problem would be addressed as a watershed cooperative effort.

Updates to this program will be the subject of annual reporting, starting in November 2004, that will include a water quality assessment and revisions to the listed water quality improvement initiatives.

D-2.0 Water Quality Assessment

Within the San Juan Creek Watershed there have been two major initiatives to monitor and assess the water quality:

- The NPDES Program began in 1990 and is anticipated to continue into the foreseeable future.
- San Juan Creek Bacterial Monitoring Study completed December 2002.

The following section provides additional background for each of these programs.

D-2.1 Water Quality Monitoring and Assessment Programs

NPDES Monitoring and Assessment Program

NPDES permits are issued for a five-year term. MS4 permits are issued on an area-wide basis. The first municipal NPDES Stormwater Permit was for the period 1990-1996; the Second Term Permit covered 1996-2002; and the Third Term Permit covers 2002-2007. Each of the permits has required the development and implementation of a monitoring program to support an effective County-wide urban stormwater management program.

First Term Permit

The monitoring program for the First Term Permit consisted of four elements. These elements were Field Screening, Channel Monitoring, Harbor/Bay Monitoring, and Sediment Sampling.

- Field screening was performed to detect the presence of illegal discharges or illicit connections. Physical and chemical analyses are conducted in the field. The annual evaluation of each station included two dry-weather samplings and one storm sampling. Field Screening monitoring stations in the San Juan Creek Watershed included the following:

    1. San Juan Creek Channel at Pacific Coast Highway
    2. San Juan Creek Channel at Ortega Highway Bridge
    3. Trabuco Creek Channel at Camino Capistrano
    4. Trabuco Creek Channel at Trabuco Creek Road

5. Oso Creek Channel at Crown Valley Parkway
6. Oso Creek Channel at Alicia Parkway
7. La Paz Channel upstream of the L03 confluence

- Channel monitoring focuses on specific watercourses with beneficial uses identified in the Basin Plan. Stations were monitored monthly and/or during storms. Samples were collected using automatic samplers. Samples were analyzed for pH, electrical conductivity, turbidity, nutrients, total suspended solids, volatile suspended solids, and total recoverable metals. The San Juan Creek at La Novia station is located in the San Juan Creek Watershed.
- Harbor/Bay sites were monitored semiannually and during storms. The monitoring included sampling for nutrients in the water column and trace metals and organics in the sediment. No Harbor/Bay Monitoring is directly associated with the San Juan Creek Watershed.
- Sediment sampling was conducted semiannually from designated channels and several bays and harbors. Samples were evaluated for metals, pesticides, herbicides, PCBs, and PAHs.

Second Term Permit

The First Term Permit monitoring program was continued into the second permit term. However, in 1999, the 99-04 Monitoring Plan was developed and implemented. This plan revised the geographic focus of the monitoring efforts by designating "Warm Spots" (where constituents are substantially above system-wide averages) and "Critical Aquatic Resources" or CARs.

The monitoring objective for the Warm Spot segment of the program was to detect changes in the levels of the identified constituents over the long term. The CARs were prioritized and additional monitoring stations selected to gather data at those sites. In the San Juan Creek Watershed, the stations were located at San Juan Creek at Ortega Highway and San Juan Creek at La Novia.

Third Term Permit

This current permit period is the most comprehensive monitoring effort to date. It extends the monitoring program to a broader range of locations and to a wider array of methods for measuring impacts. Investigation of the effects of stormwater plumes on the nearshore marine environment has been added to the program. Inland, the new plan is expanding to include bioassessment of creeks, along with more consistent use of toxicity testing. The bioassessment, toxicity testing, and measurement of chemical parameters is referred to as the "triad" approach. Three kinds of monitoring are considered for this plan.

- Core Monitoring – routine and related to small-scale or site-specific problems and processes.
- Regional Monitoring – periodic, collaborative, and larger-scale surveys.
- Special Studies – tightly focused and relatively short-term studies.

The following is a list of the four Monitoring Program Elements required in addition to Receiving Waters Monitoring in the Third Term Permit. Each of the 3 types of monitoring listed above are considered and incorporated as appropriate into each of the program elements.

Urban Stream Bioassessment – includes 12 sites plus 3 reference sites.

Long-Term Mass Loading – includes measurements of key pollutants at 6 sites. Monitoring sites include the sites designated in the 99-04 monitoring program plus additional sites. A total of 6 stations were selected across Orange County. The San Juan Creek at La Novia station is located in the San Juan Creek Watershed.

Coastal Storm Drains – based on a suite of bacterial indicators. Includes 36 sites.

Coastal Receiving Waters – uses a measure of runoff plume characteristics. Stations include threes sites in Dana Point Harbor. Testing will be done semi-annually and during two storms per year.

This monitoring program superceded the 99-04 monitoring programs.

