SAN DIEGO
Integrated Regional
Water Management

2013 San Diego Integrated Regional Water Management Plan

An Update of the 2007 IRWM Plan

Volume I: Plan

Prepared by the Regional Water Management Group in collaboration with the Regional Advisory Committee

The City of San Diego | *County of San Diego* | *San Diego County Water Authority*

Final - September 2013

Download the complete 2013 San Diego IRWM Plan at:
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Acronyms and Abbreviations

303(d) List	List of impaired and threatened waters per Clean Water Act §303(d)
AB-32	Assembly Bill 32, the California Global Warming Solutions Act of 2006
ACS	American Community Survey
AF	Acre-feet
AFY	Acre-feet per year
ASBS	Area of Special Biological Significance
AWMP	Agricultural Water Management Plan
Basin Plan	Water Quality Control Plan for the San Diego Basin
Bay-Delta	Delta of the Sacramento and San Joaquin Rivers
BLM	United States Bureau of Land Management
BMP	Best management practice
BU	Beneficial Use
Caltrans	California Department of Transportation
CASGEM	California Statewide Groundwater Elevation Monitoring Program
CDPH	California Department of Public Health
CEDEN	California Environmental Data Exchange Network
CEPA	Campo Environmental Protection Agency
CEQA	California Environmental Quality Act
CERES	California Environmental Resources Evaluation System
CFS	Cubic feet per second
City	City of San Diego
CORDC	Coastal Observing Research and Development Center
County	County of San Diego
CPA	Community Planning Area
CSD	Community Services District
CTR	California Toxics Rule
CWP	California Water Plan
DAC	Disadvantaged community
DEH	San Diego County Department of Environmental Health
DFW	California Department of Fish and Wildlife
DMS	Data Management System
DO	Dissolved oxygen
DWR	California Department of Water Resources
EJ	Environmental Justice
EHC	Environmental Health Coalition

EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESP	Emergency Storage Project
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
Flood Control District	San Diego County Flood Control District
FY	Fiscal Year
GAMA	Groundwater Ambient Monitoring and Assessment
GHG	Greenhouse gas
gpcd	Gallons per capita per day
GRP	Gross Regional Product
GWMP	Groundwater Management Plan
HA	Hydrologic Area
HCP	Habitat Conservation Plan
HU	Hydrologic Unit
IFM	Integrated Flood Management
IID	Imperial Irrigation District
IPR	Indirect potable reuse
IRWM	Integrated Regional Water Management
JEA	Jamul Environmental Agency
JPA	Joint Powers Authority
JURMP	Jurisdictional Urban Runoff Management Plan
KDLC	Kumeyaay Diegueno Land Conservancy
LID	Low impact development
M&I	Municipal and industrial
MBA	Methylene blue-activated substance
MCL	Maximum Contaminant Level
Metropolitan	Metropolitan Water District of Southern California
Metro System	San Diego Metropolitan Wastewater System
MGD	Million-gallons per day
mg/L	Milligrams per liter
MHI	Median Household Income
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MS4	Municipal Separate Storm Sewer System
MSCP	Multiple Species Conservation Program
MSHCP	Multiple Species Habitat Conservation Plan
MSL	Mean sea level

MTBE	Methyl-tertiary-butyl ether
MW	Megawatt
MWD	Municipal Water District
MWTP	Miramar Water Treatment Plant
NCCP	Natural Community Conservation Plan
NGO	Non-governmental organization
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NCWRP	North City Water Reclamation Plant
NNE	Nutrient numeric endpoint
NPDES	National Pollutant Discharge Elimination System
NPS	Non-point source
NWIS	National Water Information System
Ocean Plan	Water Quality Control Plan for Ocean Waters of California
O&M	Operations and maintenance
PED	Pala Environmental Department
POTW	Publicly Owned Treatment Works
PPL	Priority Project List
Pt. Loma WWTP	Point Loma Wastewater Treatment Plant
PUD	Public Utility District
QA/QC	Quality Assurance/Quality Control
QSA	Quantification Settlement Agreement
RA	Reservoir augmentation
RAC	Regional Advisory Committee
RAP	Region Acceptance Process
RCAC	Rural Community Assistance Corporation
RCWD	Rancho California Water District
Region	San Diego IRWM Region
Regional Board	Regional Water Quality Control Board, San Diego Region
RFP	Request for Proposals
RMS	Resource Management Strategies
RWMG	Regional Water Management Group
RWMP	Recycled Water Master Plan
SANDAG	San Diego Association of Governments
SanGIS	San Diego Geographic Information Source
San Diego PUD	City of San Diego Public Utilities Department
SBX7-7	Senate Bill X7-7, the Water Conservation Act of 2009
SCCWRP	Southern California Coastal Water Research Project

SCCOOS	Southern California Coastal Ocean Observing System
SDSU	San Diego State University
SFHA	Special Flood Hazard Area
SIHC	Southern Indian Health Council
SIO	Scripps Institute of Oceanography
SMC	Stormwater Monitoring Coalition
SNMP	Salt and Nutrient Management Plan
SNMP Guidelines	Guidelines for Salinity/Nutrient Management Planning in the San Diego Region
SRF	State Revolving Fund
State Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
SWP	State Water Project
TCR	The Climate Registry
TDS	Total dissolved solids
TMDL	Total Maximum Daily Load
Tri-County FACC	Tri-County Funding Area Coordinating Committee
UCSD	University of California, San Diego
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USMC	United States Marine Corps
UST	Underground Storage Tank
UV	Ultraviolet
UPSD	Unified Port of San Diego
UWMP	Urban Water Management Plan
VID	Vista Irrigation District
Water Authority	San Diego County Water Authority
WDL	Water Data Library
WDR	Waste Discharge Requirement
WMA	Watershed Management Area
WQIP	Water Quality Improvement Plan
WQO	Water quality objective
WURMP	Watershed Urban Runoff Management Plan
WWMP	Wastewater Master Plan

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1 Introduction

The San Diego Integrated Regional Water Management (IRWM) Region extends east from the Pacific Ocean, through one of the most populous areas in the nation, to the ridgeline of a forested mountain range.

The San Diego IRWM Region includes eleven parallel watersheds.

San Diego is an immensely complex border region consisting of 11 watersheds that jointly provide water sufficient to meet only about 15% of the region's current water demands. The region's diverse habitats range from coastal to mountainous, and support more threatened and endangered species than any comparable land area in the nation (County of San Diego, 2009). Most of the 3.1 million people within the region inhabit the urbanized coastal areas, and the population of these areas is expected to increase by 30% percent by 2035, to over 4.0 million, according to the San Diego Association of Governments (SANDAG) forecast (SANDAG, 2010). The 2013 IRWM Plan presents an overarching assessment of the San Diego region's water supply, water quality and ecosystem challenges and provides recommendations for sustainable answers.

Seeking and implementing integrated water management solutions is not new to the San Diego region. With average precipitation levels of only 10 inches per year at the coast, collaboration has been instrumental to overcoming the challenges of water scarcity. For example, the federal government assisted local agencies with water management issues in 1908 with the formation of the Cleveland National Forest in order to protect source water supplies. With the formation of the San Diego County Water Authority (Water Authority) in 1944, the diverse communities of the San Diego region formally banded together to build the aqueducts needed to import freshwater supplies. Similarly, the region has worked together over the past 13 years through the Water Authority in the construction of a series of reservoirs, pipelines, treatment plants and pump stations that, when complete, will allow the Water Authority to deliver locally stored water to the region's residents in the event of a water supply outage. In 1998, the Metropolitan Wastewater Joint Powers Authority (Metro JPA) was formed to ensure stakeholder collaboration with regard to San Diego's ocean discharge at Point Loma. In 2000, Project Clean Water was launched to coordinate on water quality issues of regional significance.

A look into the future of integrated water management in San Diego suggests that new levels of collaboration are forthcoming. For example:

- The San Diego region is a leader in the development of potable reuse as a water supply. How will water and wastewater agencies collaborate to ensure effective partnering?

- New stormwater runoff regulations align well with water conservation best management practices for large landscapes. How might stormwater and water agencies work together to efficiently partner on conservation programs?
- Many surface waters face water quality impairment from non-point source pollution, bacteria, sediment, nutrients, salinity, metals, and toxic organic compounds. How can water agencies, stormwater agencies, land-use authorities, regulators and others join forces to effect real water quality improvements?
- The Region encompasses urban and rural disadvantaged communities (DACs) with water management issues in need of being addressed. How can DACs most effectively participate in water management projects benefitting their communities?
- The Region includes 18 federally recognized tribes, each with water management challenges. How can tribal water management issues be effectively integrated into San Diego's regional water management planning?

These are but a few of the questions that the San Diego region must begin to answer. Inherent in these opportunities are the cost drivers associated with water supply diversification, wastewater treatment, regulatory compliance, and maintenance of existing infrastructure. Integration is not an end-game, but rather an iterative process.

Responsibilities for managing water resources span a multitude of agencies and entities. Natural water demarcations such as river systems do not correspond to political jurisdictions and each of the Region's watersheds span multiple cities and agencies. This creates jurisdictional complexity for water management. Although water purveyors are integrated in their plans, those that are member agencies of the Water Authority are just one stakeholder group in water. IRWM offers a forum to bring together the diversity of stakeholders into a collaborative approach to water management with reduced overall costs and improved effectiveness and efficiency. The IRWM model, while still evolving, offers the San Diego Region an enhanced approach for sustainable water management.

1.1 IRWM Planning

IRWM planning is a relatively new California initiative, aimed at developing long-term water supply reliability, improving water quality, and protecting natural resources. In 2002, the Integrated Regional Water Management (IRWM) Planning Act (SB 1672) was chaptered into State law, establishing the basis of California's IRWM Program. The Statewide IRWM Program is supported by Proposition 50 (2002) and Proposition 84 (2006), both of which provided bond funding to the California Department of Water Resources (DWR) to fund competitive grants for projects that improve water resources integration and management.

The San Diego IRWM Program began in 2005, and since then has achieved substantial success. San Diego published its first IRWM Plan in 2007 and has received over $34 million to date through voter-approved bond funding. IRWM Plans are regional plans designed to improve collaboration in water resources management and comprehensively address all aspects of water management and planning throughout an IRWM Region. IRWM Plans cross jurisdictional, watershed, and political boundaries; involve multiple agencies, stakeholders, individuals, and groups; and attempt to address the issues and differing perspectives of all the entities involved through mutually beneficial solutions.

This 2013 IRWM Plan – prepared by the San Diego Regional Water Management Group (RWMG) which consists of the San Diego County Water Authority (Water Authority), the City of San Diego (City), and the County of San Diego (County) – is a comprehensive update of the 2007 IRWM Plan.

Unique and innovative features of this 2013 IRWM Plan include the five planning studies developed to address identified water planning needs in the San Diego IRWM Region. The five planning studies were developed by a technical team in conjunction with IRWM stakeholders (see further detail in *Chapter 7, Regional Coordination*) and focused on:

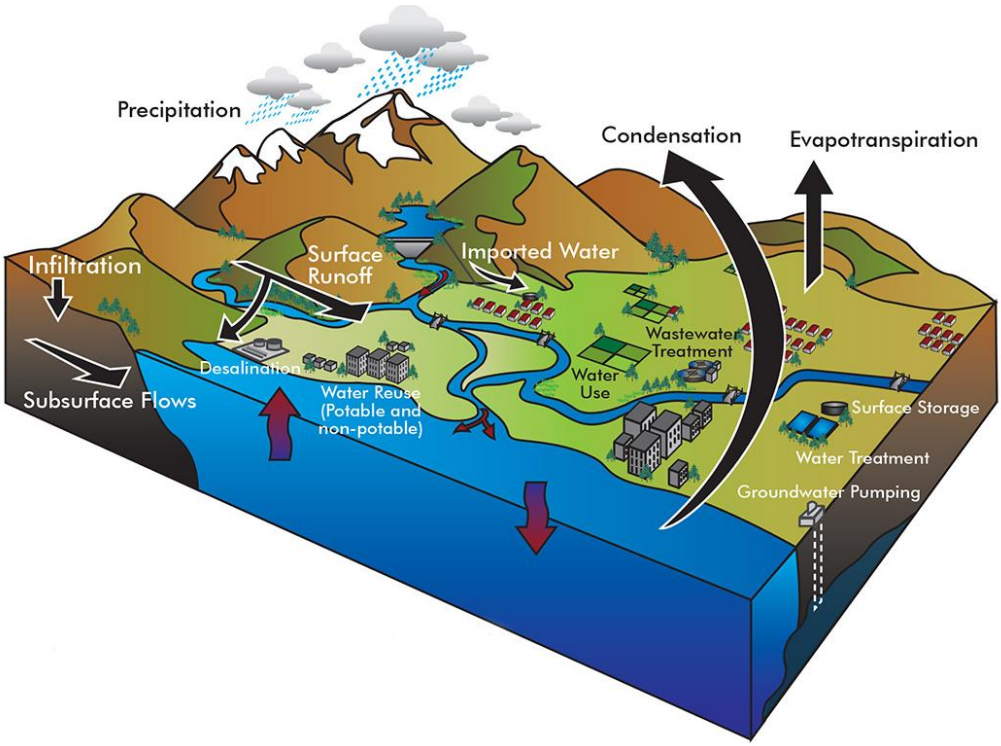
- improving collaboration between IRWM stakeholders and the Regional Water Quality Control Board (Regional Board),
- developing salinity and nutrient management guidelines and individual basin plans,
- recommending integrated flood management tools that may be utilized by water managers,
- incorporating climate change factors into IRWM planning, and
- examining how land use planning and water resources management can be better integrated.

This 2013 IRWM Plan involved five separate planning studies and associated stakeholder workgroups.

Although not required by the IRWM Planning Act, local stakeholders emphasized the need to explore how to improve working relationships between IRWM stakeholders and the Regional Board. The Regulatory Workgroup Report in Appendix 7-A attempts to facilitate better water management in the Region by documenting common ground between the regulators and the regulated community. By working together toward common goals, such as focusing together on science-based 303(d) listings, will allow broader support for compliance activities. As discussed in *Chapter 11, Implementation*, all of the recommendations of the Regulatory Report have implementation commitments from regional stakeholders.

1.1.1 The "I" in IRWM

The "I" in IRWM stands for integration, which is defined as combining or acting in harmony with the whole. The IRWM Program incentivizes agencies and organizations to integrate their water management activities within the "modern" hydrologic cycle – from managing different water sources to protecting water quality to restoring water-related habitat. This "modern" hydrologic cycle incorporates several human influences such as imported water, wastewater treatment and discharge, groundwater pumping, water reuse, and desalination. These human influences change the natural flow of water within the hydrologic cycle and must be managed to ensure that negative impacts don't result. IRWM planning seeks to integrate decision-making by the different water managers so that their management activities work together in a mutually supportive manner.



The "modern" hydrologic cycle includes precipitation, infiltration, surface and subsurface flows, as well as water importation, treatment, storage and reuse.

1.2 Plan Overview

The 2013 IRWM Plan incorporates stakeholder input, updated planning documents, planning studies completed since the 2007 IRWM Plan, and lessons learned through the IRWM Program to identify and address the water management needs of the Region. This update reflects the achievements of the IRWM Program by shifting the focus of the IRWM Plan where necessary, and utilizes the increased knowledge of the Region acquired through IRWM studies, projects, and other efforts to improve water resources management. The 2013 IRWM Plan reflects the priorities and needs identified by stakeholders through the stakeholder involvement process, and moves the Region's water resources management planning forward to address additional concerns such as climate change and integrated flood management. The IRWM Program in the San Diego Region is now well-established and its processes and procedures are formalized in this 2013 IRWM Plan to reflect the evolution of the IRWM Program.

1.2.1 Purpose of Plan

The 2013 IRWM Plan presents an integrated approach for addressing water management issues within the Region. Through a process that identifies and involves water management stakeholders throughout the Region, the 2013 IRWM Plan:

- presents the San Diego IRWM Program's vision and goals
- establishes water management objectives and measurable targets
- identifies water management challenges and issues
- identifies and evaluates applicable water management strategies

- assesses the ability of the water management strategies to meet the regional objectives
- identifies opportunities for integrating the regional water system, starting by integrating regional water supply, water quality, and watershed management strategies
- establishes a system for prioritizing the strategies
- presents a plan for implementing the water management strategies
- identifies the framework for overall integrated regional water management planning in the Region, including future updating of water management strategies and plan priorities

1.2.2 Plan Organization

This IRWM Plan is organized into four major sections providing in-depth background information about the San Diego region and the identified strategies for moving integrated water management forward. Figure 1-1 illustrates the 2013 IRWM Plan structure.

Figure 1-1: Plan Organization

1.2.3 Benefits of Regional Approach

The IRWM planning process provides a mechanism for stakeholders to work together to identify and address the challenges that potentially exist among multiple planning efforts. The IRWM planning process also provides a means to develop and update water management objectives to address the Region's water resources management challenges, overcome potential water management constraints, and identify water management projects and programs for grant funding that help attain the Plan objectives. The 2013 IRWM Plan is a result of this process, and reflects changes to the Region's water resources management challenges and needs, as indicated by stakeholders.

1.2.4 Existing Planning Environment

Groundwater, inland surface waters, and coastal waters within the Region support a wide variety of water supply needs, recreational uses, and important ecosystems and habitats. Like many urbanized areas in California and throughout the nation, the Region faces challenges in ensuring the long-term sustainability of its water supply, water quality, and watershed resources.

The Water Authority and almost all of its 24 member agencies prepare *Urban Water Management Plans* (UWMPs) every five years to articulate and balance water supplies and demands throughout their respective service areas. These UWMPs provide a summary of water use, wastewater volumes and recycled water opportunities for each of the urban water suppliers. Water and wastewater agencies also prepare a variety of other water-related planning documents as needed to manage

their assets, including reservoir management plans, groundwater management plans, wastewater master plans, and recycled water master plans.

The Regional Water Quality Control Board, San Diego Region (Regional Board) is responsible for regulating activities that affect the quality of Region's groundwater and surface water resources. The Regional Board adopted the current version of the *Water Quality Control Plan for the San Diego Basin* (Basin Plan) in 1994, and has amended this plan periodically; most recent amendments to the Basin Plan took place in 2011. The Regional Board also implements the *Water Quality Control Plan for Ocean Waters* and the *Water Quality Control Plan for Enclosed Bays and Estuaries Plan*, which establish water quality standards for marine waters and enclosed bays and estuaries, respectively (State Water Resources Control Board; 2009, 2009).

DWR is responsible for preparing multiple statewide planning documents, one of which is the *California Water Plan*, which was most recently updated in 2009. The *California Water Plan Update 2009* identifies water management challenges within the state and provides a framework for meeting the challenges. The specific Resource Management Strategies (RMS) included within the *California Water Plan Update 2009* are the basis for the RMS described in the 2013 IRWM Plan (refer to *Chapter 8, Resource Management Strategies*).

In the San Diego IRWM Region, a number of different entities are responsible for distinct areas of water management. The Region includes 21 stormwater management entities, all of which participate in the Municipal Separate Storm Sewer System (MS4) permit program to reduce and manage non-point source pollution within their respective jurisdictions. The Region's flood control agencies develop flood control plans for areas of high flood risk. Governmental agencies and non-governmental organizations (NGOs) within the Region also develop local watershed management plans to help conserve and protect watershed resources and habitats. Finally, some jurisdictions also participate in development of habitat protection and Multiple Species Conservation Program (MSCP) plans to ensure protection of sensitive natural resources.

The 2013 IRWM Plan is an umbrella document that encompasses the above local plans, but addresses water management issues on a Regional level. This Plan incorporates water resources management findings and recommendations from many of the Region's major water-related planning efforts. Implementing this Plan, however, will require additional effort to address short-term priorities and to incorporate water resources management planning from all of the Region's pertinent watershed, recreation, habitat protection, flood control, land use, and conservation plans.

1.2.5 Future of IRWM

In addition to establishing short-term priorities and facilitating the pursuit of outside funding, the 2007 IRWM Plan represented the first step in a long-term planning process. As this long-term process unfolds, stakeholder groups have been expanded, governance structures refined, coordination with watershed groups enhanced, new emerging issues identified, and new priorities established. The 2013 IRWM Plan reflects these changes, refines the IRWM process, and builds on the success of the original 2007 IRWM Plan.

The San Diego IRWM Plan is a living document; the 2013 Plan marks the second generation of IRWM planning in the Region, and it is envisioned that the IRWM Plan will continue to evolve over time in response to the changing needs of the Region. Through this stakeholder-driven, cooperative process of integrated regional water management, the San Diego Region has established itself as a leader in active water management planning.

1.2.6 Region Boundaries

Figure 1-2 (following page) presents San Diego IRWM Region. This Region is entirely within the jurisdiction of the Regional Board, and includes all portions of the County that are tributary to coastal waters. The San Diego IRWM Region was approved by DWR through the 2009 Region Acceptance Process (DWR 2009).

1.3 Regional Water Management Group

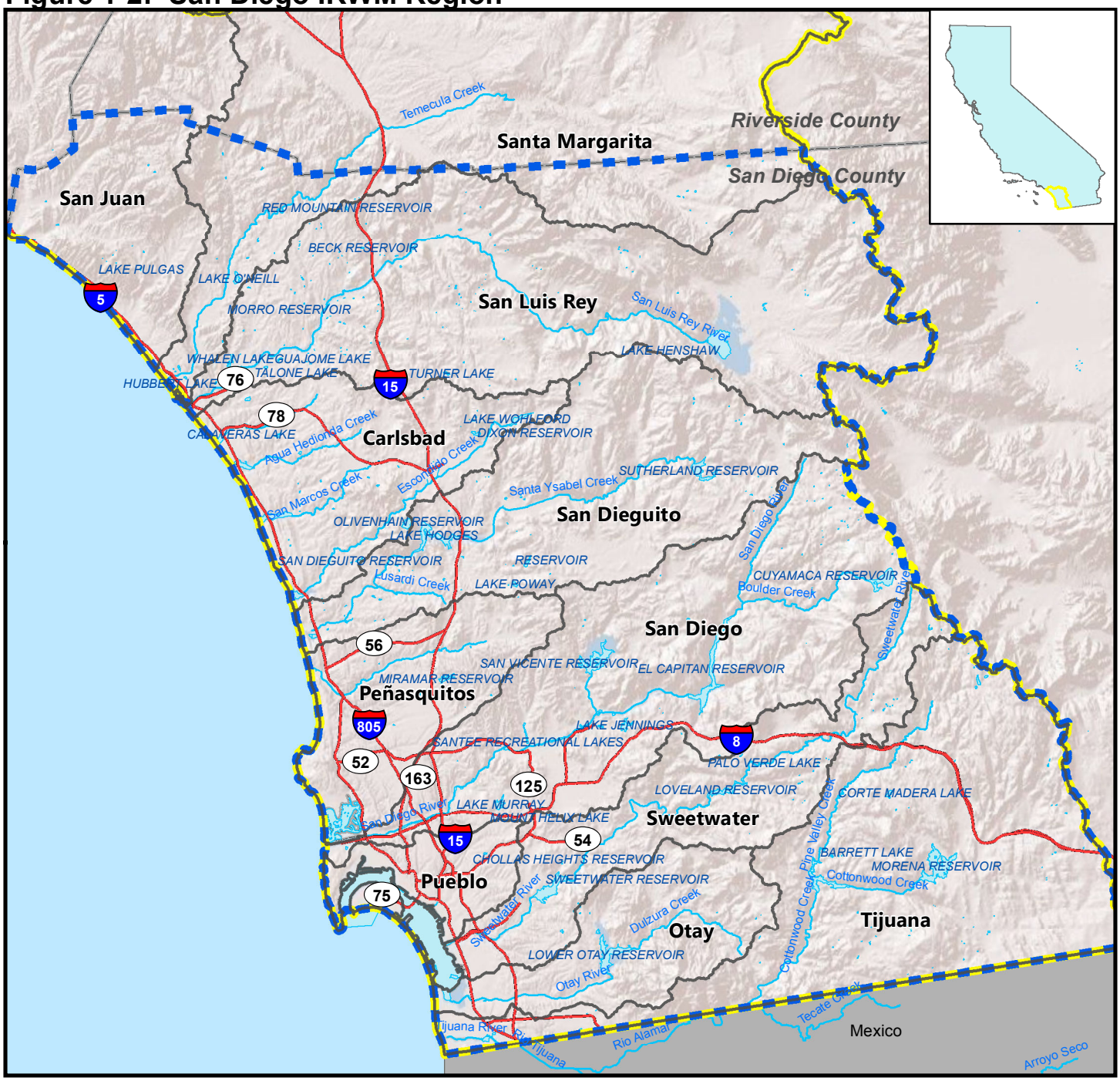
The San Diego Regional Water Management Group was formed in 2005 in accordance with provisions of the California Water Code (§79570 et seq.) to manage development and implementation of the IRWM Plan, and to manage the San Diego IRWM Program. The RWMG consists of:

- the San Diego County Water Authority (Water Authority)
- the City of San Diego (City)
- the County of San Diego (County)

In accordance with terms set forth in a Memorandum of Understanding (refer to Appendix 6-A), the three RWMG agencies are equal partners in the development of the 2013 IRWM Plan. The three agencies also equally share in the costs to develop the plan and conduct other IRWM planning activities, such as stakeholder outreach. The RWMG recognizes that cooperation and input from stakeholders throughout the Region is critical to a successful IRWM Program. As a result, the RWMG has assumed a lead role in engaging stakeholders and soliciting stakeholder input for 2013 IRWM Plan development and implementation.

Figure 1-3 shows the jurisdictional boundaries of the three RWMG agencies. The combined jurisdiction of the three agencies encompasses the entire Region; the water supply service areas of the Water Authority and the City cover all urbanized portions of the Region. Table 1-1 summarizes water management responsibilities of the three RWMG agencies. Collectively, the three RWMG agencies have key involvement in water supply, wastewater treatment, watershed management, land use, and recreational aspects of water management within the Region.

Figure 1-2: San Diego IRWM Region



Legend

- San Diego IRWM Region
- Funding Area Boundary
- Watershed
- Waterbody
- Mexico
- River
- Freeway

N

0 2.5 5 10
Miles

RMC

Source: San Diego Association of Governments (SANDAG) - GIS Data Warehouse
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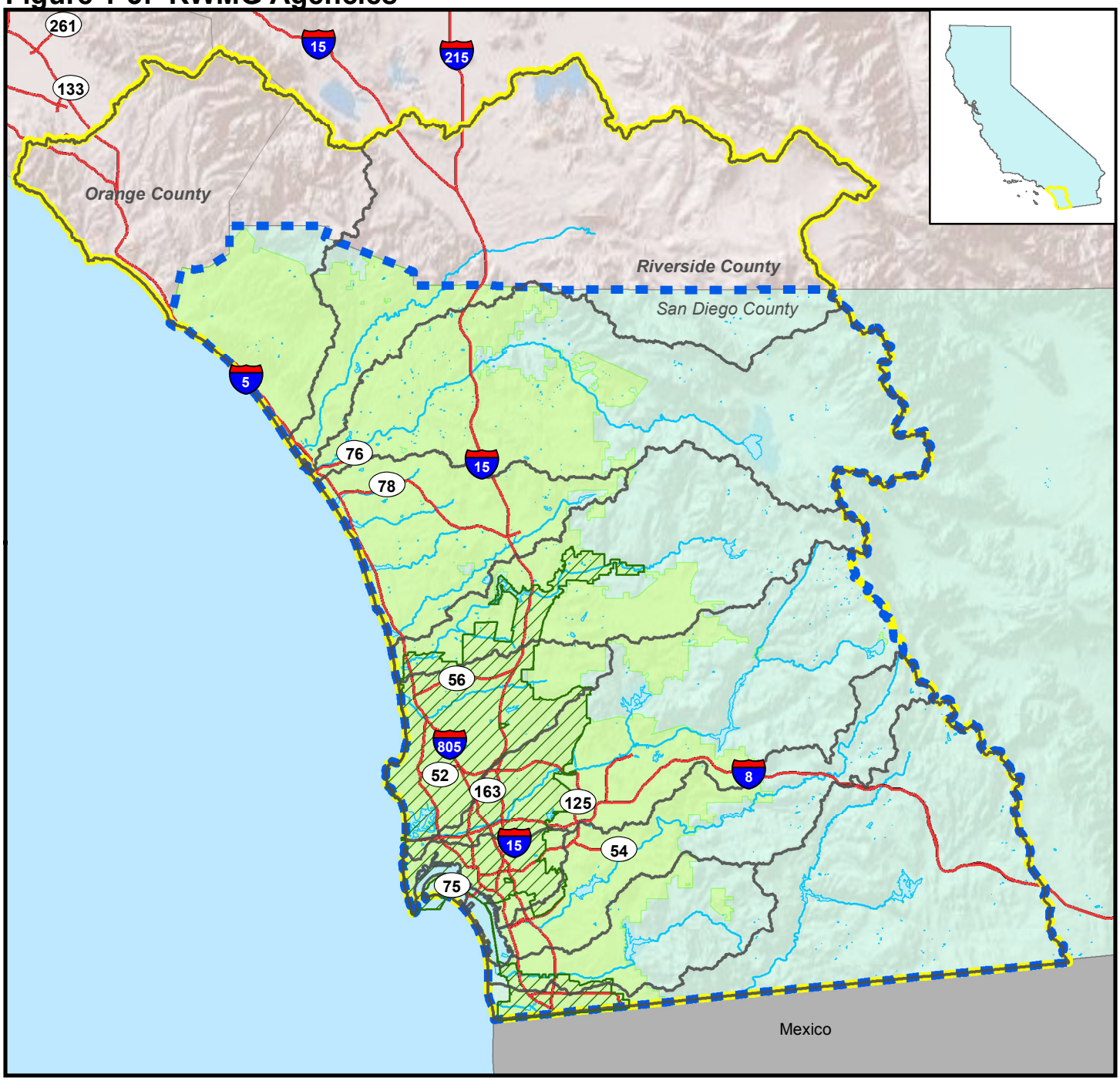
Figure 1-3: RWMG Agencies



Legend

- San Diego County Water Authority
- County of San Diego
- City of San Diego
- San Diego IRWM Region
- Watershed
- Funding Area Boundary
- Ocean
- Freeway
- Mexico

N

0 2.5 5 10
Miles

RMC

Sources: San Diego Association of Governments (SANDAG) - GIS Data Warehouse, Esri, USGS, NOAA
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Table 1-1: Summary of Water Management Responsibilities for Regional Water Management Group

Water Management Category	San Diego County Water Authority	City of San Diego	County of San Diego
Imported Water Delivery	●		
Water Supply Infrastructure	●	●	●
Water Supply Planning	●	●	○
Storing Raw Imported Water	●	●	
Capturing and Storing Local Runoff	○	●	○
Groundwater Supply	○	●	●
Wastewater Treatment		●	●
Recycled Water Supply	○	●	
Water and Recycled Water Regulation	○	○	●
Public Health Regulation			●
Municipal Stormwater NPDES Management		●	●
Flood Management and Control		●	●
Watershed Protection	○	●	●
Land Use Control and Management		●	●
Natural Community Conservation Planning	●	●	●
Parks and Recreation		●	●

● Direct water management involvement
○ Provides planning support

The RWMG led the development of this 2013 IRWM Plan by providing staffing and consultant services towards the years-long effort. Each of the agencies serve multiple water management roles within the Region and are involved in a number of region-wide water management coordination efforts. As documented in *Chapter 3, Region Description*, depending on regional hydrologic conditions, approximately 80% of the Region's water supply is provided through the Water Authority. The City of San Diego is the Region's largest retail water agency, and is involved in water management within six of the Region's eleven watersheds. The County is involved in watershed planning efforts in all but one of the Region's watersheds (San Juan). The City and County together provide wastewater service to a sizable portion of population within the Region. Additionally, the City and County are the largest copermittees in the regional urban runoff management program (stormwater program). The City and County are also responsible for land use planning and regulation within the majority of the Region.

1.3.1 San Diego County Water Authority

The Water Authority is the regional water wholesale agency within the County. The Water Authority's mission is to provide a safe and reliable supply of water to its 24 member agencies. The Water Authority's member agencies serve a combined population of 3.1 million (97% of the County's population) and support an annual regional economy of over $188 billion.

The Water Authority's boundaries comprise the western third of San Diego County with a total area of 1,468 square miles. The urbanized parts of the Region are entirely within the Water Authority's service area. Water Authority member agencies include six cities, five water districts, eight municipal water districts, three irrigation districts, a public utility district, and the U.S. Marine Corps Base Camp Pendleton. The City of San Diego is the Water Authority's largest member agency in terms of land area, population, and water purchases. It is also the largest member agency in terms of representation, with 10 members on the 35-member Water Authority Board of Directors. The County appoints a non-voting representative to the Water Authority Board.

The Water Authority is a member agency of the Metropolitan Water District of Southern California (Metropolitan) and is the largest Metropolitan customer in terms of water purchases. The Water Authority also purchases conserved agricultural supplies through a water transfer agreement with the Imperial Irrigation District. Additionally, the Water Authority has been assigned rights to water conserved by lining the All-American Canal and Coachella Canal in Imperial County. In addition, the Water Authority will purchase water from the Carlsbad Desalination plant when construction is completed. The Water Authority conveys water supplies to its member agencies via five parallel pipelines that comprise the First Aqueduct and Second Aqueduct. The Water Authority delivers both treated and untreated supplies to its member agencies through 88 service connections.

In coordination with its member agencies, the Water Authority has implemented an Emergency Storage Program that enhances the Region's reservoir capacity and improves conveyance facilities. While the Emergency Storage Program is designed to make the regional water supply more reliable during an emergency that disrupts normal imported water deliveries, the new facilities will improve the Region's water system flexibility and reliability at all times.

As part of water supply diversity plans set forth in the Water Authority's *2010 Urban Water Management Plan*, the Water Authority is active in coordinating with its 24 member agencies to plan and pursue water conservation, recycled water use, development of local groundwater supplies, surface water storage and supplies, water transfers, seawater and groundwater desalination, and water quality protection projects.

1.3.2 City of San Diego

The City of San Diego exercises a range of water supply, wastewater, recycled water, storm water, recreation, and watershed management responsibilities, and administers a number of programs that provide opportunities to pursue integrated approaches with other agencies and jurisdictions.

The City of San Diego Public Utilities Department operates an extensive water system that currently provides drinking water to 1.3 million customers located within the cities of San Diego, Del Mar, Coronado, and portions of National City, Chula Vista, and Imperial Beach. In addition to providing

drinking water to approximately half of the population of San Diego County, the City of San Diego Public Utilities Department also delivers untreated water to three adjacent agencies. On an annual basis, the City treats and delivers approximately 200,000 acre-feet of water to residential, commercial, industrial, and agricultural customers within a 340-square-mile service area. The City's water system includes nine water storage reservoirs, three water treatment facilities, 31 treated water storage facilities, and 3,213 miles of transmission and distribution pipelines (City of San Diego, 2010).

The City of San Diego Public Utilities Department also operates an extensive wastewater collection and treatment system that includes approximately 2,900 miles of sewer line servicing a 330-square mile area. The City Public Utilities Department is the operating agency for the San Diego Metropolitan Wastewater System (Metro System). The Metro System provides wastewater services to 2.2 million residents of the City of San Diego and 15 other cities and districts (called Participating Agencies) within a 450-square mile service area, and treats approximately 180 million-gallons per day of wastewater (City of San Diego, 2011). Approximately three-quarters of the County's population discharge their wastewater to the Metro System.

The City has been a pioneer in the field of water recycling. Two reclamation facilities with a combined treatment capacity of 45 million gallons per day of non-potable recycled water are in operation. Additionally, the City is actively exploring the feasibility of potable reuse as an alternative water supply. A one million gallon per day water purification demonstration project has been in operation since the summer of 2011. Tests for 342 constituents and parameters over a one-year period showed the purified water met all regulatory limits and had concentrations similar to distilled water. For more information about the City's water purification demonstration project, see www.purwatersd.org.

The City of San Diego maintains storm drain structures, pipelines, and channels within the city. The City is one of the 21 copermittees regulated by Regional Board under the 2013 Municipal Separate Storm Sewer System (MS4) Permit (Order No. R9-2013-0001 [NPDES No. CAS0109266]). The Storm Water Division in the Transportation & Storm Water Department leads the City's efforts to protect and improve the water quality of rivers, creeks, bays and estuaries, and the ocean. The Division's efforts are conducted to ensure compliance with the MS4 Permit and other surface water quality regulations issued by the State of California. The Division's priorities are to identify sources of pollution and abate them through the implementation of innovative and efficient public education, watershed management, storm water development regulations, enforcement, and citywide training programs, and to provide the most efficient storm drain system operation and maintenance services to San Diego's residents. This includes the popular "Think Blue" (www.sandiego.gov/thinkblue) educational program implemented in coordination with other organizations.

The City of San Diego Planning Department regulates land use and flood control within the metropolitan boundaries and is responsible for coordinating with other regional agencies in implementing the MSCP Plan.

1.3.3 County of San Diego

The County maintains a number of water and watershed-related program responsibilities within unincorporated portions of the Region. These responsibilities include: water supply (outside Water Authority service area), wastewater treatment, land use and planning, public health, parks and recreation, flood management and control, stormwater and water quality management, ecosystem and habitat protection, and watershed planning.

The Department of Planning and Development Services is responsible for developing the County's General Plan. The Department of Planning and Development Services also manages the MSCP South County Subarea Plan, the North County MSCP Plan, and the East County MSCP Plan. Additionally, the department manages the County's Agricultural Conservation Easement Program, maintains the groundwater and landscape ordinances, and manages environmental mitigation banks.

The County Department of Public Works provides limited wastewater and drinking water services to unincorporated communities outside the imported water distribution service area. The Department of Public Works also provides the following services for the unincorporated portion of the County:

- stormwater conveyance service and maintenance
- residential recycling and composting programs
- erosion control and flood management services
- stormwater and watershed planning and protection programs and services

The County Department of Environmental Health has regulatory authority for the beach recreational water use, site assessment and mitigation, on-site wastewater (septic) systems, recycled water use, small water systems and monitoring wells. The Department of Planning and Development Services has discretionary project approval authorities.

The County uses an inter-departmental approach for addressing county-wide issues such as habitat protection, watershed protection, and water quality improvement. The County implements its own stormwater program in unincorporated areas providing public education, employee training, water quality monitoring, source identification, code enforcement, watershed management, TMDL implementation and the development and implementation of Best Management Practices. Historically the County has acted as Principal Permittee for the MS4 Permit that regulates MS4 discharges from the County of San Diego and 20 other Copermittees, which includes the 18 municipalities of the County, the San Diego Unified Port District, and the San Diego County Regional Airport Authority. The County will continue in this role during the two-year transition period under the recently adopted 2013 MS4 Permit. Following this transition period the MS4 permit moves to a distributive watershed model in which the County will be the lead permittee for the San Luis Rey and San Diego River Watersheds and a participant in the other watersheds.

Starting in 2000, the County developed and supported Project Clean Water, a broad-based forum for developing stakeholder-driven solutions to pressing water quality problems throughout the Region. Through Project Clean Water's website (www.projectcleanwater.org) and stakeholder groups, the County assumed the primary responsibility for coordinating stakeholder input into the development of the 2007 IRWM Plan and the associated list of regional implementation projects.

The Project Clean Water stakeholder process continues today in the form of the IRWM Program while the website continues as a water quality resource of the Region.

1.4 IRWM Program History and Accomplishments

The San Diego IRWM Program was initiated in 2005, and since then has achieved multiple successes. The Program continues to evolve with respect to increasing stakeholder diversity and input, changing conditions, and adapting to meet regional needs. The following is a brief timeline and outline major accomplishments that the Program has achieved during its 8-year tenure.

- **2005:** The City of San Diego, County of San Diego, and San Diego County Water Authority, who collectively comprise the RWMG, completed a **Memorandum of Understanding (MOU)** that formalized their commitment to fund, guide, and manage development and implementation of the IRWM Program.
- **2006:** Establishment of the **Regional Advisory Committee** (RAC), a collection of professionals who represent diverse groups and points of view with a stake in water management in the region. The RAC has met regularly since its inception and is responsible for providing input and feedback to the RWMG with regards to regional planning and funding activities.

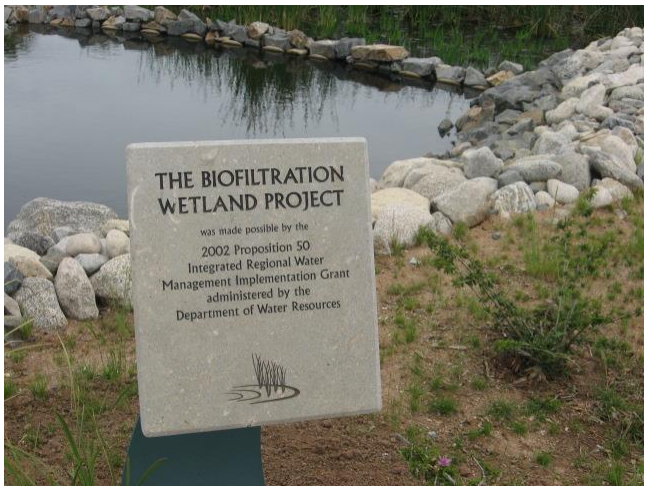
> **"The San Diego IRWM Program has taken the initial steps of bringing together organizations and individuals from diverse backgrounds, interests, and perspectives to work toward achieving a shared vision needed to guide the protection, management, and use of the region's water resources for the mutual benefit of people, wildlife, and habitats."**
>
> **-Kirk Ammerman, RAC Member Representing City of Chula Vista and Water Quality Caucus, 2006-2013**

- **2007:** Wrote and adopted the **2007 San Diego IRWM Plan**. The 2007 IRWM Plan laid the groundwork for enhanced collaborative, multi-benefit water resource projects by facilitating cooperation between public agencies and non-profit organizations.
- **2008:** DWR awarded the San Diego IRWM Region **$25 million** to support 19 high-priority local projects under Proposition 50.
- **2009:** The Region completed DWR's **Region Acceptance Process** and received formal approval of the Region's boundary.
- **2009:** The San Diego RWMG and management groups from the neighboring IRWM Regions (Upper Santa Margarita and South Orange County) formed the Tri-County Funding Area Coordinating Committee (FACC) as a collaborative inter-regional body. With this, the San Diego Funding Area became the **first and only** funding area in the State to formalize grant funding agreements to allocate IRWM funding (Proposition 84 funding) between IRWM regions.
- **2010:** DWR awarded the San Diego IRWM region a **$1 million grant award** for planning activities associated with conducting stakeholder outreach, completing planning studies, and preparing the 2013 IRWM Plan.
- **2011:** DWR awarded the San Diego IRWM region **$8 million** to implement 11 high-priority local projects under Proposition 84-Round 1.
- **2012:** Kicked off planning efforts to update the 2007 IRWM Plan. Initial outreach efforts included an **IRWM Summit** to raise awareness among the public and stakeholders about development of the 2013 IRWM Plan.