Pre-NPDES Program

Prior to the start of the NPDES program, a monitoring station was established along San Juan Creek, one quarter mile upstream of Pacific Coast Highway. There was difficulty with the monitoring data at this station because flow was not present from bank to bank. Therefore, at

some points in time, no sample was taken at the monitoring station. Samples that were collected were analyzed for nutrients, total lead, copper, zinc, cadmium, and chromium.

Orange County Health Care Agency

Over the past 40 years, the Health Care Agency (also known as Environmental Health) and local sanitation agencies (Orange County Sanitation District and South Orange County Wastewater Authority) have been testing the coastal waters in Orange County for bacteria that indicate possible presence of human disease-causing organisms. Samples are collected weekly at approximately 150 ocean, bay, and drainage locations throughout coastal Orange County. Within the San Juan Watershed, there are sample locations at the mouth of San Juan Creek **(Figure D-7B)**.

A San Juan Creek Bacterial Study funded by the California Regional Water Quality Board, was completed December 2002. The County of Orange Public Facilities and Resources Department and the Orange County Public Health Laboratory collaborated with assistance from researchers from the University of South Florida to conduct a bacteria survey and a source tracking study in the San Juan Creek Watershed. Creeks and storm drains had moderate to high levels of total and fecal coliforms and enterococcus. San Juan and Trabuco Creeks were consistently higher than ocean levels. The source tracking study first compared two methods, antimicrobial resistance and ribotyping, against each other using *E. coli* and enterococcus bacteria. The goal was to reveal a superior test and conduct a tracking study to find the actual sources of the bacteria; however, the power and accuracy of the tests were below the level required to move forward to with other intended sampling. The study speculated that the high concentrations of fecal indicator bacteria in San Juan Creek at PCH were due to intervening storm drains, direct contamination from waterfowl and unidentified sources, and regeneration of resident bacteria.

D-2.2 Water Quality Assessment

NPDES Monitoring and Assessment Program

The monitoring program for the Third Term Permit Period is in its early stages, and no assessment has been made of that data. With a report to the Regional Board in response to Order No. R9-2002-0001, a report was submitted documenting the new monitoring program. Within that report, there is a discussion of trends that have been identified in the data gathered to date.

EPA TMDL Efforts

A bacterial TMDL is currently under development for the lower one mile of San Juan Creek. It is expected to be available for review in late 2003 – early 2004.

Constituents of Concern

A study is currently underway that is being led by the County to further define the constituents of concern within the San Juan Creek Watershed. The existing data is currently under assessment. As additional constituents of concern are identified, the Watershed Permittees will address those concerns.

Monitoring List

In addition to the 303(d) list discussed in Section 1.2, a Watch List has been developed by the State Water Resources Control Board. This list indicates those waterbodies that are being monitored or investigated for potential pollutants of concern but have not been included on the 303(d) list. The following waterbodies have been included on this list in the San Juan Creek Watershed.

Table D-3 Monitoring List for San Juan Creek Watershed

Type	Name	Hydro Unit	Pollutant/Stressor	Estimated Size Affected
R	San Juan Creek		Hydromodification, PCBs, Sedimentation / Siltation	1 Mile
C	Orange County Coastline		Trash	20 Miles
R	Oso Creek (at Mission Viejo Golf Course)	90120000	Chloride, Phosphorus, Sulfates, Total Dissolved Solids, Turbidity	1 Mile
R	Oso Creek (lower)	90120000	Chloride, Phosphorus, Sulfates, Total Dissolved Solids, Turbidity	4 Miles
R	Rose Creek	90640000	Sedimentation / Siltation	13 Miles

Figure D-7A includes a GIS map that shows the 303(d) listed receiving waters within the San Juan Creek Watershed, color coded by constituent of concern as well as the identified receiving waters. **Figure D-7B** shows the subwatersheds for the MS4s and the monitoring locations within San Juan Creek Watershed.

D-2.3 Identification and Prioritization of Major Water Quality Problems

Bacteria

Bacteria continue to be a major identified water quality problem with a high priority for the Watershed Permittees due to the impact on beneficial uses. There are also several ongoing studies related to understanding bacteriological data and the sources. These studies are being undertaken as part of the watershed cooperative efforts. The findings will be used to further the process of addressing bacteria and performing watershed source tracking.

Countywide Source Tracking Studies

One such study being conducted jointly by the County of Orange and the City of Laguna Niguel will serve all the watersheds as local information in the agenda to identify indicator bacteria sources. The source tracking study is located in an urban subwatershed in the Aliso Creek watershed and is focusing on the question of the actual contribution of wildlife to the bacterial problem. The results generated by Dr. Sunny Jiang during the 8th term of the Aliso Creek 13225 Directive indicate few, if any, human sources of bacteria. However, elimination of wildlife sources of bacteria is simply not possible. It is recommended that the development of the source tracking program to establish “background” bacterial levels due to wildlife and those due to human sources provide the means to direct resources to the appropriate and achievable areas of bacterial reduction, rather than directing funds at a program that yields little real reduction. If continued source tracking and monitoring indicates a human source, appropriate resources can be directed to that individual problem area. The results from this study within the Aliso Creek watershed may have a broader application to other watersheds, such as the San Juan Creek Watershed.