- **2013:** Submitted a **$10.3 million** implementation grant application to implement 7 high-priority local projects with potential grant funding support from Proposition 84-Round 2.
- **2013:** Completed and adopted the **2013 IRWM Plan**.

1.5 Addressing the Region's Water Management Challenges

Numerous water management plans have been developed by individual or multiple agencies or groups within the Region to address water supply, water quality, stormwater and flood, ecosystem and habitat protection and enhancement, watershed protection, conservation, recreation, and land use controls (see *Chapter 7, Regional Coordination* for a description of these plans). Each local plan addresses portions of the Region, but many of the plans overlap in geography, scope, or agency jurisdiction, which can contribute to regional water management conflicts and challenges.



Biofiltration Wetland Project at the San Diego Zoo Safari Park, funded through Proposition 50

Photo Credit: Crystal Mohr, RMC Water and Environment

Table 1-2 summarizes several key challenges or constraints that the Region faces in addressing water management issues. Table 1-2 also identifies how the IRWM Plan can assist in solving those challenges. The list of key challenges or constraints was developed by the RWMG and affirmed by the RAC and stakeholders at a public workshop held on June 5, 2013. Given the importance of the challenges presented in Table 1-2, the Region will strive to implement projects to address these issues. Information about the Region's project prioritization and selection process can be found in *Chapter 9, Project Evaluation and Prioritization.*

As shown in Table 1-2, the IRWM Plan provides a process to address and resolve conflicts through a collaborative regional effort. Additionally, the IRWM Plan may prove useful in identifying, coordinating, and addressing environmental and regulatory issues on a regional basis.

In addition to resolving existing water management conflicts and prioritizing and focusing regional water management efforts, the IRWM Plan may help make water management projects and programs in the Region eligible for future state and federal funding. An approved IRWM Plan is necessary for eligibility to apply for State of California Proposition 84 funding that is administered by DWR. Further, it is likely that other forms of future state and federal funding will be tied into the IRWM Plan process.

Table 1-2: Current Challenges to Water Management within the Region and How the IRWM Plan Can Help Resolve the Challenges

Challenges and Conflicts in Water Management	How the IRWM Program Can Address Challenges
1. Regulatory Process/Administration: Regulatory constraints or disconnects – namely as they relate to the administration of regulations – can cause water management conflicts. This is particularly true for implementation of unfunded mandates, instances where there are conflicting priorities between entities, permitting or implementation of new/cutting-edge technology (such as water reuse), and inconsistent regulatory requirements. Specifically, current regulations may be infeasible to implement from a cost and technology perspective, and implementation requirements may not yield desired benefits, or may create unintended consequences.	The IRWM Program provides a unified regional approach for identifying and assessing regulatory compliance issues. Implementation of the recommended action items will represent first steps in improving coordination between regulators and water managers. Because IRWM funding can be leveraged to increase scientific knowledge and fill data gaps, the Program can potentially provide the data and information necessary to address regulatory compliance issues.
2. Water Quality Objectives and Beneficial Uses: There is widespread concern that beneficial uses are not properly defined. This may result in unnecessarily strict or unrepresentative water quality standards for surface waters. Such restrictions impact the Region's ability to effectively and affordably manage water, including imported and reuse supplies. There is concern that because beneficial uses are not prioritized, management is not realistic as every use is considered equally.	The IRWM Program provides a forum for collaboration between water managers, the regulatory agencies which establish water quality standards, and other stakeholders, including potentially redefining beneficial uses. The IRWM Program provides a forum through which regulated entities, non-governmental organizations, and others can collaborate on potential win-win solutions to current issues associated with water quality objectives and beneficial uses.
3. Integrated Planning: There are numerous entities involved in water management in the Region, including water agencies, non-governmental organizations, and other entities. Due to the number of entities in the Region, there are also conflicts with beneficial uses as different entities may not agree on which beneficial uses are most important from a water management point of view. Conflicts between jurisdictional and interested parties as well as beneficial uses are unavoidable, and demonstrate a need to integrate planning efforts in order to increase the ability to move forward in addressing water management issues. Although communication between water managers and land use jurisdictions has improved, ongoing disconnects may result in water quality, flooding, natural resources, and other water-related issues.	The IRWM Program provides a forum to bring different entities together to potentially resolve or avoid conflicts resulting from overlapping jurisdiction. It is also possible that the IRWM Program can help eliminate duplicative efforts by increasing cross-pollination of water management efforts in the Region. The IRWM Program can also bring together water managers from different disciplines, and therefore can help resolve management disputes regarding various beneficial uses. One example of this is how the IRWM Program helps to bring together water managers from different water sectors such as water supply and wastewater managers for efforts associated with potable reuse. In addition, the IRWM Program provides a regional forum for water managers to engage the land use community. Implementation of the recommended action items will represent first steps in improving coordination between land use planners and water managers.
4. Stakeholder Involvement: Stakeholder involvement in the IRWM Program is a concern, particularly given the complex nature of the program and the number of entities involved. There is particular concern that due to the number of entities, all entities may not be involved in a meaningful way. There have been identified barriers for participation of various entities, particularly those that may not participate due to funding or regulatory restrictions (e.g. non-governmental organizations, tribal entities, and DACs).	The IRWM Program's outreach efforts have attempted to resolve participation barriers to the maximum extent feasible. Specific efforts have been made to create solutions that will resolve participation barriers, such as partnering non-governmental organizations with tribal governments and DACs for grant-funded projects to resolve grant contracting and implementation issues. In addition, the IRWM Program has commented to DWR on behalf of stakeholders in an attempt to resolve regulatory and programmatic complexities that may bar or discourage certain entities from participating in the Program.
5. Public Awareness and Education: Regional awareness of water management issues is a concern, particularly given that the public and elected officials may be less inclined to support water management financing (e.g., bond or fee programs) if they are unaware of the need for these efforts. Public awareness and expectations of the IRWM Program need to be managed, especially as the State faces uncertainties regarding future water bond funding.	The IRWM Program allows for greater public understanding and acceptance of water management issues and the potential solutions (projects) to address those issues through extensive outreach and education efforts. The IRWM Program conducts outreach and education efforts in an attempt to educate the public on the potential future of the program.

Challenges and Conflicts in Water Management	How the IRWM Program Can Address Challenges
6. Funding: Given the limited amount of funding available through DWR's IRWM Grant Program and the increasing amount of resource limitations for public agencies, there is a need for affordable solutions to manage water and address water-related issues. In addition, limited funding makes prioritization of water management needs imperative. Given the uncertainty of DWR's future IRWM Grant Program, which is based on voter-approved water bonds, there is a need to determine how the Region will augment future IRWM planning efforts.	The IRWM Program brings entities together to prioritize projects for IRWM Program funding. The Region's project prioritization process specifically takes long-term, triple bottom line cost-effectiveness into consideration when evaluating projects and the online project database that has been developed for the IRWM Program can also increase cost-effectiveness by allowing stakeholders to learn about similar projects, and potentially collaborate or coordinate efforts with other entities to reduce duplicative or redundant projects. The Regional Water Quality Control Board has also experienced interest in working with the San Diego IRWM Program and potentially using the online project database to prioritize supplemental environmental projects (SEPs). In addition, the IRWM Program keeps track of other (non-IRWM) grant opportunities that are available, and announces those opportunities to stakeholders during regular meetings and email announcements.
7. IRWM Grant Administration: To-date there have been substantial concerns with IRWM grant funding delays by the State, as these delays affect the ability for the Region's local project sponsors to effectively implement projects and programs to manage water resources. Given the uncertainty of the IRWM Program's future, it is uncertain at this time if the Program will continue on its current path – that focuses on grant funding efforts – or become a larger, regional planning effort.	The IRWM Program is continuing to attempt to resolve grant funding issues through communications with DWR, meeting in Sacramento to discuss Region's needs, participation in DWR forums and workshops, and providing feedback to DWR. The IRWM Program has not created a long-term plan for governance or a programmatic structure in the absence of a MOU between the RWMG agencies or State grant funding.
8. Affordability: The Region is pressed to find solutions that meet regulatory, outreach, IRWM Program, and other needs, while maintaining affordability for the Region's residents. Affordability is an issue that is considered to span across all other issues listed in this table as it pertains to all aspects of the IRWM Program and of regional water management.	IRWM grant funding can be used to offset project-related costs in the Region. In addition, because the IRWM project prioritization process encourages projects with multiple benefits, the IRWM Program aims to fund projects that represent up-front investments with holistic solutions that can prevent negative impacts (and associated costs) from occurring. There are still additional costs incurred due to program administration and other components, which are not reimbursed by grant funding. As affordability is a regional issue, it cannot be wholly resolved by the IRWM Program.
9. Political Coordination: Regulatory, awareness, conflicts, and other items listed above present challenges to the Region's water managers with respect to political coordination. Specifically, issues that arise may present difficulties associated with project approvals that are necessary for the Region's water managers to move forward with water management efforts.	To-date the IRWM Program has not focused on political coordination, but rather has focused on public and stakeholder outreach efforts. Additional outreach and coordination efforts with other regulatory agencies and political bodies may be possible through the IRWM Program. Also, effective public outreach may impact political decision-making.
10. Managing Water Rights and Compliance: There is a need to reconcile water rights and water quality management for a variety of beneficial uses. Specifically, addressing water quality compliance concerns can result in reduced water recharge/discharge, which can potentially impact downstream or adjacent uses that may have an existing "right" to water sources.	The IRWM Program provides a mechanism to bring different entities together to potentially resolve or avoid water rights conflicts, including the potential for funding for water supply and water quality projects.
11. Sustainability of Water Resources: There is a need to manage water sustainably throughout the Region, meaning that solutions to water-related issues and conflicts are economically and environmentally preferable, and also provide equitable resource protection for the entire Region. Sustainably managing the Region's water resources will help to ensure the long-term availability of water supplies for multiple beneficial uses.	The IRWM Program has adopted the concept of sustainability, and incorporated this concept throughout the IRWM Vision, Mission, Goals and Objectives (refer to *Chapter 2, Vision and Objectives).* The project prioritization process also encompasses the idea of sustainability by prioritizing projects that provide multiple benefits (to the environment and to people) and are also cost-effective.

1.6 IRWM Plan Development

To facilitate plan review, the 2013 IRWM Plan is organized in accordance with DWR's IRWM Plan Standards established by the 2012 IRWM Program Guidelines (DWR, 2012). Table 1-3 summarizes how the 2013 IRWM Plan chapters correspond with required elements of the IRWM Program Guidelines. Figure 1-1 (page 1-2) presents a schematic depicting how the chapters of this 2013 IRWM Plan are organized to establish Plan goals and objectives, select water management strategies, establish regional priorities, and identify how the Plan is to be implemented. Remaining chapters of the 2013 Plan address conformance with state-mandated planning elements as set forth in the IRWM Program Guidelines.

Table 1-3: Organization of the 2013 IRWM Plan

IRWM Program Guidelines Requirement[1]		2013 IRWM Plan Chapter that Addresses the Requirement	
1.	Governance	6.	Governance and Stakeholder Involvement
2.	Region Description	3.	Region Description
3.	Objectives	2.	Vision and Objectives
4.	Resource Management Strategies (RMS)	8.	Resource Management Strategies
5.	Integration	9.	Project Evaluation and Prioritization
6.	Project Review Process	9.	Project Evaluation and Prioritization
7.	Impacts and Benefits	11.	Implementation
8.	Plan Performance and Monitoring	11.	Implementation
9.	Data Management	10.	Data and Technical Analysis
10.	Financing	11.	Implementation
11.	Technical Analysis	10.	Data and Technical Analysis
12.	Relation to Local Water Planning	7.	Regional Coordination
13.	Relation to Local Land Use Planning	7.	Regional Coordination
14.	Stakeholder Involvement	6.	Governance and Stakeholder Involvement
15.	Coordination	7.	Regional Coordination
16.	Climate Change	*	Incorporated throughout Plan – see Chapters 2, 3, 5, and 6

[1]From Appendix A (IRWM Plan Standards) in the 2012 IRWM Program Guidelines (DWR, 2012).

1.6.1 Plan Preparation Team

The RWMG provided overall direction in the development and preparation of this 2013 IRWM Plan. The RWMG was assisted in preparing Plan documents by a team of consultants that included:

- RMC Water and Environment
- Katz and Associates
- Michael R. Welch, Ph.D., P.E., Consulting Engineer
- CityPlace Planning
- PACE
- AECOM

1.6.2 Plan Development Process and Stakeholder Input

Development of the 2013 IRWM Plan involved a significant public input/stakeholder process (see *Chapter 6, Governance and Stakeholder Involvement*) that endeavored to secure participation from as many stakeholders as possible in the IRWM process. The RWMG and consultants coordinated with the following regional groups in organizing the stakeholder input process as well as organizing, preparing, and reviewing the IRWM Plan:

- *Regional Advisory Committee.* Policy-level input to the IRWM Plan was provided by a Regional Advisory Committee (RAC) that included subject matter experts representing environmental groups, academic entities, local business, agricultural groups, water suppliers, wastewater agencies, water quality interests, and regulatory agencies. The RAC includes representatives of both public agencies and non-government organizations that serve DACs. The RAC served as the primary organization that provided direction to the RWMG for plan preparation.

San Diego Regional Advisory Committee, 2011
Photo Credit: Crystal Mohr, RMC Water and Environment

- *Workgroups.* Technical input was provided by various workgroups that participated in 2013 IRWM Plan topics and/or planning studies. The workgroups were comprised of representatives from the RAC and other stakeholders and interested parties.

Additional technical and stakeholder input was achieved through an outreach effort to planning groups, environmental organizations, watershed groups, municipalities, water and wastewater agencies, transportation agencies, flood control agencies, regulatory agencies, business groups, community groups including DACs, environmental justice organizations, local Tribal Nations, and general members of the public. This outreach effort included workshops and workgroups conducted throughout 2012 and 2013 to discuss Region-specific issues, priorities, and needs. Stakeholder involvement was encouraged through the 2012 IRWM Summit, RAC meetings and public workshops, and public review of draft materials (see *Chapter 6, Governance and Stakeholder Involvement* for a detailed description of the IRWM Plan outreach effort).

1.6.3 California Environmental Quality Act (CEQA) Exemption

This 2013 IRWM Plan consists of a data collection effort and planning study that will not result in the disturbance of environmental resources. Approval or adoption of this Plan does not entail any direct commitment of resources by the RWMG or any other agency. Preparation and adoption of this Plan are thus exempt from the California Environmental Quality Act (CEQA) pursuant to Sections 15262 and 15306 of the CEQA Guidelines, and programmatic analysis under CEQA is not required.

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2 Vision and Objectives

This chapter addresses requirements set forth in the Objectives Standard included in the 2012 IRWM Program Guidelines (DWR 2012). Consistent with DWR's 2012 Guidelines, the objectives presented in this chapter were developed to manage or eliminate the challenges faced by the Region as described in detail in *Chapter 3, Region Description.*

2.1 Overview

The intent of this chapter is to document various aspects of the planning hierarchy established for the 2013 San Diego IRWM Plan. Specifically, this chapter includes information regarding:

- The process used to develop the IRWM objectives.
- How the objectives address major water-related issues and conflicts of the Region.
- How the objectives will be measured so that achievement of objectives can be monitored.
- An explanation of why the objectives were not prioritized.
- An explanation of the overall planning hierarchy (vision, mission, goals, and objectives) included in the 2013 IRWM Plan.

2.2 Describing the Process

The IRWM planning components (vision, mission, goals, and objectives) were revised for the 2013 IRWM Plan through a collaborative process that involved members of the public, stakeholders, workgroup members, the Regional Advisory Committee (RAC), and the Regional Water Management Group (RWMG).

As described in detail in *Chapter 6, Governance and Stakeholder Involvement,* the 2013 IRWM Plan involved a number of workgroups consisting of representatives from the RAC and interested stakeholders, which were convened to provide input on specific components of the 2013 IRWM Plan. One workgroup, the Priorities and Metrics Workgroup, was convened to complete the following tasks:

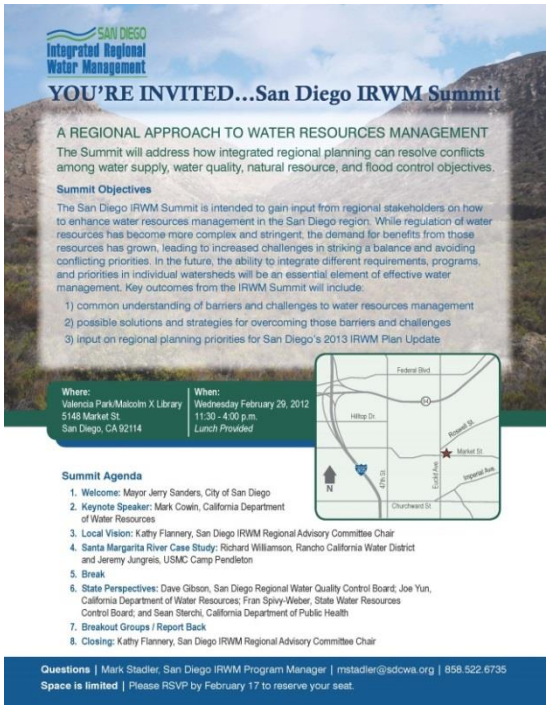
- Refine IRWM vision, mission, goals, and objectives
- Review information received during the IRWM Summit (described in detail below) and use that information to refine the vision, mission, goals, and objectives
- Develop a recommended list of targets and metrics that can be used to measure achievement of the IRWM objectives
- Discuss pros and cons of prioritization and potentially prioritize the IRWM objectives

The Priorities and Metrics Workgroup met a total of five times from February to December 2012 and provided substantial input on the development of the IRWM vision, mission, goals, and objectives. The workgroup used information received at a public IRWM Summit to refine those planning components. Further information regarding the Priorities and Metrics Workgroup,

including complete meeting agendas and notes are available online at the following web address: http://sdirwmp.org/2013-irwm-plan-update-workgroups.

The 2007 IRWM Plan vision, mission, goals, and objectives were used as a starting point for the Priorities and Metrics, as these existing IRWM Plan components were previously determined by the Region's stakeholders. Further, the Priorities and Metrics Workgroup considered existing water management plans such as the Region's 2010 Urban Water Management Plans, the San Diego County General Plan Update, and requirements and considerations established by the California Department of Water Resources (DWR) in the 2012 IRWM Guidelines (DWR 2012).

The IRWM Summit, held on February 29, 2012, was open to members of the public, and had two purposes: 1) to increase awareness of the IRWM Program and 2013 IRWM Plan as part of the Region's public outreach and involvement process, and 2) to solicit stakeholder input on the existing IRWM objectives, and any additional objectives that may be suitable to include in the 2013 IRWM Plan. IRWM Summit attendees considered a wide array of information to make recommendations regarding the IRWM objectives. IRWM Summit attendees provided input via open discussions, and largely relied upon personal knowledge and experience as the basis for their input.


SAN DIEGO Integrated Regional Water Management

YOU'RE INVITED…San Diego IRWM Summit

A REGIONAL APPROACH TO WATER RESOURCES MANAGEMENT

The Summit will address how integrated regional planning can resolve conflicts among water supply, water quality, natural resource, and flood control objectives.

Summit Objectives

The San Diego IRWM Summit is intended to gain input from regional stakeholders on how to enhance water resources management in the San Diego region. While regulation of water resources has become more complex and stringent, the demand for benefits from those resources has grown, leading to increased challenges in striking a balance and avoiding conflicting priorities. In the future, the ability to integrate different requirements, programs, and priorities in individual watersheds will be an essential element of effective water management. Key outcomes from the IRWM Summit will include:

1) common understanding of barriers and challenges to water resources management
2) possible solutions and strategies for overcoming those barriers and challenges
3) input on regional planning priorities for San Diego's 2013 IRWM Plan Update

Where: Valencia Park/Malcolm X Library, 5148 Market St, San Diego, CA 92114

When: Wednesday February 29, 2012, 11:30 - 4:00 p.m. Lunch Provided

Summit Agenda

1. Welcome: Mayor Jerry Sanders, City of San Diego
2. Keynote Speaker: Mark Cowin, California Department of Water Resources
3. Local Vision: Kathy Flannery, San Diego IRWM Regional Advisory Committee Chair
4. Santa Margarita River Case Study: Richard Williamson, Rancho California Water District and Jeremy Jungreis, USMC Camp Pendleton
5. Break
6. State Perspectives: Dave Gibson, San Diego Regional Water Quality Control Board; Joe Yun, California Department of Water Resources; Fran Spivy-Weber, State Water Resources Control Board; and Sean Sterchi, California Department of Public Health
7. Breakout Groups / Report Back
8. Closing: Kathy Flannery, San Diego IRWM Regional Advisory Committee Chair

Questions | Mark Stadler, San Diego IRWM Program Manager | mstadler@sdcwa.org | 858.522.6735
Space is limited | Please RSVP by February 17 to reserve your seat.

The IRWM Summit, held in February 2012, provided a venue to receive public input on key aspects of the 2013 IRWM Plan, including the IRWM Objectives.

Determining the IRWM objectives was considerably more challenging than determining the IRWM vision, mission, or goals and included many revisions and substantial input from all stakeholders. Further, due to the planning hierarchy of the vision, mission, goals, and objectives; the goals were reviewed and revised as applicable when revising the objectives to ensure that the information and priorities included in the goals were reflected in the objectives, and vice versa.

The Priorities and Metrics Workgroup, in coordination with the RWMG, was responsible for compiling a draft version of the vision, mission, goals, and objectives for further vetting through the RAC and members of the public. On December 5, 2012, a joint Public Workshop/RAC meeting was held, which focused on receiving input on the revised IRWM vision, mission, goals, and objectives before they were incorporated into the 2013 IRWM Plan.

The information included in the following sections regarding the IRWM vision, mission, goals, and objectives represents a synthesis of the input received through the aforementioned processes and stakeholder groups. Together, these processes were highly collaborative, involving as many IRWM stakeholders and interested parties as possible. All input received on the IRWM vision, mission, goals, and objectives was compiled into the Public Draft version of the 2013 IRWM Plan, which was further reviewed and commented upon by IRWM stakeholders, ensuring that the IRWM vision, mission, goals and objectives were established through a collaborative stakeholder process.

2.3 Sustainability of Water Resources

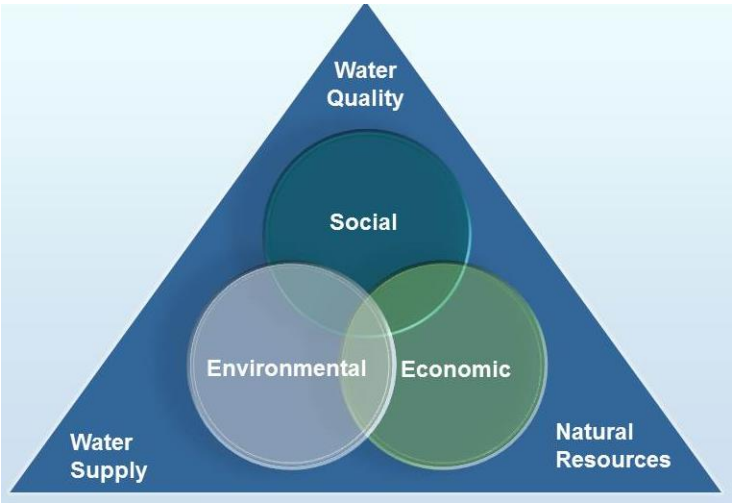
The IRWM Program supports the concept of sustainability, which is integrated in the IRWM vision, mission, goals, and objectives (see sections below for further details). Sustainability, broadly stated, calls for meeting the needs of the present without compromising the ability of future generations to meet their own needs. The San Diego IRWM Program advocates for sustainable water resources planning and has adopted a triple-bottom line definition to foster comprehensive results. Below you will find the San Diego IRWM Program's definition of sustainability.

Definition of Sustainability for the 2013 IRWM Plan

- ***Social***: Fostering public health and safety and maintaining the community's quality of life through provision of safe, reliable water supplies, and recreational waters.
- ***Environmental***: Providing effective stewardship of water-based natural resources, including protection of water quality, habitat, water supply and minimizing climate change impacts.
- ***Economic***: Providing and protecting reliable, sustainable water resources that support the regional economy.

Ensuring long term sustainability requires effective leadership and commitment that encourages collaboration, improved integration of infrastructure and natural systems, and addresses conflicting regulations and policies. Sustainability is also furthered by the approach that is taken to assess and manage water resource projects. Considerations in assuring sustainable water management may include: water quality, habitat, floodplain functions, biodiversity, wetland and surface water functions, greenhouse gas emissions, resiliency and life cycle costing that broadly considers all costs associated with materials, construction, operations maintenance, and decommissioning. No-regret climate change strategies (discussed in the *Climate Change Study* in Appendix 7-D), which are defined as those strategies that would take place in the Region even in the absence of climate change, will also be considered for purposes of assessing sustainability.

As discussed in *Chapter 1, Introduction*, securing reliable sources of funding for these costs, particularly for operation and maintenance costs, is considered a potential implementation barrier as funding for these items is not readily available. For more information on implementation issues and challenges to sustainability, refer to *Chapter 11, Implementation*.



Principles of Sustainability for the 2013 IRWM Plan

2.4 IRWM Vision

The San Diego IRWM vision is to achieve:

> ***An integrated, balanced, and consensus-based approach to ensuring the long-term sustainability of the Region's water supply, water quality, and natural resources.***

2.5 IRWM Mission

The mission of the San Diego IRWM Program is:

> ***To develop and implement an integrated strategy to guide the Region toward protecting, managing, and developing reliable and sustainable water resources. Through a stakeholder-driven and adaptive process, the Region can develop solutions to water-related issues and conflicts that are economically and environmentally preferable, and that provide equitable resource protection for the entire Region.***

2.6 IRWM Goals

The San Diego IRWM goals are as follows:

1. ***Improve the reliability and sustainability of regional water supplies.***
2. ***Protect and enhance water quality.***
3. ***Protect and enhance our watersheds and natural resources.***
4. ***Promote and support sustainable integrated water resource management.***

2.7 IRWM Objectives

The 11 IRWM objectives described below were developed to meet the IRWM goals included as part of the 2013 IRWM Plan. Each objective has a number of targets and associated metrics designed to evaluate how well each objective is being met by the Region's water management activities. These targets, along with their metrics, are presented in Table 2-2. The IRWM objectives and targets were developed considering the State's planning guidance in CWC §10540(c), and encompass water supply reliability, water quality, groundwater overdraft, environmental stewardship, and water-related needs of economically disadvantaged communities (DACs). These objectives reflect the San Diego Region's efforts towards obtaining the State's goal for water and the environment.

In total, two new objectives were added to the existing 2007 IRWM Plan objectives: one that encourages integration (Objective A) and one that addresses climate change (Objective K). To be included in the IRWM Plan, projects only need to meet one of the 11 IRWM objectives (refer to *Chapter 9, Project Evaluation and Prioritization*). However, to be considered for IRWM funding, projects have to meet Objective A, Objective B, and at least one other objective. Each of the 11 IRWM objectives, as well as information regarding how each objective addresses relevant water management issues, is provided below.

IRWM Funding Requirement – Objective A, Objective B, and One Other

To be included in the IRWM Plan, projects must contribute to at least one IRWM objective. A new requirement of the 2013 IRWM Plan is that, in order to be **eligible for IRWM funding**, projects must meet Objective A, Objective B, and at least one additional IRWM objective.

Objective A: Encourage the development of integrated solutions to address water management issues and conflicts.

Detailed Description of Objective A

Implement projects and programs that effectively address local water management issues and conflicts through the following types of integration:

1. *Partnership*: Establishing partnerships between different organizations to increase cost-effectiveness through sharing of data, resources, and infrastructure.
2. *Resource Management*: Employing multiple resource management strategies within a single project to effectively address a variety of issues.
3. *Beneficial Uses*: Developing solutions that address multiple beneficial uses to expand benefits.
4. *Geography*: Implementing watershed- or regional-scale projects to benefit a greater amount of people and potentially save costs through economies of scale.
5. *Hydrology*: Addressing multiple watershed functions within the hydrologic cycle to holistically address issues and resolve conflicts.
6. *Sustainability:* Implement projects that meet the needs of the present without compromising the ability of future generations to meet their own needs and broadly support social, environmental, and economic benefits.

The focus of this objective is to meet the requirements of Goal 4, which focuses on integration of water resources management. Both the vision and mission emphasize an integrated approach to water management, which is also a Statewide Priority (refer to Section 2.9). Due to the importance of integration to the San Diego IRWM Region, stakeholders determined that in order to be included in the IRWM Plan, a project must meet one of the IRWM Plan Objectives. To be eligible for IRWM grant funding, a project must meet Objective A, Objective B, and at least one additional objective. Refer to *Chapter 9, Project Evaluation and Prioritization* for more information.

Table 1-2, which can be found in *Chapter 1, Introduction,* includes an overview of identified water management challenges and conflicts relevant to the Region. In addition to the integration definitions described above, attainment of this objective will be evaluated based upon the ability to address relevant issues listed in Table 1-2.

Determination and Rationale for Objective A: The Region is a large and diverse area, falling under the jurisdiction of multiple water management agencies and organizations. By creating an objective that specifically focuses on integrated approaches to water resources and their management, the 2013 IRWM Plan emphasizes the importance of addressing issues across the Region regardless of jurisdictional and other boundaries that are not necessarily conducive to effective water management. Integration is the "I" in IRWM planning, and is the emphasis of the State's efforts towards IRWM planning, which encourages planning and understanding of the inter-relationships across a variety of resource areas rather than traditional water planning efforts through which different resource areas (water supply, water quality, natural resources, flood management, etc.) are not necessarily coordinated. For example, water reuse efforts in the Region integrate both

wastewater management and water supply development, and represent an integrated approach to managing water resources within the Region.

Incorporating cost-effective approaches to water management is essential for sustainable water management. Integration should also focus on the region's ability to accomplish more with less. The IRWM mission seeks solutions to water-management issues that are economically preferable on a long-term basis. The following text box, developed by the Priorities and Metrics Workgroup, acknowledges some of the disincentives and benefits of integration.

Potential Barriers or Disincentives to Integration	***Potential Benefits or Incentives to Integration***
• Takes a lot of time and energy to coordinate with other partners. • Integration may mean reducing the amount of grant funding that each organization receives. • Administrative costs associated with combining projects and completing grant administrative for multiple entities. • Integrating with other partners could mean losing some control over a project. • Integration makes projects more complex. • May have to give up some benefits or features of the original project concept to integrate with another project concept.	• Integration makes projects more competitive to receive grant funding, although integration in early or pre-design produces more win-win opportunities. • May be more cost-effective – partners such as NGOs can provide services at a lower cost and are adept at grant writing and grant administration. • May be more cost effective due to cost sharing with other agencies. • Integration reduces conflicts, which may result in streamlining for project approvals. • Integration may add additional expertise to a project.

Objective B: Maximize stakeholder/community involvement and stewardship of water resources, emphasizing education and outreach.

Detailed Description of Objective B

Implement efforts to engage and educate the public on the IRWM Program and the interconnectedness of water supply, water quality, and natural resources. Build stewardship throughout the Region by providing opportunities to participate in water management and promote individual and community ownership of water resource problems and solutions.

The focus of this objective is to incorporate stakeholder and community involvement and engagement into realization of each IRWM goal. The IRWM vision emphasizes the need for a consensus-based approach in water resources management within the Region, and the mission emphasizes the need for a stakeholder-driven process. Maximizing stakeholder and community involvement and stewardship has been a critical focus of the IRWM Program, and is a component of every aspect of the IRWM planning hierarchy. Due to the importance of stakeholder involvement to the San Diego IRWM Region, stakeholders determined that in order to be eligible for IRWM grant funding, a project must meet Objective A, Objective B, and at least one additional objective. Refer to *Chapter 9, Project Evaluation and Prioritization* for more information.

Determination and Rationale for Objective B: Stakeholder involvement is a vital part of the IRWM Program, and is necessary to identify and address public interests and perceptions, address stakeholder questions and issues upfront, ensure that the 2013 IRWM Plan and projects are consistent with public interests, provide for public ownership and support of IRWM activities, and bring diverse viewpoints to improve the next iteration of the IRWM Plan.

Stakeholder involvement may assist in identifying areas where increased public education and outreach is required and help focus on the public's key water management issues and potential solutions. Public education and outreach at community events, workshops, and school-based educational programs are required to promote the identification and understanding of the Region's resources. Hands-on and volunteer participation of the public encourages community ownership of water resource problems and solutions. Stakeholder input is also an essential element in identifying and resolving potential water management conflicts within the Region, and has been a fundamental component of the 2007 and 2013 San Diego IRWM Plans.

Objective C: Effectively obtain, manage, and assess water resource data and information.

Detailed Description of Objective C

Increase and expand sharing, integration, and comprehensive analysis of water resource and water quality data to provide a basis for improved water resources management.

Attainment of each IRWM goal can be enhanced through data and information sharing. Through this objective, the RWMG and RAC recognize that obtaining and evaluating water quality, water supply, environmental, and recreational data is essential to the successful development and implementation of regional water management actions and programs. Data collection and analysis is required to identify trends, document water quality improvements or impairments, assess the effectiveness of water resource management programs, and provide direction for future program planning and management strategies.

Determination and Rationale for Objective C: Organizations and individuals that collect data within the Region have historically worked separately, and have not compiled information into a central repository where data can be evaluated, formulated, compared, and shared with interested stakeholders. The IRWM Program has undertaken actions to address this issue, and is working toward development and implementation of a Data Management System (DMS) that will meet this very important regional need. Refer to *Chapter 10, Data and Technical Analysis* for more information.

Despite the IRWM Program's efforts towards implementing a Region-wide DMS, there are still challenges associated with data and data management that are the impetus for Objective C. Challenges associated with trying to collect regional data from multiple jurisdictions and organizations include: (1) differences and sometimes incompatibilities in electronic formats, (2) the lack of a centralized system or location for maintaining hard copy data such as reports or maps, (3) proprietary data use concerns, (4) inconsistent data protocols that make data comparison difficult and time-consuming, and (5) the cost of maintaining an ongoing regional data management system.

The RWMG and RAC recognize that the IRWM Program offers a potential opportunity for regional entities to coordinate the collection, storage, analysis, and distribution of water quality, water supply, and natural resources data to overcome the challenges stated above. Beyond the regional DMS, other potential data-related opportunities for managers and stakeholders may include:

- making it possible to identify and update water supply, water quality, and other related data that will assist with water management issues
- providing data collection and storage in compatible electronic formats so that it is easily accessible to water managers and regional stakeholders

- analyzing collected data from areas within the Region that will assist in supporting water management actions/decisions
- assessing integration efforts between managers and stakeholders to provide water quality, water supply, and natural resources data in a beneficial manner to all parties involved
- developing a method to implement adequate quality controls for data collection, record keeping and analysis for the Region
- soliciting public/stakeholder involvement on data management and distribution
- identifying gaps in existing data or research needs to improve water resource management

Objective D: Further the scientific and technical foundation of water management.

Detailed Description of Objective D

Promote actions, programs, and projects that increase scientific knowledge and understanding of water management issues and support sustainable science-based regulations and requirements. Coordinate with regulatory agencies to assess and resolve ambiguous or conflicting regulatory standards or requirements.

Attainment of each IRWM goal can also be enhanced through increasing the scientific and technical foundation of water management. Objective D recognizes that additional scientific information and technical understanding is required to effectively implement many water management strategies, as well as improve regulations pertaining to water management.

Determination and Rationale for Objective D: Water management actions for the Region must comply with existing water quality, public health, flood control, environmental, and other laws and regulations. While water management actions must be addressed within the framework of existing regulations, additional technical and scientific understanding is required to adjust regulations and the way in which regulations are implemented to ensure that such regulations are realistic, cost-effective, and being implemented in a meaningful way.

By addressing scientific and technical issues through regional coordination efforts, implementing agencies may recognize benefits of cost sharing, economies of scale and scope, and the increased potential for outside funding through collaborative approaches. Additionally, increased technical and scientific understanding allows for more consistent and expedient implementation of programs and activities.

Increased scientific data and technical comprehension may allow for the development of regionally-feasible or watershed- based compliance alternatives that may not have been feasible from site-specific or project-specific standpoints. Better scientific understanding will result in more effective use of technology and other natural approaches that will encourage the implementation of the most cost-effective solutions and improved water quality on a long-term basis. The IRWM Plan process may also allow regional agencies to coordinate with regulators to identify areas where modification of regulations or regulatory procedures may be appropriate for maximizing beneficial use and protecting the Region's water resources.

Objective E: Develop and maintain a diverse mix of water resources, encouraging their efficient use and development of local water supplies.

Detailed Description of Objective E

Continue to develop diverse water resources to meet local supply and conservation goals, reduce dependence on imported water supplies, and increase water supply reliability. A diverse mix of water resources includes imported water, water transfers, recycled water, water conservation, desalination, local surface water, and groundwater.

The focus of this objective is to meet the requirements of Goal 1. The Region's population of approximately three million and the Region's economy are both dependent upon a reliable, cost-effective, and diverse water supply. Securing a variety of water supply sources will help the Region ensure that even in drought or emergency conditions, reliable water supply can be made available now and in the future. Ensuring that water supplies are available to meet future demands is essential given that the Region's population is projected to increase by approximately one third by 2030. This objective addresses the variety of water supply sources – both imported and local – that are necessary to sustain the Region's water demands.

Determination and Rationale for Objective E: As documented within the *California Water Plan Update 2009* (DWR 2009), water allocation, environmental, and hydrologic constraints present significant challenges to the sustainability of State Water Project and Colorado River supplies (imported water supplies), particularly during long-term droughts. Additionally, reliance on imported water supplies renders the Region potentially vulnerable to short-term reliability issues that may occur in the event of a catastrophic emergency such as an earthquake that cuts off imported water supplies for up to six months.

El Capitan Reservoir has a storage capacity of 112,800 acre-feet and holds both surface runoff and imported water.

Photo credit: Jeff Pasek, City of San Diego

Despite historic reliance on imported water supplies, the Region has made substantial progress in diversifying its water supply portfolio, a trend which will continue to occur in the future. Objective E aims to support the Region's water supply diversification efforts as well as the Region's water conservation efforts, which will both help to increase water supply reliability and reduce demands on imported water supplies.

Objective F: Construct, operate, and maintain a reliable water management infrastructure system.

Detailed Description of Objective F

Construct, operate, and maintain water conveyance, treatment, storage, and distribution facilities that comprise a reliable water infrastructure system consistent with the future planned mix of water resources, and provide flexibility in system operations.

The focus of this objective is to provide reliable infrastructure to meet IRWM goals 1, 2, and 3. The Region's residents and economy are both dependent upon a reliable infrastructure to deliver water to residents, businesses, industries, parks, and agricultural lands. The Region's existing water supply infrastructure is described in *Chapter 3, Region Description*, and is a complex system of aqueducts, reservoirs, treatment plants, water pipelines, pump stations, and other appurtenances. Further, this objective addresses water infrastructure required for the disposal and reuse of wastewater, as well as infrastructure required for stormwater, flood control, water quality-related concerns, and natural resources protection and enhancement.

Determination and Rationale for Objective F: Improvements to existing water supply infrastructure are required to ensure facilities are in place to produce, deliver, store, and treat supplies to reliably meet existing and future demands throughout the Region. Capital improvements will focus on increasing water supply flexibility, storage, supply diversity, and reliability.

This objective also addresses requisite improvements to other types of water infrastructure that are required to meet other objectives included in this IRWM Plan. Other types of infrastructure are related: wastewater, flood control, and stormwater infrastructure should be designed in a manner to address, improve, and maintain water quality, and protect and enhance natural resources and watersheds.

Objective G: Enhance natural hydrologic processes to reduce the effects of hydromodification and encourage integrated flood management.

Detailed Description of Objective G

Restore and enhance natural hydrologic processes, and promote best management practices that reduce negative effects on receiving systems such as natural stream systems, groundwater systems, local water supply reservoirs, and lagoons, bays, and the ocean. Reduce runoff from impervious surfaces, erosion, sedimentation, and flooding. Use integrated flood management to holistically address flood issues, water quality, natural resources, and other water management concerns.