The science behind source tracking is still evolving and the best methods for field application and study have yet to be decided. Seven organizations (Southern California Coastal Water Research Project [SCCWRP], National Water Research Institute, State of California Water Resources Control Board, USEPA, Southern California Stormwater Monitoring Coalition, Orange County Sanitation District, and City of Santa Barbara) are cooperating to conduct a comparative evaluation of microbiological source tracking methods. A recent study conducted by a collaboration of 22 researchers investigated the accuracy and effectiveness of adapting

several microbiological methods to characterize bacteria and their sources from the water column. Publication of the final report is anticipated in the *Journal of Water and Health* in December.

Scientists at SCCWRP are currently conducting two further studies into the development of new source tracking methods. The first study is in the first of three years. Researchers are working on method development in three target areas: immunomagnetic separation, polymerase chain reaction (PCR) segment amplification, and chromatogenic signal detection. Method development is expected to continue through the end of 2003. The second study is a comparative evaluation of molecular biological techniques. The goal is to develop source tracking methods able to differentiate between sources of enterococcus and researchers are collaborating with researchers at two major academic institutions to develop methods to detect and quantify human pathogenic viruses in recreational waters. This project is in the first of four years. Efforts at this point are being focused on developing and testing appropriate PCR primers and restriction enzymes to analyze the samples for different genetic fragments that are specific to human pathogenic viruses and to an array of sources for the enterococcus bacteria.

Figure D-7A Receiving Waterbodies

Figure D-7B Subwatersheds & Monitoring Locations

D-3.0 Plan of Action

The Watershed Permittees have developed and are in the process of implementing pollution prevention and source control programs within their jurisdictions. However, beyond the programs implemented at the jurisdictional level, the Watershed Permittees recognize that certain issues need to be addressed at a watershed scale utilizing a cross-jurisdictional approach. The following describes the plan of action at both levels.

D-3.1 Jurisdictional Program

Each LIP provides details on the specifics of the implementation of the local jurisdictional plan. This section focuses on those activities specific to the San Juan Creek Watershed. The following figures are provided:

- Figure D-8 – a map displaying the inventoried commercial and industrial site
- Figure D-9 – a map displaying the inventoried municipal sites and residential areas.

Existing Development Program

Each city LIP contains an inventory of municipal, commercial, industrial, residential, and commercial sites subject to program directives. In the San Juan Creek Watershed, municipal sites largely consist of storm drains, parks, open space, and beach access. The main activities that would be expected at these sites include recreational use including walking, picnicking, and bike riding.

Because it is believed that each Common Interest Area (CIA) contained within the San Juan Creek Watershed is also contained within a single jurisdictional boundary, measures directed at management of CIAs and HOAs are contained within each LIP.

Future revisions of the City LIPs will contain a description of the Designated Minimum BMPs that apply to each of these sites, as well as the inspection and public education program that relates to the sites. Significant focus will be placed on those BMPs identified in the LIP that target the specific constituents of concern for the San Juan Creek Streams watershed. For each BMP listed, the training and public education associated with that BMP would also have a likelihood of contributing significantly to the reduction of the constituents of concern.

Figure D-8 Commercial and Industrial Sites

Figure D-9 Municipal Sites and Priority Construction Areas

New Development and Construction Areas

Each city LIP contains information related to new development and construction areas. This information includes a review of the General Plan; to include the requirement for a Water Quality Management Plan (WQMP); revision of the CEQA Environmental Review Process; and the Review, Approval, and Permitting Process. A map (**Figure D-9**) showing the priority construction sites for the entire watershed was included in the previous section. The LIP discusses the inclusion of routine non-structural and structural source control BMPs, site design BMPs that focus on pollution prevention, and treatment control BMPs in the WQMP. At least one treatment control BMP is required at all priority projects. There will be a significant focus on those BMPs that target the constituents of concern in the watershed.

Hydro-Modification

There is a need to protect natural channels from hydro-modification and losses of beach sand replenishment. Urban development of a landscape increases the percentage of impervious area. Studies have shown that starting with at least 5% impervious area, the hydrograph for urban streams begins to change. Typical changes in the hydrology include sharper runoff peaks and higher sustained volumes. This may impact stream structure, causing bank erosion and scouring. As the percentage of impervious area increases, the storm water washes across pavement and ceases to carry the sediment load that replenishes the beach sand. The storm event runoff carries pollutants from the washed surfaces to the stream channel, often impacting the stream ecology, wildlife habitat, and downstream human recreation opportunities.