The focus of this objective is to help achieve IRWM goals 2 and 3. Sediment pollution, erosion, and other development-related water quality and hydromodification issues have impacted the Region's water resources. This objective is intended to encourage restoration and floodplain management activities that help to address these historical issues, and includes activities that utilize natural infrastructure and mimic natural infrastructure functions.

Determination and Rationale for Objective G: Sedimentation, erosion, and hydromodification present significant water management challenges within many of the Region's watersheds. Development practices may decrease normal, distributed, at-source infiltration and therefore increase the volume and duration of stormwater runoff due to the increased amount of impermeable surfaces, such as paved areas and roofs. These development practices impact natural conveyance systems, such as creeks, streams and rivers due to increases of water loads from storm

drain and other discharge points not originally part of the natural drainage system. Future development in the Region will also contribute to these impacts.

Pollution loads due to runoff will reflect the change in residential, commercial, industrial, construction and agricultural activities (land use changes). These land use changes can result in physical changes (hydromodification) to the Region's waterways. Addressing these problems will require regional cooperation in identifying and implementing cost-effective strategies. By identifying and addressing areas that are already, or likely to be, affected by hydromodification, stakeholders and mangers can prevent or decrease its impacts, mitigate its negative effects and address economic impacts that future development may have on the current infrastructure.

Community flood damage loss can be addressed through integrated flood management solutions.

Photo credit: Bruce Phillips, PACE

Further, integrated flood management, which is a Statewide Priority, is also included within this objective. Integrated flood management involves developing solutions for effectively managing flood risks through a watershed approach that allows for development of holistic strategies that can also address beneficial uses and watershed functions.

Objective H: Effectively reduce sources of pollutants and environmental stressors to protect and enhance human health, safety, and the environment.

Detailed Description of Objective H

Reduce pollutants and environmental stressors to maintain or improve water quality through the application of point and non-point source controls, stormwater best management practices, management measures such as land use planning and conservation, and reservoir management. Reduce pollutant loads to protect the health and safety of humans and the environment.

The focus of this objective is to help achieve IRWM goals 2 and 3. Existing regulatory programs control pollutants through a broad array of point source and non-point source programs. These programs are directed towards achieving compliance by mandating pollutant source controls and industry-standard best management practices. This objective is intended to encourage restoration, source control, and treatment activities that help to address water quality issues.

Determination and Rationale for Objective H: More than 54 inland surface waters (rivers or streams) and 13 reservoirs are listed on the 303(d) list of impaired water bodies as not attaining applicable water quality standards. Region-wide constituents of concern include bacteria, sediment, nutrients, and total dissolved solids (TDS). Toxic inorganic and toxic organic constituents are additional pollutants of concern in many of the Region's urbanized watersheds.

Cost-effective approaches to reducing pollutant loads, sources, and stressors is essential to bring listed water bodies into attainment of the standards, achieve Total Maximum Daily Load (TMDL) allocations, and prevent waters that currently meet the standards from slipping into non-attainment. Additional data and analysis are required to establish a correlation between the use of

pollutant source controls and water quality improvements, which will assist in the identification of predominant pollutant sources.

An important management consideration in addressing pollutants and stressors within local water supplies is reservoir and lake management. Reservoir and lake management strategies, including natural treatment systems, can be considered as a way to reduce problems associated with poor water quality and treatability resulting from stressors such as nitrogen, phosphorus, iron, manganese, and sulfur.

Objective I: Protect, restore, and maintain habitat and open space.

Detailed Description of Objective I

Manage and acquire land to preserve open space and protect sensitive habitat for endangered, threatened, and locally-important plant and wildlife species. Invasive species management, habitat conservation, and water pollution prevention activities will help to maintain and enhance biological diversity.

The focus of this objective is to meet Goal 3. The Region features biologically diverse and important habitats and has a high degree of biological diversity (biodiversity). In recent decades, however, development and population growth within the Region have resulted in the loss of open space and habitat. Additionally, remaining native habitat may be subject to impacts or stress from invasive species, water quality degradation, or hydromodification.

Determination and Rationale for Objective I: More bird and plant species live within San Diego County than in any other county in the contiguous United States; however, the reduction of available open space lands that can support wildlife habitats has reduced the number of native plants and animals living in the Region, and has reduced overall biodiversity. The trend of decreasing open space land within the Region is projected to continue, and it is anticipated that biodiversity in the Region will decrease as well.

Lower Otay Reservoir contains extensive wetlands habitats.
Photo credit: Jeff Pasek, City of San Diego

Due to anticipated growth and development, preservation and maintenance of open space is an important component of ensuring protection of the Region's water quality, water availability, and protection of endangered and threatened species and habitats. Preserving and maintaining open space is also important for maintaining the Region's natural aesthetics, preserving and enhancing recreational opportunities, enhancing the quality of life for residents, and providing benefits relative to tourism and the economy. Further, the *Water Quality Control Plan for the San Diego Basin* (Basin Plan) identifies several beneficial uses that address the needs of aquatic, wildlife, and marine habitats. Due to Basin Plan beneficial use designations pertaining to habitats, habitat management in the Region is a regulatory requirement that must be considered in water bodies that have such habitat-related beneficial uses, including Areas of Special Biological Significance (ASBS). Maintaining and expanding habitat can have an additional benefit of improving water quality.

Objective J: Optimize water-based recreational opportunities.

Detailed Description of Objective J

Protect and provide access to water-based recreational activities such as swimming, fishing, boating, as well as picnicking and hiking along waterways, while ensuring that the recreational activities do not adversely affect other beneficial uses of water. Improve public safety in water-based recreational areas so that members of the Region can use them freely.

The focus of this objective is to meet Goal 4. The Basin Plan designates both water contact recreation (swimming, wading, tide pooling, water skiing, surfing) and non-contact recreation (boating, fishing, hiking, bird watching, kayaking) as key beneficial uses of inland and marine waters within the Region.

Determination and Rationale for Objective J: Water contact and non-contact recreation are important components of the Region's quality of life and tourism-dependent economy. A considerable number of recreational opportunities exist at the beaches, rivers, streams, lakes, marine and estuarine waters within the Region.

Urban and agricultural stormwater runoff frequently degrades the water quality of the Region's coastal waters, resulting in the posting of advisories of potential public health threats and beach closures. Controlling these pollutant-contributing activities is critical to enhancing and maintaining water-based recreational opportunities within the Region.

The Region's inland lakes are all man-made water supply reservoirs. Many of these reservoirs permit recreational uses that may adversely affect water quality due to contamination from swimmers, boating equipment, camping activities, and littering. Recreational activities within the Region's reservoirs must therefore be balanced with water supply and water quality protection needs. While optimizing recreational opportunities is a Plan objective, restrictions on recreation (limiting public access, limiting certain recreational activities, or requiring implementation of best management practices) may be necessary to protect water supply and other beneficial uses.

Objective K: Effectively address climate change through greenhouse gas reduction, adaptation, or mitigation in water resource management.

Detailed Description of Objective K

Adapt to the potential effects of climate change, such as sea-level rise, temperature changes, and rainfall variability, by implementing 'climate-proof' water management projects and programs. Incorporate greenhouse gas emissions reduction and energy efficiency in planning and management efforts.

Each IRWM goal can potentially be enhanced by considering climate change. Climate change may have wide-spread impacts on water resources management, including less overall precipitation and associated water supply, more severe and unpredictable flood events, and sea level rise and associated impacts to coastal infrastructure. Planning for future water management infrastructure needs to consider both mitigation of additional contributions to climate change through greenhouse gas (GHG) reduction and adaptation to its future impacts (such as sea level rise).

Determination and Rationale for Objective K: The effects of climate change have the potential to dramatically alter the natural resources of the Region. As a coastal area, the Region is susceptible to changes in sea level, salt water inundation, and potential extreme weather events. Climate change is also likely to affect habitat availability for the Region's multitude of species, and increase the vulnerability of the Region's water supply. Implementation of projects and programs that are not

influenced by the effects of climate change, such as water recycling, will help the Region adapt to the potential effects of climate change.

2.7.1 Prioritizing the IRWM Objectives

The 11 IRWM objectives described above will be used to evaluate potential projects for inclusion in the 2013 IRWM Plan, and will therefore help to determine which projects are submitted in grant applications. The question of prioritizing objectives was discussed by stakeholders in the Priorities and Metrics Workgroup, who ultimately recommended against prioritizing objectives in the 2013 IRWM Plan. While recognizing that prioritizing objectives could make project evaluation easier and more transparent, it was determined that the costs of prioritizing objectives, including limiting the potential breadth of water management activities, losing some of the flexibility of the 2013 IRWM Plan, and losing stakeholder support, outweighed the benefits. All 11 IRWM objectives were developed by stakeholders because they address an identified priority for water management in the Region. Balancing project selection such that all objectives are addressed through IRWM funding opportunities will contribute to broader sustainability is the approach that the IRWM Region will take.

2.7.2 Climate Change Considerations

Climate change considerations pertaining to the IRWM objectives are addressed directly by Objective K, which was added to the 2013 IRWM Plan to reflect the Region's growing concern over climate change impacts on water resources management (refer to *Chapter 7, Regional Coordination* for more information on the Climate Change Study). In addition, several of the other IRWM objectives will generate climate change adaptation and mitigation benefits. Examples of how the other IRWM objectives will potentially address and consider climate change adaptation and mitigation are provided below:

1. *Climate Change Adaptation*: Objective E encourages development of diverse water supplies, including municipal recycled water. Increasing local water supplies such as recycled water and desalinated water will help the Region adapt to climate change by increasing the availability of 'drought-proof' local water supplies, which are not dependent on factors influenced by climate change such as temperature and precipitation. Local supply development also reduces the Region's reliance on imported water supplies that may be more severely impacted by climate change.
2. *Climate Change Mitigation*: Objective I encourages protection and restoration of habitat and open space. Conserving natural habitat and restoring native plants in the Region could mitigate climate change by sequestering greenhouse gases.

2.8 IRWM Planning Hierarchy

This chapter includes an overview of all aspects of the IRWM planning hierarchy. The IRWM planning hierarchy included in this 2013 IRWM Plan is consistent with the planning hierarchy originally developed for the 2007 IRWM Plan.

The individual components of the planning hierarchy – as illustrated in Figure 2-1 – are explained in the previous sections and are applied consistently throughout the 2013 IRWM Plan.

Figure 2-1: IRWM Planning Hierarchy

2.9 Consistency with Statewide Priorities

The IRWM objectives included in the previous sections address issues specific to the San Diego IRWM Region as identified by and vetted with regional stakeholders. While the objectives address issues specific to the IRWM Region, they are also in conformance with the Statewide Priorities set forth by DWR in the 2012 IRWM Guidelines (DWR 2012). The following table demonstrates how the IRWM objectives either directly or indirectly address each Statewide Priority included in the 2012 IRWM Guidelines.

2.10 IRWM Plan Targets

Each of the 11 IRWM objectives described above has a number of measurable targets designed to help evaluate how well each objective is being met. Each of these targets has one or more quantitative or qualitative metric to evaluate the targets. The targets and metrics for each objective are described in Table 2-2 below. The process of assessing attainment of each objective through the targets and metrics is detailed in *Chapter 11, Implementation.* Further, Table 2-2 indicates (with an "x") whether each measurable target can be implemented through the IRWM Program or through IRWM Projects, which are organized by project type in the table.

Table 2-1: Conformance of Plan Objectives with Statewide Priorities

San Diego IRWM Objectives	Statewide Priorities							
	Drought Preparedness	Use and Reuse Water More Efficiently	Climate Change Response Actions	Expand Environmental Stewardship	Practice Integrated Flood Management	Protect Surface Water and Groundwater Quality	Improve Tribal Water and Natural Resources	Ensure Equitable Distribution of Benefits
Objective A: Encourage the development of integrated solutions to address water management issues and conflicts.	○	○	○	●	●	○	○	●
Objective B: Maximize stakeholder/community involvement and stewardship of water resources, emphasizing education and outreach.	○	●	○	●	●	○	●	●
Objective C: Effectively obtain, manage, and assess water resource data and information.	○	○	○	●	○	○	○	○
Objective D: Further scientific and technical foundation of water management.	○	○	○	●	○	○	○	○
Objective E: Develop and maintain a diverse mix of water resources, encouraging their efficient use and development of local water supplies.	●	●	○	●	○	○	○	○
Objective F: Construct, operate, and maintain a reliable infrastructure system.	●	●	○	○	○	○	○	○
Objective G: Enhance natural hydrologic processes to reduce the effects of hydromodification and encourage integrated flood management.			○	●	●	○	○	○
Objective H: Effectively reduce sources of pollutants and environmental stressors to protect and enhance human health, safety, and the environment.			○	●		●	○	○
Objective I: Protect, restore, and maintain habitat and open space.			○	●			○	○
Objective J: Optimize water-based recreational opportunities.							○	○
Objective K: Effectively address climate change through adaptation or mitigation in water resource management.	○	○	●	●	○	○	○	○

● IRWM Plan objective directly supports the listed Statewide Priority
○ IRWM Plan objective indirectly supports the listed Statewide Priority

Table 2-2: IRWM Objectives, Targets, and Metrics

Objectives *Specific observable outcomes.*	**Targets** *Measurable and tangible actions to achieve the objectives.*	**Metrics** *Measurements that can be used to evaluate the actions – may be quantitative or qualitative.*	**IRWM Program**	**Project Type**						
				Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat / Open Space
Objective A: Encourage the development of integrated solutions to address water management issues and conflicts.	1. Encourage the development of partnerships to implement water management projects.	Number of IRWM-funded projects that have multiple partners	x	x	x	x	x	x	x	x
	2. Encourage the development of projects that achieve multiple IRWM Plan objectives.	Number of IRWM-funded projects that contribute to attainment of multiple IRWM Plan objectives	x	x	x	x	x	x	x	x
	3. Encourage the development of projects that integrate multiple Resource Management Strategies.	Number of IRWM-funded projects with multiple Resource Management Strategies	x	x	x	x	x	x	x	x
	4. Encourage the development of projects that provide regional or multi-watershed benefits.	Number of IRWM-funded projects that provide multi-watershed or regional benefits	x	x	x	x	x	x	x	x
	5. Encourage the development of projects that consider multiple hydrologic functions.	Number of IRWM-funded projects addressing multiple watershed functions considering the hydrology of the system (upstream/downstream, surface/groundwater)	x	x	x	x	x	x	x	x
	6. Realize efficiencies by implementing integrated approaches to water management.	Number of benefits per IRWM-funded project	x	x	x	x	x	x	x	x
Objective B: Maximize stakeholder/community involvement and stewardship of water resources, emphasizing education and outreach.	1. Maintain the regional IRWM website to provide centralized public access to IRWM program data and information.	Regular updates to the website Access provided Number of website visits	x							

Objectives *Specific observable outcomes.*	**Targets** *Measurable and tangible actions to achieve the objectives.*	**Metrics** *Measurements that can be used to evaluate the actions – may be quantitative or qualitative.*	**IRWM Program**	**Project Type**						
				Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat / Open Space
	2. Provide access (via active link) to the regional IRWM website to help inform the Region's population about the IRWM program.	Access provided		x	x	x	x	x	x	x
	3. Conduct education and outreach activities to obtain a measureable increase in the regional population's knowledge of sustainable water resources management, including the nexus between water and energy.	Public workshops, meetings and presentations held Outreach activities (brochures, fair booths, landscape contests); Survey results	x	x	x	x	x	x	x	x
	4. Provide "hands-on" stewardship and volunteer opportunities in the Region's watersheds, including underserved and disadvantaged communities.	Stewardship activities held Number of participants (new vs. returning)		x	x	x	x	x	x	x
	5. Encourage the use of partnerships and community contacts to collect and disseminate information on water management.	Partners utilized to collect and disseminate information	x	x	x	x	x	x	x	x
Objective C: Effectively obtain, manage, and assess water resource data and information.	1. Provide centralized public access to key water management data sets and contribute water resources data consistent with established standards to regional data management system (DMS)	Regional DMS developed and populated Data sets that meet quality standards contributed Access to regional water quality sampling and reporting data for public health and environmental protection purposes	x	x	x	x	x	x	x	x
	2. Collect and evaluate water resources data in order to assess and document regional conditions, issues, and potential solutions.	Collected data informs and supports decision-making	x	x	x	x	x	x	x	x

Objectives *Specific observable outcomes.*	**Targets** *Measurable and tangible actions to achieve the objectives.*	**Metrics** *Measurements that can be used to evaluate the actions – may be quantitative or qualitative.*	**IRWM Program**	**Project Type**						
				Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat / Open Space
Objective D: Further scientific and technical foundation of water management.	1. Work with the Regional Board to implement collaborative activities to update, improve, and validate the Basin Plan.	Collaborative activities with Regional Board Development of alternative strategies (such as implementation plans) to maintain compliance with Basin Plan water quality objectives Implementation of Regulatory Workgroup Strategies Number of scientifically-based site-specific objectives developed	x	x	x	x	x	x	x	x
	2. Work with regional flood managers to understand and encourage application of integrated flood management techniques.	Studies/projects implemented	x	x	x	x	x	x	x	x
	3. Promote the inclusion of sustainable water resource management policies in land use plans.	Number and diversity of water resource management policies included in land use plans	x							
	4. Expand the technical foundation of reusing local supplies (i.e. potable reuse, stormwater capture, greywater).	Study outcomes Guidelines or specifications developed Research and development, pilot testing, or conceptual design projects implemented New technologies used	x	x	x	x	x	x	x	x
	5. Apply innovative approaches to understanding the connectivity between regional groundwater and surface water supplies.	Study outcomes Research and development, pilot testing, or conceptual design projects implemented	x	x	x	x	x	x	x	x
	6. Expand the technical foundation of using riparian habitat for greenhouse gas mitigation.	Study outcomes	x							x

Objectives *Specific observable outcomes.*	**Targets** *Measurable and tangible actions to achieve the objectives.*	**Metrics** *Measurements that can be used to evaluate the actions – may be quantitative or qualitative.*	**IRWM Program**	**Project Type**						
				Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat / Open Space
	7. Explore innovative Low Impact Development concepts and develop new solutions to manage runoff.	Study outcomes Research and development, pilot testing, or conceptual design projects implemented	x					x		
Objective E: Develop and maintain a diverse mix of water resources, encouraging their efficient use and development of local water supplies.	1. Conserve or reuse water to meet aggregated retail agency SBX7-7 demand target of 167 gallons per capita day (gpcd) for the region by 2020.	AFY of water conserved AFY of recycled water produced for beneficial use or used by customers Urban and agricultural water conservation programs implemented		x		x				
	2. Increase local supply development (recycled water, groundwater, desalinated water, surface water) in urban areas.	AFY of seawater desalinated AFY of recycled water used Number of new recycled water connections AFY of potable reuse (purified water) used Number of potable reuse projects studied, designed, or implemented AFY of groundwater produced or recharged Maintenance of groundwater levels		x	x	x	x			
	3. Implement Colorado River conservation and transfer programs to augment local supply development.	AFY of Colorado River water delivered		x						
	4. Encourage efficient technologies, water conservation, and recharge area protection in rural areas in order to assure a sustainable long-term supply of groundwater.	AFY of groundwater produced or recharged Maintenance or increase of groundwater levels AFY of water conserved Water use audits performed Well meters installed Studies/projects implemented		x		x	x			

Objectives *Specific observable outcomes.*	Targets *Measurable and tangible actions to achieve the objectives.*	Metrics *Measurements that can be used to evaluate the actions – may be quantitative or qualitative.*	IRWM Program	Project Type						
				Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat / Open Space
	5. Develop and implement effective and cost efficient approaches for drinking water source protection.	Studies/projects implemented Improved local water supply quality		x	x	x	x	x	x	x
	6. Protect water supply from invasive Quagga mussels.	Number of sites with Quagga mussels present Amount of Quagga mussels removed, eradicated, or avoided								
Objective F: Construct, operate, and maintain a reliable infrastructure system.	1. Develop facilities and manage supplies to ensure adequate emergency and carry-over deliveries.	AFY of emergency and carry-over supply % of reservoir storage capacity used Increase in operational flexibility		x						
	2. Develop, maintain, and optimize infrastructure and water quality for delivering water, collecting wastewater, capturing stormwater, and transporting storm water and flood flows.	Infrastructure developed Length of conveyance pipe installed Construction or maintenance projects implemented Water quality projects that maintain use of infrastructure		x	x	x	x	x	x	
	3. Encourage innovative approaches to sustain or increase groundwater supplies in rural areas.	AFY of groundwater produced or recharged Infrastructure developed Soil humidity					x			
	4. Create, restore, protect, and maintain habitats that also serve a water resources management function.	Acreage of habitat associated with water resources Acreage of functioning wetlands Volume of transitory flood storage		x				x	x	x
	5. Enable small water systems to effectively construct and maintain their infrastructure.	AFY of supply impacted by project Infrastructure developed Small water systems brought into drinking water compliance Management plans developed		x	x		x			

Objectives *Specific observable outcomes.*	Targets *Measurable and tangible actions to achieve the objectives.*	Metrics *Measurements that can be used to evaluate the actions – may be quantitative or qualitative.*	IRWM Program	Project Type						
				Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat / Open Space
Objective G: Enhance natural hydrologic processes to reduce the effects of hydromodification and encourage integrated flood management.	1. Integrate cost-effective flood management benefits into water supply and water quality projects.	Integrated projects implemented AFY of stormwater captured, treated, or reused		x			x	x	x	x
	2. Enhance or restore healthy hydrologic processes in the Region's watersheds, notably reducing the negative effects of impervious surfaces.	Decrease in peak flow or total runoff Reduction in flood claims Reduction in road closures due to flooding Acreage of impervious surface restored Acreage of functioning wetlands Volume of transitory flood storage						x	x	x
	3. Promote watershed management and land use planning that mitigates or avoids typical hydromodification impacts associated with urbanization.	Policies Acreage of permeable surface protected Acreage of riparian or floodplain buffer protected	x					x	x	x
Objective H: Effectively reduce sources of pollutants and environmental stressors to protect and enhance human health, safety, and the environment.	1. Maintain or improve the water quality entering local reservoirs, groundwater, recharge areas, watersheds, and other local water resources.	AFY flow reduction to ocean outfalls Decrease in pollutant concentrations Pounds of trash removed Pounds of trash prevented from entering water ways Acreage of buffer vegetation planted Strategies employed TMDL implementation plans developed Number of 303(d)-listed water bodies that are de-listed		x	x	x	x	x	x	x

Objectives *Specific observable outcomes.*	Targets *Measurable and tangible actions to achieve the objectives.*	Metrics *Measurements that can be used to evaluate the actions – may be quantitative or qualitative.*	IRWM Program	Project Type						
				Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat / Open Space
		Measured decreases in pollutant concentrations Reduction in MS4 exceedances BMPs implemented								
	2. Implement 3-6 individual groundwater basin plans with stakeholder involvement that adhere to the Salinity/Nutrient Management Guidelines that will assist in the preservation of the quality of the Region's water resources.	Groundwater basin plans implemented		x		x	x		x	x
	3. Develop and implement effective and cost efficient source management strategies to address regionally-significant constituents (e.g., pathogens, nutrients, sediments, solid waste).	Volume of fertilizer/pesticide applied Amount of organic versus chemical fertilizer applied Decrease in sediment transport Decrease in solid waste Strategies employed		x	x	x	x	x		x
	4. Implement wastewater improvements that reduce the frequency and volume of sanitary sewer overflows within the Region.	Number of sewer overflows Reduced beach postings Volume of sewer overflows per mile of pipe			x					
	5. Implement Low Impact Development (LID) practices to reduce non-stormwater runoff.	Decrease in peak flow or total runoff Volume of water retained						x		
	6. Plan and implement stormwater or natural treatment systems on a watershed scale to improve water quality.	Decrease in pollutant concentrations Reduced beach postings Acreage of functioning wetlands						x	x	x
	7. Protect and improve groundwater quality in rural basins to ensure compliance with drinking water standards.	Decrease in pollutant concentrations Compliance with MCLs		x		x	x			

Objectives *Specific observable outcomes.*	**Targets** *Measurable and tangible actions to achieve the objectives.*	**Metrics** *Measurements that can be used to evaluate the actions – may be quantitative or qualitative.*	**IRWM Program**	**Project Type**						
				Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat / Open Space
Objective I: Protect, restore, and maintain habitat and open space.	1. Conserve, protect, and restore habitat, open space, and sensitive species associated with water resources, including functional aquatic, riparian, and wetland habitat and associated buffer habitat.	Acreage of habitat or open space Number of parcels acquired Number of sensitive species with potential to occur on site Presence/ absence of sensitive species		x				x	x	x
	2. Reduce, remove, and control sources of sediment and trash	Pounds of trash diverted Pounds of trash collected Metric for sediment						x		
	3. Remove and control non-native invasive plants that are impacting regional water resources.	Acreage of invasive plants % of native planting survival % percent increase in flow capacity Water resources affected						x	x	x
	4. Monitor, manage, control, and prevent establishment of nuisance aquatic species in the Region.	Water resources affected Increase in operational time due to control		x						x
Objective J: Optimize water-based recreational opportunities.	1. Develop water-based recreational open space that is open to the public and focuses on underserved areas and ensures equal access for disadvantaged communities.	Acreage of open space Number of visitors								
	2. Develop new public access points (boat launch facilities, fishing floats or piers, swim beaches, trails, stairs, parking areas, or similar) to recreational surface waters.	Number of public access points Number of visitors Length of trail Connectivity between existing open spaces		x				x	x	x

Objectives *Specific observable outcomes.*	**Targets** *Measurable and tangible actions to achieve the objectives.*	**Metrics** *Measurements that can be used to evaluate the actions – may be quantitative or qualitative.*	**IRWM Program**	**Project Type**						
				Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat / Open Space
	3. Improve quality of recreation through interpretation, signage, and ADA access.	Number/length of wheelchair accessible trails Number of visitors utilizing interpretation resources Number of interpretive signs Amount of trees and urban forests								
Objective K: Effectively address climate change through adaptation or mitigation in water resource management.	1. Encourage development of cost-effective and energy efficient strategies for water management projects.	kWh of energy offset Efficiency strategies implemented		x	x	x	x	x	x	x
	2. Incorporate adaptation strategies to respond to sea-level rise, rainfall variability, and temperature variability in planning for water and wastewater management.	Adaptation measures implemented		x	x	x	x	x	x	x
	3. Reduce or neutralize GHG emissions and embedded energy or capture GHG emissions in water resource management.	GHG emissions offset or neutralized Mitigation measures implemented		x	x	x	x	x	x	x

2.11 References

California Department of Water Resources (DWR). 2012. *Guidelines: Integrated Regional Water Management, Proposition 84 and 1E*. November 2012. Available: http://www.water.ca.gov/irwm/grants/docs/Guidelines/GL_2012_FINAL.pdf

3 Region Description

The San Diego IRWM Region (Region) as defined by this 2013 IRWM Plan consists of eleven parallel and similar watersheds within the County of San Diego that discharge to coastal waters. Figure 3-1 provides an overview of the Region's watersheds and *Chapter 5, Watershed Characterizations* provides a detailed discussion of the water resources within each watershed. The Region boundaries were selected primarily on the basis of water management regulatory and political jurisdictional boundaries. Other factors that influenced IRWM Plan boundary selection included similarities in hydrology and watershed characteristics and a common imported water supply.

3.1 Region Overview

Population

The Region addressed by this 2013 IRWM Plan includes all but a small fraction of the County's population. Table 3-1 presents existing and projected population within the County and Water Authority service area. Table 3-1 also presents a population breakdown by ethnicity and age. Population within the region is projected to increase by approximately 28% by the year 2030.

Table 3-1 also illustrates that nearly all of the County's population is within the Water Authority service area. The portion of the County's population outside the Water Authority service area is dependent on local groundwater supply.

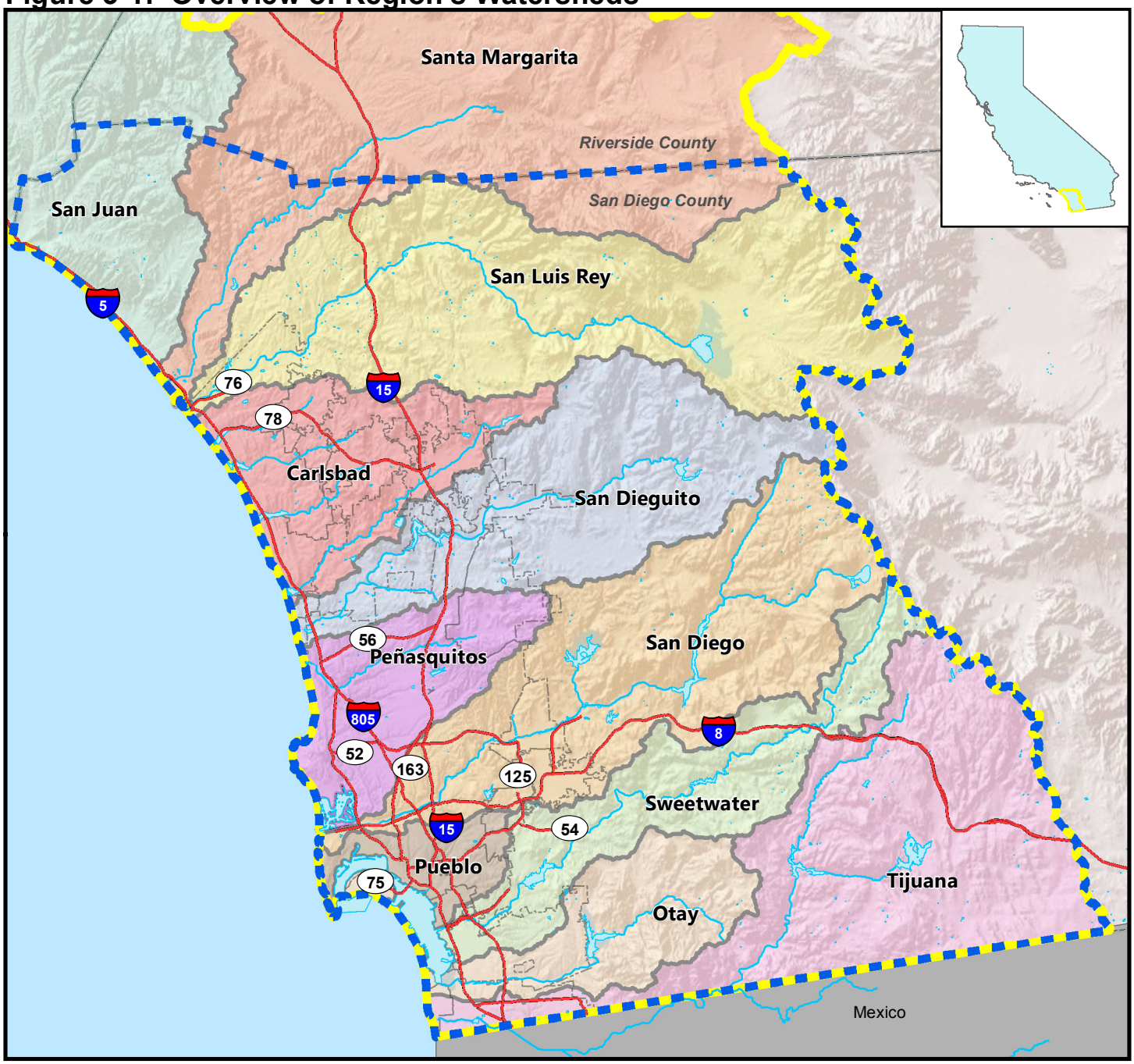
Social and Cultural Makeup

The Region is culturally diverse and features national and ethnic communities from throughout the world, including large and active national and ethnic communities from Mexico, Central and South America, the Caribbean, Africa, Europe, former Eastern bloc nations, the Middle East, India, China, Southeast Asia, and the Pacific Islands.

As shown in Table 3-1, the Region's diverse ethnic groups comprise a majority of the County's population. Population gains are projected within all ethnic communities.

By numbers, Hispanics represent the fastest growing segment of the population, and currently comprise roughly one-third of the Region's population. The Region also features a diverse Asian population that includes large communities that celebrate heritage from China, Southeast Asia, and India. Pacific Islander populations within the County are projected to show the greatest percentage increase in the next twenty years, with populations projected to increase from approximately 25,000 to more than 65,000 by year 2030 (SANDAG, 2010).

Figure 3-1: Overview of Region's Watersheds



Legend

- San Diego IRWM Region
- Funding Area Boundary
- Watershed
- City Boundaries
- Waterbody
- County
- River
- Freeway

N

0 2.5 5 10
Miles

RMC

Source: San Diego Association of Governments (SANDAG) - GIS Data Warehouse
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Table 3-1: Existing and Projected Population

Category	Demographic Parameter	2010	2015	2020	2025	2030	2035
Population (millions)	San Diego County[1]	3,095,313[2]	3,364,191	3,535,000	3,703,824	3,870,000	4,026,131
	Water Authority Service Area[3]	3,007,977[4]	3,271,773	3,438,837	3,599,952	3,758,933	3,906,718
	Percent of San Diego County	NA	97%	97%	97%	97%	97%
San Diego County Population Breakdown by Age[1]	Percent Age 0-19	25%	27%	27%	26%	26%	25%
	Percent Age 20-39	31%	29%	28%	28%	28%	27%
	Percent Age 40-64	32%	32%	31%	29%	28%	28%
	Percent Age 65+	11%	13%	15%	17%	19%	20%
San Diego County Population Breakdown by Ethnicity[1]	Percent White	48%	47%	45%	44%	42%	40%
	Percent Hispanic	32%	32%	34%	35%	37%	39%
	Percent Asian	11%	10%	11%	11%	11%	11%
	Percent Black	6%	5%	5%	5%	5%	5%
	Percent Native American	1.4%	1%	1%	1%	1%	1%
	Percent Pacific Islander	0.6%	1%	1%	1%	1%	1%
	Percent Other/Mixed	4	4%	4%	4%	4%	4%

1 From SANDAG *2050 Regional Growth Forecast* (SANDAG, 2010), except 2010 data. Percent values rounded to nearest 1%.
2 From 2010 U.S. Census (U.S. Census Bureau, 2012).
3 From Water Authority *2010 Urban Water Management Plan* (Water Authority, 2011a), except 2010 data.
4 Calculated based on average percentage of population estimated in Water Authority Service Area from 2015-2035.

The County includes 18 Tribal Nation Reservations, more than any other county in the United States. Native Americans within the Region comprise four tribal groups: the Luiseño, Cupeño, and Cahuilla groups from North San Diego County, and the Kumeyaay/Diegueño tribal group. Only a small percentage of the Region's Native American population of 17,000 lives within the Tribal Reservation lands (SANDAG, 2010). Tribal nations are detailed further in *Chapter 4, Tribal Nations of San Diego County*.

Table 3-2 summarizes language use within the County. As shown in the table, English and Spanish are the dominant languages within the Region. English is the sole language of approximately two-thirds of the population, and more than one-fifth of the population speaks Spanish.

Table 3-2: Culture/Language Use (2010)

Language	Principal Language Spoken at Home	Percent who Speak English Less than "Very Well"
English	63.3%	NA
Spanish	24.6%	11.1%
Other Indo-European	3.0%	0.8%
Asian/Pacific Islander	7.8%	3.6%
Other Languages	1.3%	0.6%
Totals	100%	16.1%

From 2010 U.S. Census for adults over the age of 25 (U.S. Census Bureau, 2012).

Table 3-3 summarizes the range of education within the adult population of the County. Approximately 30% of the adult population has a 4-year college degree, and more than 10% of the population has a graduate degree. Less than 15% of the adult population did not graduate from high school.

Table 3-3: Education (2010)

Highest Level of Education Attained	Percent	Cumulative Percent
Graduate Degree	12.8%	12.8%
Bachelor's Degree	21.4%	34.2%
Associates Degree	8.6%	42.8%
Attended College	23.2%	66.0%
High School Graduation	19.3%	85.3%
Attended High School	7.3%	92.6%

From 2010 Census for adults over the age of 25 (U.S. Census Bureau, 2012).

Housing

Table 3-4 summarizes projected housing units and types within the Region. Approximately 60% of the population resides in single-family units, though the percent of households living in multiple-unit structures is projected to increase in the next 20 years.

Table 3-4: Existing and Projected Housing[1]

Housing within the County[2]	2008	2030	2050	Change 2008 – 2050	
Occupied Units	1,140,654	1,369,807	1,529,090	388,436	34%
Households in Single Family Units (percent of total)	692,382 (61%)	750,022 (55%)	761,699 (50%)	69,317	10%
Households in Multiple Family Units (percent of total)	405,023 (36%)	581,143 (42%)	732,832 (48%)	327,809	81%
Households in Mobile Homes (percent of total)	43,249 (4%)	38,632 (3%)	34,559 (2%)	-8,690	-20%

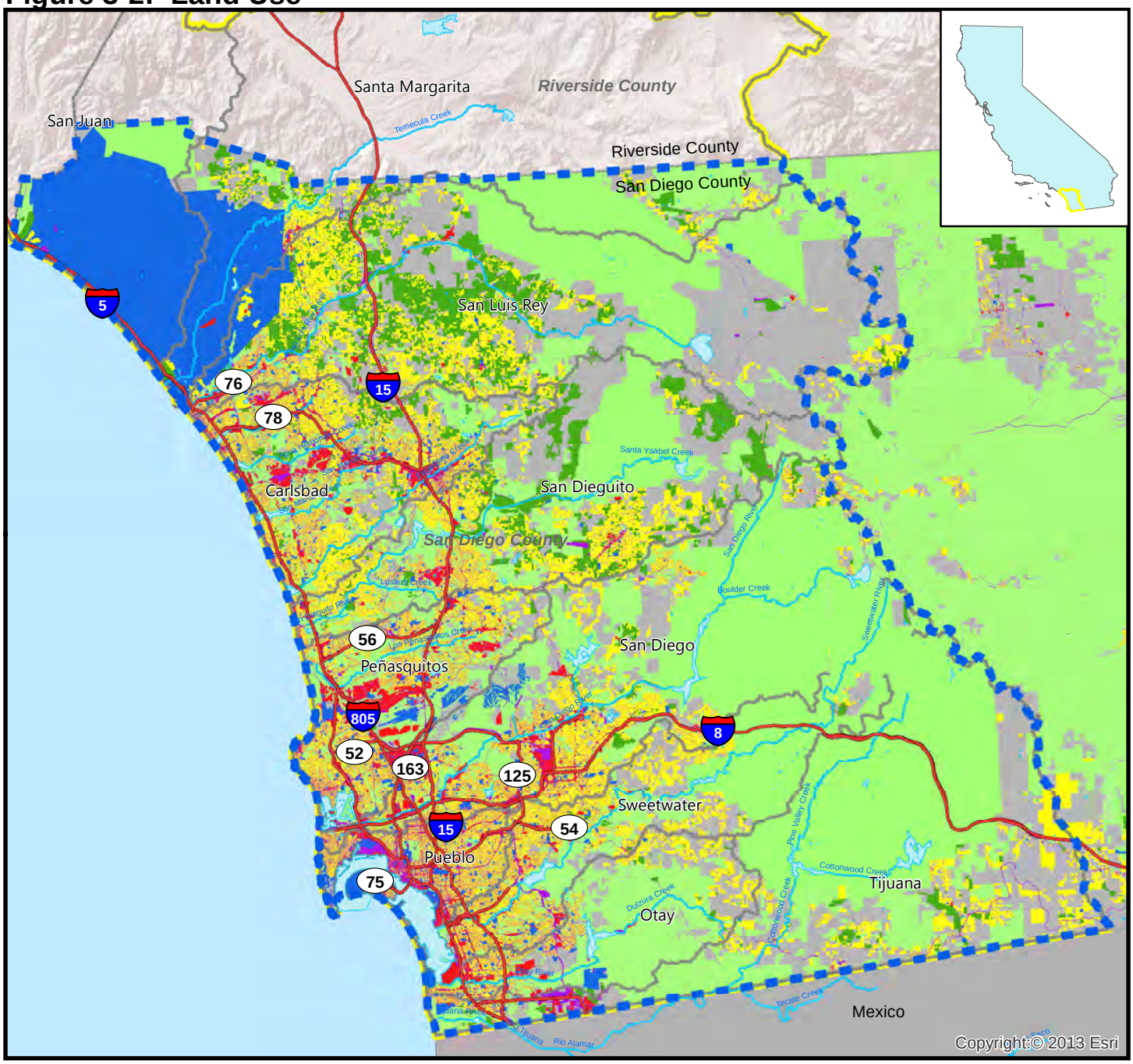
1 From San Diego Association of Governments (SANDAG), *2050 Regional Growth Forecast* (SANDAG, 2010).

2 The Region addressed in this IRWM Plan includes all of the Water Authority Service Area and almost all of the County's population. Only a small fraction of the County's population is within the Colorado River watershed and is outside the Region addressed in this IRWM Plan.

Land Use

Figure 3-2 presents land use within the Region. Table 3-5 summarizes existing and projected land use acreages within the County. Significant residential development within the Region is projected to occur within the next 25 years. Approximately 20% of the County is currently classified as vacant developable land. By year 2035, vacant developable land is projected to decrease to 8% of the total San Diego County land. Residential lands within the County are projected to more than double by year 2050.