Within the San Juan Creek Watershed, the streams are showing erosion behavior. Therefore, it is assumed at this point in time that hydro-modification is an issue of concern in this watershed.

Peak Discharge Impact Study

There is a need to protect natural channels from hydro-modification and losses of beach sand replenishment. Urban development of a landscape increases the percentage of impervious area. Studies have shown that starting with at least 5% impervious area, the hydrograph for urban streams begins to change. Typical changes in the hydrology include sharper runoff peaks and higher sustained volumes. This may impact stream structure, causing bank erosion and scouring. As the percentage of impervious area increases, the storm water washes across pavement and ceases to carry the sediment load that replenishes the beach sand. The storm event runoff carries pollutants from the washed surfaces to the stream channel, often impacting the stream ecology, wildlife habitat, and downstream human recreation opportunities.

Illicit Discharge / Illegal Connection (ID / IC) Investigation

Investigation of illicit discharges and illegal connections is currently described in the LIP. Illicit discharges and illegal connections to city storm drains are being dealt with by individual jurisdictions, and information on this program is contained within each LIP. If a problem is identified that crosses jurisdictional boundaries, it will be collaborated on between the Watershed Permittees.

Watershed-Wide Land Use Planning

One of the most important responsibilities of local government is to provide a decision making and approval processing framework for the new development and re-development that occurs within its boundaries. This primacy in land use planning enables jurisdictions to control the types and intensities of particular activities that may be allowed within specified geographic areas and consequently land use decisions can play an important role in addressing *point and nonpoint sources* of pollution.

State law requires that each jurisdiction adopt a comprehensive, long-term general plan to guide the physical development of its community. 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. It reflects the community's long-term vision and the community's needs.

The Watershed Permittees are required by the areawide NPDES permit to minimize short and long-term impacts on receiving water quality from new development and redevelopment. Further, with regard to their general plans specifically, the Watershed Permittees must at a minimum review and update their general plans as necessary to ensure watershed and stormwater quality and quantity are considered (see Section 7.4 DAMP).

Upon completion of the necessary general plan updates, the Watershed Permittees will have common plan elements addressing urban and stormwater runoff management and water quality protection. These common elements will provide the basis for collaborative watershed-based land use planning. The schedule for the process of plan update is discussed in Section A-7.0 of each jurisdiction's LIP.

The mechanisms used to facilitate watershed-based land use planning relate to the use of the water quality assessment findings to inform decision making and the dissemination of this information.

The annual watershed-based water quality assessment will provide a major part of the informational basis for all watershed activities initiated by the Watershed Permittees, including land use planning. On an annual basis, or as key findings are developed, information, and/or recommendations will developed during the water quality assessment process and distributed to each jurisdiction's planning department for consideration by land use decision makers to ensure that water quality issues are addressed.

The Watershed Permittees will establish mechanisms, such as meetings and internet based resources, as they determine necessary to ensure effective communication with staff both jurisdictionally and on an inter-jurisdictional basis. In both instances, the purpose of the meetings will be to facilitate the exchange of watershed-specific information and to explore the collaborative development of water quality management and protection initiatives.

BMP Effectiveness Investigations

The Watershed Permittees together with the Permittees County-wide, are currently coordinating with one another on a BMP effectiveness study. In addition, there are several other studies underway that are testing the efficacy and cost-effectiveness of various water quality improvement measures. It is anticipated that these studies will result in proposed modifications to the list of recommended BMPs and other measures contained in the 2003 DAMP and later incorporated into the JURMP/LIPs. Studies directed at all jurisdictions within the watershed that are currently underway include the following:

- BMP Effectiveness Study/Orange County
- Trash and Debris BMP Evaluation
- Erosion Control BMP Effectiveness Evaluation
- Septic System Assessment on Stormwater Quality Evaluation
- Portable Toilet Oversight Program Evaluation
- Fats, Oils, and Grease (FOG) Program for Restaurants Evaluation
- Bacterial "Warm Spot" Elimination for City Storm Drains Evaluation

Ongoing BMP evaluation of a non-traditional nature includes:

- Conducting surveys to determine if public outreach efforts hare having the desired effect of increasing household awareness of water quality issues.
- Monitoring oil delivery to household hazardous waste collection centers.
- Monitoring materials removed from catch basins, retarding structures, and the like.

Restoration Projects

- Ambuel Elementary School in San Juan Capistrano planted vegetation and conducted a small restoration project on San Juan Creek in 2002 to aid flow. It is the hope that lessons such as these can be extended to all school-age children and that funding can be provided to encourage their incorporation at schools throughout the San Juan Creek Watershed.
- There exists a water barrier in Trabuco Creek at the Oso Parkway that collects water that is pumped, treated, and sold for irrigation by the Santa Margarita Water District.
- The Audubon Society is leading a restoration project at Star Ranch to place a water barrier in Dove Canyon to collect and treat runoff from the ranch. The Regional Board is funding the project, which is expected to begin construction in 2003.
- Trabuco Canyon Water District operates a reservoir south of Robinson Ranch that captures the runoff from the ranch. The water is treated and used as reclaimed water for the municipality.
- A study by Mission Viejo to identify three wetland restoration projects is underway in the San Juan Creek drainage.