Figure 3-2: Land Use



Legend

- Watershed
- San Diego IRWM Region
- Funding Area Boundary
- Ocean
- Waterbody
- County
- River
- Freeway

Land Use

- Residential
- Commercial/Industrial
- Civic/Institutional
- Open Space
- Agricultural
- Other
- Vacant Land

N

0 2.5 5 10
Miles

RMC

Source: San Diego Association of Governments (SANDAG) - GIS Data Warehouse Dec 2012
Parks, Cleveland Nat'l Forest, MCSP & MHPA, SANGIS, Available: http://www.sangis.org/Download_GIS_Data.htm
\\rmcla\RMCLA\Projects GIS\0188-003 SDIRWM Plan Update\MXD\Set 060713\Fig3-2_Land Use 060713.mxd

Table 3-5: Existing and Projected Land Use within the County (Acres)

Land Use	Existing (2008)	2020	2035	2050	Change 2013 - 2050	
Residential	340,586	512,781	650,999	738,576	397,990	116%
Civic/Institutional	157,623	212,812	213,358	214,210	56,587	36%
Commercial/Industrial	39,449	41,446	44,496	48,198	8,749	22%
Other	123,793	131,350	131,267	131,215	7,422	6%
Parks and Open Space	1,443,074	1,390,141	1,390,981	1,392,257	(50,817)	(4%)
Agricultural	112,300	106,544	79,144	57,739	(54,561)	(49%)
Vacant Land	510,382	332,134	216,962	145,013	(365,369)	(71%)
Total	2,727,207	2,727,207	2,727,207	2,727,207	0	0%

Sources: SANDAG, 2012; Personal communication, G. Chung (SANDAG), 2013

Agricultural lands are projected to be reduced by almost half; the percentage of land in the County identified as agricultural in use will fall from 4% to 2%. The agricultural lands shown in Table 3-5 include both irrigated agriculture and non-irrigated (cattle grazing) lands across the entire County. Most irrigated agriculture that occurs within the Region is within the Water Authority's service area. As documented within the Water Authority's *2010 Urban Water Management Plan*, agricultural water demands are projected to decrease as a result of conversion of irrigated agricultural lands to residential uses (Water Authority, 2011a).

The United States military owns more than 6% of the Region's land. Major bases that include significant open space or undeveloped lands include U.S. Marine Corps (USMC) Camp Pendleton, Fallbrook Naval Weapons Annex, and Miramar Air Station. The military acts as a steward of the open space environment and coordinates with local jurisdictions for watershed planning and environmental protection.

Other large federal land holdings within the Region include recreational lands owned and managed by the United States Bureau of Land Management (BLM) and the United States Forest Service (USFS).

Regional Economy

Table 3-6 summarizes projected jobs within the Region. Employment is forecast to increase in line with housing (33% and 34%, respectively) through 2050.

Table 3-6: Existing and Projected Jobs within the County[1]

Jobs within the County[2]	2008	2030	2050	Change 2008 – 2050	
Jobs	1,501,080	1,752,630	2,003,038	501,958	33%

1 From San Diego Association of Governments (SANDAG), *2050 Regional Growth Forecast* (SANDAG, 2010).

2 The Region addressed in this IRWM Plan includes all of the Water Authority Service Area and almost all of the County's population. Only a small fraction of the County's population is within the Colorado River watershed and is outside the Region addressed in this IRWM Plan.

Table 3-7 summarizes the County's Gross Regional Product for the past four years. The County's Gross Regional Product exceeded $155 billion during 2010 (San Diego Regional Chamber of Commerce, 2013). Historically dependent on military spending, the Region's economy has diversified during the past 20 years. The economic recession during 2007 – 2009 resulted in a decline of Gross Regional Product, but has seen gains since 2010. Manufacturing is the largest economic contributor to the local economy, accounting for $25 billion of the Gross Regional

Product. Leading industries within the region include telecommunications, electronics, computers, industrial machinery, aerospace, shipbuilding, biotechnology, and instruments. Currently, 1,400 companies in the region employ nearly 160,000 high technology workers. The telecommunications industry alone contributes more than $5 billion to the local economy each year (San Diego Regional Chamber of Commerce and San Diego County, 2013).

Table 3-7: Gross Regional Product within the County

Year	San Diego County Gross Regional Product[1] ($ billions)	Percent Increase from Prior Year
2007	156.8	-
2008	158.5	1.0%
2009	153.9	-2.9%
2010	155.3	0.9%

1 Gross regional product data from San Diego Regional Chamber of Commerce Economic Research Bureau and County of San Diego (2013).

Tourism is the second largest industry in the Region. In 2012, visitor spending in the County exceeded $7.5 billion. Defense represents the third largest industry, and more than a dozen USMC and Navy bases and support facilities exist within the County.

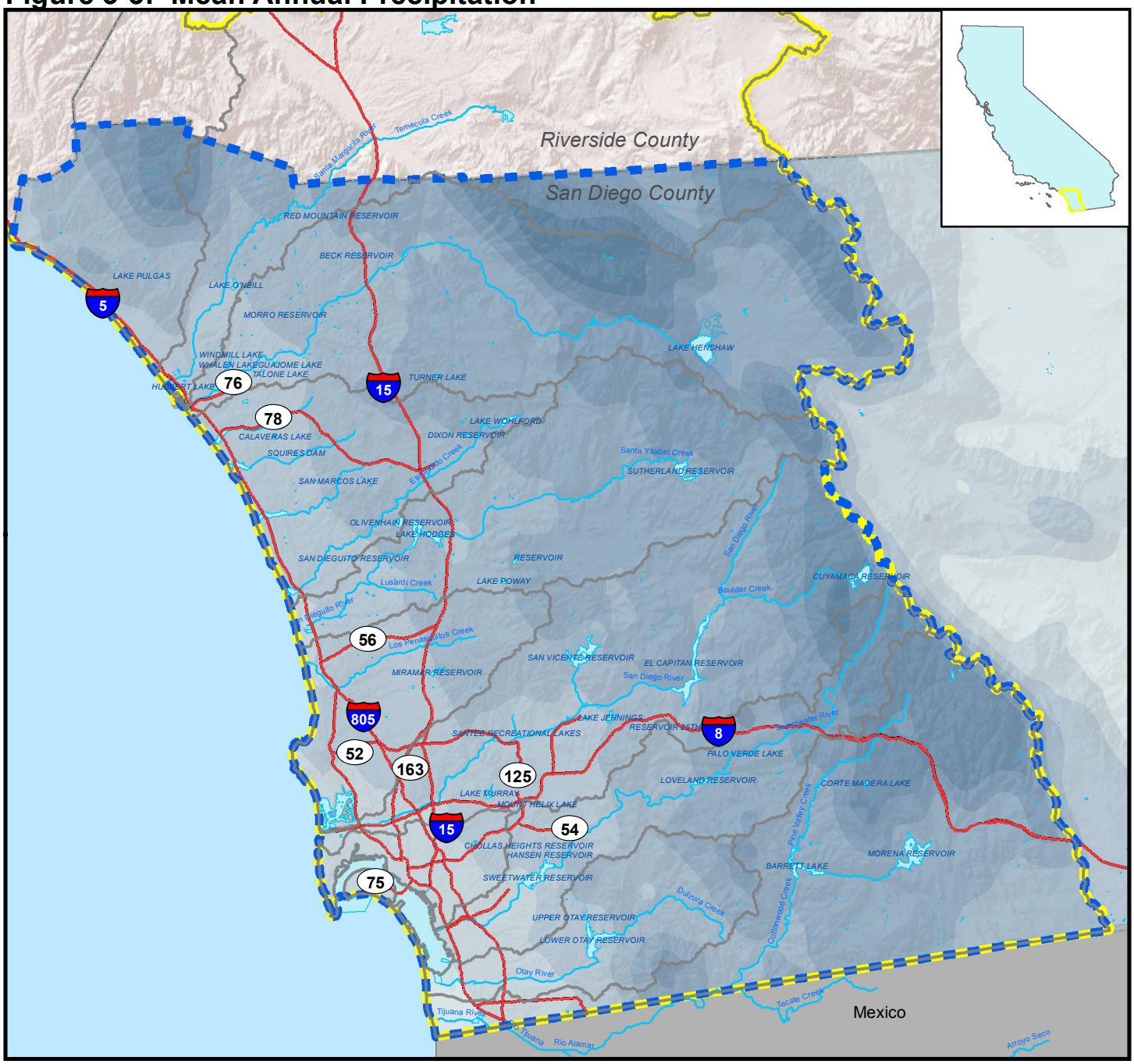
Agriculture ranks as the fourth largest industry in the Region. The 2011 annual crop value within the County (almost all of which is irrigated agriculture) exceeded $1.68 billion. This represents a 2% increase from 2010's total of $1.64 billion. Although the value increased, the acreage devoted to commercial agriculture decreased by approximately 1% (1,927 acres) (San Diego County Department of Agricultural Weights and Measures, 2012). The County has the 18th largest agricultural economy in the country (San Diego County Department of Agricultural Weights and Measures, 2012). With limited precipitation and local water sources, agriculture within the Region is dependent on imported water.

Climate and Precipitation

The Region experiences a Mediterranean climate characterized by mild temperatures year-round at the coast. Inland area weather patterns are more extreme, with summer temperatures often exceeding 90 degrees Fahrenheit and winter temperatures occasionally dipping below freezing. Average annual rainfall is approximately 10 inches per year on the coast, and in excess of 33 inches per year in the inland mountains. More than 80% of the region's rainfall occurs between December and March (Water Authority, 2011a). Figure 3-3 presents the geographic distribution of mean annual precipitation within San Diego County, demonstrating that annual precipitation in the region follows a pattern of increased precipitation with increased elevation.

Significant variation in precipitation also occurs from year to year. Table 3-8 summarizes annual precipitation for a 155-year period at the San Diego Lindbergh Field and City of Escondido precipitation stations. Annual precipitation totals range from more than double the annual mean to less than half the annual mean.

Figure 3-3: Mean Annual Precipitation



Legend

- Watershed
- San Diego IRWM Region
- Funding Area Boundary
- Ocean
- Waterbody
- County
- River
- Freeway

Mean Annual Precipitation (in.)

- 3 to 9 inches
- 9 to 12 inches
- 12 to 15 inches
- 15 to 18 inches
- 18 to 21 inches
- 21 to 24 inches
- 24 to 30 inches
- 30 to 35 inches

N

0 2.5 5 10
Miles

RMC

Source: San Diego Association of Governments (SANDAG) - GIS Data Warehouse
\\rmcsd\RMCSD\Projects GIS\0188-003 SDIRWM Plan Update\AdminDraftMaps\060713_JD\Fig3-3_Mean Annual Precipitation 060713.mxd

Table 3-8: Annual Variation in Precipitation at San Diego Lindbergh Field, 1850-2012

Parameter		San Diego Lindbergh Field, 1850-2011[1]		Escondido, 1875-2012[2]	
		Annual Precipitation (inches)	Percent of Annual Mean	Annual Precipitation (inches)	Percent of Annual Mean
Maximum Observed Value		27.6	279%	32.8	214%
Percentile Values:	5%	17.2	174%	28.0	182%
	10%	15.3	155%	25.3	165%
	25%	11.8	119%	18.7	122%
	50%	9.2	93%	13.8	90%
	75%	7.0	71%	11.3	74%
	90%	5.4	54%	8.1	53%
	95%	4.4	44%	6.7	44%
Minimum Observed Value		3.0	31%	4.4	29%
Mean Annual Value		9.9	---	15.3	---

1 Annual calendar year precipitation at San Diego Lindbergh Field for the period 1850 through 2011. From Western Regional Climate Center (2013).
2 Annual calendar year precipitation at Escondido Station for the period 1875-2012. From Western Regional Climate Center (2013).

While the mean annual precipitation at the Escondido precipitation station is 50% greater than at the San Diego Lindbergh Field station, Table 3-8 demonstrates that both stations exhibit a similar statistical distribution about the mean. This is due to the fact that most of the San Diego winter precipitation occurs as a result of eastward-moving frontal storm systems that affect the entire Region. The mean is skewed by a few years of exceptionally high precipitation; as such, precipitation totals above the annual mean occurred only 45% of the time at the two precipitation stations. San Diego Lindbergh Field precipitation was between 7.0 inches (71% of normal) and 11.8 inches (119% of normal) during approximately 50% of the years, while Escondido precipitation was between 11.3 inches (74% of normal) and 18.7 inches (122% of normal) during 50% of the years. For comparison, the South Coast Hydrologic Region, which includes the San Diego IRWM Region north through Los Angeles and Ventura Counties, averages 16.9 inches of precipitation, while the Sacramento River Hydrologic Region, which includes the City of Sacramento, averages over 37 inches per year (DWR, ND).

While all but a fraction of Region's precipitation occurs during November through April, a significant majority of the potential evaporation (which is approximately equal to the evapotranspiration rate of grass) occurs during summer and autumn months. More than 80% of the potential evaporation occurs during the months of March through October. Potential evaporation within the region ranges from approximately 3.7 feet per year in coastal valleys to more than 4.2 feet per year in inland valleys (DWR, 1986, DWR, 2010).

3.2 Defining Boundaries for the Region

The San Diego Region as defined by this IRWM Plan consists of eleven parallel and similar watersheds within the County of San Diego that discharge to coastal waters. The regional boundaries were selected primarily on the basis of regulatory, jurisdictional, and political boundaries. Other factors that influenced IRWM Plan boundary selection included similarities in hydrology and watershed characteristics, and a common imported water supply.

Appropriateness of Region

The San Diego IRWM Region is appropriate for regional water management. The selected regional boundaries take into account Regional Board jurisdiction, political jurisdictions, physical and hydrologic characteristics, the imported water supply service area, and wastewater service considerations.

Regional Board Jurisdiction

The Region is entirely within the jurisdiction of the San Diego Regional Board (designated as Region 9 among California's Regional Boards). Water quality and wastewater discharges within the Region are regulated by policies and regulations established in the Regional Board's *Water Quality Control Plan for the San Diego Basin* (Basin Plan). Ocean and marine water quality is regulated by policies and regulations established in the Basin Plan (Regional Board, 1994), Ocean Plan (State Board, 2005), and Enclosed Bays and Estuaries Plan (State Board, 1991).

Municipal stormwater runoff within the Region is regulated through a single National Pollutant Elimination Discharge System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit issued by the Regional Board to designated Copermittees. Two of the three RWMG agencies (the County and City of San Diego) comprise the largest land area among the regulated Copermittees.

The Regional Board's jurisdiction includes the southern portions of Orange and Riverside Counties. The IRWM Plan boundaries, however, are limited to the County on the basis of political jurisdictions, development and land use trends, land use regulatory authority, water supply, and stormwater regulation and control (see insert to right).

Political Jurisdictions

The Region is located entirely within the County of San Diego. The County is comprised of five Board of Supervisor Districts, each represented by one elected official. Districts 1, 3, and 4 are entirely within the Region, and approximately the western two-thirds of Districts 2 and 5 are within the Region. Through authorities delegated by the California Department of Public Health (CDPH), the County maintains

Watersheds, Hydrologic Units, Hydrologic Areas, and Watershed Management Areas

A watershed is an area of land that drains downslope to a common point. A hydrologic unit (HU) is a drainage area delineated by DWR that may include one or more individual sub-watersheds. Within this IRWM Plan, 'watershed' refers to HU. An HU is further subdivided into hydrologic areas (HA), each of which may represent one or more sub-watersheds.

The San Diego Region is comprised of eleven DWR-designated HUs, four of which (San Juan, Carlsbad, Peñasquitos, and Pueblo) are comprised of several smaller parallel sub-watersheds that drain to common coastal waters. Seven of the Region's HUs constitute watersheds for the Region's primary rivers: Santa Margarita, San Luis Rey, San Dieguito, San Diego, Sweetwater, Otay, and Tijuana.

The Regional Board defines a watershed management area (WMA) as a drainage area that may include one or more HUs or watersheds. As designated by the Regional Board, three HUs (Pueblo, Sweetwater, and Otay) are combined to form the San Diego Bay WMA. The Peñasquitos HU is comprised of the Mission Bay WMA and the Los Peñasquitos WMA. The Region's remaining seven hydrologic units constitute their own individual WMAs.

local regulatory oversight within the Region on drinking water wells, monitoring wells, small water systems, recycled water use, and the beach recreational water quality program. The County also regulates on-site wastewater systems through an agreement with the Regional Board.

Eighteen incorporated municipalities exist within the Region, including the Cities of Carlsbad, Chula Vista, Coronado, Del Mar, El Cajon, Encinitas, Escondido, Imperial Beach, La Mesa, Lemon Grove, National City, Oceanside, Poway, San Diego, San Marcos, Santee, Solana Beach, and Vista.

Physical and Hydrologic Characteristics

Each of the Region's east-west-trending watersheds flows from elevated regions in the east toward coastal lagoons, estuaries, or bays in the west. Each of the watersheds features similar habitats at similar elevations, and all watersheds share habitat restoration and protection needs. A significant majority of the volume of surface flow in each of the watersheds is comprised of runoff from seasonal precipitation that predominantly occurs during the winter and spring months. Surface flows during summer and fall months are typically low, and consist of urban runoff, agricultural runoff, and surfacing groundwater. Each of the watersheds has similar water quality characteristics and faces similar water quality problems.

Imported Water Supply

Imported water supplied by the Water Authority is the predominant source of supply within the Region. The Region's imported water supply infrastructure crosses watershed and jurisdictional boundaries and requires coordination among local agencies and entities to address water supply, water quality, and habitat issues. This broader perspective promotes funding for regional projects and increases the economy of scale for the Region's local supply development projects.

Wastewater Service

Wastewater generated in the Region is either locally recycled or exported to one of the regional ocean outfall disposal systems. The Region's urban wastewater agencies have organized – both through the formation of JPAs and through interagency contracts – into five multi-jurisdictional wastewater systems based around the Region's five deep-water ocean outfalls. This shared infrastructure requires a high level of collaboration and coordination between local agencies within the Region. Further, the Region's agencies are collaborating with the International Boundary and Water Commission to address trash and wastewater pollution in the shared Tijuana River watershed.

3.3 Disadvantaged Communities

Disadvantaged communities (DACs) are defined by DWR as communities with a combined Median Household Income (MHI) of less than 80% of the statewide MHI (DWR and SWRCB, 2007). The 2012 IRWM Guidelines define DACs based on data from the 2006-2010 American Community Survey. This defines DACs as Census tracts with an MHI of $48,706 (DWR, 2012). The San Diego IRWM Region has refined data, with projections of 2013 MHI by Census blocks, produced by Nielsen-Claritas. Per the Nielsen-Claritas projections, 2013 statewide MHI is $58,724, making the 80% criteria to define DACs as $46,979 (Nielsen-Claritas, 2013). The decrease in statewide MHI from 2010 to 2013 has caused some of the Region's communities to no longer be considered DACs per the State standards; however, due to the Region's concern with addressing the needs of DACs, both the 2010 and 2013 data has been included in this Plan. The DAC information presented in Figure 3-4A and Figure 3-4B and discussed in the following sections represents the best available data on the location and nature of economically disadvantaged communities in the Region and does not constitute final or complete representation of DACs due to the scale of the data available

Additional income survey and other reliable data sources that demonstrate the location and nature of DACs in the Region may be used to further refine the data set and can be used for purposes of justifying grant eligibility based on DAC service areas.

Several communities and rural areas within the Region have an average MHI that is less than 80% of Statewide. The 2013 IRWM Plan uses various geographical designations to analyze DACs, including cities, County of San Diego community planning areas, and City of San Diego community planning areas. However, the use of larger planning areas can at times cause smaller portions of the planning area that are economically disadvantaged to be overlooked. The RWMG recently analyzed MHI values on a Census block basis to identify smaller pockets of DACs for outreach purposes. Figure 3-4A illustrates the community planning areas (CPAs) within the Region that are considered economically disadvantaged according to either the 2010 MHI criteria at tract level and the 2013 projections at block level. Figure 3-4B shows those areas within the City of San Diego that are considered DACs by either the 2010 or the 2013 data. Figure 3-4A also demonstrates the location of DACs with respect to the Water Authority's service area, which is used to distinguish Urban and Rural DACs as described below. Based on the 2010 Census data, eight of the County's 18 incorporated cities are considered DACs or contain DACs; these cities are El Cajon, Imperial Beach, Oceanside, Carlsbad, Escondido, San Marcos, National City, and San Diego. Additionally, based on the same data, 24 of the 58 City of San Diego CPAs and 18 of the 23 County CPAs are considered DACs or contain areas that qualify as DACs (SANDAG, 2013). Analysis of the 2013 data reduces these down to 22 and 13, respectively (Nielsen-Claritas, 2013).

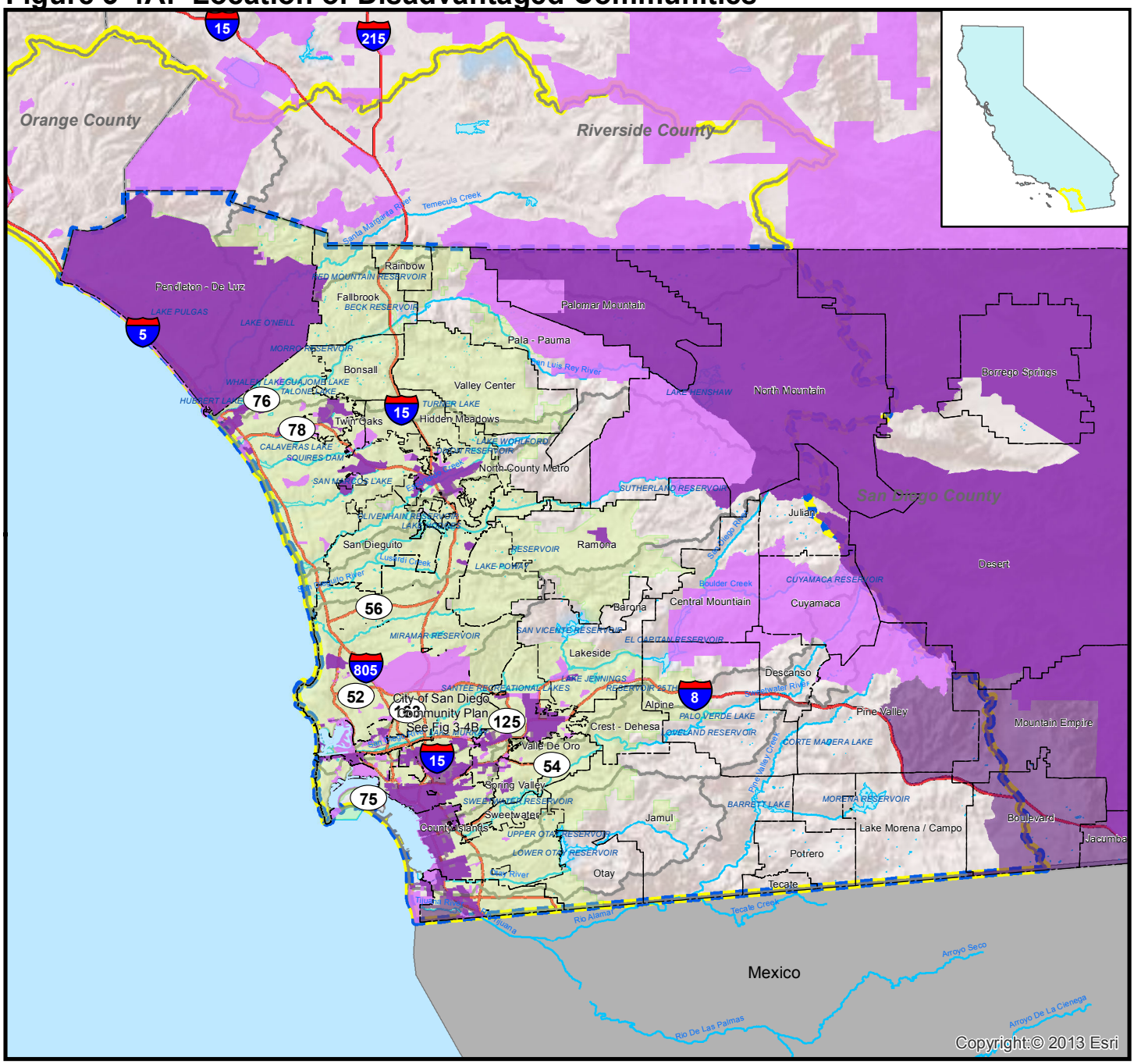
Chollas Creek is a widely acknowledged disadvantaged community with surface water quality issues.

Photo credit: Leslie Reynolds, Groundwork San Diego-Chollas Creek

Table 3-9 summarizes communities (by planning area) within the Region that meet DWR and State Board criteria for designation as DACs. The CPAs shown in the table are all CPAs in the Region that contain at least some DAC areas. Some CPAs are entirely or primarily DAC, while others (denoted by an asterisk) only contain small pockets of DACs. The table also shows how the DAC status for these areas has changed since 2000. The DACs are geographically distributed throughout the Region.

2010 Census data indicated that numerous Census tract neighborhoods in many of the Region's planning areas (both in incorporated and unincorporated areas) have MHIs that are less than 80% of the statewide MHI. Consistent with the recommendations of the *San Diego IRWM Public Outreach and Disadvantaged & Environmental Justice Community Involvement Plan,* actions are underway to outreach and collaborate with DACs throughout the Region.

Figure 3-4A: Location of Disadvantaged Communities



Legend

- 2013 Disadvantaged Communities
- 2010 Disadvantaged Communities
- San Diego County Water Authority
- Community Planning Area
- Watershed
- San Diego IRWM Region
- Funding Area Boundary
- Ocean
- Waterbody
- County
- River
- Freeway

Community Planning Areas (CPA) Containing Disadvantaged Communities (DAC)

Alpine CPA***
Bostonia County/Lakeside CPA***
Central Mountain CPA*
City of Carlsbad***
City of Oceanside***
County Islands CPA
Cuyamaca CPA*
Descanso CPA***
Desert CPA
Fallbrook CPA***
Fallbrook CPA***
Julian CPA
Mountain Empire CPA**
North County Metro CPA*
City of Escondido
City of San Marcos
North Mountain County CPA
Pala-Pauma CPA*
Palomar Mountain CPA
Pendleton-DeLuz CPA
Pine Valley CPA
Ramona CPA***
Spring Valley CPA
Twin Oaks CPA***

*Areas meeting 2010 DAC criteria but not 2013 criteria
**Areas meeting 2013 DAC criteria but not 2010 criteria
***Areas contining small pockets of DAC

N

0 3 6 12
Miles

RMC

Sources: San Diego Association of Governments (SANDAG) - GIS Data Warehouse, 2010 Census Data.
DAC defined as a block group with a median household income (MHI) of less than $48,706 (80% of the Statewide MHI).
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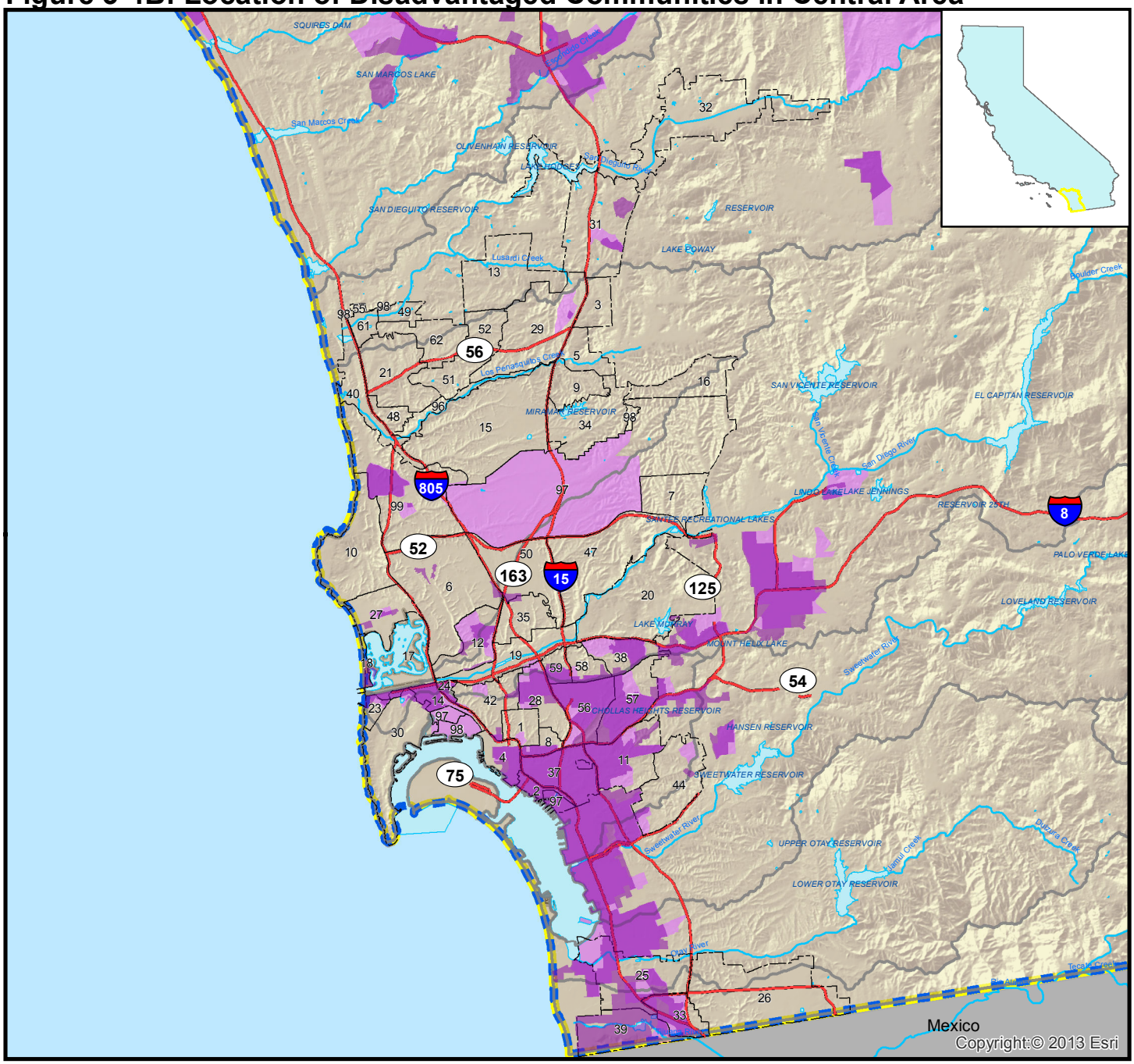
Figure 3-4B: Location of Disadvantaged Communities in Central Area



Legend

- 2013 Disadvantaged Communities
- 2010 Disadvantaged Communities
- Community Plan
- Watershed
- San Diego IRWM Region
- Funding Area Boundary
- Ocean
- City Boundaries
- Waterbody
- County
- River
- Freeway

Community Planning Areas (CPA) Containing Disadvantaged Communities (DAC)

2 - Barrio Logan CPA
6 - Clairemont Mesa CPA***
8 - Greater Golden Hill CPA
9 - Miramar Air Station CPA*
10 - La Jolla CPA***
11 - Encanto CPA
14 - Midway CPA
17 - Mission Bay Park CPA
23 - Pacific Beach CPA***
24 - Old San Diego CPA
25 - Otay Mesa CPA**
29 - Rancho Penasquitos CPA***
31 - Rancho Bernardo CPA***
33 - San Ysidro CPA
37 - Southeastern San Diego CPA
38 - College Area CPA
42 - Uptown CPA***
44 - Skyline-Paradise Hills CPA***
56 - City Heights CPA
57 - Eastern Area CPA
58 - Kensington-Talmadge CPA***
59 - Normal Heights CPA
98 - Harbor CPA
99 - University CPA***

Cities Defined as DACs:

City of National City
City of Imperial Beach*
City of El Cajon

*Areas meeting 2010 DAC criteria but not 2013 criteria
**Areas meeting 2013 DA C criteria but not 2010 criteria
***Areas containing small pockets of DAC

N

0 1.25 2.5 5
Miles

RMC

Sources: Sources: San Diego Association of Governments (SANDAG) - GIS Data Warehouse, 2010 Census Data.
DAC defined as a block group with a median household income (MHI) of less than $48,706 (80% of the Statewide MHI).
\\rmcsd\RMCSD\Projects GIS\0188-003 SDIRWM Plan Update\AdminDraftMaps\060713_JD\Fig3-4B_Location of DACs in SD 060713.mxd

Table 3-9: Economically Disadvantaged Communities

HU[1]	Name[2]	Disadvantaged City or Community Planning Area (CPA)[3]	Jurisdiction	2000 DACs	2010 DACs	2013 DACs
901 902	San Juan Santa Margarita	Pendleton-DeLuz CPA	County	•	•	•
902 903	Santa Margarita San Luis Rey	Palomar Mountain CPA	County		•	•
		Fallbrook CPA*	County		•	•
903	San Luis Rey	North Mountain County CPA	County	•	•	•
		Pala-Pauma CPA	County		•	
903 904	San Luis Rey Carlsbad	City of Oceanside*	City of Oceanside		•	•
		City of Carlsbad*	City of Carlsbad		•	•
904	Carlsbad	North County Metro CPA	County		•	
		Twin Oaks CPA*	County		•	•
		City of San Marcos	City of San Marcos		•	•
		City of Escondido	City of Escondido		•	•
906	Peñasquitos	Miramar Air Station CPA	City of San Diego		•	
		Mission Bay Park CPA	City of San Diego		•	•
		Rancho Peñasquitos CPA*	City of San Diego		•	•
		University CPA*	City of San Diego		•	•
		La Jolla CPA*	City of San Diego		•	•
		Clairemont Mesa CPA*	City of San Diego		•	•
		Pacific Beach CPA*	City of San Diego		•	•
905 906	San Dieguito San Diego	Ramona CPA*	County		•	•
907	San Diego	Bostonia County/Lakeside CPA*	County	•	•	•
		Central Mountain CPA	County		•	
		Julian CPA	County		•	•
		City of El Cajon	City of El Cajon	•	•	•
		Rancho Bernardo CPA*	City of San Diego		•	•
907 908	San Diego Pueblo	Normal Heights CPA	City of San Diego	•	•	•
		College Area CPA	City of San Diego	•	•	•
		Ocean Beach CPA	City of San Diego	•		
		Midway CPA	City of San Diego	•	•	•
		County Islands CPA	County		•	•
		Old San Diego CPA	City of San Diego	•	•	•
		Kensington-Talmadge CPA*	City of San Diego		•	•
907 909	San Diego Sweetwater	Alpine CPA*	County		•	
		Cuyamaca CPA	County		•	
		Descanso CPA*	County		•	
908	Pueblo	Barrio Logan CPA	City of San Diego	•	•	•
		Centre City CPA	City of San Diego	•		
		Spring Valley CPA	County		•	•
		City Heights CPA	City of San Diego	•	•	•
		Eastern Area CPA	City of San Diego	•	•	•
		Greater Golden Hill CPA	City of San Diego	•	•	•
		Greater North Park CPA	City of San Diego	•		
		Encanto CPA	City of San Diego	•	•	•
		Lindbergh Field CPA	City of San Diego	•	•	
		Southeastern San Diego CPA	City of San Diego	•	•	•
		Uptown CPA*	City of San Diego		•	•
908 909	Pueblo Sweetwater	City of National City	City of National City	•	•	•
		Skyline-Paradise Hills CPA*	City of San Diego		•	•

HU[1]	Name[2]	Disadvantaged City or Community Planning Area (CPA)[3]	Jurisdiction	2000 DACs	2010 DACs	2013 DACs
910 911	Otay Tijuana	City of Imperial Beach	City of Imperial Beach	•	•	•
		Otay Mesa - Nestor CPA	City of San Diego		•	•
911	Tijuana	San Ysidro CPA	City of San Diego	•	•	•
		Mountain Empire CPA	County	•		•
		Desert CPA	County		•	•
911 909	Tijuana Sweetwater	Pine Valley CPA	County		•	•
80% Statewide Median Household Income				*$37,520*	*$48,706*	*$46,979*

1 Numerical watershed (hydrologic unit) designation per Regional Water Quality Control Board (1994) and California Department of Water Resources *Hydrologic Data* (Bulletin 130).

2 Some planning areas fall within multiple watersheds

3 * denotes a CPA that contains small pocket(s) of DAC

DAC advocates have indicated that additional efforts to validate DACs in the Region are necessary, because U.S. Census data is often unable to capture the true economic conditions of various communities in San Diego County, particularly those communities with a high number of undocumented residents, tribal communities, or other residents that may not participate in providing information to the U.S. Census. For the 2013 IRWM Plan, this effort included using 2013 MHI projections on a Census block level for a refined understanding of DAC areas. Areas that may no longer qualify as DACs per the 2013 data, but are considered DACs with the 2010 data, remain areas of concern and will continue to be included in outreach efforts associated with the IRWM Program.

DAC Assistance

The RWMG has worked directly with many organizations that are involved with addressing water-related issues of DACs and environmental justice (EJ) communities within the Region, including: San Diego Coastkeeper, Environmental Health Coalition, Rural Community Assistance Corporation (RCAC), Jacobs Center for Neighborhood Innovation, Groundwork San Diego-Chollas Creek, WildCoast, and others. Outreach has focused on identifying DAC issues, needs, and concerns, as well as ensuring DAC and EJ representation on the RAC.

Within the San Diego IRWM Region, DACs are typically classified as either an Urban DAC – those DACs that are located within the Water Authority's service area (with municipal water and wastewater service), or a Rural DAC – those DACs that exist outside the bounds of a city or are not served by a Water Authority member agency. This distinction aids planners in addressing the true needs of DACs in the Region, as Rural DACs and Urban DACs face different issues and challenges. Some areas are rural in nature due to their distance from the Region's urban core, although they are served by large public water systems and therefore have characteristics of both Rural and Urban DACs. One such community, which includes Ramona, is provided water services by Ramona MWD, a Water Authority member agency.

In 2010, 2012, and 2013, targeted outreach to DACs was undertaken by the RWMG. The purpose of this outreach effort was to develop an understanding of the water needs in DACs within the Region, and increase awareness of IRWM funding opportunities.

Urban DACs Issues and Needs

As described above, Urban DACs fall within the service area of a water or wastewater agency. Of the communities in the Region that have been identified as DACs using both 2010 and 2013 data, the majority are Urban DACs. These include:

- Miramar Air Station CPA*
- Mission Bay Park CPA
- City of El Cajon
- Normal Heights CPA
- Old San Diego CPA
- Barrio Logan CPA
- Eastern Area CPA
- College Area CPA
- Midway CPA
- Twin Oaks CPA†
- North County Metro CPA*
  - City of Escondido
  - City of San Marcos
- Bostonia County/Lakeside CPA†
- City of Oceanside†
- City of Carlsbad†
- Pacific Beach CPA†
- Rancho Bernardo CPA†
- Uptown CPA†
- City Heights CPA
- Encanto CPA
- Lindbergh Field CPA*
- Southeastern San Diego CPA
- City of National City
- City of Imperial Beach
- San Ysidro CPA
- Otay Mesa-Nestor CPA**
- Greater Golden Hill CPA
- Ramona CPA†
- Spring Valley CPA
- County Islands CPA
- Fallbrook CPA†
- Rancho Peñasquitos CPA†
- University CPA†
- La Jolla CPA†
- Clairemont Mesa CPA†
- Kensington-Talmadge CPA†
- Skyline-Paradise Hills CPA†

** Area meeting 2010 DAC criteria but not 2013 criteria*
***Area meeting 2013 DAC criteria but not 2010 criteria*
†CPA containing only a small pocket(s) of DAC

Because Urban DACs are located within water agency service areas, their water resources needs are generally centered around community development and surface water quality issues, rather than drinking water quality or drinking water supply issues, as they receive safe drinking water through their water agency. DWR's definition of a critical water supply or water quality need of a DAC often fails to encompass what the Urban DACs (and their relevant planning agencies) consider a critical water supply or water quality need. Therefore it can be challenging to obtain funding for Urban DAC water projects, as they often do not qualify for the funding match waivers frequently provided for DAC projects. While Urban DACs in the Region receive safe drinking water from local water agencies, increases in water rates (refer to Section 3.10 for more information) can have a disproportionate impact on DAC residents, because they tend to spend a larger percentage of their income on water compared to those in higher-income communities. .

During rain events, Urban DACs often suffer from flooding due to creek constrictions, which can result from inadequately-sized drains and culverts, vegetation overgrowth (particularly *Arundo donax*), creek realignment, pollution, or illegal dumping. Urban DAC areas are also prone to flooding due to high runoff from impervious surfaces associated with urbanization and the typical lack of parks or other non-paved recreation areas in Urban DACs. In order to improve surface permeability while not restricting economic growth potential in Urban DACs, more assistance is necessary for de-channelization, hydro-modification, and to implement Low Impact Development (LID) projects to reduce stormwater runoff and associated flooding. These projects could also be used as an

Illegal dumping in creeks and watersheds is a common problem faced by Urban DACs.

Photo credit: Leslie Reynolds, Groundwork San Diego-Chollas Creek

Water quality concerns in urban creeks can result from illegal dumping, invasive species, and stormwater runoff.

Photo credit: Leslie Reynolds, Groundwork San Diego-Chollas Creek

opportunity to provide increased access to recreational areas, which is sorely lacking in most Urban DACs.

The high volume of stormwater runoff also contributes to the poor surface water quality in Urban DACs, as it is often polluted and drains directly into creeks. Although many of the residents of Urban DACs are aware of the pollution problems, and TMDLs have been developed for some streams that traverse Urban DACs, challenges remain.. For example, while TMDLs for metals and bacteria in Chollas Creek have been developed, illegal dumping (especially of large trash items such as mattresses) in creeks and watersheds is a common problem that causes water quality issues in Urban DACs. A large-trash collection program would help reduce these incidents and the public health and safety hazards they often represent. Watershed stakeholders have reported that homelessness presents water quality issues throughout the Region, especially in homeless encampments located alongside the Region's water bodies that are prone to becoming a place for trash and other illegally-dumped items to accumulate.