Mitigation Projects

Mitigation is typically required as compensation for impacts to biological resources regulated under the CDFG 1601-1603 Streambank Alteration program or the U.S. Army Corps of Engineers' Clean Water Act Section 404 program. Following are those mitigation projects in the watershed.

Table D-4 Mitigation Projects in the San Juan Creek Watershed

Project	City/Sub-Watershed	Status	Performance Measures
Ladera		Constructed	
Las Flores		Constructed	
Oso Creek-Galivan		Constructed	
Lower Rosan Ranch	San Juan Capistrano-Trabuco Creek	Completed	Wetland Habitat

Ladera Ranch

In order to mitigate the impacts of the development of the Ladera Ranch Planned Community on stormwater runoff and water quality within the San Juan Creek Watershed, two basins were engineered at the downstream limit of the development. The two basins lie adjacent to one another and drain an area of 1,816 acres. One functions as a water quality control basin and wetland restoration site while the other functions exclusively as a detention basin.

In addition to the basins, Horno Creek, which traverses through the community, was transformed into a “riverine system”. The creek is an open bottom revegetated channel designed to capture dry weather or nuisance flow. The system absorbs constituents in urban runoff as nutrients before emptying into the water quality basin.

Las Flores

The Las Flores Planned Community encompasses a residential area of approximately 1005 acres within the San Juan Creek Watershed. The development drains into two water quality detention basins (one northwest and one southwest of the community) which have been fully operational since 1996.

Retrofitting

The following table indicates the retrofitting opportunities that have been taken or are underway within the San Juan Creek Watershed. Those projects that have begun can reasonably be expected to be completed within the Third Term Permit period.

Table D-5 Retrofit Projects in the San Juan Creek Watershed

Project	City/Sub-Watershed	Status	Performance Measures
Debris Screens at catch basin inserts	Rancho Santa Margarita	Installed	Debris
Catch basin inlet filter	Rancho Santa Margarita - large commercial site	Installed	Unknown
Feasibility Study	Rancho Santa Margarita - small package plant	Ongoing	Stormwater – unknown parameter
Catch Basin Insert Program BMP Low Flow Diversions (with CDS inserts yes / no)	City of Dana Point		
Camino De Estrella Diversion* (no)	City of Dana Point - Pacific Ocean / Capistrano County Beach	Installed	*Trash, Debris, Bacteria*
Beach Road Diversions* (Eight Total) (no)	City of Dana Point - Pacific Ocean / Capistrano County Beach	Installed	*Trash Debris, Bacteria*
Alipaz Storm Drain Diversion* (yes)	City of Dana Point - San Juan Creek / Doheny State Beach	Installed	*Trash Debris, Bacteria*
North Beach Creek Strom Drain Diversion* (yes)	City of Dana Point - San Juan Creek / Doheny State Beach	Installed	*Trash Debris, Bacteria*
Del Obispo Storm Drain Diversion* (yes)	City of Dana Point - San Juan Creek / Doheny State Beach	Installed	*Trash Debris, Bacteria*

*The low flows are diverted using South Coast Water District or the City of San Juan Capistrano collection systems. The flows are directed to a wastewater treatment plant owned and operated by the South Orange County Wastewater Authority (SOCWA) for treatment

Further retrofit opportunities will be assessed based on the results of the Retrofit Opportunities Assessment study that is currently underway. This assessment will be performed over the next 12 months.

D-3.2 Watershed Cooperative Efforts

Watershed-Wide Public Education

The goal of watershed-wide public education is to spread knowledge of the water quality protection practices to municipalities, agencies, businesses owners and employees, individuals, and other interest groups within the San Juan Creek Watershed. Education is intended to both pass on knowledge of the issues facing San Juan Creek and its watershed and to encourage activities that will promote improvement of water quality.

Water quality education will occur at three distinct geographic scales: Countywide, watershed-scale, and jurisdictional. Watershed-scale efforts focus on the constituents of concern within the San Juan Creek Watershed. While continuing public education efforts reflect the evolving state of knowledge by residents and visitors, the primary goal of watershed-wide public education is to provide the larger environmental picture and enhance the sense of land and water stewardship by adding to the knowledge base of individuals. The ultimate goal of education is to encourage action and changes in the habits and behavior of those that work and live within the watershed.