Pollution of San Diego Bay waters also substantially impacts Urban DACs, many of which are located adjacent to the Bay, near industrial areas. Bay pollution from industry, runoff, and other activities has negatively impacted subsistence fishermen, many of whom are residents of Urban DACs. Additionally, insufficient water quality monitoring has been completed in the San Diego Bay wetlands, again located near or in Urban DACs, to understand and address water quality issues. Low-lying Urban DACs near the Bay will also suffer disproportionately from the effects of sea level rise as a result of climate change. These areas will be more susceptible to floods and inundation from storm surges, which are anticipated to be larger and more frequent.

One of the biggest issues facing Urban DACs is food security. Food security is one of the highest priorities in these areas and must be addressed before full DAC involvement in other issues, including water quality. However, some urban DACs use community gardens to help offset food needs, and irrigation costs may impact their ability to care for such gardens.

Urban DACs, like their rural counterparts, frequently lack the financial and technological resources to design, implement, operate, and maintain water projects. Because of this, they require financial assistance for project implementation, particularly to support ongoing operation and maintenance (O&M) costs. Non-governmental organizations (NGOs) that propose projects in Urban DACs should consider the long-term stewardship of the projects in question, and determine post-project ownership of any acquired land at the outset of the projects, to ensure the resources necessary to achieve the long-term benefits associated with the projects. For creek restoration projects, or those projects that improve recreational or access opportunities, public safety should always be considered. In Urban DACs, there may be a need for additional park rangers or security officers to ensure public safety in recreation areas.

Effective water conservation, watershed, and stormwater management outreach and education is lacking in Urban DACs. In order to be most effective, outreach and education efforts should come from the community or peers, rather than top-down through an agency. Outreach efforts should also aim to raise awareness of the existence of surface waters in Urban DACs, which will assist in improving stewardship of these resources. These efforts should be tailored to the community and be multilingual.

Priority projects in Urban DACs include those with education, creek restoration, passive recreation, hydro-modification, stormwater management/pollution prevention, public safety, and those that address sea level rise adaptation components.

Rural DACs

Rural DACs are located outside of the jurisdictional boundaries of the Region's water and wastewater agencies, and are not provided municipal water supply or wastewater infrastructure. Of the communities in the Region that have been identified as DACs using both the 2010 and 2013 data, the following are Rural DACs:

- North Mountain County CPA
- Pala-Pauma CPA*
- Palomar Mountain CPA
- Pendleton-DeLuz CPA
- Pine Valley CPA
- Mountain Empire CPA**
- Alpine CPA*†
- Central Mountain CPA*
- Cuyamaca CPA*
- Descanso CPA*†
- Julian CPA
- Desert CPA

** Area meeting 2010 DAC criteria but not 2013 criteria*
***Area meeting 2013 DAC criteria but not 2010 criteria*
†CPA containing only a small pocket(s) of DAC

It should be noted that more rural communities may be designated as DACs following additional efforts that may be taken to characterize DACs in the Region.

Unlike Urban DACs, Rural DACs are not consistently supplied with a safe source of drinking water. Due to infrastructure, source water quality, and other issues, the primary water-related concern of Rural DACs is meeting drinking water needs with a safe, reliable source of drinking water. Rural DACs often lack access to much-needed infrastructure and financing, as well as the resources to adequately maintain existing system facilities. As a result, drinking water systems in Rural DACs often face significant challenges in complying with longstanding and new drinking water rules (EPA 2007).

Three major problems that impede the sustainability of small community water systems include:

1) contamination of drinking water source water from wastewater intrusion, agricultural influences, naturally occurring contaminants, and/or contaminant spills from industrial activities;
2) seasonal weather changes resulting in floods or droughts may require design options to bypass treatment during rain and storm events and identification of alternative water supplies (including water reuse sources) to increase capacity during droughts; and
3) deteriorating collection and distribution systems compromise source water quality and increase the cost of water treatment.

Rural communities within the San Diego IRWM Region's unincorporated areas have water supply and water quality issues that may be exacerbated by climate change, poor economies, and lack of community expertise. Inadequate water supply to support existing communities is a public health risk, especially considering that the rural portions of the Region are also those that are particularly susceptible to wildfires. The majority of drinking water maximum containment level (MCL) violations in the Region occur with small public water systems, and inadequate wastewater treatment can result in unplanned discharge events.

The infrastructure needs of Rural DACs are so extensive that there is not enough currently available funding to meet the needs of Rural DACs throughout the Region. CDPH has 41 small (less than 10,000 population) systems located in San Diego County on its 2013 State Revolving Fund (SRF) Priority Project List, with many systems listed for multiple improvements (CDPH 2013). The State Board has a similarly lengthy list of communities requesting funding from the Clean Water SRF for wastewater improvements. Additional challenges to obtaining funding for Rural DAC projects includes a regulatory burden that is often too difficult for Rural DACs to meet and difficulties in providing matching funds, both of which cause DAC projects to look unfavorable when compared to non-DAC projects during consideration for funding.

Aging storage tanks can lead to contamination of rural water supplies.

Photo credit: Dave Harvey, Rural Community Assistance Corporation

Rural DACs in the San Diego IRWM Region are faced with critical water supply issues in that some areas have inadequate water supplies to support existing connections. Rural DACs also face water quality issues associated with costs as it is costly to provide supplemental treatment processes to improve the water quality of contaminated drinking water source waters, and it is also difficult for small DAC systems to afford improvements because they have fewer ratepayers to share the costs. Further, Rural DACs may lack the technical expertise and financial stability to access funding programs that could be implemented to address cost-related issues. Because of the lack of internal capacity for small water systems, a supporting agency should provide capacity (such as engineering) to support necessary improvements for Rural DAC systems. The lack of technical

capacity and support from agencies also contributes to the high cost of DAC projects through an inability to adequately perform O&M activities during the life of a system.

Some of the other issues facing Rural DACs include groundwater contamination, potentially from leaking septic tanks. Leaking or improperly sited septic tanks also pose a public health hazard, though the conversion from septic to sewer is expensive, and Rural DACs often struggle to find assistance in funding such projects. The San Dieguito and San Diego groundwater basins have experienced contamination, as has the Otay/San Diego Formation, which is being considered by U.S. Geological Survey (USGS) for groundwater use. As described above, small water systems often lack the ability to treat contaminated water with a supplemental treatment process. Drinking water supplies for some Rural DACs have also been contaminated with ash from recent wildfires. It is anticipated that the projected increase in wildfire frequency and intensity resulting from climate change will inordinately affect Rural DACs, which are more likely to be located near fire-prone areas and less likely to have the ability to defend against fires. Some Rural DACs lack sufficient water supplies for fire protection, further increasing the danger.

Illegal dumping, especially of chemicals or hazardous wastes in creeks and watersheds, is a common problem reported in Rural DACs. Awareness of existing programs such as the County's permanent Household Hazardous Waste Collection Facilities in Ramona and El Cajon and the County's collection events that travel throughout unincorporated areas of the County can help to reduce illegal dumping and associated water quality impacts.

To meet the needs of Rural DACs, the San Diego IRWM Region will need to identify solutions that recognize that the needs of Rural DACs differ from those of Urban DACs. In order to be most effective, the Region may develop and implement targeted, multilingual outreach to Rural DACs that is tailored to the community being addressed. Finally, appropriate support must be provided to enable Rural DACs to develop projects, secure funding for projects, and properly operate and maintain their systems.

Community Support for DACs and Environmental Justice Communities

The U.S. EPA defines Environmental Justice as:

> *…the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies…It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.*

In addition to the efforts of the San Diego IRWM Program, a variety of organizations in the IRWM Region work to address the needs of DACs and EJs:

San Diego Coastkeeper

The San Diego Coastkeeper's mission is to protect and restore fishable, swimmable, and drinkable waters in San Diego County. Coastkeeper enhances public awareness of water quality and other water-related issues through their extensive community outreach and participation program that involves hands-on stewardship activities such as beach cleanups and water quality sampling.

Rural Community Assistance Corporation

The Rural Community Assistance Corporation (RCAC) focuses its San Diego-based efforts in the rural portions of the Region that generally do not receive municipal water or wastewater services.

RCAC completes a variety of work to address the needs of DACs and EJs, including providing technical assistance, training, and funding support.

California Rural Water Association

California Rural Water Association (CRWA) works to provide on-site technical assistance and specialized training for rural water and wastewater systems. Similar to RCAC, CRWA focuses its work on the rural portions of the Region that do not receive municipal water or wastewater.

Environmental Health Coalition

The Environmental Health Coalition (EHC), founded in 1980, is a community-based organization founded in Barrio Logan, an Urban DAC. It works to achieve environmental and social justice through leader development, organizing, and advocacy. EHC focuses on green energy and jobs, healthy kids, border environmental justice, and toxic-free neighborhoods.

Groundwork San Diego

Groundwork San Diego–Chollas Creek works with the communities surrounding Chollas Creek to improve the creek and communities. It strives to create opportunities for people to learn new skills and take action, help businesses grow, and create safer and healthier neighborhoods. It achieves these goals through three overarching programs: 1) Environmental education, 2) Clean creeks and healthy habitats, and 3) Thriving communities.

Jacobs Center for Neighborhood Innovation

The Jacobs Center for Neighborhood Innovation seeks to create community change by teaming up with residents in under-invested communities. It seeks to empower residents to take ownership of the change they wish to see in their communities, and provide financial, technical, and other forms of support. The Jacobs Center works in Chollas View, Emerald Hills, Lincoln Park, Mountain View, Mount Hope, North Encanto, Oak Park, South Encanto, Valencia Park, and Webster.

Jacobs Center for Neighborhood Innovation serves an important role in improving creek conditions in Southeast San Diego.

Photo credit: Charles Davis, Jacobs Center for Neighborhood Innovation

Civic San Diego

Civic San Diego is a public non-profit founded by the City of San Diego following the dissolution of the Redevelopment Agency of the City of San Diego in 2012. Its main responsibility has been the redevelopment and subsequent revitalization of Downtown San Diego, though it also works in the surrounding neighborhoods, including four Urban DACS: Barrio Logan, City Heights, Southeastern, and San Ysidro.

3.4 Watersheds

As shown in Figure 3-1, the Region addressed in this IRWM Plan is comprised of eleven watersheds that are tributary to coastal waters. Table 3-10 summarizes the characteristics of the eleven watersheds, which are described in greater detail in *Chapter 5, Watershed Characterizations*.

3.5 Water Management Systems

This section includes an overview of the various water management systems in the San Diego IRWM Region, including water supply, wastewater, water reuse, stormwater, and flood control.

Table 3-11 presents a breakdown of member agency water supplies from 2010-2011. Approximately 21% of the overall regional supply was from local sources (groundwater, local surface water, and recycled water). A total of 10 member agencies use local surface water sources, of these nine develop potable supplies from the local surface waters, and 10 member agencies develop local groundwater supplies. Additionally, 16 of the 24 Water Authority member agencies provide recycled water supply for irrigation purposes and other non-potable uses within their respective service areas.

Local hydrologic conditions (precipitation, evaporation, and surface flows) influence both the quantity of water demand and the availability of local supplies within the Region. Total water use can also be influenced by local economic conditions, which contributed to the reduction in demands between 2007 and 2012. Table 3-12 summarizes the variation in Region's local water supplies from 1999-2011.

Water Supply outside Water Authority Service Area

All but a small fraction of the Region's 3.1 million residents live within the Water Authority's service area (refer to Table 3-1). Rural residences and small communities that exist outside the Water Authority service area are entirely dependent on groundwater resources, and rely exclusively on individual groundwater wells or community water wells operated by small community water systems or private water companies.

While the Region's groundwater-dependent population is relatively small (compared to the population served by the Water Authority), the population is spread over a significant geographic portion of the Region. The availability of groundwater in the portion of the Region that lies east of the Water Authority's service area is limited by (1) available precipitation recharge, (2) recharge infiltration limitations, (3) low aquifer yields, and (4) limited groundwater storage capacity. The majority of this area is underlain by fractured rock aquifers. Such aquifers typically have well yields no more than several gallons per minute. Shallow alluvial valleys exist along several of the river and stream valleys in portions of the eastern section of the Region. Groundwater production from these shallow aquifers, however, is constrained by the limited aquifer storage. Overall, the groundwater-limiting factors listed above severely limit the potential of additional growth and development in this area of the County.

Table 3-10: Summary of the Region's Watersheds[1]

HU[2]	Name	Watershed Area (sq. miles)	Primary Watercourses or Hydrologic Areas	Approximate Length[3] (miles)	Elevation Range[4] (feet MSL)	Primary Tributaries
901	San Juan	150[5]	San Mateo Creek San Onofre Canyon Las Pulgas Canyon	21	0 - 3575	Coastal estuaries/marshes Pacific Ocean
902	Santa Margarita River	200[6]	Santa Margarita River	55	0 – 6190	Santa Margarita Estuary Pacific Ocean
903	San Luis Rey River	558	San Luis Rey River	52	0 – 6530	San Luis Rey River Mouth Pacific Ocean
904	Carlsbad	210	Loma Alta Creek	8	0 – 460	Loma Alta Slough Pacific Ocean
			Buena Vista Creek	11	0 – 1670	Buena Vista Lagoon Pacific Ocean
			Encinas HA	4	0 - 350	Pacific Ocean
			Aqua Hedionda Creek	10	0 – 1300	Agua Hedionda Lagoon Pacific Ocean
			San Marcos Creek	14	0 – 1670	Batiquitos Lagoon Pacific Ocean
			Escondido Creek	24	0 – 2330	San Elijo Lagoon Pacific Ocean
905	San Dieguito River	346	San Dieguito River	42	0 – 5720	San Dieguito Lagoon Pacific Ocean
906	Peñasquitos	100	Los Peñasquitos Creek Rose Creek Tecolote Creek	18	0 – 2700	Los Peñasquitos Lagoon Mission Bay
907	San Diego River	440	San Diego River	44	0 – 6510	San Diego River Estuary Pacific Ocean
908	Pueblo	60	Chollas Creek	8	0 – 830	San Diego Bay Pacific Ocean
909	Sweetwater River	230	Sweetwater River	41	0 – 6510	Sweetwater River Estuary San Diego Bay
910	Otay River	160	Otay River	23	0 – 3720	San Diego Bay
911	Tijuana River	470[11]	Tijuana River	47	0 – 6380	Tijuana River Estuary Pacific Ocean

1 Adapted from basin descriptions presented in Comprehensive Water Quality Control Plan Report (Regional Board, 1976).
2 Numerical watershed (hydrologic unit) designation per Regional Water Quality Control Board (1994) and California Department of Water Resources *Hydrologic Data* (Bulletin 130).
3 Approximate distance of eastern end of the watershed to the Pacific Ocean.
4 Approximate range of elevation in feet above mean sea level (MSL) within the watershed.
5 The San Juan Watershed comprises approximately 476 square miles. The lower 150 square miles of this watershed is within the County and the Region addressed within this IRWM Plan; this area includes four hydrologic areas: San Mateo, San Onofre, Las Pulgas, and Stuart Mesa. The upper portion of the watershed lies within Orange County and is addressed by that Region's IRWM Plan.
6 The Santa Margarita River Watershed area is approximately 750 square miles. The lower 200 square miles of this watershed is within the County and the Region addressed within this IRWM Plan. The remainder of the Santa Margarita River Watershed lies within Riverside County, and includes the communities of Temecula and Murrieta.
7 The Tijuana River Watershed is approximately 1,750 square miles; approximately 27% of the land area is within the Region.

While some community well systems outside the Water Authority's service area maintain records of overall water production, very few wells are required to be metered for production. As a result, it is difficult to estimate the overall quantity of water supplies used. The low-density residential population in this area uses a small fraction of water when compared to the overall Water Authority supply. However, non-residential water use within this area (e.g. agriculture, golf courses, campgrounds, resorts, retreat centers, public parks, casinos, hotels, and industrial uses) can represent a sizable demand on available groundwater resources.

Table 3-11: Member Agency Water Supply – Water Authority Service Area

Water Authority Member Agency	2011 Water Supply[1] (Acre-feet per Year)			Percent of Supply from Local Sources	Source of Member Agency Local Supply		
	Total Agency Supply	Water Authority Imported Supply	Member Agency Local Supply[2]		Recycled Water	Local Surface Water	Ground-water
Carlsbad MWD	19,231	15,830	3,401	17.69%	●		
City of Del Mar	1,151	1,088	63	5.46%	●		
City of Escondido	23,355	13,307	10,049	43.02%	●	●	
Fallbrook PUD	12,158	11,649	508	4.18%	●	●	
Helix Water District	31,811	20,666	11,145	35.04%		●	●
Lakeside Water District	3,910	3,251	659	16.85%			●
City of National City[3]	6,685	1,685	5,000	74.79%		●	●
City of Oceanside	26,193	21,559	4,635	17.69%	●		●
Olivenhain MWD	20,958	18,440	2,518	12.02%	●		
Otay Water District	33,710	29,861	3,849	11.42%	●		
Padre Dam MWD	12,168	11,459	709	5.83%	●		
Camp Pendleton	9,244	838.6	8,406	90.93%	●		●
City of Poway	11,181	10,603	578	5.17%	●		
Rainbow MWD	18,608	18,608	0	0.00%			
Ramona MWD	6,522	5,808	714	10.94%	●	●[4]	●
Rincon Del Diablo MWD	8,142	5,770	2,371	29.12%	●		
City of San Diego	189,393	161,552	27,842	14.70%	●	●	●
San Dieguito Water Dist.	6,863	1,901	4,962	72.30%	●	●	
Santa Fe Irrigation Dist.	9,475	4,102	5,373	56.71%	●	●	
South Bay Irrigation Dist.[3]	14,136	5,344	8,792	62.20%		●	●
Vallecitos Water District	15,412	15,412	0	0.00%			
Valley Center MWD	26,100	25,674	426	1.63%	●		
Vista Irrigation District	17,916	10,818	7,097	39.61%		●	●
Yuima MWD	2,623	1,619	1,004	38.29%			●
Totals	526,945	416,844	110,101	20.89%			

1 From Water Authority Annual Report for Fiscal Year 2010-2011 (Water Authority, 2011b).
2 Includes local recycled water, surface water, and groundwater supplies. Does not reflect conserved water. Also does not include groundwater pumped by private well owners or surface water outside the Water Authority's service area.
3 Local water supply is from Sweetwater Authority (a joint powers agency comprised of the South Bay Irrigation District and City of National City).
4 Ramona MWD uses local surface water along with imported raw water for irrigation customers. Ramona MWD currently does not treat local surface water for potable use.

3.5.1 Imported Water

The Water Authority purchases imported water from three main sources: the Metropolitan Water District of Southern California (Metropolitan), conserved agricultural water from the Imperial Irrigation District (IID), and conserved water from projects that lined the All-American and Coachella Canals. The Water Authority has also acquired spot water transfers to offset reductions in supplies from Metropolitan during water shortage years.

Metropolitan is Southern California's wholesale water agency, and the Water Authority is the largest customer among Metropolitan's 26 member agencies. Metropolitan derives its water supply from two sources: the Colorado River and the State Water Project (SWP). Metropolitan owns and operates the Colorado River Aqueduct to deliver Colorado River water to Southern California. Metropolitan is the largest of the State Water Contractors that receive supplies from the SWP. SWP water (originating from the Bay Delta) is delivered to Metropolitan via the California Aqueduct.

In 1998, the Water Authority entered into a transfer agreement with IID to purchase conserved agricultural water. Through the agreement, the Water Authority received 70,000 acre-feet (AF) in 2010 and will receive an annually-increasing volume up to 200,000 AF by 2021. The volume then remains fixed for the remainder of the 75-year agreement. Metropolitan conveys the IID transfer water to the Water Authority via an exchange agreement. Through the 2003 Quantification Settlement Agreement (QSA) on the Colorado River, the Water Authority also receives 77,700 AF per year of conserved water from lining of the All-American and Coachella Canals for 110 years (Water Authority, 2013).

Imported water provides approximately 80% of the Region's water supply.

Photo credit: San Diego County Water Authority

As shown in Table 3-12, imported water supplies provided through the Water Authority have comprised between 79 and 93% of the Region's water supply in recent years. Except during periods of extreme drought, Water Authority supplies typically comprise approximately 80% of the Region's water supply.

The Water Authority takes delivery of the Metropolitan/IID transfer and canal lining project supplies at a point located six miles south of the San Diego County-Riverside County border. The Water Authority conveys imported water to its member agencies through two aqueducts that consist of five large-diameter pipelines. Figure 3-5 shows the locations of the Water Authority aqueducts. The aqueducts follow general north-to-south alignments, and the water is delivered largely by gravity. The First Aqueduct includes Pipelines 1 and 2, which are located in a common right-of-way and are operated as a unit. These pipelines have a combined capacity of 180 cubic feet per second (CFS). Pipelines 3, 4, and 5 form the Second Aqueduct. These pipelines are operated independently and are located in separate rights-of-way from the First Aqueduct. Pipelines 3, 4, and 5 have respective capacities of 280 CFS, 470CFS, and 500CFS. Key appurtenant facilities to the aqueduct system include flow control facilities, pump stations, control valves, and air release mechanisms. The Water Authority delivers the imported supply to member agencies via 88 turnouts along the aqueduct system.

Table 3-12: Imported Water Reliance within the Region, 1999-2011

Fiscal Year	Water Supply in Acre-feet per Year[1]			Percent of Regional Supply from Imported Water[2]
	Total Regional Supply[2]	Water Authority Imported Supply	Member Agency Local Supply[3]	
1999-2000	694,995	580,118	114,877	83.5%
2000-2001	646,387	564,140	82,247	87.3%
2001-2002	686,529	615,572	70,957	89.7%
2002-2003	649,622	586,849	62,773	90.3%
2003-2004	715,763	666,008	49,755	93.0%
2004-2005	644,845	573,048	71,797	88.9%
2005-2006	687,253	576,620	110,633	83.9%
2006-2007	741,893	661,309	80,584	89.1%
2007-2008	691,931	608,903	83,029	88.0%
2008-2009	643,900	555,789	88,211	86.3%
2009-2010	566,443	494,960	71,484	87.4%
2010-2011	526,945	416,844	110,101	79.1%

1 From *Water Authority Annual Reports* for Fiscal Years 1999-2000 through 2010-2011 (Water Authority, 2011b).
2 Regional supply provided by water agencies within the Water Authority service area. As noted in Table 3-1 all but a small fraction of the Region's population is within the Water Authority service area. Local groundwater is the source of water supply in rural areas outside the water distribution networks of the Water Authority member agencies.
3 Includes local recycled water, surface water, and groundwater supplies. Does not reflect conserved water. Also does not include groundwater pumped by private well owners.

The five pipelines of the First and Second Aqueducts allow the Water Authority to take delivery of both treated (filtered and disinfected) and untreated water from Metropolitan. The Water Authority's treated water supplies come from its own Twin Oak Valley Water Treatment Plant, purchases from Metropolitan's Skinner Water Treatment Plant, and purchases from the Helix Water District's R.M. Levy Water Treatment Plant. These supplies are delivered directly to member agency potable water distribution systems. Untreated water supplies are delivered to member agency surface reservoirs or water treatment facilities.

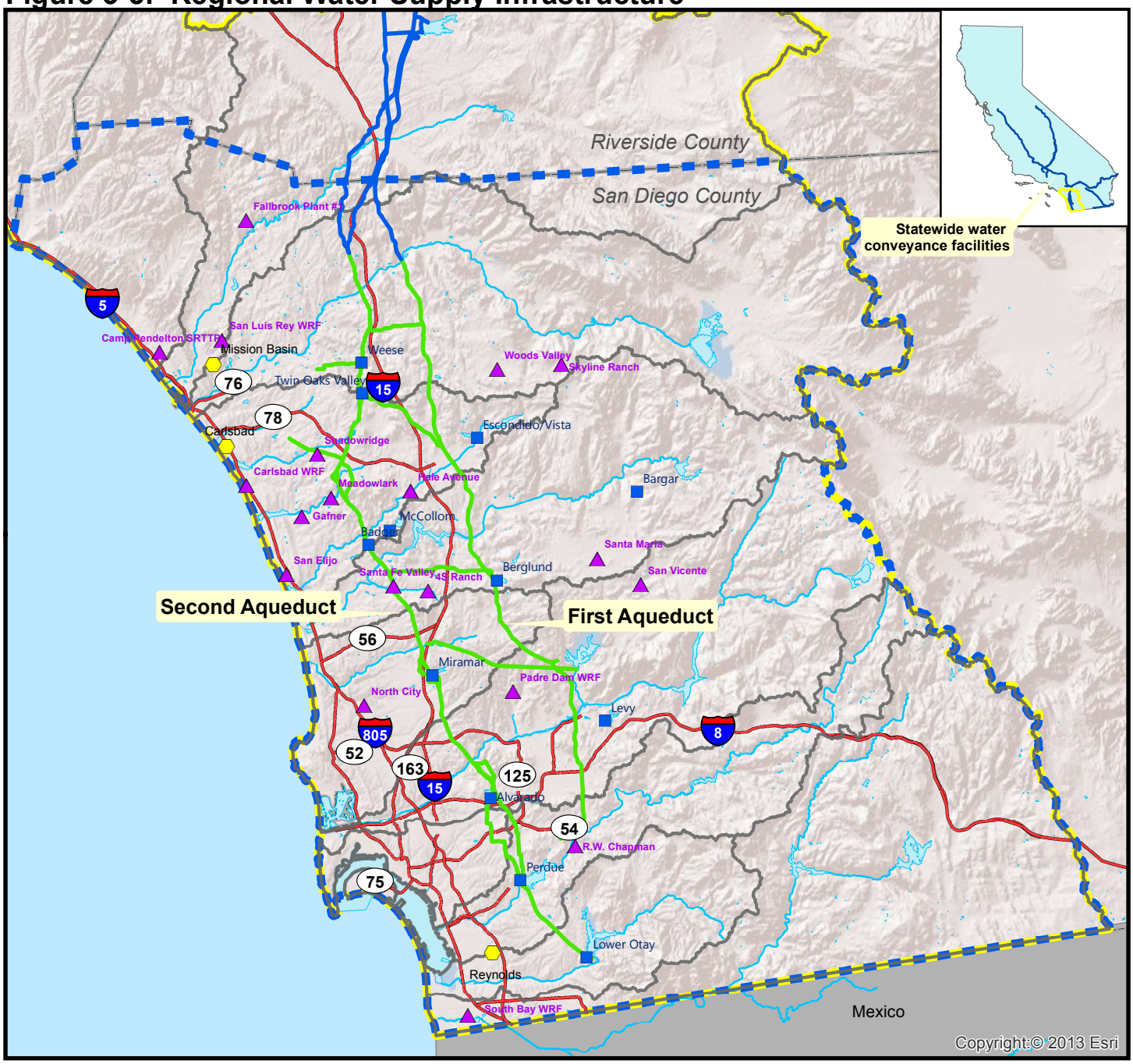
3.5.2 Regional Water Supply Infrastructure

Figure 3-5 presents the location of key local water supply infrastructure within the Region. The 25 surface water reservoirs located within the Region are summarized in Table 3-13. Local water supply reservoirs exist within eight of the Region's eleven watersheds, and local surface water supplied 27,300 AF of water in 2010 (Water Authority 2011). A total of 17 reservoirs are currently connected to the Water Authority's aqueduct system.

Several reservoirs within the Region are currently operated as hydroelectric power generation facilities: the Bear Valley Facility which is connected to Lake Wohlford and operated by the City of Escondido, two facilities (Roger Miller and David C. McCollom) that are operated by the Olivenhain Municipal Water District and connected to the Olivenhain Reservoir, and a forty megawatt (40 MW) power generation facility that was constructed as part of a pumped storage project that links Olivenhain Reservoir and Hodges Reservoir.

Table 3-14 summarizes regional water treatment facilities operated by the Water Authority and its member agencies and identifies associated sources of filtration plant raw water supply.

Figure 3-5: Regional Water Supply Infrastructure



Legend

- Water Treatment Plant
- Water Reclamation Facility
- Desalination Facility
- Metropolitan Water District Aqueducts
- San Diego County Water Authority Aqueducts
- Watershed
- San Diego IRWM Region
- Funding Area Boundary
- Waterbody
- County
- River
- Freeway

N

0 2.5 5 10
Miles

RMC

Source: San Diego Association of Governments (SANDAG) - GIS Data Warehouse, Metropolitan Water District
\\rmcsd\RMCSD\Projects GIS\0188-003 SDIRWM Plan Update\AdminDraftMaps\060713_JD\Fig3-5_Region Water Supply Infra 060713.mxd

Table 3-13: Principal Surface Water Reservoirs[1]

HU[2]	Watershed	Reservoir	Operating Agency	Capacity (Acre-Feet)	Aqueduct Connection[3]
903	San Luis Rey	Turner[5]	Valley Center Municipal Water Dist.	1,612[4]	
		Henshaw	Vista Irrigation District	51,774	
904	Carlsbad	Dixon	City of Escondido	2,606	●
		Wohlford	City of Escondido	6,506	
		Olivenhain[6]	Water Authority and Olivenhain Municipal Water District	24,364	●
		San Dieguito	San Dieguito Water District and Santa Fe Irrigation District	883	●
905	San Dieguito	Hodges	City of San Diego	30,251	●
		Sutherland	City of San Diego	29,685	
		Ramona	Ramona Municipal Water District	12,000	●
		Poway	City of Poway	3,330	●
906	Peñasquitos	Miramar	City of San Diego	7,185	●
907	San Diego	Murray	City of San Diego	4,818	●
		San Vicente	City of San Diego	90,230	●
		El Capitan	City of San Diego	112,807	●[7]
		Cuyamaca	Helix Water District	8,195	
		Lake Jennings	Helix Water District	9,790	●
909	Sweetwater	Loveland	Sweetwater Authority	25,387	
		Sweetwater	Sweetwater Authority	28,079	●
910	Otay	Lower Otay	City of San Diego	49,510	●
911	Tijuana	Barrett	City of San Diego	37,947	
		Morena	City of San Diego	50,207	

1 From *2010 Urban Water Management Plan* (Water Authority, 2011).
2 Numerical watershed (hydrologic unit) designations per Regional Water Quality Control Board (1994) and California Department of Water Resources *Hydrologic Data* (Bulletin 130).
3 Bullets indicate which reservoirs are connected to the Water Authority's San Diego Aqueduct to receive untreated aqueduct water.
4 Reservoir is not currently used as a source of raw potable water supply.
5 Reservoir is out of service for maintenance and scheduled to return online in 2012.
6 Reservoir jointly owned and operated by the Water Authority and Olivenhain Municipal Water District. Reservoir is part of the Water Authority's Emergency Storage Program.
7 El Capitan Reservoir is indirectly connected, via San Vicente Reservoir, to the Water Authority's aqueduct.

Table 3-14: Potable Water Treatment Facilities[1]

HU[2]	Watershed	Treatment Facility	Operating Agency	Capacity (million gallons per day)	Aqueduct Connection[3]
903	San Luis Rey River	Weese	City of Oceanside	25	●
904	Carlsbad	Escondido/Vista[4]	City of Escondido Vista Irrigation District	65	●
		Badger[5]	San Dieguito Water District Santa Fe Irrigation District	40	●
		McCollom[5]	Olivenhain Municipal Water District	34	●
		Escondido/Vista[4]	City of Escondido Vista Irrigation District	65	●
		Twin Oaks Valley	San Diego County Water Authority	100	●
905	San Dieguito River	Berglund	City of Poway	24	●
		Bargar	Ramona Municipal Water District	4[6]	
906	Peñasquitos	Miramar	City of San Diego	140[7]	●
907	San Diego River	Alvarado[7,8]	City of San Diego	200	●
		Levy	Helix Water District	106	●
909	Sweetwater	Perdue	Sweetwater Authority	30	●
910	Otay	Lower Otay	City of San Diego	40	●

1 From *2010 Urban Water Management Plans* (Water Authority, 2011a and City of San Diego, 2011).
2 Numerical watershed (hydrologic unit) designations per Regional Water Quality Control Board (1994) and California Department of Water Resources *Hydrologic Data* (Bulletin 130).
3 Bullets indicate which treatment plants are connected to receive untreated water from the Water Authority's San Diego Aqueduct.
4 Treatment plant is physically located within the Carlsbad Watershed, but receives untreated water from Lake Henshaw (Vista Irrigation District) within the San Luis Rey River (903) watershed.
5 Treatment plant is located within the Carlsbad Watershed, but receives surface water supplies from imported water sources and from Hodges Reservoir within the San Dieguito Watershed (905).
6 The Bargar Water Treatment Plant has not been in operation since 2007 when it could not meet new requirements. In 2011 the Ramona Water District Board of Directors agreed not to pursue a plan to bring the out-of-service plant into operation during times of emergency.
7 The Miramar Water Treatment Plant has the ability to increase to 215 million gallons per day (MGD) in the future with approval from CDPH based upon results of a future treatment process study (high Filtration Rate Study) that is yet to be performed (City of San Diego 2011).
8 Water from Sutherland Reservoir (within the San Dieguito River Watershed) can be directed to San Vicente Reservoir (within the San Diego River Watershed) (San Diego River Watershed Work Group 2005). San Vicente Reservoir is one of the sources of untreated water supply for the Alvarado Water Treatment Plant.

Public water agencies currently utilize groundwater resources to develop municipal water supply within the following watersheds: San Juan (901), Santa Margarita River (902), San Luis Rey River (903), San Dieguito River (905), San Diego (907), and Sweetwater (909). Demineralization treatment of groundwater is utilized in three of these groundwater basins. Table 3-15 summarizes groundwater demineralization treatment facilities within the Region.

Table 3-15: Groundwater Demineralization Facilities

HU[1]	Watershed	Groundwater Demineralization Facility	Operating Agency	Treatment Capacity[2] (MGD)	Source of Groundwater
902	Santa Margarita	Haybarn Canyon	USMC Camp Pendleton	6.9	Santa Margarita Basin
903	San Luis Rey River	Mission Basin	City of Oceanside	6.37	Mission Basin
909	Sweetwater River	Reynolds	Sweetwater Authority	4.0	Lower Sweetwater Basin

1 Numerical watershed (hydrologic unit) designations per Regional Water Quality Control Board (1994) and California Department of Water Resources *Hydrologic Data* (Bulletin 130).
2 Potable water production capacity. Influent treatment plant capacity is larger as part of the flow is lost as waste brine. MGD = million gallons per day

Emergency Storage Program

Recognizing the Region's dependence on timely delivery of imported water supplies, the Water Authority has initiated an Emergency Storage Project (ESP) designed to provide water to the Region during imported water interruptions of up to two months of complete loss of imported supplies or six months of partial outage.

When completed in 2014, the ESP will consist of storage and conveyance facilities that will allow the Water Authority to maintain a 75% service level to member agencies during interruption of imported water deliveries. ESP facilities will be located in the north and east portions of the Water Authority service area, and are being constructed in phases. Table 3-16 summarizes existing and planned ESP facilities.

Table 3-16: Emergency Storage Program Facilities and Schedule

Key Facilities	Facility Components and Details	Scheduled Completion
Olivenhain Dam/Reservoir, Pipeline and Pump Station	A. 318-foot tall Olivenhain Dam B. Olivenhain pipeline to connect the Olivenhain Reservoir to the Water Authority's Second Aqueduct C. Water transfer pump station	A. Completed in 2003 B. Completed in 2002 C. Completed in 2005
Hodges Reservoir Pipeline and Pump Station	A. Pipeline connecting Olivenhain Reservoir to Hodges Reservoir B. Electrical facilities to deliver power locally C. Pump station to generate power and move water between Hodges Reservoir and Olivenhain Reservoir	A. Completed in 2007 B. Completed in 2008 C. Operational in 2012
San Vicente Pipeline and Pump Station	A. 11-mile pipeline to connect the San Vicente Reservoir to the Water Authority's Second Aqueduct B. Pump station and other facilities to move water from San Vicente Reservoir to the Second Aqueduct	A. Completed in 2010 B. Completed in 2010
San Vicente Dam Raise	A. Additional 117 feet added to the existing San Vicente Dam to provide additional storage capacity for emergency use and during times of water scarcity	A. Under Construction through 2013
North County Pump Station	A. Pump station to move emergency water supplies to the northern-most areas of the County	A. Anticipated for completion by 2018

3.5.3 Surface Water Resources

There are over 200 streams and creeks in San Diego County, converging into five major rivers: the Santa Margarita, San Luis Rey, San Dieguito, San Diego, and Sweetwater Rivers.

Streamflow

A major element of the water cycle, streamflow refers to the flow of water in streams, rivers, and other channels. By volume, most of the surface flow in streams and rivers within the San Diego Region is from precipitation runoff (storm events). The amount of storm precipitation that becomes streamflow depends on (1) topography, land uses, and soil permeability; (2) the frequency and timing of storm events; and (3) stormwater management practices. Streamflows during non-storm periods ("dry weather flows") are the result of urban runoff, agricultural runoff, and surfacing groundwater. Dry weather flows, though small by volume, are significant in that they may carry pollutant loads and can alter the seasonal nature of aquatic and riparian habitats.

Stream gaging stations monitored as part of the USGS network currently exist in all but two of the Region's watersheds. Table 3-17 summarizes permanent streamflow monitoring stations within the region. More than 50 years of streamflow data are available from twelve of the Region's streamflow gages. Table 3-17 also presents mean and median annual streamflow at each of the existing USGS stream gaging stations.

Santa Ysabel Creek just above the gorge.

Photo credit: Jeff Pasek, City of San Diego

Significant differences exist between mean and median streamflows. As previously noted the Region is categorized as a semi-arid climate and experiences few hydrologic events that contribute to surface flows. Mean streamflow is predominantly affected by sporadic extreme hydrologic events, whereas median streamflow is more representative of daily surface runoff for the Region.

Figures 3-6 through 3-8 present mean and median monthly streamflow for three of the largest watercourses within the Region. These three watercourses generate the same trend of peak streamflow in the February to March period. The figures also show the variance of mean and median streamflow, which is caused by the occasional extreme hydrologic event. As indicated by the monthly mean values in the figures, nearly 90% of the streamflow volume in the Santa Margarita, San Luis Rey, and San Diego Rivers occurs during the months of December through May. The majority of streamflow occurs as a result of direct stormwater runoff from a few major storm events within each rainy season. Because significant precipitation within the region typically occurs over only 30 to 60 days of the year, streamflow on most days remains low. This is demonstrated by the median streamflow values shown in Figures 3-6 through 3-8.

Table 3-17: U.S. Geological Survey Surface Flow Gaging Stations

HU[1]	Watershed	No. Gaging Stations in Watershed[2]	Currently Operating Stream Gages[2]	Annual Streamflow[2] (cubic feet per sec.)		Period of Record[2]
				Median Daily Flow	Mean Annual Flow	
901	San Juan	11[3]	Las Flores Creek at Las Pulgas Canyon	0.2	1.5	1999 - 2012
			Las Flores Creek near Oceanside	0.0	1.8	1952 - 2012[4]
			San Onofre Creek at San Onofre	0.0	1.8	1947 -2010[5]
			Cristianitos Creek above San Mateo Ck.	0.5	3.7	1994 - 2012
			San Mateo Creek near San Clemente	0.2	12.4	1953 - 2012[6]
902	Santa Margarita River	10[7]	Santa Margarita River at Ysidora	8.1[8]	41.3[8]	1923 - 2012[9]
			Santa Margarita River near Fallbrook	7.0[10]	42.2[10]	1924 - 2012[10]
			O'Neill Spillway near Fallbrook	0.0	0.2	1998 - 2012
			Lake O'Neill outlet near Fallbrook	0.4	1.6	1998 - 2012
			Lake O'Neill trib. near Fallbrook	0.0	0.1	2001 - 2005[11]
			Fallbrook Creek near Fallbrook	0.4	1.5	1993 - 2012
			DeLuz Creek near DeLuz	0.9	11.7	1992 - 2012
			DeLuz Creek near Fallbrook	0.0	4.3	1951 - 2005[12]
			Rainbow Creek near Fallbrook	0.5	3.7	1989 - 2012
			Sandia Creek near Fallbrook	3.6	9.5	1989 - 2012
903	San Luis Rey River	11	San Luis Rey River at Oceanside	2.3	36.3	1940 - 2012[13]
904	Carlsbad	1	[None currently operating]	NA	NA	NA
905	San Dieguito River	9	Santa Maria Creek near Ramona	0.0	6.3	1912 - 2012[14]
			Guejito Creek near San Pasqual	0.1	2.8	1946 - 2012[15]
			Santa Ysabel Creek near Ramona	0.1	10.5	1955 - 2012
906	Peñasquitos	10	Los Peñasquitos Creek at Poway	1.9	11.3	1964 - 2012
907	San Diego River	5	San Diego River at Fashion Valley	6.7	38.6	1982 - 2012
			San Diego River at Mast Blvd.	1.9	24.9	1912 - 2012
			Los Coches Creek near Lakeside	0.5	1.9	1984- 2012
			Padre Barona Creek near Lakeside	0.0	1.4	2005 - 2008
908	Pueblo	0	[None currently operating]	NA	NA	NA
909	Sweetwater	3	Sweetwater River near Descanso Sweetwater River near Dehesa	0.3	8.9	1957 - 2012
910	Otay	2	Jamul Creek near Jamul	0.2[16]	13.2[16]	1940 - 2012
911	Tijuana River	7	Tijuana River near Dulzura	0.2	1.8	1936 - 1990
			Campo Creek near Campo	0.1	3.2	1937 - 2012

1 Numerical watershed (hydrologic unit) designation per Regional Water Quality Control Board (1994) and California Department of Water Resources *Hydrologic Data* (Bulletin 130).
2 From USGS (2012). Many of the historical gaging stations were temporary and were operated for short periods of time as part of special streamflow investigations. Streamflow records summarized above are for gaging stations that remain in operation and for gaging stations that were discontinued in recent years.
3 All USGS stream gages within the San Juan HU (901) are within the Region.
4 Stream gage not in operation during 1978-1993.
5 Stream gage not in operation during 1968-1998. Stream gage discontinued in 2010.
6 Stream gage not in operation during 1968-1993.
7 A total of ten historic gaging stations (all currently still operational) are in the San Diego County portion of the Santa Margarita River Watershed. An additional ten historical gaging stations have existed in Riverside County within the Santa Margarita River Watershed. Seven of these stations are currently in operation, including: Santa Margarita River at Temecula (1923-present), Temecula Creek near Aguanga (1957-present), Pechanga Creek near Temecula (1987-present), Murrieta Creek near Murrieta (1997-present), Warm Springs near Murrieta (1987-present), Santa Gertrudis Creek at Temecula (1987-present), and Murrieta Creek near Temecula (1930-present).
8 Listed mean and median are for 1981-2012. Mean and median flow during 1923-1948 was 43.3 CFS and 1.6 CFS, respectively, but these flows are not equivalent to the post-1980 flows due to construction of downstream conservation ponds (see USG, 2012).
9 Stream gage not in operation during 1975-1979 and 2000-2001.
10 A flood destroyed the original stream gage in 1980. The stream gage was relocated in 1989 to its current site near the Fallbrook Public Utility District sump. Listed mean and median streamflows are for the current gage station location (1989-2012).
11 Gaging station discontinued in 2005.
12 Stream gage not in operation during 1968-1990 and 1991-2003. Gaging station discontinued in 2006.
13 Stream gage not in operation during 1942-1946 and 1991-1993. The gaging station was also operated from 1912-1914 but flows from these years are not included in the above-listed mean and median statistics.
14 Stream gage not in operation during 1921-1946.
15 The stream gage was relocated in 1957.
16 Includes flow diverted to Jamul Creek by the City of San Diego from Barrett Reservoir (in the Tijuana River Watershed) via the Dulzura conduit. Stream gaging station not in operation from October 1978 through September 1984.