Environmental education efforts at the watershed scale are novel and should be organized to include participation from many broad groups within the watershed such as municipal agencies, military, hospitals, schools, city and federal government, businesses, and residences. Watershed-wide efforts will focus on education at all these levels.

Additional public education materials will continue to be developed by the County. These will be used to support outreach strategies for local efforts that watershed groups are best positioned to implement, such as at festivals, markets, and fairs.

Public education through school activities is an additional source of education of all residents. School children take home the messages they learn and educate other members of the household. Volunteer or mandated school curricula that include activities and scientific investigations that lead to sound environmental behaviors will be encouraged at all levels of school education. Currently volunteer efforts by educators within several cities have introduced environmentally oriented classroom and field activities that promote environmental

stewardship and further public participation. Public involvement in the pursuit of funding for these programs is a long-term effort, and is being encouraged at schools throughout the San Juan Creek Watershed.

Adult environmental education through courses and public events has lead to positive outcomes on the constituents of concern in the San Juan Creek Watershed. The Master Gardener program and the University of California's Agricultural Extension Integrated Pest Management programs provide classes and distribute information to the public, municipal employees, and landscape firms on biologically effective and appropriate pest management and fertilization techniques.

Environmental Education Survey

One outcome of the recognition of the role of public education in water quality improvement efforts was the formation of the Orange County Stormwater Public Education Committee, composed of the County of Orange and its 34 cities. In 2003, a survey designed to serve as a "baseline" upon which changes in public knowledge, behaviors, and public opinion can be periodically measured was conducted.

The survey results indicate the need for further public education on water quality issues. While many respondents understand the connection between pollution and beach closures, few make the connection between local urban runoff and beach closures. Furthermore, most believe that urban runoff flows into sewer systems, and not necessarily down storm drains that lead into natural channels or the beach. Public focus seems to be more on oil and grease than on activities such as sweeping, gardening, landscaping, car washing, or other everyday activities. When asked about information dissemination, the public believes that biologists and scientists are the most credible people for spreading messages about the effects of urban runoff pollution on the environment.

Focused education in communities such as the San Juan Creek Watershed should incorporate experts and agencies to explain new information and answer questions. The focus of continuing public education efforts within the San Juan Creek Watershed will reflect the changing state of knowledge of residents and visitors. Based on the findings of the 2003 survey, public education initiatives will have the following areas of emphasis:

- Explanation of the link between urban runoff and stream pollution and beach closures.
- Explanation of the separate function of the storm drain and sanitary sewer systems.
- Identification of the principal causes of stream and ocean pollution.

- Explanation of the potential link between urban runoff and the environment.
- Explanation that all residents and visitors to the watershed affect water quality through their actions.
- Explanation of the value of carefully selecting and applying fertilizer and pesticides.
- Explanation of the importance of pet waste clean-up.
- Expansion of the range of "message sources" from storm drain stenciling and newspaper articles to other types of media.

Watershed-Wide Public Participation

A "watershed" scale education effort is not only necessary to impart important environmental information but also to engage individuals, groups, businesses, and agencies in pollution prevention programs and clean up activities that promote water quality improvement and watershed health. While initial participation may occur at organized events, the goal is to empower individuals to identify and change their activities that could result in detrimental impacts on the San Juan Creek Watershed, with a focus on the watersheds constituents of concern; bacteria, phosphorus, and toxin (resulting from pesticide and fertilizer over-application or misuse) contamination.

Public participation on watershed planning has been sought by inquiry at public events, notably watershed workshops, and at the regularly scheduled meetings of the San Juan Creek Watershed Group sponsored by the County of Orange's Public Facilities and Resources Department. Public participation in the Group has been voluntary and influential on policy, funding, and project implementation in the San Juan Creek Watershed.

City-based participation in events at the watershed scale, such as sponsorship of the "Trails for All" event and others, encourages attendees to learn about water quality issues and further fosters participation by individuals and groups in events with a similar outcome. Collaboration has the effect of changing passive acceptance of messages to community or individual action. Direct public participation in the improvement of the creek and its watershed is encouraged by the organization of annual or bi-annual "Clean Up" days. Typically, volunteers collect thousands of pounds of debris that would otherwise make its way into watercourses and eventually the ocean, and properly dispose of the waste.

Participation by businesses in local partnerships may also yield positive effects at the watershed scale. Business participation and potential sponsorship of local events may have a positive effect

on both the business and also the individual participants. For instance, the sponsorship of a home improvement center in education on integrated pest management techniques may encourage both smaller landscaping firms and individuals to carry forward that education and apply it within their service area or at home. The Business Education Awards Program is another venue for business participation.

Participation in the clean up of animal wastes, discarded organic materials, yard and landscaping waste, and unused fertilizer and pesticides contributes to improvement of individual pollutant impairments, as well as overall water quality in the San Juan Creek Watershed. Even clean up of materials that do not constitute designated impairments contributes to the general aesthetic quality of the environment and fosters the development of an environmental ethic on the part of individuals that leads to consistent behaviors that positively contribute to the improvement of water quality over the entire spectrum of constituents.