Figure 3-6: Mean and Median Monthly Streamflows – Santa Margarita River at Fallbrook

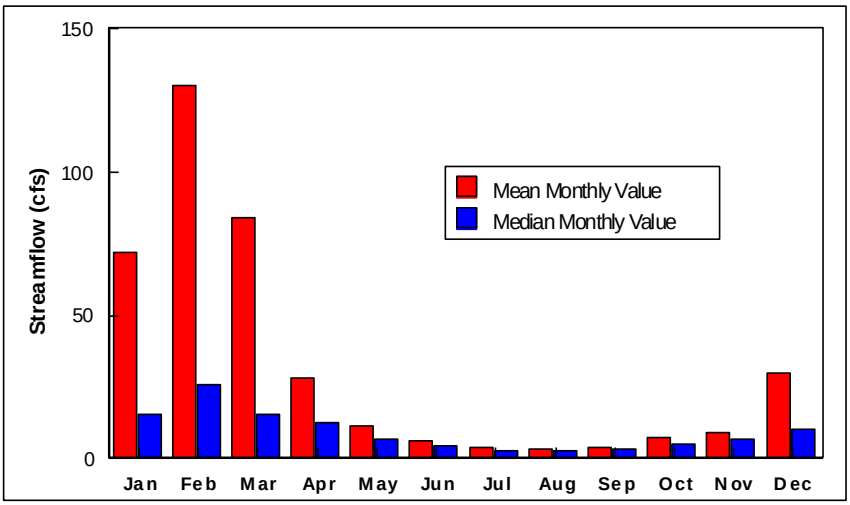


Figure 3-7: Mean and Median Monthly Streamflows – San Luis Rey River at Oceanside

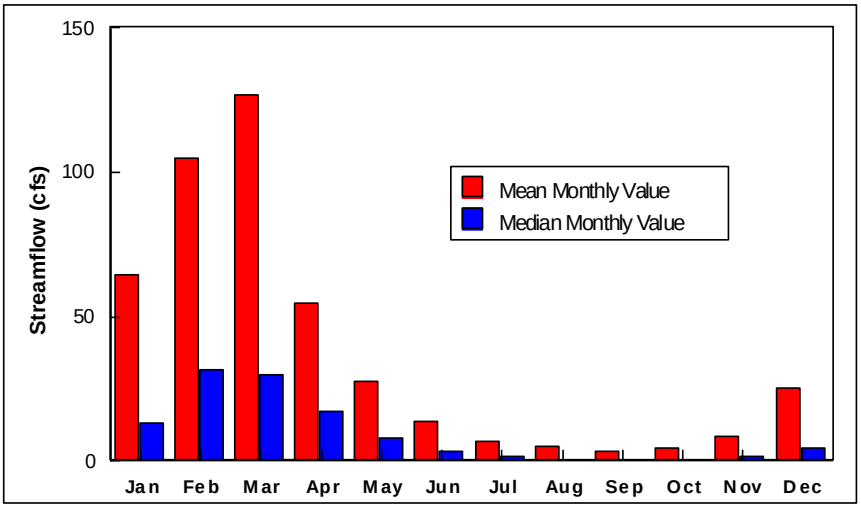


Figure 3-8: Mean and Median Monthly Streamflows – San Diego River at Mast Blvd.

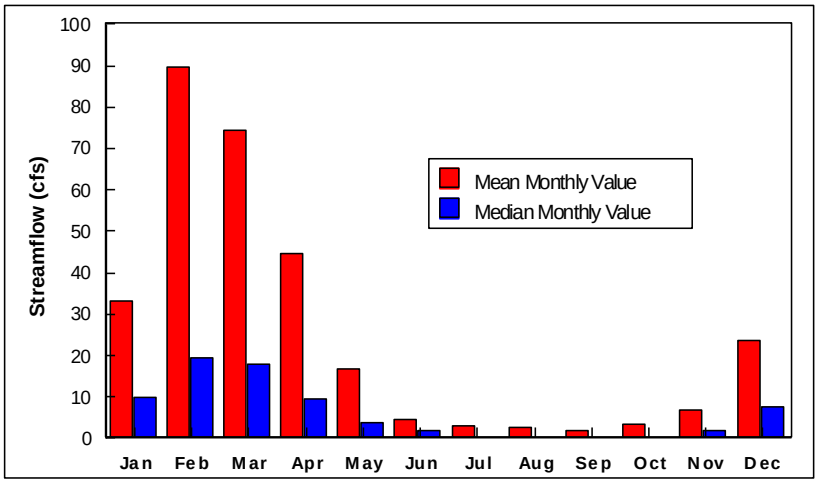


Table 3-189 compares pre-1975 and post-1975 summertime streamflow at the Santa Margarita, San Luis Rey, and San Diego River gaging stations. A major cause of the increase in median monthly streamflow values from pre-1975 to post-1975 can be attributed to urbanization in the watershed, which has reduced soil percolation and absorption by increasing paved surfaces, thereby increasing runoff.

While runoff directly associated with precipitation contributes most of the annual volume of streamflow, urban runoff, agricultural runoff, and surfacing groundwater are the prime sources of surface flow during non-storm (dry weather) periods. The Region has experienced a trend of increasing non-storm flows during the past 30 years as the region has developed. Increased development has resulted in increased imported water use and increased urban runoff. Additionally, the availability of good-quality imported water within the Water Authority service area has resulted in reduced groundwater use in the Region's coastal areas during recent decades, increasing the amount of surfacing groundwater that contributes to streamflow in the downstream areas of the region.

Table 3-18: Comparison of Pre-1975 and Post-1975 Median Monthly Summer Streamflow

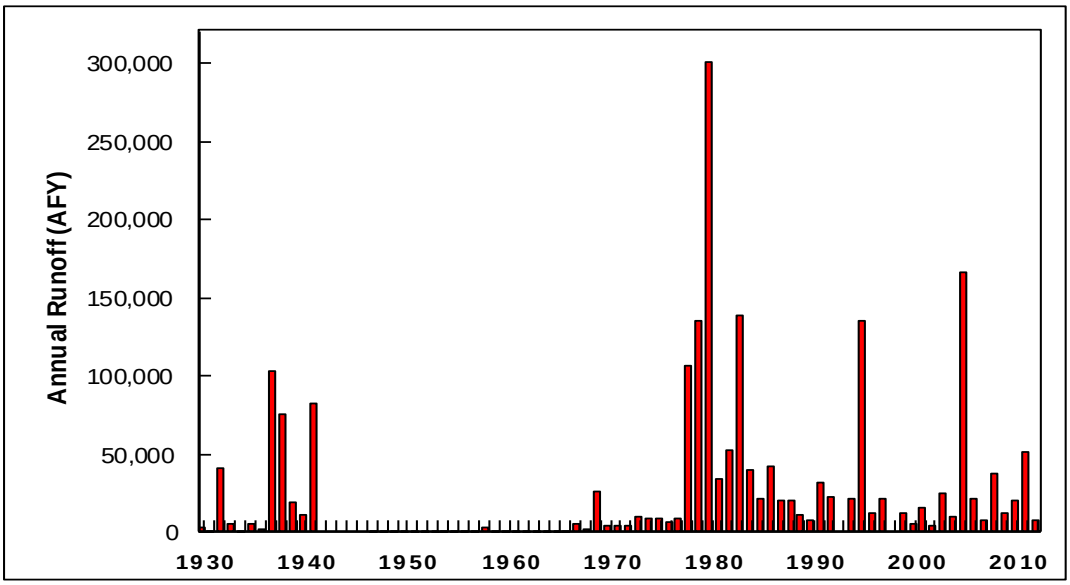
Gaging Station	Median Monthly Summer Streamflow[1] in Cubic Feet per Second (CFS)	
	Prior to 1975	After 1975
Santa Margarita River at Fallbrook	1.5[2]	5.7[3]
San Luis Rey River at Oceanside	0.0[4]	3.7[3]
San Diego River at Mast Boulevard	0.0[5]	2.6[3]

1 Median of monthly streamflow values (CFS) for the summer months June through October, as reported by U.S. Geological Survey (2012).
2 Data period covering 1924 through 1974.
3 Data period from 1975 through 2012.
4 Data period from 1929 through 1974.
5 Data period from 1912 through 1974.

As shown in Table 3-18, prior to 1975, San Diego River and San Luis Rey River median streamflows during July through October were zero. Since 1975, summertime streamflows of several cubic feet per second have occurred on a sustained basis.

Figure 3-9 presents annual runoff data for the San Luis Rey River at Oceanside that depicts the significant variation in annual runoff within the Region. While median annual runoff at the San Luis Rey River at Oceanside during 1929-2012 was 8,000 acre-feet per year (AFY), annual runoff has exceeded 100,000 AFY during seven years of the period of record. A total of 54% of the San Luis Rey River runoff during 1929-2012 occurred during these seven years.

Figure 3-9: Annual Runoff - San Luis Rey River at Oceanside



Coastal Waters

Each of the Region's eleven watersheds features coastal water resources that support wildlife habitat, endangered species, and recreational uses (see Appendix 3-A for a list of the designated beneficial uses of Region coastal waters).

The Region's coastal lagoons represent a unique resource, and the Region features more coastal lagoons than any comparably-sized area in California. Eight of the Region's watersheds discharge to the following estuaries or brackish coastal lagoons:

- San Mateo Lagoon, San Onofre Lagoon, and Las Flores Lagoon (San Juan Watershed),
- Santa Margarita River Estuary (Santa Margarita River Watershed),
- San Luis Rey River Estuary (San Luis Rey River Watershed),
- Loma Alta Slough, Batiquitos Lagoon, Buena Vista Lagoon, Agua Hedionda Lagoon, and San Elijo Lagoon (Carlsbad Watershed),
- San Dieguito Lagoon (San Dieguito River Watershed),
- Los Peñasquitos Lagoon (Peñasquitos Watershed),
- San Diego River Estuary (San Diego River Watershed), and
- Tijuana River Estuary (Tijuana River Watershed).

A portion of the Peñasquitos Watershed (Rose and Tecolote Creeks) discharges to Mission Bay, a widely used regional recreational asset. Three watersheds (Sweetwater, Otay, and a portion of the Pueblo) discharge to San Diego Bay, an important regional commercial and recreational asset.

State Board Resolution No. 74-28 requires Regional Board's to designate coastal waters as Areas of Special Biological Significance (ASBS) if the waters contain "biological communities of such extraordinary, even though unquantifiable, value that no acceptable risk of change in their environment as a result of man's activities can be entertained."

The Basin Plan designates two ASBS within the Region, both of which are coastal waters of the Peñasquitos Watershed:

- La Jolla Ecological Reserve Area, and
- San Diego Marine Life Refuge Area.

Numerous recreational beaches, recreational areas and ecologic reserves (see Sections 3-8 and 3-9) exist within the Region's eleven watersheds.

3.5.4 Wastewater

The Region produces approximately 300 MGD of wastewater, which is treated at one of 32 wastewater treatment or water reclamation facilities. Wastewater is typically treated to secondary standards prior to ocean discharge, or to tertiary levels if intended for distribution for non-potable use. The processes through which wastewater is treated to higher levels and reused are discussed further in Section 3.5.5.

Wastewater in the Region may undergo four levels of treatment . Primary treatment removes heavy solids through settling by gravity. Advanced primary treatment further removes solids using chemicals that cause clumping of smaller solids to allow solids to settle out of water for removal. Secondary treatment uses primary-treated water, and subjects it to biological treatment, wherein microbes are used to break down biological substances. Tertiary treatment filters secondary effluent through a medium such as coal to reduce total dissolved solids (TDS) and other water quality impairments.

The Region treats approximately 100 MGD of wastewater to primary standards, 100 MGD to secondary standards, and 40 MGD to tertiary standards. Planned projects would increase this capacity to 120 MGD, 120 MGD, and 78 MGD, respectively, by 2040 (Water Authority, 2011). Water that is not treated to tertiary levels and reused as recycled water is discharged through one of the Region's five deep-water ocean outfalls, summarized in Table 3-19 and shown in Figure 3-10. As shown, there are four primary sewersheds within the Region – a sewershed is the area of land from which wastewater is collected and conveyed to a treatment facility. These sewersheds are:

1) the area that conveys wastewater to the Oceanside Ocean Outfall,
2) the area that conveys wastewater to the Encina Ocean Outfall,
3) the area that conveys wastewater to the San Elijo Ocean Outfall, and
4) the area that conveys wastewater from the Metropolitan (Metro) Wastewater System, including the Point Loma Ocean Outfall and the South Bay Ocean Outfall.

Please note that the Metro Wastewater sewershed (indicated in blue on Figure 3-10) conveys wastewater to both the Point Loma Ocean Outfall and the South Bay Ocean Outfall; however, the source of wastewater that is conveyed to each facility varies on a day-to-day basis depending on wastewater flow availability and various operational parameters.

In addition to providing means for wastewater and recycled water disposal, the outfalls can also be used as a salinity management asset. Four of the regional municipal wastewater outfalls are currently being used for disposal of saline or brackish water, including:

- Oceanside Ocean Outfall is used for disposal of demineralization brine from the City of Oceanside's groundwater desalter and demineralization brine from a local industry,

- Encina Ocean Outfall is used for the disposal of demineralization brine from the City of Carlsbad Water Reclamation Facility when demineralization facilities are operational,
- San Elijo Ocean Outfall is used for disposal of brackish cooling tower water from the Palomar Energy Plant in Escondido via the City of Escondido Industrial Brine Collection System, and demineralization brine from the San Elijo Joint Powers Authority Water Reclamation Facility, and
- Point Loma Ocean Outfall is used for disposal of demineralization brine from the City's North City Water Reclamation Plant.

Table 3-19: Municipal Wastewater Ocean Outfalls[1]

HU[2]	Name	Outfall	Operating Agency	Discharge Distance Offshore (ft)	Permitted Discharge Flow (MGD)	Agencies Served
903	San Luis Rey River	Oceanside	City of Oceanside	8,050	22.9[3]	City of Oceanside
					3.6[4]	USMC Base Camp Pendleton
					2.4[5]	Fallbrook Public Utility District
904	Carlsbad	Encina	Encina Wastewater Authority	7,800	43.3[6]	Encina Wastewater Authority[7]
		San Elijo	San Elijo Joint Powers Authority[8]	8,000	18.0[9]	City of Escondido
					5.25[10]	San Elijo JPA[11]
908	Pueblo	Point Loma	City of San Diego	23,470	240[12]	San Diego Metropolitan Sewerage System[13]
911	Tijuana River	South Bay	City of San Diego[16]	23,600	15[14]	San Diego Metropolitan Sewerage System [13,15]
					25[17]	U.S. Boundary and Water Commission[17]

1 Compiled from adopted recycled water discharge permits adopted by the Regional Board. See footnotes below.
2 Numerical watershed (hydrologic unit) and hydrologic area designations per Regional Water Quality Control Board (1994) and California Department of Water Resources *Hydrologic Data* (Bulletin 130).
3 City of Oceanside per Regional Board Order No. R9-2009-0016, NPDES CA0107433. The permitted discharge is the combined discharge from the San Luis Rey Water Reclamation Facility, La Salina Wastewater Treatment Plant and waster brine from the Mission Bay Desalting Facility.
4 U.S. Marine Corps Base Camp Pendleton per Regional Board Order No. R9-2012-0041 and Addendum No. 1, NPDES CA0109347.
5 Fallbrook Public Utility District per Regional Board Order No. R9-2012-0004, NPDES CA0108031.
6 Encina Wastewater Authority per Regional Board Order No. R9-2011-0019, NPDES CA0107395. The permitted discharge is the combined discharge from the Encina Water Pollution Control Facility, Meadowlark Water Reclamation Plan, Shadowridge Water Reclamation Plant and Carlsbad Water Reclamation Facility
7 Encina Wastewater Authority member agencies include Buena Sanitation District, City of Carlsbad, City of Encinitas, Leucadia County Water District, Vallecitos Water District, and City of Vista.
8 The San Elijo Ocean Outfall is jointly owned by the City of Escondido and San Elijo Joint Powers Authority.
9 City of Escondido per Regional Board Order No. R9-2010-0086, NPDES CA0107981.
10 San Elijo Joint Powers Authority per Regional Board Order No. R9-2010-0087, NPDES CA0107999.
11 San Elijo Joint Powers Authority member agencies include the City of Solana Beach and City of Encinitas.
12 Point Loma Ocean Outfall per Regional Board Order No. R9-2009-0001, NPDES CA0107409.
13 The City of San Diego serves as operating agency for the San Diego Metropolitan Wastewater System (Metro System). The Metro System serves the following agencies: City of Coronado, City of Chula Vista, City of Del Mar, City of El Cajon, City of Imperial Beach, City of La Mesa, City of National City, City of Poway, City of San Diego, Lemon Grove Sanitation District, Padre Dam Municipal Water District, Otay Water District, Lakeside/Alpine Sanitation District, Spring Valley Sanitation District, East Otay Sewer Maintenance District and Winter Gardens Sewer Maintenance District.
14 South Bay Ocean Outfall per Regional Board Order No. R9-2013-0006, NPDES CA0109045.
15 Metro System member agencies tributary to the South Bay Ocean Outfall include the City of San Diego, City of Imperial Beach, and City of Chula Vista.
16 South Bay Ocean Outfall is jointly owned by the City of San Diego and the U.S. Government (International Boundary and Water Commission).
17 U.S. Boundary and Water Commission (IBWC) South Bay International Treatment Plant that treats up to 25 MGD of wastewater from Tijuana, Mexico. The IBWC discharge to the South Bay Ocean Outfall is regulated by Regional Board Order No. 95-50 (NPDES CA0108928) and Cease & Desist Order No. 96-52.

3.5.5 Water Reuse

Beneficial reuse of wastewater is an important component of the Region's local water resources, both now and in the future. Water reuse includes non-potable reuse and potable reuse – in both cases secondary treated wastewater receives additional treatment to match its quality to the intended use. Non-potable reuse involves production of tertiary-treated recycled water in accordance with Title 22 of the California Code of Regulations. Non-potable recycled water, discussed in detail below, is used today throughout the Region for irrigation, toilet flushing, and industry. Although potable reuse is not currently part of the Region's water supply, it is being actively studied and pursued in the Region. Potable reuse involves advanced treatment of tertiary-quality recycled water to create purified water, which is similar in quality to distilled water, and as its name suggests, can be added to drinking water supplies.

Water reuse can increase water supply reliability by increasing the availability of local supplies and reducing the need to import water from outside the Region. The benefits of water reuse can include cost savings, energy savings, reduced wastewater discharges, avoidance of the need for peak surface water treatment capacity, improved water quality, and reduced fertilizer application needs when used for irrigation.

Since its inception, the IRWM Program has provided over $16 million to a variety of water reuse projects. In total, approximately 40% of San Diego's IRWM grant funding has been awarded to water reuse projects.

Non-Potable Reuse

During 2010, Water Authority member agencies reported the reuse of approximately 28,000 AF of non-potable recycled water. The use of non-potable recycled water within the Region is projected to increase to approximately 50,000 AFY by 2035 (Water Authority, 2011a).

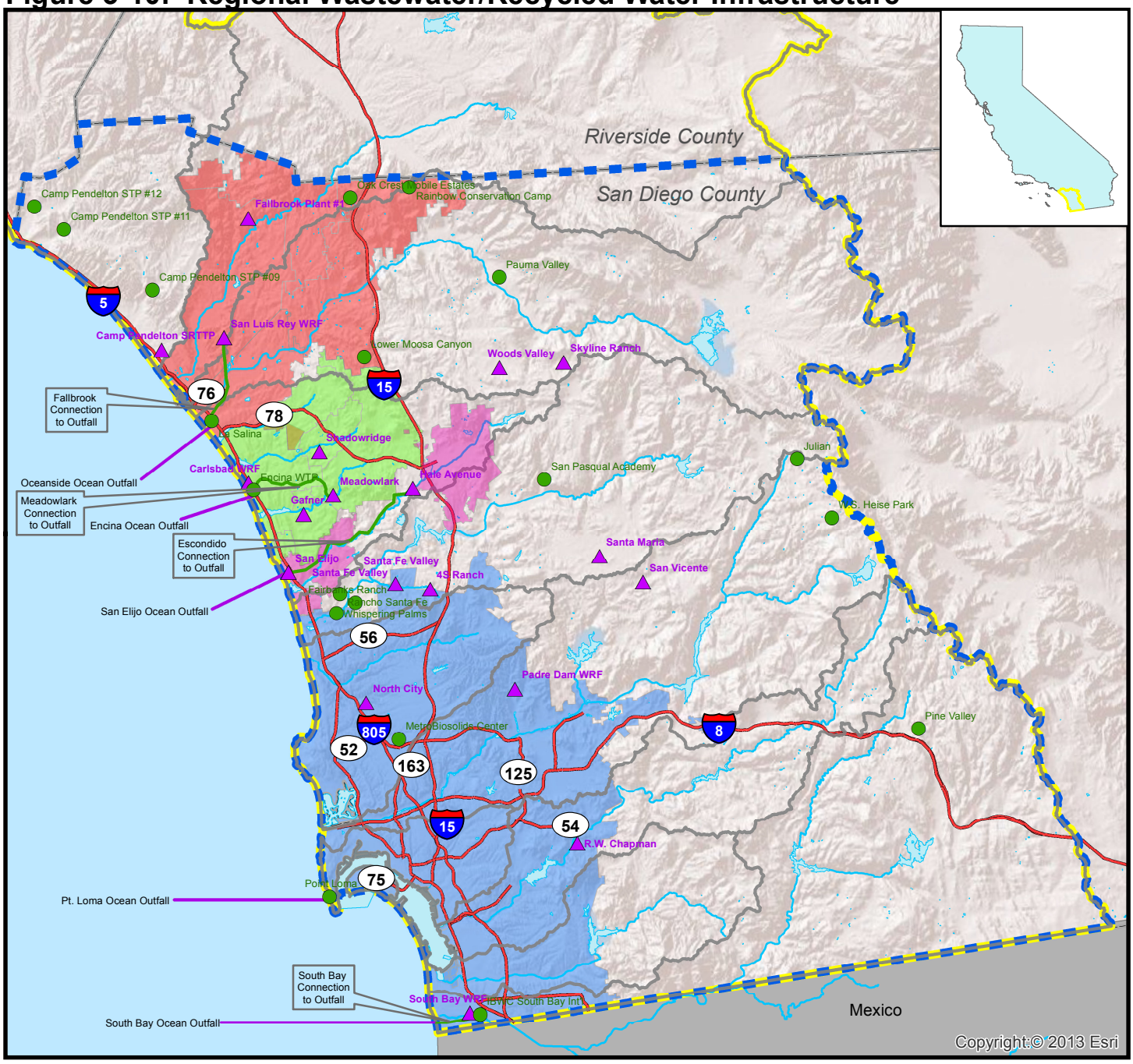
Since currently most recycled water is used for irrigation, recycled water demands vary substantially throughout the year, increasing in the dry summer months and decreasing in the wet winter months. A key and necessary component of water recycling is providing means of disposal or storage of excess recycled water supplies during periods of reduced demand. Local agencies may utilize either storage ponds or regional ocean outfall facilities to handle excess recycled water or wastewater flows during periods of wet weather or limited demand. An exception to this is Padre Dam MWD, which has a permit to discharge recycled water to the Santee Lakes, which overflows to the San Diego River.

Figure 3-10 presents the location of all wastewater and recycled water infrastructure within the Region. Table 3-20 summarizes the Region's existing wastewater and water recycling facilities, and indicates which of the Region's water reclamation plants are capable of treating water to tertiary standards for non-potable reuse.

Recycled water is primarily used to irrigate commercial landscaping, parks, campgrounds, golf courses, freeway medians, greenbelts, athletic fields, crops, orchards, and nursery stock. Recycled water is also used to augment supplies in recreational or ornamental lakes or ponds, control dust at construction sites, recharge groundwater basins, and for industrial cooling water. Because tertiary treated recycled water is higher in nutrients than potable water, this water source can also reduce the amount (and therefore the costs) of fertilizer application.

Since non-potable reuse doesn't require the pumping associated with water from the SWP or the Colorado River, it typically has lower energy needs and greenhouse gas emissions compared to imported potable water.

Figure 3-10: Regional Wastewater/Recycled Water Infrastructure



Legend

- Wastewater Treatment Plant
- Water Reclamation Facility
- Ocean Outfalls
- Connection to Outfalls
- Watershed
- San Diego IRWM Region
- Funding Area Boundary
- Ocean
- Waterbody
- County
- River
- Freeway

Ocean Outfall Sewersheds

- Oceanside Outfall
- Encina Outfall
- San Elijo Outfall
- Metro Wastewater System
  - Pt. Loma Outfall
  - South Bay Outfall

N

0 2.5 5 10
Miles

RMC

Sources: San Diego Association of Governments (SANDAG) - GIS Data Warehouse
\\rmcsd\RMCSD\Projects GIS\0188-003 SDIRWM Plan Update\AdminDraftMaps\060713_JD\Fig3-10_Regional WW RW Infra 060713.mxd

Table 3-20: Wastewater and Recycled Water Treatment Facilities

HU[1]	Watershed	Agency	Name of Treatment Facility	Permitted Secondary Treatment Capacity (mgd)	Permitted Tertiary Treatment Capacity (mgd)	Recycled Water Use in 2010[2] (acre-feet)
902	Santa Margarita	Camp Pendleton	Southern Regional		3.75[3]	5273
		Camp Pendleton	STP 9	0.7[4]		
		Camp Pendleton	STP 11	3.15[5]		
		Camp Pendleton	STP 12	0.35[6]		
		Rainbow Municipal Water District	Oak Crest Mobile Estates	0.012[7]		
		California Department of Forestry and Fire Protection (CalFire)	Rainbow Conservation Camp	0.0125[8]		
903	San Luis Rey	City of Oceanside	San Luis Rey	13.5[9]	0.7[9]	119[9]
		Fallbrook Public Utility District	Plant No. 1		2.7[10]	543[10]
		Valley Center Municipal Water District	Woods Valley Ranch		0.147[11]	44[11]
		Valley Center Municipal Water District	Lower Moosa Canyon	1[12]		
		Skyline Ranch Country Club, LLC	Skyline Ranch	0.055[13]		
		Pauma Valley Community Service District	Pauma Valley	0.15[14]		
904	Carlsbad	Buena Sanitation District/City of Vista	Shadowridge[8]		1.16[15]	0[15]
		Carlsbad Municipal Water District	Carlsbad		4.0[16]	1,324[16]
		Leucadia Wastewater District	Gafner		1.0[17]	269[17]
		Vallecitos Water District	Meadowlark		5.0[18]	2,768[18]
		City of Escondido	Hale Avenue		9.0[19]	3,692[19]
		San Elijo Joint Powers Authority	San Elijo	5.25[20]	2.48[20]	1,160[20]
		City of Oceanside	La Salina	5.5[21]		
		Encina Wastewater Authority	Encina	40.5[22]		
905	San Dieguito River	Olivenhain Municipal Water District	4-S Ranch		2.0[23]	895[23]
		Ramona Municipal Water District	Santa Maria	1.0[24]	0.35[24]	209[24]
		Rancho Santa Fe Community Services District	Santa Fe Valley		0.485[25]	105[25]
		Rancho Santa Fe Community Services District	Rancho Sante Fe	0.45[26]		
		Whispering Palms Community Services District	Whispering Palms	0.2[27]		
		Fairbanks Community Services District	Fairbanks Ranch	0.275[28]		
		County of San Diego	San Pasqual Academy	0.05[29]		
906	Peñasquitos	City of San Diego	North City		30.0[30]	7,505[30]
		City of San Diego	Metropolitan Biosolids Center	N/A[31]		
907	San Diego River	Padre Dam Municipal Water District	Padre Dam		2.0[32]	2,016[32]
		Ramona Municipal Water District	San Vicente		0.75[33]	520[33]
		County of San Diego	W.S. Heise Park	0.018[34]		
		County of San Diego	Julian	0.04[35]		
908	Pueblo	City of San Diego	Point Loma	240[36]		

HU[1]	Watershed	Agency	Name of Treatment Facility	Permitted Secondary Treatment Capacity (mgd)	Permitted Tertiary Treatment Capacity (mgd)	Recycled Water Use in 2010[2] (acre-feet)
910	Otay River[19]	Otay Water District	R.W. Chapman		1.3[37]	1,033[37]
911	Tijuana River	City of San Diego	South Bay	15[39]	15.0[39]	4,705[39]
		International Boundary and Water Commission	South Bay International	25[40]		
		County of San Diego	Pine Valley	0.04[41]		

1 Numerical watershed (hydrologic unit) and hydrologic area designations per Regional Water Quality Control Board (1994) and California Department of Water Resources *Hydrologic Data* (Bulletin 130).
2 Recycled water use for year 2010 as reported by member agencies in *2010 Urban Water Management Plan* (Water Authority, 2011a). Reporting criteria for recycled water use may vary on an agency-by-agency basis.
3 Permitted tertiary treatment capacity per Regional Board Order No. R9-2009-0021. The listed recycled water use for 2010 does not include 657 acre-feet of effluent from Camp Pendleton secondary treatment percolation ponds.
4 Regional Board Order No. 98-04
5 Regional Board Order No. 97-13
6 Regional Board Order No. 98-05
7 Regional Board Order No. 93-69
8 Regional Board Order No. R9-2009-0009
9 The San Luis Rey facility is permitted to discharge 13.5 MGD secondary effluent, or up to 15.4 MGD with written approval from the Regional Board in accordance with its discharge permit. Regional Board Order No. R9-2011-0016 as amended by R9-2012-0042.
10 Regional Board Order No. 91-39 and Addenda Nos. 1, 2 and 3.
11 Regional Board Order No. 98-09 and Addendum No. 1. The listed recycled water use for 2010 does not include 347 acre-feet of secondary effluent from the Lower Moosa Canyon Water Reclamation Facility that is discharged to percolation ponds or secondary effluent from Skyline Ranch Country Club Reclamation. The Skyline plant was formerly managed by Valley Center Municipal Water District but is now privately owned.
12 Regional Board Order No. 95-32, as amended
13 Regional Board Order No. R9-2005-0258
14 Regional Board Order No. R9-2006-0049
15 Regional Board Order No. 93-82 and Addenda Nos. 1 and 2. Facility is currently not in operation. Due to high production costs, the City of Vista suspended operations of the facility in 2003. A feasibility study was completed in 2009 to evaluate the feasibility upgrading the facility.
16 Regional Board Order No. 2001-352.
17 Regional Board Order No. R9-2004-0223.
18 Regional Board Order No. R9-2007-0018. Recycled water from the Meadowlark Water Reclamation Facility is purveyed by Carlsbad Municipal Water District and Olivenhain Municipal Water District.
19 Regional Board Order No. 93-70 and Addendum No. 1. Recycled water from the Hale Avenue facility is purveyed by the City of Escondido and Rincon Del Diablo Municipal Water.
20 Regional Board Order No. R9-2010-0087. Recycled water from the San Elijo facility is purveyed by the Santa Fe Irrigation District, San Dieguito Water District, and City of Del Mar.
21 Regional Board Order No. R9-2011-0016 as amended by R9-2012-0042
22 The Encina Wastewater Pollution Control Facility is permitted to produce secondary water (up to 40.5 MGD), but sells up to 5 MGD of this to Carlsbad WRF (4 MGD) and Gaftner WRF (1 MGD) for tertiary treatment. Regional Board Order No. R9-2011-0019
23 Regional Board Order No. R9-2003-0007.
24 Regional Board Order No. 2000-177.
25 Regional Board Order No. R9-2002-0013.
26 Rancho Santa Fe Community Services District (http://www.rsfcsd.com/aboutus.html), Accessed August 29, 2013.
27 Regional Board Order No. 94-80
28 Regional Board Order No. 93-05, as amended
29 Regional Board Order R9-2009-0072
30 Regional Board Order No. 97-03 and Addendum No. 1. Recycled water use per City of San Diego 2010 UWMP. Recycled water from the North City Water Reclamation Plant is purveyed by Olivenhain Municipal Water District, the City of Poway and City of San Diego.
31 The Metro Biosolids Center is a solids handling facility, dewatering sludge produced by North San Diego and Point Loma wastewater treatment facilities. As such, it does not have a permitted capacity.
32 Regional Board Order No. 97-49 (recycled water irrigation) and Order No. R9-2003-0179, NPDES CA0107492 (lake replenishment). Recycled water is for replenishing Santee Lakes.
33 Regional Board Order No.R9-2009-0005.
34 Regional Board Order No. 93-09
35 Regional Board Order No. 83-09, as appended
36 Point Loma is permitted to treat to Advanced Primary rather than Secondary. Regional Board Order No. R9-2009-0001
37 Plant is located in Sweetwater Watershed, but recycled water use is in Otay Watershed. Regional Board Order No. 92-25 and Addendum No. 1.
38 Regional Board Order No. 93-112. However, this permit was rescinded in 2010.
39 Plant can discharge a total of up to 15 MGD, either secondary, tertiary, or some combination of the two. Regional Board Order No. R9-2013-0006; Regional Board Order No. 2000-203 and Addenda Nos. 1 and 2. Recycled water use per City of San Diego 2010 UWMP.
40 Regional Board Order No. 96-50
41 Regional Board Order No. 94-161

Despite the cost and energy savings associated with non-potable reuse, it also requires additional work by the local water agency, thus additional cost, for regulatory compliance. Because tertiary treated recycled water is a non-potable resource, it must be segregated from potable water and delivered through a separate distribution system. This recycled water distribution system is commonly referred to as the "purple pipe" system. The purple pipe system includes not only pipelines, but also all other water conveyance infrastructure such as pumps, valves, and storage tanks. While such facilities may exist for potable water, separate infrastructure must be constructed and operated for recycled water, and there must be infrastructure and agency programs to ensure that the non-potable recycled water does not mix with potable water. Additionally, higher levels of TDS in recycled water compared to potable water can lead to accelerated corrosion, requiring more frequent infrastructure replacement than in potable systems or use of demineralization facilities to reduce salinity, which adds cost to system operations.

Recycled water is used primarily for landscape and agricultural irrigation.

Photo credit: City of San Diego

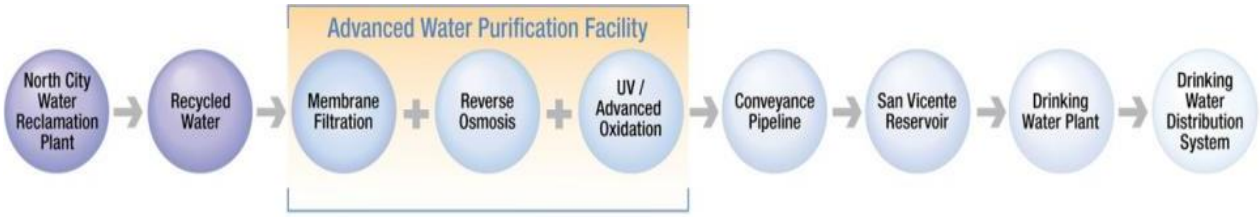
The IRWM Program has been supportive of expanding non-potable reuse in the Region by funding treatment plant improvements, distribution system expansions, inter-connections and use site retrofits.

Potable Reuse

Although non-potable reuse is widespread in the Region, non-potable reuse alone does not achieve the full potential for beneficial reuse of wastewater. Potable reuse is another alternative under study as a means to increase water reuse. Potable reuse would involve advanced treatment of tertiary-quality recycled water to produce purified water, which would be similar in quality to distilled water (City of San Diego 2013). The purified water would then become part of the raw water supply, treated again at a drinking water treatment plant, and distributed through the existing potable water system. The health and safety of the drinking water is ensured by having multiple treatment barriers between recycled water and drinking water.

Several agencies – including the City of San Diego, City of Escondido, City of Oceanside, Padre Dam Municipal Water District, and San Elijo Joint Powers Authority – are exploring different technologies that would allow for future potable reuse. In the City of San Diego's 2006 *Water Reuse Study*, a group of stakeholders determined that the preferred option for water reuse would be to augment the City's San Vicente Reservoir with advance-treated purified water (City of San Diego 2013). This type of system is called indirect potable reuse through reservoir augmentation (IPR/RA), wherein the reservoir provides an environmental buffer in the string of multiple treatment barriers. The schematic below shows the processes for indirect potable reuse through reservoir augmentation.

Multiple Treatment Barriers for the City of San Diego's Proposed Indirect Potable Reuse/Reservoir Augmentation Project



Source: City of San Diego 2013

Another form of potable reuse being studied by the City of San Diego is direct potable reuse, or DPR, which would not include the reservoir as an environmental buffer. In this system, advance treated purified water would be delivered directly to the drinking water treatment plant. At this time it is not clear what additional treatment barriers would be needed for a direct potable reuse project in the San Diego region.

Two agencies in California are responsible for regulating potable reuse projects: the California Department of Public Health (CDPH), which regulates drinking water supplies, and the State Water Resources Control Board through its nine Regional Water Quality Control Boards, which regulate surface water and groundwater discharges. In California, IPR projects using groundwater recharge have been safely operated since the 1960s. After completing numerous technical studies and research, the city of San Diego has received conceptual approval from both CDPH and the Regional Board to implement an IPR project using reservoir augmentation at San Vicente Reservoir.

Potable reuse can provide multiple water management benefits to the Region. As expressed by IRWM stakeholders, potable reuse would further diversify the Region's water supplies and achieve environmental objectives by reducing wastewater discharges to the ocean. Investing in potable reuse would be a more efficient investment than solely focusing on upgrades to wastewater systems because it helps toward two goals – water supply and wastewater management (refer to the comment letter from the Metro JPA Technical Advisory Committee in Appendix 6-D). Savings from offloading wastewater systems could reduce water supply costs to consumers by $1000 per AF (City of San Diego 2013). Potable reuse would also reduce the cost of higher salinity to utilities and consumers through water quality improvements associated with advanced water treatment. Because purified water has TDS levels much lower than the existing imported water (about 15 mg/L compared to 500 mg/L), blending of the two supplies will reduce overall salinity. Operations and maintenance costs associated with corrosion would be substantially reduced in the potable water system for consumers. The savings from reduced TDS has been estimated at $100 per AF (City of San Diego 2012).

The IRWM Program has funded several projects to conduct important research that will advance the opportunities to reuse our water. This will lead to the opportunity to further integrate the Region's water supply and wastewater management efforts and achieve multiple benefits.

The City of San Diego is Testing the Feasibility of IPR and DPR at its Advanced Water Purification Demonstration Facility

The City of San Diego has been studying indirect potable reuse (IPR) using reservoir augmentation since the 1990s, recently with the Water Purification Demonstration Project. The Water Purification Demonstration Project, which began in 2007 and was completed in 2012, consisted of installation and operation of a 1 mgd demonstration-scale Advanced Water Purification Facility, studies of San Vicente Reservoir, education and outreach, and assessments of regulations, energy use, and costs; all with oversight by an Independent Advisory Committee. Although there are currently no regulations for IPR using reservoir augmentation, the results of the Water Purification Demonstration Project allowed CDPH to issue a letter of conceptual regulatory approval for the City's proposed 15 mgd IPR project using San Vicente Reservoir. Similarly, in a 2012 resolution the Regional Board expressed support of the City's proposed IPR projects, and in 2013 the Regional Board issued a letter validating the proposed regulatory pathway for a project at San Vicente Reservoir (City of San Diego, 2013).

The City of San Diego's proposals to augment drinking water supplies through potable reuse has support of residents: in a 2012 poll of City residents, 73% of respondents strongly favored or somewhat favored using advanced treated recycled water as an addition to the Region's drinking water supply (City of San Diego, 2013).

The City of San Diego is also investigating options for Direct Potable Reuse (DPR). The City has teamed with the WateReuse Foundation to conduct additional research at the Advanced Water Purification Facility to test treatment and monitory technologies. The City's Advanced Water Purification Facility is ideal for this research because it uses full-scale components, and the water produced can be returned to the purple pipe system. DPR is an emerging concept – there is currently no regulatory framework for DPR projects in California. The results of these on-going projects will support establishing regulatory guidelines for DPR. Continuing tours and education at the facility will further public understanding of the health and safety aspects of potable reuse.

The City's IPR and DPR initiatives are supported by grant funding from the San Diego IRWM Program.

3.5.6 Groundwater Resources

The San Diego IRWM Region contains 24 separate groundwater basins, as defined by the California Department of Water Resources (DWR) Bulletin 118 (DWR, 2003). These groundwater basins are:

- San Mateo Valley
- San Onofre Valley
- Santa Margarita Valley
- San Luis Rey Valley
- Warner Valley
- Escondido Valley
- San Pasqual Valley
- Santa Maria Valley
- San Dieguito Creek
- Poway Valley
- Mission Valley
- San Diego River Valley
- El Cajon Valley
- Sweetwater Valley
- Otay Valley
- Tijuana Basin
- Batiquitos Lagoon Valley
- San Elijo Valley
- Pamo Valley
- Ranchita Town Area
- Cottonwood Valley
- Campo Valley
- Potrero Valley
- San Marcos Area

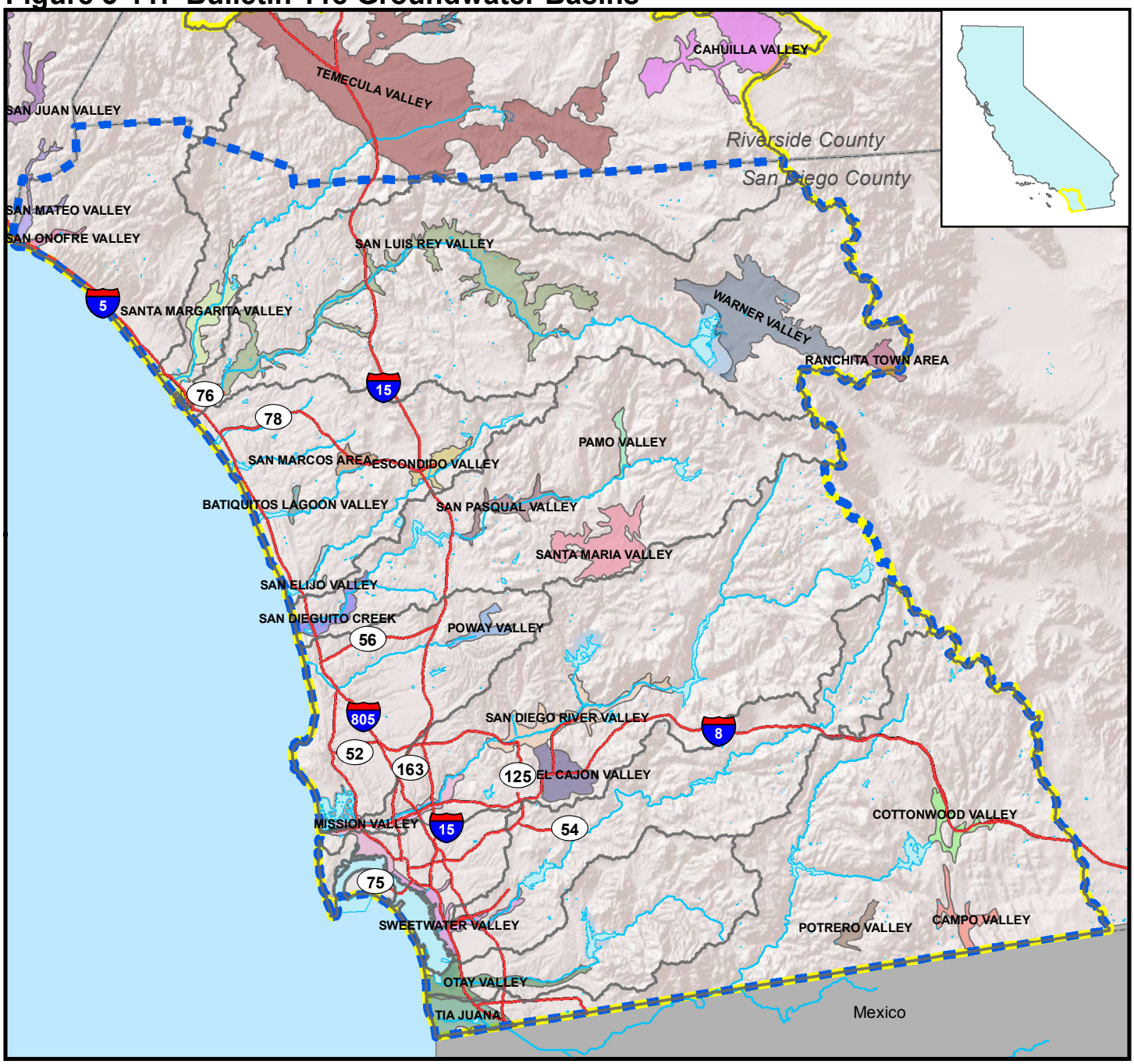
Though this Plan uses the groundwater basins defined by Bulletin 118, other local or regional plans may define basins slightly differently. For example, the *Salinity and Nutrient Management Planning Guidelines*, produced by the Water Authority and the Southern California Salinity Coalition, defines the San Luis Rey Valley groundwater basin as five basins: Oceanside/Mission, Bonsall, Moosa, Pala, and Pauma. Some basins that are recognized by a management agency may not be recognized in Bulletin 118, such as the Middle Sweetwater aquifer. The Regional Board has begun to use the basins as named and defined in the *Salinity and Nutrient Management Planning Guidelines* when referring to Salt and Nutrient Management Plans in the Region.

For the most part, groundwater within the Region occurs in alluvial aquifers, residuum (crystalline bedrock that has weathered in place), aquifers comprised of semi-consolidated or consolidated sediments, and fractured crystalline rock. Other water-bearing formations in the Region include the Poway Group, San Diego Formation, San Mateo Formation, La Jolla Group, Santiago Peak Volcanics and Otay Formation. Figure 3-11 presents the locations of groundwater basins (as defined in Bulletin 118) in the Region. Groundwater yields from fractured rock and residuum can be sufficient to provide water supply for individual homes, but these aquifer types are typically not sufficiently productive to warrant supply development by water supply agencies (Water Authority, 1997). Table 3-21 summarizes characteristics of key groundwater aquifers within the Region.

Aside from the Warner, San Luis Rey Valley, and Sweetwater Valley Basins, none of the Region's alluvial aquifers exceed a storage capacity of 100,000 AF. A total of ten alluvial aquifers, however, are estimated to exceed a 50,000 AF capacity. Aquifers comprised of alluvial deposits (alluvium) provide much of the current groundwater production capacity within the region. Yields from the Region's larger aquifers are typically on the order of several thousand acre-feet per year (Water Authority, 1997; DWR, 2003).

Sources of groundwater recharge in the Region include creeks, precipitation, discharges from treatment plants, underflow from dams, and return flow. The imported water that is applied to the land as irrigation water (for agriculture and domestic irrigation) contributes to the groundwater supply in the form of return flows and may also be a resource for agencies that have usable aquifers.

Figure 3-11: Bulletin 118 Groundwater Basins



Legend

- Watershed
- San Diego IRWM Region
- Funding Area Boundary
- Waterbody
- County
- River
- Freeway
- Waterbody

N

0 2.5 5 10
Miles

RMC

Sources: San Diego Association of Governments (SANDAG) - GIS Data Warehouse
\\rmcsd\RMCSD\Projects GIS\0188-003 SDIRWM Plan Update\AdminDraftMaps\060713_JD\Fig3-11_GW Basins 060713.mxd

Table 3-21: Summary of the Region's Principal Groundwater Aquifers[1]

Groundwater Basin	Basin Number	Water-Bearing Formations	Surface Area (sq. miles)	Estimated Storage Capacity (AF)	Estimated Potential Yield[2,4] (AFY)	Aquifer Depth (Feet)	
						Maximum	Average
San Mateo Valley	9-2	Alluvium, San Mateo	4.7[4]	14,000[4]	3,180[3]	100[4]	60[4]
San Onofre Valley	9-3	Alluvium, San Mateo	2.0[4]	6,500[4]	1,420[3]	55[4]	25[4]
Santa Margarita Valley	9-4	Alluvium, Residuum, Fractured Rock	12.4[4]	61,600[4]	5,400 to 16,700[6]	200[4]	175[4]
San Luis Rey Valley[5]	9-7	Alluvium, La Jolla	46.0[4,5]	240,000[4,5]	22,400 to 23,400[5,6,7]	1,650[4,8]	200[4,9]
Warner Valley	9-8	Alluvium, Residuum	37.5[4]	550,000[4]	12,000[6]	900[4,10]	900[4,10]
Escondido Valley	9-9	Alluvium, Residuum, Fractured Rock	4.5[4]	24,000[4]	NA[11]	NA[11]	NA[11]
San Pasqual Valley	9-10	Alluvium, Residuum	7.1[4]	63,000[4]	5,800[6]	200[4]	120[4]
Santa Maria Valley	9-11	Alluvium, Residuum	19.2[4]	77,000[4]	>2,500[6]	225[4]	40[4]
San Dieguito Creek	9-12	Alluvium, La Jolla, Santiago Peak Volcanics	5.6[4]	52,000[4]	<2,500[6]	180[4]	125[4]
Poway Valley	9-13	Alluvium, Residuum, Poway	3.8[4]	2,330[4]	NA	75[4]	40[4]
Mission Valley	9-14	Alluvium, San Diego	11.5[4]	42,000[4]	2,000 to 4,000[6]	200[4]	80[4]
San Diego River Valley[12]	9-15	Alluvium	15.4[4,12]	97,000[4,12]	5,000 to 8,000[6,12,13]	200[4]	70[4]
El Cajon Valley	9-16	Alluvium, Fractured Rock	11.2[4]	32,500[4]	NA[11]	350[64]	NA[11]
Sweetwater Valley	9-17	Alluvium, San Diego	9.3[4]	973,000[14]	8,400 - 10,400[6,15]	2,000[4,16]	700[4,16]
Otay Valley	9-18	Alluvium, San Diego, Otay	11[4]	28,900[4]	NA[11]	1,400[4]	100[4]
Tijuana Basin	9-19	Alluvium, San Diego	11.6[4]	80,000[4,7]	5,000 to 6,800[6,17]	1,700[4,18]	80[4,18]
Batiquitos Lagoon Valley	9-22	Alluvium, La Jolla	1.2[4]	NA[11]	NA[11]	100[4]	NA[11]
San Elijo Valley	9-23	Alluvium, La Jolla, Santiago Peak Volcanics	1.4[4]	8,500[4]	NA[11]	1,650[4]	50[4]
Pamo Valley	9-24	Alluvium, Residuum	2.3[4]	NA[11]	NA[11]	NA[11]	NA[11]
Ranchita Town Area	9-25	Alluvium, Residuum	4.9[4]	NA[11]	NA[11]	130[4]	NA[11]
Cottonwood Valley	9-27	Alluvium, Residuum	6.0[4]	NA[11]	NA[11]	100[4]	NA[11]
Campo Valley	9-28	Alluvium, Residuum	5.5[4]	63,450[4]	NA[11]	100[4]	55[4]
Potrero Valley	9-29	Alluvium, Residuum	3.2[4]	NA[11]	NA[11]	NA[11]	NA[11]
San Marcos Area	9-32	Alluvium, Residuum	3.3[4]	NA[11]	NA[11]	175[4]	NA[11]

Table 3-21: Summary of the Region's Principal Groundwater Aquifers[1]

Groundwater Basin	Basin Number	Water-Bearing Formations	Surface Area (sq. miles)	Estimated Storage Capacity (AF)	Estimated Potential Yield[2,4] (AFY)	Aquifer Depth (Feet)	
						Maximum	Average

1 Groundwater Basin names and numerical designations per California Department of Water Resources *California's Groundwater* (Bulletin 118).
2 Total existing long-term yield that could be realized on an annual basis without causing long-term overdraft. Does not consider yield restrictions that may be necessary to prevent impacts to groundwater-dependent vegetation or yield restrictions necessary to protect or improve existing groundwater quality. In many coastal basins, the available groundwater yield may not be of a quality that meets potable or irrigation use standards.
3 Value reported by U.S. Marine Corps Base Camp Pendleton within Metropolitan Water District of Southern California *Groundwater Assessment Study*, Chapter IV, Groundwater Basin Reports (Metropolitan Water District of Southern California, 2007).
4 Value or estimated presented within California Department of Water Resources *California's Groundwater* (Bulletin 118)(DWR, 2003).
5 Includes Oceanside Mission Basin, Bonsall Basin, Moosa Basin, and Pala/Pauma Basin.
6 Value reported within Metropolitan Water District of Southern California *Groundwater Assessment Study*, Chapter IV, Groundwater Basin Reports (Metropolitan Water District of Southern California, 2007).
7 Estimated yield for Mission Basin (7,000-10,000 AFY), Bonsall Basin (5,400 AFY), and Pala/Pauma Basin (8,000 AFY).
8 Maximum depth of La Jolla Formation within the San Luis Rey Valley groundwater basin.
9 Average depth of alluvium within the San Luis Rey Valley groundwater basin.
10 Depth for Temecula Arkose formation which underlies the Warner Basin.
11 Value currently unknown, as reported within DWR Bulletin 118 (DWR, 2003).
12 Includes the Mission Valley Basin and Santee-El Monte Basin.
13 Estimated yield includes 2,000-3,000 AFY from the Mission Valley Basin and 3,000-4,000 AFY from the Santee-El Monte Basin.
14 Capacity includes capacity of underlying San Diego Formation. DWR (2003) estimates the storage capacity of alluvium within the Sweetwater Valley Groundwater basin at 17,00o to 20,000 acre-feet.
15 Estimated yield includes 2,400 AF from the lower Sweetwater River Valley alluvium, 3,000 AF from the middle Sweetwater River Valley alluvium, and 3,000-5,000 AFY from the San Diego Formation.
16 Listed thickness for the San Diego Formation within the Sweetwater River Valley.
17 Yield is for the San Diego Formation within the Lower Tijuana Basin.
18 Depth of San Diego Formation extends to 1700 feet. Maximum depth of alluvium is 150 feet.

The Water Authority (2011a) reports that existing groundwater production for municipal supply purposes exceeds 18,000 AFY within the region, and includes:

- more than 8,500 AFY of production within the Santa Margarita, San Mateo, and San Onofre Basins within USMC Base Camp Pendleton,
- 2200 AFY of production by the City of Oceanside from the Mission Basin (lower San Luis Rey River Valley Basin),
- approximately 980 AFY of production by mutual water company wells within the Yuima Water District boundaries in the Pauma Basin (upper San Luis Rey River Valley Basin),
- more than 900 AFY of production within the Santee Basin by the Lakeside Water District,
- 150 AFY of production within the El Monte Basin by the Helix Water District,
- approximately 150 AFY of production within the El Monte Basin by the City of San Diego, and
- more than 5,400 AFY of production within the San Diego Formation and Lower Sweetwater River Valley by Sweetwater Authority.

In 1954, the Vista Irrigation District began pumping groundwater from the Warner Valley groundwater basin to supplement raw water supplies in Lake Henshaw (VID 2011). Although VID groundwater pumping from the Warner Valley groundwater basin varies, VID estimates that since 1960 the median annual groundwater production has been 7,702 AFY (VID 2011). This pumping is not included within the Water Authority's estimates of groundwater use.

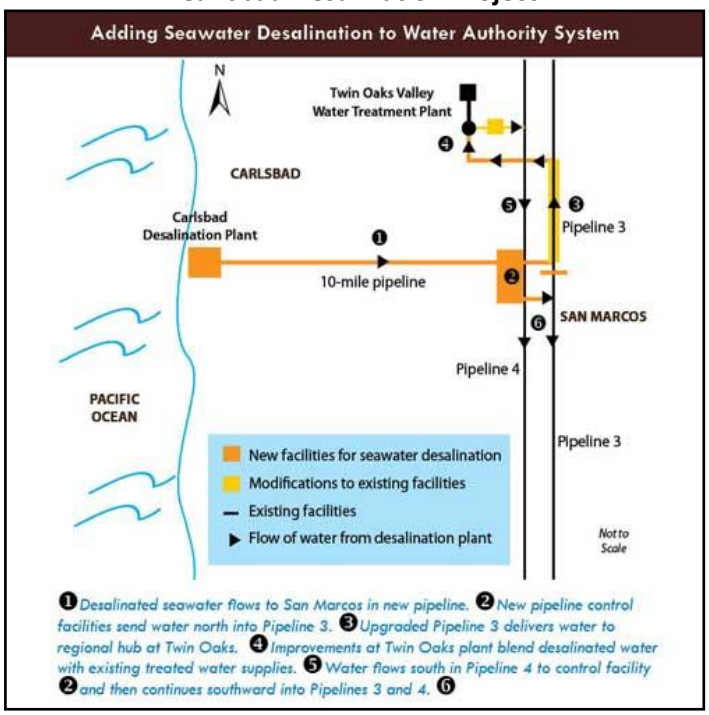
Significant groundwater resources have been found to exist in deeper aquifers comprised of semi-consolidated or consolidated sediments. Recent field investigations indicate that one such deep aquifer, the San Diego Formation, has significant unused water storage and groundwater production potential.

While significant understanding occurs for larger alluvial aquifers that have supported ongoing groundwater development projects, additional study and evaluation is required to better understand aquifer characteristics and water supply development potential within the Region's deeper and less utilized aquifers. To address this need, the USGS, in partnership with local water agencies, has initiated a comprehensive geologic and hydrologic study of the Region's aquifers. Key objectives of the San Diego Hydrology Project include:

1. Develop an integrated, comprehensive understanding of the geology and hydrology of the San Diego area, focusing on the San Diego Formation and the overlying alluvial deposits.
2. Use this understanding to evaluate expanded use of the alluvial deposits and the San Diego Formation for recharge and extraction.

To develop data in support of these objectives, the USGS study has completed 12 multiple-depth test wells in and around the San Diego Formation, along with an additional well in the Santa Ysabel area. Four additional deep test wells are planned as part of this effort.

Figure 3-12: Conveyance Facilities for Carlsbad Desalination Project



3.5.7 Desalinated Seawater

Poseidon Resources, a private investor-owned company, is constructing a 50 MGD seawater desalination plant adjacent to the Encina Power Station in Carlsbad. When completed in 2016, the plant will be the largest seawater desalination facility in the Western Hemisphere. As part of the project, Poseidon Resources is also constructing a 10-mile conveyance pipeline to link the desalination plant to the Water Authority's second aqueduct.

The Water Authority in November 2012 approved a 30-year Water Purchase Agreement with Poseidon Resources for the purchase of up to 56,000 AFY of desalinated seawater. Poseidon Resources will own and operate the desalination facility and will assume risks associated with constructing, maintaining, and operating the facility, and ensuring that water quality meets standards specified within the agreement. The Water Authority, in turn, has agreed to purchase the water that meets specified standards at a set price during the 30-year agreement period. Additionally, the agreement specifies that the Water Authority can purchase the desalination plant for one dollar at the end of the 30-year agreement. Once constructed, the Water Authority will own and operate the 10-mile conveyance pipeline. Two of the Water Authority's

member agencies, the City of Carlsbad and the Vallecitos Water District have agreed to purchase a total of 6,000 AFY of the desalinated water.

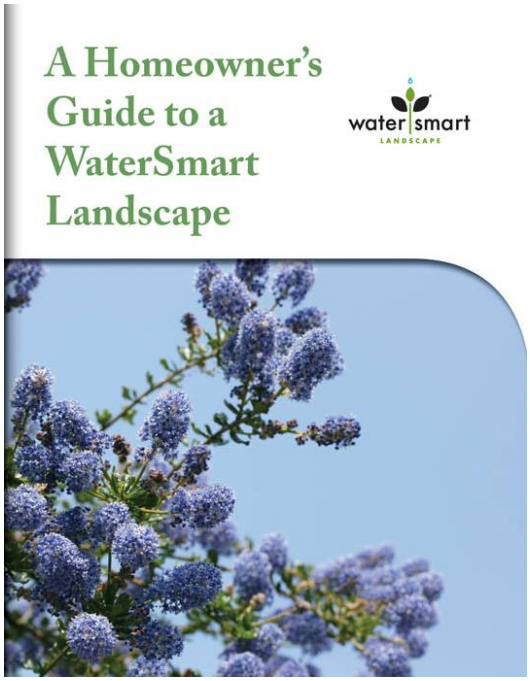
The Water Authority is in the process of implementing improvements to its regional water delivery and treatment system to integrate desalinated water. These system improvements (see Figure 3-12) will allow the Water Authority to blend the desalinated supply into treated water in Pipelines 3 and 4 of the second aqueduct. The Water Authority also is involved in two feasibility studies of additional seawater desalination plants, one at Camp Pendleton Marine Corps Base and the other in Rosarito, Baja California, in conjunction with several parties that receive water from the lower basin of the Colorado River. In addition, the Otay Water District is in discussion with a private company to develop a binational desalination plant in Rosarito.

3.5.8 Conservation

Water conservation is a fundamental component of the Region's water supply diversification effort. The Water Authority and its member agencies have been aggressively implementing water conservation since 1990. There are two types of water conservation in the Region, both of which are contribute to Regional water supplies: 1) water conserved through reduced loss from the system, and 2) water conserved through reduced user demand. Water conservation through loss reduction has been achieved through projects that line the canals that bring imported water to the Region and other infrastructure improvements. Potable water demand reduction can take place in a traditional water conservation setting whereby water users use less water on a per capita basis. In addition to traditional water conservation, implementation of onsite systems that use alternative water sources such as graywater systems, rainwater harvesting systems or on-site industrial reuse can reduce potable water demands.

A Homeowners Guide to a WaterSmart Landscape

http://www.sdcwa.org/landscape-guide-flipbook/



Water Use Reduction Programs

Significant Water Authority and member agency funding has been directed toward implementing comprehensive water conservation best management practices (BMPs) (see inset below) to reduce water use for residential, commercial, and agricultural irrigation, and to reduce water use in homes, businesses, industries, and institutions.

The comprehensive water conservation program implemented by the Water Authority and its member agencies resulted in approximately 65,000 AF of water savings during 2010 (Water Authority, 2011a). Additional water conservation savings are projected as the Water Authority and its member agencies expand regional water conservation efforts. Additionally, the Water Authority and its members agencies are undertaking measures to comply with Senate Bill 7-7 (SBx7-7), which require retail urban water agencies to achieve a 20% reduction in per capita water use by 2020.

Starting in 2006, the Water Authority and member agencies began a transition in the approach to water conservation. Three Water Conservation Summits were held between 2006 and 2009. These summits, which placed an increased emphasis on landscape and commercial/industrial conservation, brought in business and industry, land use planning agencies, environmental groups and other stakeholders to participate in a regional approach to landscape conservation. Following the second summit, the region developed a Blueprint for Water Conservation to help the Water Authority and its member agencies strategically plan and implement conservation efforts and programs. The Blueprint includes strategies for saving water in landscaping, indoor uses and agriculture. The Water Authority is also implementing conservation partnerships with its member agencies, the Water Conservation Garden, Metropolitan Water District, and San Diego Gas and Electric.

California Urban Water Conservation Council
Water Conservation Best Management Practices (BMPs)

The Water Authority and its member agencies comply with all 13 water conservation BMPs developed by the California Urban Water Conservation Council, including:

Utilities Operations Programs

- Conservation coordinator
- Water waste prevention
- Wholesale agency assistance programs

Education Programs

- Public information programs
- School education programs

Residential

- Residential assistance program
- Landscape water survey
- High-efficiency clothes washers
- WaterSense Specification toilets
- WaterSense Specifications for residential development

Commercial, Industrial, and Institutional

- Commercial, industrial, and institutional savings

Landscape

- Savings for dedicated landscape irrigation accounts
- Savings from CII accounts within meters or mixed use meters

Source: CUWCC Resource Center: http://www.cuwcc.org/bmps.aspx

While many regional efforts have been implemented to increase conservation, especially with regards to outdoor water use for landscape irrigation, regional stakeholders have indicated that there are impediments to conservation actions. The public's attitude about what are acceptable landscaping options given the Region's warm and dry Mediterranean climate., need to change to match the current climate There are a wide range of options available for landscapes which use a minimal amount of water and still look beautiful Contrary to State law homeowners associations are still trying to enforce outdated rules that restrict the use of certain plants, and therefore provide an impediment to landscaping with low water use plants. Public education and a conservation ethic is critical to achieving outdoor conservation.

Graywater

Graywater is defined as wastewater that is generated from domestic activities such as laundry and bathing. To protect human and environmental health, graywater systems reuse untreated wastewater that has not been contaminated by food or human waste for non-potable purposes, primarily irrigation.

Although the potential for graywater reuse to reduce potable water demand has long been recognized, permitting and regulations have presented significant barriers to widespread implementation of graywater systems in the Region. In 2009, however, DWR released an emergency order that eased the permitting process for graywater systems in California. Per State Plumbing Code Chapter 16A, graywater systems supplied by washing machines generally do not require a permit, though more complex systems or ones that utilize other graywater supply sources typically do. General requirements for graywater systems include the ability to direct graywater to both irrigation and sewer systems, a physical barrier or air gap to prevent backflow and cross-contamination, subsurface irrigation systems, and design that prevents ponding or runoff. Additionally, graywater cannot make direct contact with edible portions of food crops. Cities, counties, and other jurisdictions are able to place additional regulations on graywater systems and uses (HCD, 2010). Within the Region ,local cities and the County of San Diego (Department of Environmental Health) regulate graywater through adoption of the plumbing code. Both the City of San Diego and the County regulate graywater per the State code with no additional restrictions.

Challenges to widespread implementation of graywater systems include the expense of installation and restrictions on use, both of which place limits on graywater system installation (City of San Diego, 2002). The City of San Diego has estimated that graywater could potentially provide 2,575 AFY of irrigation water by 2035 (City of San Diego 2013). If this amount of graywater were to be used in the City, it would represent just over 1% of the City's 2035 water demands (City of San Diego 2011).

Rainwater Capture

Rainwater capture is another tool for water conservation in the Region. As its name implies, rainwater capture involves diverting, capturing, and storing rainwater runoff before it enters the storm sewer system. Captured rainwater can be used for non-potable purposes, such as irrigation, or may be allowed to recharge into groundwater basins. Capturing and reusing rainwater reduces water demands for irrigation or groundwater recharge, benefits water quality through reduced stormwater runoff, reduces the load on regional stormwater infrastructure, and helps mitigate high runoff flows from impervious surfaces that cause hydromodification of streams and rivers. Rainwater capture through groundwater recharge is limited in the San Diego region due to the small size of the local groundwater basin and the presence of expansive clay soils.

Common methods of rainwater capture include installation of rain barrels to collect water from rooftops, and rain gardens designed to collect rainwater and allow the water to irrigate onsite plants. Though the Region encourages the use of rain barrels and rain gardens, it is important to properly design rainwater capture systems for the appropriate volume of water expected to be captured and to accommodate individual site characteristics, such as soil type or slope. The City of San Diego has produced a *Rainwater Harvesting Guide* (City of San Diego, 2012) that details how to design a rainwater harvesting system. This guide encourages customers to select plants for a proposed rain garden that have a corresponding water need to the expected volume of rainwater that can be captured by the system. For example, if the site only receives a few inches of rain per year, a rain garden of tropical plants would require additional irrigation, as its water needs would not be met by the captured rainfall. Instead, landowners in areas with low rainfall should select

less-water intensive plants, such as native plants or succulents. The City of San Diego initiated its Rain Barrel Rebate Pilot Program in 2012 which offers single-family residential customers the opportunity to receive a rebate when connecting a newly installed rain barrel to a rain gutter downspout in that collects precipitation from the rooftop. The amount of rain water that can be collected depends on several variables, including dimensions of the rooftop, storage capacity of the rain barrel(s), as well as the amount and timing of rainfall. A general rule of thumb follows that 1,000 square feet of rooftop surface captures 625 gallons of water when an inch of rainwater falls. Since the start of the City's program, over 300 rain barrel rebates have been issued with water savings projected at 1,113,250 gallons (3.4 AF) per year.

In addition to rainwater capture that involves capturing water and storing the water for irrigation purposes, landscapes can be modified to increase local infiltration potential, which will help to ensure that water that falls on the ground is infiltrated rather than running off the surface as stormwater. Increasing infiltration is a long-term rainwater capture strategy that helps to restore soil moisture and improve ecosystem health by restoring sub-surface water flows.

Low Impact Development (LID) is another method that can be implemented to capture rainwater and reduce stormwater runoff. The 2013 MS4 permit mandates that no additional runoff may occur from new developments in the MS4 permit area. This requirement will encourage implementation of rainwater capture-friendly LID measures, such as permeable surfaces, dispersed infiltration, rain barrels or cisterns, rain gardens, or bioswales (County of San Diego, 2007).

Reducing stormwater runoff could improve water quality by increasing natural filtration of pollutants from runoff flowing slowly through vegetation and percolation through permeable surfaces, reducing the amount of pollutants washing into local waterways over time, and reducing habitat changes that may have a negative impact on water quality. Though reduced runoff contributes to improved water quality, pollutants that are found on surfaces that runoff would have carried into waterways, is still present, and will enter waters during the "first flush" event – the first major storm event following the dry season. However, this first flush event tends to move pollutants to the ocean more quickly and at greater dilution than is carried by smaller rainfall events that would produce runoff without rainfall capture efforts in place.

3.5.9 Stormwater Management

Stormwater is managed through the Region's MS4 Permit, as described here and in Section 3.6.4. Stormwater in the Region is diverted to each agency's municipal separate storm sewer system (MS4). An MS4 system is legally defined as a system through which stormwater and non-stormwater are discharged to waters of the United States (Regional Board, 2013a). In the San Diego Region, MS4 systems 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
2. A small MS4 that is "interrelated" to a medium or large MS4
3. An MS4 which contributes to a violation of a water quality standard
4. An MS4 which is a significant contributor of pollutants to waters of the United States

The MS4 system comprises the ditches, storm pipes, retention ponds and other facilities constructed to store runoff or carry it to a receiving stream, lake, or ocean. Other constructed features in such a system include swales that collect runoff and direct it to storm drains and ditches. Most systems are designed to handle the amount of water expected during a 10-year storm. Larger

storms overload them and the resulting backed-up storm drains and ditches produce shallow flooding (FEMA, 2007).

An MS4 is designed to prevent or reduce flooding in developed areas. Because MS4s do not provide treatment prior to discharging collected stormwater, they can present a water quality challenge, as stormwater can have high levels of pollutants collected during runoff. The MS4s in the Region also collect urban runoff which can carry pesticides, fertilizers, and anything that is dumped into storm drains, such as oil or trash, to the receiving waters. As the Region continues to grow, addressing the problem of pollution from stormwater and the MS4 will be imperative. In general, stormwater programs governed by the MS4 process include:

- Urban runoff and receiving water monitoring during wet and dry weather,
- Assessment of water quality trends, potential sources, and impacts,
- Standards to manage runoff discharge rates and durations from all Priority Development Projects, and
- Programs to prevent, control, and treat sources of pollutants such as BMPs, water conservation, public education and outreach, maintenance of streets and storm water infrastructure, inspections of pollutant generating activities.

Stormwater is managed by the jurisdictions that own and operate the MS4 system, and regulated by an MS4 Permit granted by the Regional Board.

In 2001, the MS4 Permit for the San Diego Copermittees changed dramatically from past permits. New requirements included stormwater mitigation plans for new and re-development projects, expanded oversight of existing commercial and industrial areas, and the creation of both Jurisdictional Urban Runoff Management Programs (JURMP) and Watershed Urban Runoff Management Programs (WURMP). Each Copermittee developed a JURMP describing its plan to control urban runoff within its jurisdiction. In addition, WURMPs were developed collaboratively by all Copermittees whose jurisdictions fell partially or entirely within a watershed. The WURMPs were written to specifically address the management of priority water quality issues identified in each watershed.

In May 2013, a new MS4 Permit was issued for the Region. Over the next few years, this new permit will eventually include the portions of south Orange County and south Riverside County that are within the San Diego Regional Board area. New to this permit is the development of Water Quality Improvement Plans (WQIPs) for each watershed. WQIPs will define priority water quality conditions, establish water quality improvement goals and strategies, establish schedules for meeting the WQIP goals and incorporate integrated monitoring and assessment plans to help guide runoff management programs in improving water quality in MS4 discharges and receiving waters (Regional Board, 2013a). The new permit also includes more rigorous development and redevelopment requirements that include an offsite mitigation option for development projects where onsite retention and treatment are not technically feasible, or where applicants can demonstrate a greater overall benefit to water quality by mitigating offsite. The 2013 permit also includes adopted TMDL waste load allocations as numeric water quality based effluent limits that must be achieved by specified timelines. Finally, the permit now requires Copermittees to implement expanded programs to pro-actively address urban runoff discharges from residential areas, including a stronger emphasis on eliminating or reducing over-irrigation flows.Improved stormwater quality is a central component to multiple IRWM Plan objectives. Specifically, activities that contribute to Objective G and Objective H frequently manifest themselves as stormwater or stormwater quality control. The IRWM Program includes numerous projects that reduce

impervious surfaces, increase infiltration, and reduce runoff. Changes in landscaping practices, such as using water-wise plants instead of turf or improving irrigation practices, also help to reduce the pollutants in stormwater and runoff. Restoration projects also frequently increase the ability of an area to act as natural filters for runoff. By helping to meet the Plan objectives, these types of projects are more likely to be prioritized or selected for inclusion in IRWM funding packages, and help to improve stormwater management region-wide. Projects designed to improve the scientific basis of water quality regulations are consistent with the IRWM regulatory strategies outlined in *Chapter 7, Regional Coordination*.

Challenges to managing stormwater in the Region frequently stem from the expense of BMP installation, variability and uncertainty of BMP success, jurisdictional boundaries that are not aligned with watersheds or drainage areas, differences in land use and priorities, debate over appropriate water quality standards that are protective of beneficial uses, and uncertainty over the ability to comply with the terms of the Region's 2013 MS4 Permit. The WURMP and JURMP process, while important, is difficult, expensive, and time consuming. The 2013 MS4 permit requires Water Quality Improvement Plans (WQIP) instead of WURMPs. Under the expected terms of the new permit, WQIPs will cover the entire watershed and will require coordination between all copermittees whose jurisdictions fall within the watershed. There has also been some debate over the water quality standards established by the Regional Board, and the future may see a shift from some of the current concentration-based standards to biological criteria, such as those considered in the nutrient numeric endpoint (NNE) based standards. This shift may affect which management strategies are necessary or appropriate, and may make management easier or more challenging, depending on if or how changes to standards are implemented.

Determining Appropriate Water Quality Objectives: Santa Margarita River

Nitrogen and phosphorous loading from the Santa Margarita River Watershed can result in low dissolved oxygen (DO) and increased algal blooms in the estuary and stream segments, several of which have been 303(d)-listed for nitrogen, phosphorus, or eutrophication. Total Maximum Daily Loads (TMDLs) are not currently in place in most of the Santa Margarita River Watershed segments which are listed for nutrient impairment. At this time, there is little scientific knowledge about the appropriate level of nutrients that the Santa Margarita River can sustainably assimilate.

The Santa Margarita River Nutrient Study – funded through Proposition 84, Round 1 – aims to establish the science and seek stakeholder consensus to develop seasonal nutrient water quality objectives (WQOs) that are protective of beneficial uses. Stakeholders believe that since the estuary through which the Santa Margarita River flows is open to the ocean during the winter (the wet season), nutrients in the river only have a short residence time before they enter the ocean. Development and adoption of seasonal WQOs would significantly decrease stormwater treatment costs during a timeframe in which there are no real impacts to riverine species or habitats.

Nutrient water quality data collection will help the Region better understand how to manage the Santa Margarita River.

Photo credit: JoAnn Weber, County of San Diego

Another challenge to stormwater maintenance involves balancing multiple and sometimes conflicting interests. For example, the City of San Diego's Master Storm Water System Maintenance

Program identifies channels within the City's jurisdiction that have deposits of sediment and overgrowth of vegetation that require maintenance to restore stormwater and flood control capacity. This program was challenged by local organizations for its potential habitat fragmentation and biological impacts, and a Settlement Agreement was reached that incorporated additional water quality measures and biological mitigation requirements into the program. This program, and others across the Region, must balance flood control safety and stormwater maintenance requirements with natural resources protection.

3.5.10 Flood Management

Although precipitation in the Region is highly variable, flooding remains a high risk in many communities. Flooding in the Region occurs during periods of heavy rainfall, particularly after long dry spells (San Diego County, 2010).

The Floodplain Management Plan for the County of San Diego (FEMA, 2007) reports that from 1770 until 1952, 29 floods were recorded in the County of San Diego. Between 1950 and 2006, flooding prompted 12 Proclaimed States of Emergency in the County of San Diego. Several very large floods have caused significant damage in the County. The Hatfield Flood of 1916 destroyed the Sweetwater and Lower Otay Dams, and caused 22 deaths and $4.5 million in damages. The most recent serious floods affecting the County occurred during tropical storms Kathleen (1977) and Doreen (1978) and during winter storms in 1980, 1987, 1993, 1998, and 2005. In the 1980 flood, approximately 16-20 inches of rain accumulated over a six week period. This slow moving storm, which was the most severe since the Hatfield Flood of 1916, lead to wide-spread small stream flooding and evacuations of residents in Mission Valley. The San Diego River at Mission Valley peaked at 27,000 CFS and caused $120 million in damage (FEMA, 2007). Flooding during the 2004-2005 wet season caused $7.7 million in damages, and flash flooding since 1993 has caused upwards of $16 billion in damages, countywide (San Diego County, 2011a).

Within the Region there are two categories of flooding: precipitation-induced and non-precipitation-induced. Precipitation-induced flooding includes flash floods, debris flows, and alluvial fan floods. The central and eastern portions of San Diego County are most susceptible to flash floods where mountain canyons, dry creek beds, and high deserts are the prevailing terrain (FEMA, 2007). Additional risks from precipitation induced flooding stems from the association of wildfires with flooding. As fires remove vegetation, runoff is not taken up by vegetation and soils are destabilized. This leads to an increase in runoff entering streams, increasing flooding risks, and to an increase in debris flow risks. Because the Region is prone to wildfires, and this risk is expected to increase as an impact of climate change, the risk of flooding that is exacerbated by wildfires needs to be managed (San Diego County, 2011a). An additional flood risk that can be exacerbated by wildfires is non-native invasive vegetation species. Land that has been cleared by wildfire is more susceptible to regrowth of non-native invasive vegetation species. Invasive species, such as giant reed (*Arundo donax*), can outcompete native species and dominate riparian areas. Once established, Arundo in particular can change diverse native riparian areas into monotypic non-native riparian areas. Arundo provides very little habitat value to native wildlife and dead and dry stands can become a fire hazard themselves. The root system of Arundo along with its typical dense growth structure can cause increased sedimentation and narrowing of channels. This can increase flood risk on adjacent lands.

Non-precipitation-induced flooding is caused by urbanization, landform modification, faulty drainage facilities, dam failures, tsunamis, and seiches (standing waves in an enclosed or partially enclosed body of water). Of these, the Region is most at risk from flooding caused by urbanization and faulty drainage facilities. Urbanization increases impervious surfaces, and therefore increases

runoff. This runoff enters streams more quickly, in higher volumes, and at greater speeds. Each of these contributes to an increase in flood risk if the channels or streams are not able to accommodate the increased runoff. These problems can be made worse by faulty drainage facilities, which may fail or overflow if not adequately sized or maintained (San Diego County, 2011a).

Federal Emergency Management Agency (FEMA) flood zones represent the areas susceptible to the 1% annual chance flood (often referred to as the "100-year flood"), and the 0.2% annual chance flood ("500-year flood"). The 1% annual chance flood, also known as the "base flood," has at least a 1% chance of occurring in any given year. FEMA designates this area as the Special Flood Hazard Area (SFHA) and requires flood insurance for properties in this area as a condition of a mortgage backed by federal funds. Designated high-risk areas are those within the 100-year floodplain, while areas within the 500-year floodplain are considered low-risk. Areas within the Region at highest risk for flooding are typically downstream areas along rivers, and concentrated around the coast at bays, coastal inlets, and estuaries. Properties that are included in the SFHA may be contested, and those interested in changing a property's floodplain designation may submit a request for a Letter of Map Change (LOMC) to FEMA. If FEMA approves a LOMC, the FEMA Flood Insurance Rate Map will be officially revised or amended by FEMA; such an amendment will likely reduce insurance requirements and can reduce development restrictions.

Within the Region, over 101,000 people are exposed to high-risk from flooding. The potential losses due to damages to buildings in high-risk areas are over $17 billion, with $2.2 billion of critical facilities (e.g. hospitals, infrastructure) at high-risk from flooding (San Diego County, 2010). Locally identified "hot spot" flood areas are listed in Table 3-22 below.

In order to address these risks, a *Multi-Hazard Mitigation Plan* was developed for San Diego County (San Diego County, 2010). This Mitigation Plan included participation from the Water Authority, California Emergency Management Agency, FEMA, local and regional officials, the Rancho Santa Fe Fire Protection District, and stakeholder input. The Mitigation Plan includes specific goals, objectives, and actions for each jurisdiction to help address or mitigate the identified risks. Common actions related to mitigation of flood risks include maintaining current flood maps, discouraging growth in flood-risk areas, improving or maintaining stormwater systems, incorporation of natural flood control measures into design and development, continue to monitor and assess drainage, and develop comprehensive flood management and response plans (San Diego County, 2010).