Finally, the Watershed Permittees can make available scientists, biologists, and others knowledgeable on watershed planning, in public speaking programs at special events. The speakers can be specifically chosen for their knowledge of how behaviors and activities impact water quality and what the attendees may do to promote improvement.

While the Watershed Group spawned by the Corps of Engineers study suggested adoption of a program of schooling within the elementary, junior, and senior high schools in the watershed, this program has been adopted very sporadically. It is also not possible to fund this program through any Corps of Engineers or local authorities. This is because none of the Watershed Permittees has authority over the school districts or their programs. Regardless, pursuit of a program for education of schoolchildren is considered to be a fundamental part of an education program for watershed-based planning and public involvement. This issue will continue to be addressed by the Watershed Permittees or special interest groups within the watershed.

Rancho Santa Margarita

The cities of San Juan Capistrano and Rancho Santa Margarita participate in the annual Santa Margarita Water District Water Festival in May. The Rancho Santa Margarita city booth provided stormwater education by distributing educational pamphlets and stickers as well as conducting urban runoff demonstrations using the Enviroscape Model.

San Juan Capistrano

The City of San Juan Capistrano has a multitude of local public education and participation events that relate to the broader watershed scale. The city has printed materials covering water

quality and pollution prevention online, in the city business newsletter, as a water bill insert, and quarterly in the "Town Happenings"newsletter. The city has taken education and participation in watershed environmental quality seriously and provided outreach through several venues including booths and activities to teach and distribute materials about water quality, pollution prevention, recycling, composting and cleaning up pet waste.

Booths:

- Annual Earth Day event, during which various public education materials are distributed, exhibits and demonstrations (such as the enviroscape model) shown. Event participators include O.C.vector control, O.C.Health, O.C. Used Oil program, Dana Point Ocean Institute, San Juan Capistrano water conservation, CR & R disposal, composting distribution and educational materials.
- 4 annual concerts at the Park: the city has a water quality public education booth at the concerts. Public education materials are distributed to the public regarding pollution prevention, recycling, composting with stress on pet waste pick up.
- Annual 4th of July: the city has a water quality public education booth at the 4th of July event. Public education materials are distributed to the public regarding pollution prevention, recycling, composting with stress on pet waste pick up.
- Annual creek clean up day: On the coastal clean up day, the city hosts a creek clean up day, during which volunteers enter the creek and remove trash and recycled material. A public education booth is also set up and material shared with the volunteers.
- Annual Children Water Festival: The city participates annually in the children water festival, during which children are shown using the Enviroscape model how urban runoff impacts the creeks and the ocean.

Activities:

- City staff performs regular presentations to community groups regarding water quality issues, such as the Chamber of commerce, Kiwanis, Rotary International, and others.
- In addition to the Public education outreach, the city has a very aggressive staff training, starting with monthly water quality articles in the City's employees newsletter, followed by regular training. The City developed an employee water quality employee manual that was distributed to all employees. In addition, a water quality answer flyer was also distributed to all employees to help them assist the public as it relates to water quality.
- The City has hosted and will continue hosting water quality workshops for businesses, such as food facilities, hazardous waste generators, home owner associations, shopping center owners and property managers, and others.

- The City of San Juan Capistrano set up and is chairing the Equestrian Water Task Force, to develop guidelines and Best Management Practices for the equestrian community to deal with water quality issues. The result of the task force will be shared county wide.
- The City has formed the "Water Quality and Watershed Management Committee", formed by the City's mayor and a council member, city manager, all department heads, a county of Orange representative and the City's NPDES coordinator. This committee meets every other month and reviews all the water quality issues that the city is involved in and water quality issues at the watershed level.

U.S. Army Corps of Engineers Watershed Studies

The U.S. Army Corps of Engineers, Los Angeles District, completed a reconnaissance study of the San Juan (and Aliso) Creek watershed in February 1997. The study reviewed and assessed past and current activities and conditions in the watershed to help identify management opportunities from a basin-wide perspective. Issues addressed in the reconnaissance study included geomorphology, geology and soils, land use, environmental resources, hydrology, hydraulics, sedimentation, groundwater, water quality, and economics. The findings from this study supported the identification and refinement of watershed problems and opportunities, involvement of key stakeholders, and conceptual watershed solutions.

Following completion of the reconnaissance study, a feasibility study, a more detailed study, was initiated in 1998. This phase of the watershed study built upon the findings of the reconnaissance study and developed more detailed technical data across a range of study categories. As part of the watershed study, a preliminary array of measures was developed to meet the established planning objectives. After screening of the measures, a final array of alternative plans was proposed as a component of the draft Watershed Management Plan (WMP; COE, August 2002). The WMP addressed recommended management actions that could be pursued within the watershed, both by the Federal government and non-Federal agencies. The components of the WMP, as shown in **Table D-6**, included ecosystem restoration projects, water quality projects, streambank erosion control, floodproofing plans, and comprehensive plans.

Table D-6 Components of the San Juan Creek Watershed Management Plan

Component	Cost-Effectiveness Ranking
Watershed Education	1
Non-point Source Public Awareness Plan	2
Water Quality Wetlands Construction	3
On-Site Biofiltration / Infiltration Treatment	4
Landscape Controls / Enforcement to Reduce Water, Fertilizer, Pesticide Application	5
Enforcement of Ordinances on Pet Wastes	6
Ecosystem / Habitat Restoration	7-10
Retrofitting of Existing Drainage BMPs	11
BMP Monitoring and Evaluation	12

The feasibility study recommended that additional cooperative steps be taken by local, state, and Federal agencies, along with local citizens to implement the identified measures.

A number of these Corps recommendations are believed to have had positive impacts on water quality. While the ecosystem restoration plans are not directed primarily at water quality improvement, but at larger-scale ecosystem improvement, they would be expected to have a positive impact on water temperature, turbidity, and oxygen content, and potentially on bacteria reduction through the creation of vegetative buffering from urban landscaping.

The San Juan Creek Watershed Management Study is currently under evaluation for possible COE funding for detailed feasibility studies for the Flood Damage Reduction / Ecosystem Restoration study. This potential project is currently in the phase of preparation of a Project Management Plan. This study may be funded for initiation in 2004.

A number of projects recommended in the Watershed Management Study have been pursued by the Watershed Permittees. The expansion of the BMP program, including evaluations, is currently under review by the County and expected to be included in the 2003 DAMP as a decision-making tool. Watershed education efforts and the iterative pursuit of a “living” Water Quality Monitoring Plan are also currently being conducted by the County and cities and are expected to have a positive effect on water quality.

D-4.0 Program Effectiveness Assessment

A principle objective of the Watershed Chapter is to present an integrated plan of action that result in meaningful water quality improvement in the San Juan Creek Watershed while balancing economic, social and environmental constraints. The program effectiveness assessment strategy requires the identification and thereafter annual consideration of measures that indicate whether progress is being made toward attainment of this objective and the other program objectives discussed in Section D-1.0. In considering program approaches to program assessment, it is recognized that both short- and long–term strategies are needed to assess the effectiveness of the Watershed Chapter.

D-4.1 Short Term Strategy

The short-term strategy initially focuses on the implementation of the watershed planning framework and the outcomes that are expected to be achieved within the first 5-year Permit period (2002-2007). The programmatic activity to be discussed in the first annual report will therefore specifically relate to:

- The meetings of a Watershed Mamagement Group and the actions arising from its deliberations;
- The extent of public participation in watershed issues, through Permittee and public interaction at watershed events, annual / semi-annual "Clean Up Days", and other activities;
- Education of the public regarding water quality issues;
- Modification of jurisdictional plans and policies to reflect potential impacts to water quality at watershed-scale.

In addition, annual results from the water quality assessment will be integrated into the evaluation of program effectiveness in successive years. It is anticipated that this information will, towards the end of the first permit term, start to inform the Watershed Permittees as to whether specific programmatic initiatives are contributing or are capable of contributing towards the attainment of the Watershed Chapter's objectives. Direct methods (water quality data) of assessment to be considered in the short term strategy will include relevant findings from the monitoring initiatives and any individual investigations of BMP performance. The findings from evaluations of non-structural BMP initiatives (indirect measures i.e non-water quality indicators of BMP performance), documented in the Watershed Permittees Annual

Progress Reports, will be presented in the watershed annual report where appropriate. It is anticipated that the emphasis of the short-term strategy will be on jurisdictional programs

D-4.2 Long-term Strategy

Long term strategies for assessing effectiveness apply to programs and activities conducted with the expectation that outcomes will occur outside of the 5-year Permit period (2007 on). Long-term assessment strategies focus on direct measures of performance that will validate the long-term progress of the Watershed Chapter towards achieving improvements in receiving water quality impacted by urban runoff and urban stormwater discharges. The long-term strategy includes consideration of the findings from the water quality monitoring initiatives principally related to the detection of improvements in receiving water quality and reductions in pollutant loading. The emphasis of the long-term strategy will be on watershed cooperative efforts and the overall success of the Watershed Chapter in realizing its objectives.

D-4.3 Review of Management Program

In each future year the short-term and long-term effectiveness assessment strategies will be used to verify and ultimately validate the implementation of the watershed program. It is expected that the program objective and supporting management actions will be revised as the program evolves. Specifically, the annual assessment of effectiveness will be used to inform and direct the watershed planning process to ensure cost effective water quality improvement.