Table 3-22: Local "Hot Spot" Flood Areas[1]

HU	Watershed	Flooding Source	Location and/or Description
902	Santa Margarita River	Santa Margarita River	Sandia Creek Drive and Rock Mountain Drive affecting Fallbrook and DeLuz
903	San Luis Rey	Upper San Luis Rey River	Between Lake Henshaw and La Jolla Indian Reservation; Cole Grade Road; and Shearer Crossing (San Luis Rey River at I-15); Pauma Valley Drive: Wiskon Way; Valley Center Road (Rincon Casino)
904	Carlsbad	Escondido Creek	El Camino Del Norte near Rancho Santa Fe and Olivenhain
		Escondido Creek	At Country Club Road; Elfin Forest
		Twin Oaks Creek	At Sycamore Road/Walnut Grove
		San Marcos Creek	From Discovery Street to East of SR-78
905	San Dieguito River	San Dieguito River	Downstream from Hodges Reservoir to Del Mar
		Hatfield Creek	Magnolia Avenue in Ramona
		Santa Maria Creek	In Ramona; Rangeland Road
907	San Diego River	San Diego River	Mission Valley and Fashion Valley Mall; Fashion Valley Road; Avenida del Rio; Camino del Este
		San Vicente Creek	Below San Vicente Reservoir, Moreno Valley
		Lemon Crest (Lakeside)	Local flooding problem
		Dulene Drive (Lakeside)	Local flooding problem
		Adlai Drive (East Lakeview)	Local flooding problem
909	Sweetwater River	Spring Valley Creek	Quarry Road at Spring Valley Creek
		Sweetwater River	Singing Hills Country Club
		Wildoats Lane off Central Avenue	Yearly flooding problem identified by Flood Control staff
911	Tijuana River	Tijuana River Valley	Tijuana River Regional Park; Hollester Street; Dairy Mart Road
		Cottonwood Creek	Trailer Park at Barret Junction
		Campo Creek	Campo Valley flash flooding

1 From *Floodplain Management Plan* (FEMA, 2007).

Flood Warning Program

The San Diego County Flood Control District (FCD) has the responsibility to provide flood warning services for the County of San Diego. This program encompasses three components: the ALERT Flood Warning System, the Webcam Program, and the Flood Forecast System.

The ALERT Flood Warning System

The ALERT Flood Warning System was developed in 1982 to address the need to obtain real-time rain and stream level data in order to detect flood-producing events early enough to respond in a timely manner. The system started out with 14 stations and has since expanded to over 120 stations. Data collected by the individual field stations are relayed in real-time to nearby data repeaters, which in turn, relay the data to the flood warning base station in Kearny Mesa. Incoming data is received by the flood warning computer, examined for quality control, examined for meeting any alarm criteria, then is placed into the database. Displays are updated, and if the data meet alarm criteria, a warning is issued on the computer, and a text message is assembled and sent to designated emergency personnel via email or smart phone. Emergency staff responds to the alarm

and contact the pertinent emergency agencies with information and recommendations. The ALERT flood warning system forms the core of the County Flood Warning Program and is used to provide input to flood forecast programs and provide real-time warning to emergency managers.

The FCD Webcam Program

The County of San Diego has several low water crossings over creeks and rivers. These crossings are either built directly on the river bottom or have small culverts to carry low flows under the road. Several times per year, heavy rainfall in the region is sufficient to cause enough runoff to flood several low water crossings in the County. The County has recently begun a program of placing internet webcams at key low water crossings with a history of flooding and flooding-related accidents. By accessing an in-house County website, these webcams can be controlled by emergency managers to check the magnitude of flooding at a crossing, check the quality of the road conditions during and immediately after flooding, identify vehicles that may have gotten trapped in the flood waters, and enable the public to examine the condition of the road during storms to determine whether they should use the crossing. Current webcams are located at Country Club Drive at Escondido Creek, Quarry Road at Spring Valley Creek, and Sandia Creek Road at Santa Margarita River. There is one candidate for a future webcam at Cole Grade Road on the San Luis Rey River. The public can view, but not control, the webcams at http://sdcfcd.org/.

The San Diego County Flood Forecast Program

Occasionally, the magnitude of the periodic flooding in San Diego County river systems is high enough to cause significant damage and injury. Recently, the FCD contracted with DHI Water and Environment to develop a comprehensive flood forecast model to cover the entire San Luis Rey Watershed and its primary tributaries. At regular timed intervals, the model retrieves rainfall and streamflow data from the ALERT Flood Warning system, and forecast rainfall from the National Weather Service website (http://www.weather.gov/). This information is run through the model to create a forecast of the expected flow conditions at several points along the San Luis Rey River and its primary tributaries. Analysis results are uploaded to a public website and a private emergency managers' website. The websites display the ALERT flood warning data from the stations within and near the watershed, point forecasts at nearly 100 bridges and low water crossings in the watershed, floodplain forecasts at five sensitive floodplains within the watershed, and a "state of the watershed" map showing the current water conditions at the forecast points. Emergency managers have access to detailed point forecasts, and animated floodplain maps that enable the user to drill right down to the street level to determined expected areas of flooding.

As funds allow, the model will be extended over time to cover the major watersheds of the San Diego River, Sweetwater River, San Dieguito River, and possibly the Tijuana River.

3.6 Internal Boundaries

3.6.1 Land Use Jurisdictions

Figure 3-13 identifies agencies responsible for land use and land planning within the region. The County, the 18 incorporated cities, and their associated planning districts support community planning, maintain comprehensive plans as required by statute, and administer and enforce land use codes and ordinances.

The USMC Base Camp Pendleton covers over 125,000 acres in the north portion of the Region. More than a dozen other military facilities exist within the Region. Additional federal land managers within the Region, in part, include the USFS, BLM, and the United States Fish and Wildlife Service (USFWS). USFS manages the Cleveland National Forest, which comprises the eastern portions of several of the Region's larger watersheds. BLM manages lands designated as Wilderness Areas, BLM National Monuments, BLM Public Lands, and BLM Wilderness Study Areas. USFWS manages the National Wildlife Refuge in the southwestern part of the County.

State land managers include the California Department of Fish and Wildlife (DFW), which manages land to implement DFW's Natural Community Conservation Plan (California Fish and Game Code Sections 2088-2805), and the California State Parks, which manages parklands such as Cuyamaca State Park. DFW's Natural Community Conservation Plan seeks to conserve natural communities at the ecosystem scale while accommodating compatible land use.

Tribal lands are significant in the Region: there are more Tribal Reservations within the County than in any other county in the United States (University of San Diego, 2006). These Reservation lands, which are governed by Tribal Nations, total 127,000 acres (approximately 200 square miles).

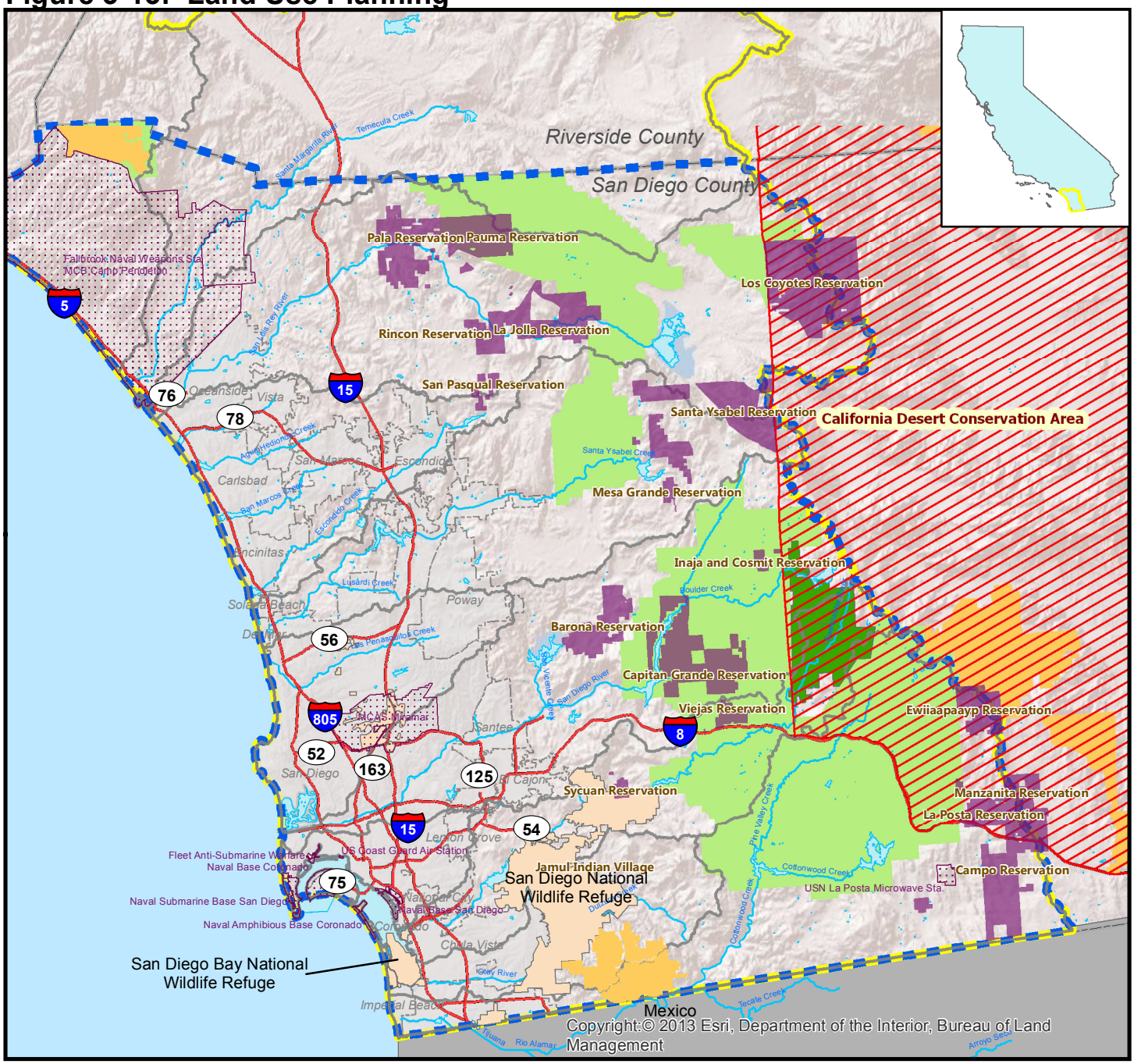
3.6.2 Water Supply Agencies

Water supply within the Region is predominantly imported water provided by the Water Authority, which is the sole regional imported water wholesale agency within the region. All major retail water agencies within the Region are members of the Water Authority. Figure 3-14 presents boundaries of Water Authority member agencies.

In addition to serving as the Region's provider of imported water, the Water Authority serves as a regional water planning agency to coordinate regional water issues. In this role, the Water Authority assists its member agencies (through financial, coordination, or planning support) in implementing local water planning and project development, and provides a forum for member agencies to discuss and address regional water issues. Most Water Authority member agencies maintain interagency agreements with adjoining member agencies to maximize conveyance flexibility and emergency response.

The rural eastern portion of the Region is outside the Water Authority's service area. Water service within this eastern area is provided by either onsite private wells or by small community water systems or private water companies.

Figure 3-13: Land Use Planning



Legend

- US Fish and Wildlife Service Wildlife Refuge
- Cuyamaca State Park
- Tribal Lands
- Watershed
- San Diego IRWM Region
- Funding Area Boundary
- Freeway
- BLM National Conservation Areas
- BLM Wilderness Areas
- Cleveland National Forest
- Military Facilities
- Watershed
- Ocean
- Waterbody
- City Boundaries
- County
- Freeway

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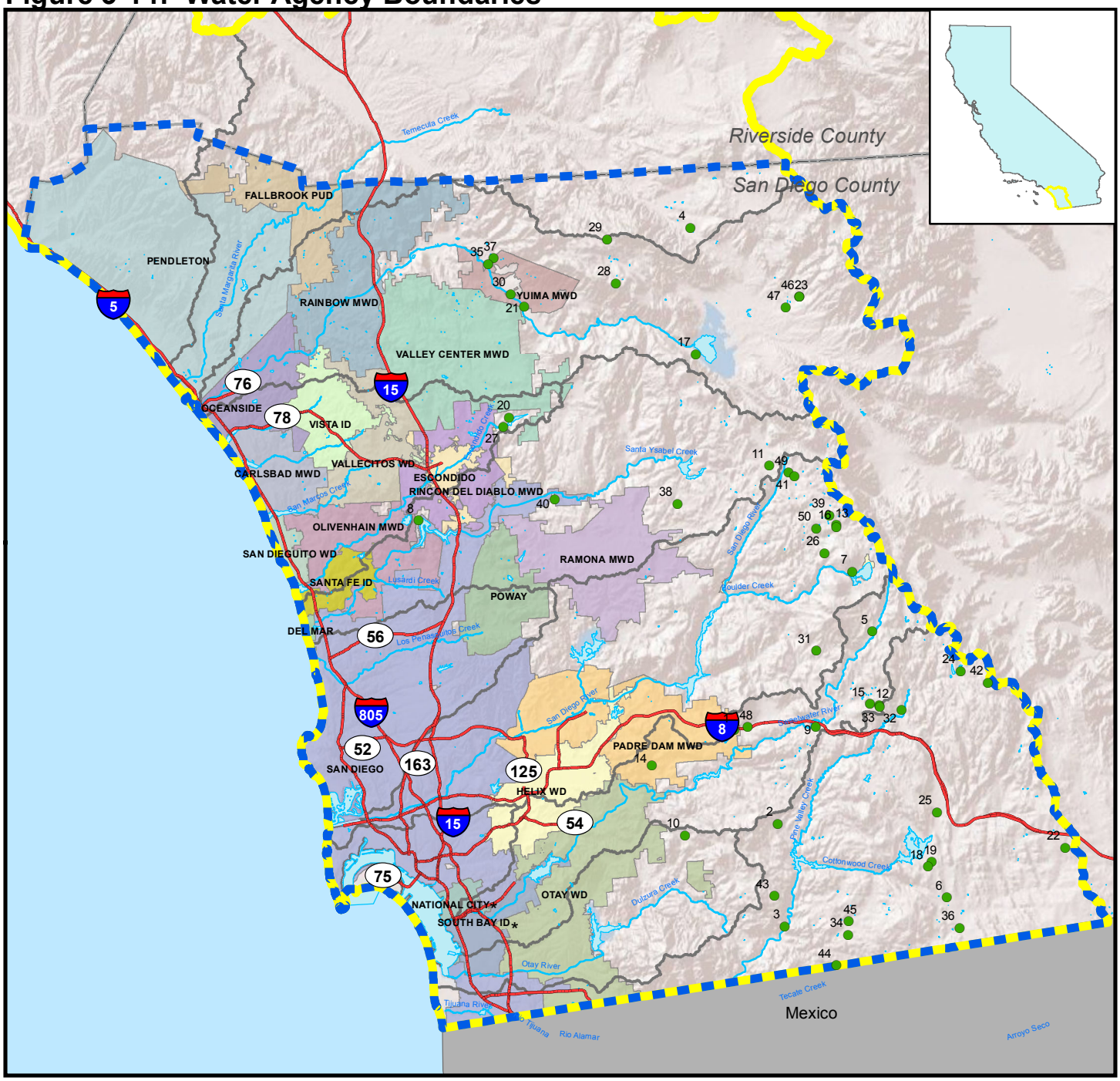
Sources: San Diego Association of Governments (SANDAG) - GIS Data Warehouse, Department of Interior and Bureau of Land Management.
N:\Projects GIS\0188-003 SDIRWM Plan Update\AdminDraftMaps\060713_JD\Fig3-13_Land Use Planning 060813.mxd

Figure 3-14: Water Agency Boundaries



Legend

- Small Water Systems
- San Diego IRWM Region
- Prop 84 Funding Area Boundary
- Mexico
- Waterbody
- Freeway
- River

Map ID	Small Water System	Map ID	Small Water System
1	ALPINE OAKS ESTATES	26	NORTH PEAK MUTUAL WATER CO.
2	BARRETT HONOR CAMP	27	OAKVALE PARK
3	BARRETT LAKE MOBILEHOME PARK	28	PALOMAR MOUNTAIN MW CO.
4	BUTTERFIELD OAKS MH PARK	29	PALOMAR OBSERVATORY
5	CAMP CUYAMACA	30	PAUMA VALLEY MUTUAL WATER CO.
6	CAMPO ELEMENTARY SCHOOL	31	PHOENIX HOUSE
7	CUYAMACA WATER DISTRICT	32	PINE VALLEY BIBLE CONF. CENTER
8	DEL DIOS MUTUAL WATER CO.	33	PINE VALLEY TRAILER PARK
9	DESCANSO DETENTION FACILITY	34	POTRERO ELEMENTARY SCHOOL
10	DIAMOND JACK'S RV RANCH	35	RANCHO CORRIDO RV RESORT
11	DUDLEY'S BAKERY	36	RANCHO DEL CAMPO WATER SYSTEM
12	GUATAY MUTUAL BENEFIT CORP.	37	RANCHO ESTATES MUTUAL WATER CO
13	H & J WATER CO.	38	RANCHO SANTA TERESA MW CO.
14	HARBISON CANYON ESTATES	39	RICHARDSON BEARDSLEY PARK INC.
15	HEAVENLY OAKS	40	SAN PASQUAL ACADEMY
16	JULIAN YOUTH ACADEMY	41	SPENCER VALLEY SCHOOL
17	LAKE HENSHAW WATER CO.	42	STUART WATER CO.
18	LAKE MORENA TRAILER RESORT	43	SUNRISE ESTATES MW CO.
19	LAKE MORENA VIEWS MW CO.	44	TECATE VISTA MUTUAL WATER CO.
20	LAKE WOHLFORD RESORT	45	TWIN LAKES RESORT
21	LAZY H MUTUAL WATER CO.	46	WARNER SPRINGS RANCH
22	LIVE OAK SPRINGS WATER COMPANY	47	WARNER UNIFIED SCHOOL DIST.
23	LOS TULES MUTUAL WATER CO.	48	WILLOWSIDE TERRACE WATER ASSOC
24	MOUNT LAGUNA IMPROVEMENT ASSN.	49	WYNOLA WATER DISTRICT
25	MOUNTAIN EMPIRE HIGH SCHOOL	50	YMCA CAMP MARSTON/RAINTREE

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County of San Diego, Department of Environmental Health, Small Water Systems dataset, San Diego County Water Authority Member Agencies, Available: http://www.sangis.org/Download_GIS_Data.htm
** The City of National City and South Bay Irrigation District have formed a joint powers authority, the Sweetwater Authority, to provide water supply within their jurisdictions.*
\\rmcsd\RMCSD\Projects GIS\0188-003 SDIRWM Plan Update\AdminDraftMaps\060713_JD\Fig3-14_Water Agency Boundaries 060713.mxd

Table 3-23 presents a list of water systems within the Region that are supported by special districts or the County. In addition to the community water systems operated or supported by the County or special districts, nearly 200 mutual water companies provide water service (derived from local groundwater supply) to small communities within the Region. Table 3-24 presents mutual water companies within the Region that serve more than 200 service connections.

Tribal Nations within the Region are generally located on lands east of the Water Authority's service area and are dependent on local sources of water (primarily groundwater). The Rincon Band of Indians receives deliveries from Lake Henshaw, which stores both natural runoff and groundwater pumped from the Warner Basin. Their share of deliveries from Lake Henshaw is dependent on hydrologic conditions, as the groundwater is reserved for Vista Irrigation District and the City of Escondido.

Table 3-23: District-Operated Water Systems outside the Water Authority Service Area

HU[1]	Watershed	District	Community	Number of Connections[2]	Water Source
903	San Luis Rey River	Mootamai Municipal Water District	Pala-Pauma	0[3]	Local groundwater
		Pauma Municipal Water District	Pala-Pauma	0[4]	Local groundwater
		San Luis Rey Municipal Water District	Fallbrook Valley Center Pala-Pauma	0[5]	Local groundwater
905	San Dieguito River	Questhaven Municipal Water District	San Dieguito	18	Local groundwater
907	San Diego River	Cuyamaca Water District	Cuyamaca	125	Local groundwater
		Julian Community Service District	Julian	188	Local groundwater
		Majestic Pines Community Service District[6]	Julian	695[6]	Local groundwater
		Wynola Water District	Julian/Wynola	63	Local groundwater
909	Sweetwater	Descanso Community Service District	Descanso	315	Local groundwater
911	Tijuana River	County of San Diego (Campo Water and Sewer Maintenance District)	Campo	45	Local groundwater

1 Numerical watershed (hydrologic unit) designation per Regional Water Quality Control Board (1994) and California Department of Water Resources *Hydrologic Data* (Bulletin 130).
2 Estimated number of connections as of 2011, per San Diego Local Agency Formation Commission (2011).
3 The Mootami Municipal Water District does not directly provide water. The district's operations are limited to protection of groundwater and riparian water sources. Water users within the district are served by privately-owned Pauma Valley Water Company or private wells.
4 The Pauma Municipal Water District does not directly provide water. The district manages water rights protection efforts and coordinates engineering activities related to water supply. All water within the district is obtained from private wells.
5 The San Luis Rey Municipal Water District is not authorized to provide water. The district funds activities to protect water and water storage rights of private owners.
6 A portion of the Majestic Pines Community Service District is within the Colorado River Basin, and is located outside the IRWM Plan region. Data are not available on the number of these customers that are inside the Region's boundaries.

Table 3-24: Mutual Water Company Systems outside the Water Authority Service Area[1]

HU[2]	Watershed	Water Company	Community	Number of Connections	Water Source
903	San Luis Rey River	Rancho Pauma Mutual Water Company	Pala-Pauma	396[3]	Local groundwater
907	San Diego River	Pine Hills Mutual Water Company	Julian/Pine Hills	465[4]	Local groundwater
		Pine Valley Mutual Water Company	Pine Valley	691[5]	Local groundwater
911	Tijuana	Lake Morena Oak Shores Mutual Water Company	Lake Morena	205[6]	Local groundwater

1 Mutual water companies with more than 200 service connections servicing areas outside the Water Authority service area. Water systems with more than 200 service connections are regulated by the California Department of Public Health.
2 Numerical watershed (hydrologic unit) designation per Regional Water Quality Control Board (1994) and California Department of Water Resources *Hydrologic Data* (Bulletin 130).
3 Pauma Valley Community Services District. Available: http://www.paumavalleycsd.com/waterdist.php. Accessed 14 May 2013.
4 Number of people served. Total number of connections not available. New York Times.16 May 2012. Available: http://projects.nytimes.com/toxic-waters/contaminants/ca/san-diego/ca3700905-pine-hills-mututal-water-company. Accessed 14 May 2013.
5 Pine Valley Mutual Water Company. Available: http://www.pinevalleywater.org/company-history.html. Accessed 14 May 2013
6 *2007 San Diego IRWM Plan.* Available: http://sdirwmp.org/2007-irwm-plan

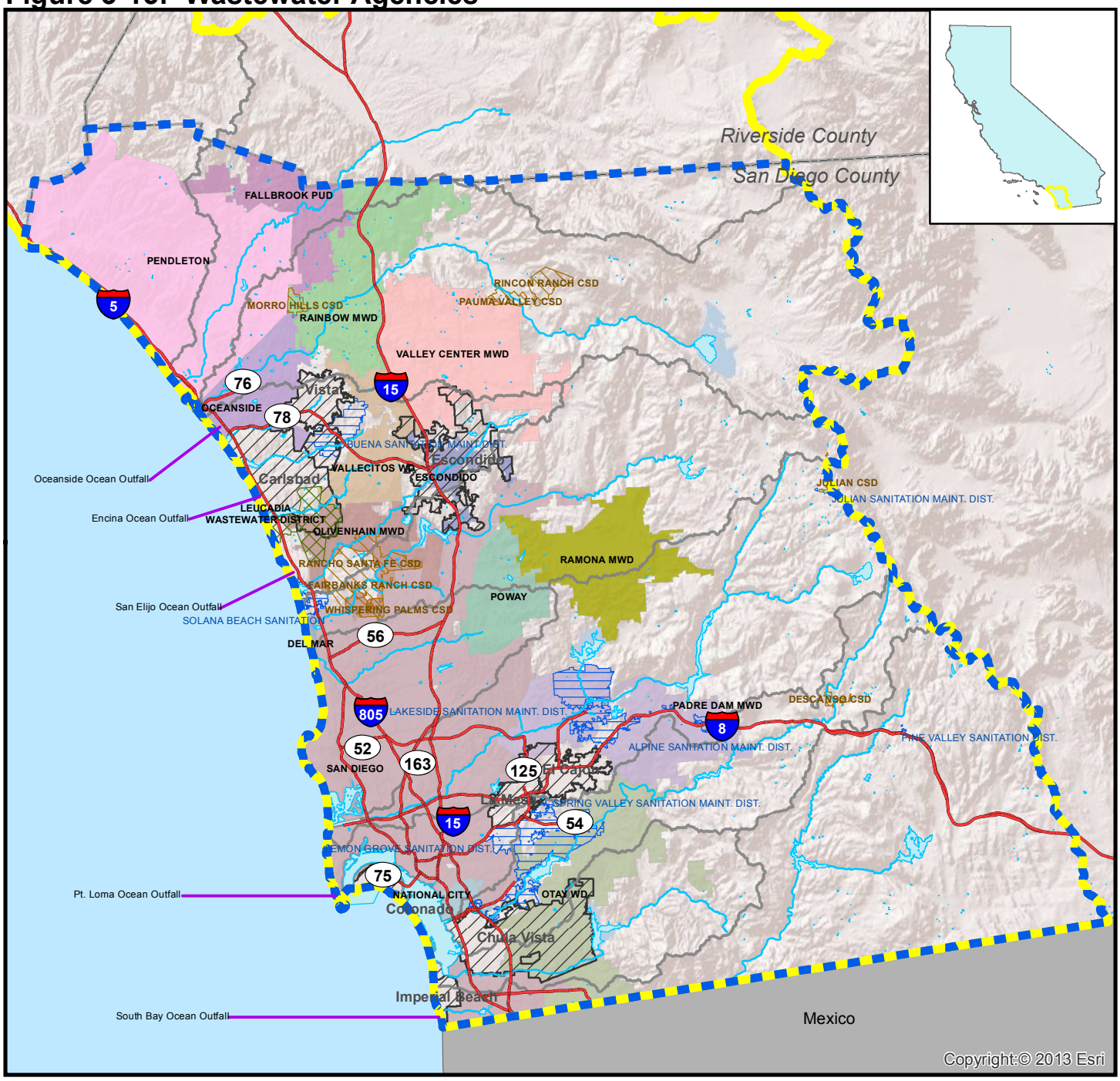
3.6.3 Wastewater Agencies

Municipalities and special districts provide wastewater service within the urbanized portion of the Region. Figure 3-15 presents wastewater agencies within the Region.

Section 3.5.4 presents a general description of the Region's wastewater infrastructure. The Region's urban wastewater agencies have organized (both through the formation of joint powers authorities and through interagency contracts) into five multi-jurisdictional wastewater systems based around the Region's five deep-water ocean outfalls. These include:

1. *Oceanside Ocean Outfall*. Fallbrook Public Utility District and USMC Base Camp Pendleton (southern portion of the base) have connected to the City of Oceanside system (via contract) to form an interconnected regional wastewater system in North San Diego County.
2. *Encina Ocean Outfall*. North County agencies that comprise the Encina Wastewater Authority (a joint powers authority) include the Buena Sanitation District, City of Carlsbad, City of Encinitas, Leucadia County Water District, Vallecitos Water District, and City of Vista.
3. *San Elijo Ocean Outfall***.** The City of Escondido and San Elijo Joint Powers Authority jointly own the San Elijo Ocean Outfall. The San Elijo Joint Powers Authority is comprised of the City of Solana Beach, Cardiff Sanitation District, Olivenhain Municipal Water District, and Rancho Santa Fe Community Services District.
4. *Point Loma Ocean Outfall*. The Metropolitan Wastewater Sewer is operated by the City of San Diego on behalf of the Cities of Chula Vista, Coronado, Del Mar, El Cajon, Imperial Beach, La Mesa, National City, Poway, and San Diego, San Diego County, the Otay and Padre Dam Water Districts, and the East Otay, Lemon Grove, Alpine, Lakeside, Spring Valley, and Winter Gardens Sanitation Districts. *Note*: the City of Chula Vista is not a member of the Joint Powers Authority but receives wastewater service through the Metropolitan Wastewater System.
5. *South Bay Ocean Outfall*. The City of San Diego and the U.S. Government jointly own the South Bay Ocean Outfall.

Figure 3-15: Wastewater Agencies



Legend

- San Diego IRWM Region
- Prop 84 Funding Area Boundary
- Community Service Districts
- Cities
- Sanitation Districts
- Waterbody
- Freeway
- River

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San Diego County Water Authority Member Agencies, Community Service Districts & Sanitation Districts, Available: http://www.sangis.org/Download_GIS_Data.htm
Note: City utility districts are based on their municipal boundaries. Data to show their actual sanitation district boundaries do no currently exist, so there may be some overlap.
\\rmcsd\RMCSD\Projects GIS\0188-003 SDIRWM Plan Update\AdminDraftMaps\060713_JD\Fig3-15_Wastewater Agency Boundaries.mxd

In addition to the integrated wastewater systems listed above, a number of the Region's wastewater and recycled water agencies have entered into agreements to construct and operate joint facilities, share use of facilities owned by one or more entities, purvey recycled water to one another, address wastewater and recycled water service areas and responsibilities, share or assign industrial waste pretreatment responsibilities, conduct required monitoring, and mutually share resources during emergencies.

Special service districts provide wastewater service in less urbanized areas of the Region, including the communities of Whispering Palms, Valley Center, Fairbanks Ranch, Ramona, Rancho Santa Fe, and Pauma Valley. Sanitation districts operated by the County provide wastewater service to such inland communities as Julian, Pine Valley, and Campo. Local Tribes provide wastewater service within their respective reservation boundaries. Wastewater service outside of these districts is provided by onsite wastewater (septic) systems.

3.6.4 Stormwater Agencies

As noted in *Chapter 1, Introduction*, the Regional Board MS4 Permit regulates stormwater and urban runoff within the Region. The recent adoption of a new MS4 Permit in May 2013 shifts the emphasis of stormwater management more to watersheds. Under the 2007 permit, the County acted as Principal Permittee for the 21 Copermittees named in the permit. Each Copermittee is responsible for operating its own stormwater/urban runoff management program within its respective jurisdiction. Copermittees implement stormwater programs on a watershed basis following the boundaries of the Watershed Management Areass (WMAs).

The 21 Copermittees from the San Diego IRWM Region named in the 2013 MS4 Permit include:

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

As Principal Permittee, the County coordinated with the County's 18 municipalities, the Unified Port District, and the County Regional Airport Authority in the development and implementation of regional stormwater monitoring programs, stormwater management plans, and best management practices. In this role, the County organized and managed the Stormwater Copermittee Regional Management Committee to facilitate interaction and coordination among the Copermittees.

Additionally, the County formed Project Clean Water (www.projectcleanwater.org) to address region-wide watershed issues through participation of a broad range of governmental agencies, non-governmental agencies, and regulators. As part of Project Clean Water, the Watershed Technical Advisory Committee was formed in 2004 to discuss and coordinate a range of watershed planning and implementation issues.

A new MS4 permit was adopted and went into effect in 2013 (Order No. R9-2013-0001 [NPDES No. CAS0109266]). Significantly, the 2013 permit does not have a Principal Permittee, and will eventually include all 39 agencies in Regional Water Quality Control Board Region 9 (this includes Copermittees from San Diego County, south Riverside County, and south Orange County). Copermittees will now be required to organize on a watershed scale for coordination and planning

of stormwater programs. However, given the nature of water management and jurisdictions in the Region and the fact that regional coordination on stormwater management will continue to be critical, it is likely that the County will continue to play a central role in facilitating coordination of stormwater management.

3.6.5 Flood Control Agencies

The San Diego County Flood Control District (Flood Control District) is the key flood control agency in the County. The Flood Control District (which is governed by the elected Supervisors of the County) establishes flood policies, maintains flood control facilities, operates a regional flood warning system, and is charged with protection of watercourses, watershed management, and protection of water quality.

The different agencies responsible for floodplain management within the region include:

- County of San Diego
- City of Carlsbad
- City of Chula Vista
- City of Coronado
- City of Del Mar
- City of El Cajon
- City of Encinitas
- City of Escondido
- City of Imperial Beach
- City of La Mesa
- City of Lemon Grove
- City of National City
- City of Oceanside
- City of Poway
- City of San Diego
- City of San Marcos
- City of Santee
- City of Solana Beach
- City of Vista

The Flood Control District's role is to provide for the control of the flood and storm waters of the District, and of the flood and storm waters that flow into the District. The District's role also includes preserving such waters for beneficial use such as water supply, groundwater percolation, recreation, and environment, and to protect the land, properties, facilities, and people within the District from damage caused by storm and flood waters. The Flood Control District has an adopted Floodplain Management Plan for the County unincorporated area which assesses the flood hazards, summarizes the current flood management program, describes mitigation strategies, and provides a future action plan.

North end of El Capitan Reservoir, showing flooded trees.

Photo credit: Jeff Pasek, City of San Diego

As listed above, the eighteen other cities within the Region also have floodplain management responsibilities, which are similar to those of the District, but are only applied within that city's jurisdictional boundaries. Although the District spans the entire unincorporated portion of the County, no single entity within the Region currently coordinates floodplain management between the different floodplain managers.

3.6.6 Environmental Organizations

In addition to the above-noted federal land managers, many private foundations and conservancies have been established within the Region to preserve lands and to provide environmental management of conserved lands. Foundations or conservancies that provide environmental management of lagoons include: Batiquitos Lagoon Foundation, Buena Vista Lagoon Foundation, Agua Hedionda Lagoon Foundation, San Elijo Lagoon Conservancy, Los Peñasquitos Lagoon Foundation, and San Dieguito River Valley Land Conservancy.

Additional conservancy groups involved in conservation and environmental management, in part, include: CoastKeeper, the Southern California Coastal Water Research Project (SCCWRP) San Diego Task Force, The Nature Conservancy, the Trust for Public Land, the Escondido Creek Conservancy, Cottonwood Creek Conservancy, Fallbrook Land Conservancy, Bonsall Conservancy, Preserve Calaveras, Iron Mountain Conservancy, Back Country Land Trust, San Diego River Park Foundation, San Diego River Conservancy, Lakeside River Park Conservancy, and Groundwork San Diego-Chollas Creek. The San Diego Conservation Resources Network is a network that assists in coordinating efforts among the Region's conservancy groups.

3.7 Water Quality

The following sections focus on discussing water quality for the Region's various water resources. Water quality management and regulations pertaining to stormwater are described above in Section 3.5.9.

3.7.1 Imported Water Quality

Imported water provided to the Water Authority by Metropolitan is a blend of water from the SWP and Colorado River. The quality of imported supply provided at any time is a function of hydrologic conditions in Northern California and the Colorado River basin, and the blend of water between the two sources.

Total Dissolved Solids (TDS) concentrations in the Colorado River supply have varied significantly during the past 30 years depending on hydrologic conditions. Peak TDS concentrations in the Colorado River supply have exceeded 800 milligrams per liter (mg/L) during sustained years of below-normal runoff within the basin, while TDS concentrations approaching 500 mg/L have occurred after sustained years of above-normal runoff. Colorado River TDS concentrations have averaged approximately 650 mg/L over the past decade.

SWP supplies typically comprise a smaller percentage of the imported supply provided to the Water Authority, but TDS concentrations in the SWP supply are typically lower than those of Colorado River supplies, historically ranging from more than 425 mg/L to less than 300 mg/L.

While SWP supplies have lower TDS concentrations than Colorado River supplies, concentrations of nutrients (nitrogen and phosphorus) are higher in SWP supplies than in Colorado River supplies. Total nitrogen concentrations in the imported water provided by the Water Authority have ranged from 0.05 mg/L to 1.1 mg/L (as N), with the low values occurring during times when Colorado River supplies comprise a significant portion of the Region's imported supply (Flow Science, 2012). Total phosphorus concentrations in the imported supply have ranged from less than 0.005 mg/L to 0.08 mg/L (Flow Science, 2012).

3.7.2 Surface Water Quality

Designated Beneficial Uses

The Basin Plan designates beneficial uses for streamflow and surface waters, coastal waters, and reservoir and lake resources within the Region's 11 watersheds. Appendix 3-A presents these beneficial use designations as documented in the Basin Plan for each watershed. The Basin Plan also designates wildlife habitat, water contact recreation, and non-contact recreation of surface waters as beneficial uses within each of the watersheds. Additionally, portions of each of the 11 watersheds have been designated as warm-water or cold-water aquatic habitats. Municipal, agricultural, and industrial supplies are designated as beneficial uses of surface waters within 10 of the 11 watersheds.

> ***Basin Plan Surface Water Nutrient Standards***
>
> The San Diego Regional Board is the only one of the nine California Regional Boards to interpret narrative Basin Plan Objectives as numerical concentration standards for nitrogen and phosphorus in surface waters. The San Diego Basin Plan standard for phosphorus is 0.025 mg/L for standing bodies of water and 0.05 mg/L for flowing waters. The original 1976 San Diego Region Basin Plan cited historic nutrient-related biostimulation impacts to San Diego County's coastal lagoons as part of the justification for establishing the numerical phosphorus and nitrogen standards. The 1976 nutrient standards have been maintained in the current (1994) version of the Basin Plan. However, the San Diego Regional Board has indicated that they may consider narrative interpretation of nutrient objectives in the future.

Surface Water Quality Standards

The Basin Plan (Regional Board, 1994) establishes numeric and narrative water quality objectives to protect designated beneficial uses of inland surface waters and coastal waters. Appendix 3-B presents Basin Plan numerical water quality objectives for the Region. The Basin Plan establishes numeric water quality objectives for TDS, mineral constituents, and turbidity on a watershed-by-watershed basis within the Region. The Water Quality Objective for TDS for surface waters is set at 500 mg/L (the state and federal secondary drinking water standard) in most watersheds, but TDS objectives range from as low as 300 mg/L in the upper reaches of the San Diego River Watershed to as high as 2,100 mg/L in the downstream reach of the Tijuana River Watershed.

As shown in Appendix 3-B, water quality objectives that apply to the entire region are established for total and fecal coliform bacteria, nutrients (total nitrogen and total phosphorus), pH, dissolved oxygen, and unionized ammonia. The Basin Plan establishes a region-wide phosphorus standard of 0.025 mg/L for standing bodies of water, and a phosphorus standard of 0.05 mg/L for flowing waters. A narrative objective for biostimulatory substances defines total nitrogen standards at a 10:1 ratio to the total phosphorus limits; however, as indicated above, the Regional Board currently interprets these narrative objectives as numerical concentration standards.

Water quality objectives for toxic organic and toxic inorganic constituents are established at the corresponding state and federal drinking water standards for waters designated as municipal supply. The Regional Board also implements the Water Quality Criteria for Priority Toxic Pollutants for California Inland Surface Waters, Enclosed Bays and Estuaries, also known as the California Toxics Rule (CTR) established by the U.S. Environmental Protection Agency in Title 40 §141.38 of the Code of Federal Regulations. The CTR establishes numeric criteria for cyanide, metals, and toxic organic constituents (EPA, 2002).

The State Board established water quality objectives for ocean waters in the *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan). The Ocean Plan establishes receiving water standards for total coliform, fecal coliform, toxic inorganic constituents, and toxic organic constituents.

In addition to complying with statewide regulations, the Region has recognized the need to improve surface water quality, especially within the Region's reservoirs given the important role that those reservoirs play in regional water supply reliability. Due to its concern for the water quality of its reservoirs, the City of San Diego prepared the *Source Water Protection Guidelines for New Developments* (Guidelines) in 2004. The Guidelines were prepared to assist municipal agencies, designers, land planners, developers, and laypersons in conducting site design planning and select best management practices (BMPs) that protect or improve the quality of runoff draining into the reservoirs. The Guidelines provide a stepwise, simplified BMP selection process to ensure that preferred source water protection BMPs are considered when designing new developments. Although the use of the Guidelines is voluntary, the guidance is consistent with state and local storm water permit requirements, as well as local planning protocols.

303(d) Impairment and Imported Water Reservoirs

A number of the Region's reservoirs are predominantly used for imported water storage, including Miramar, San Vicente, Murray, Jennings, and Sweetwater, and Otay Reservoirs. The Regional Board has listed several of the imported water storage reservoirs (see Appendix 3-C) as being on the State's 303(d) list of impaired water bodies for exceedance of water quality objectives that are based on drinking water secondary standards (MCLs); specifically for color, manganese, pH, iron, sulfate, and chloride. These listings require that TMDLs be developed to assure attainment of drinking water secondary standards in the reservoirs themselves. These goals cannot be achieved as many of these exceedances are the result of natural conditions.

While local water suppliers agree that water at the tap should be regulated and treated so that it complies with the secondary standards at the point of use, enforcing drinking water secondary standards in the environment does not enhance beneficial uses within these water bodies nor does it improve the quality of municipal water supply at the tap. Maintaining water quality in these reservoirs at levels which occur naturally would balance costs (both economic and environmental) with benefits to beneficial uses.

Lower Otay Reservoir
Photo Credit: Jeff Pasek, City of San Diego

Section 303(d) Listed Waters

Per Section 303(d) of the Clean Water Act, the Regional Board and State Board are required to identify waters that do not meet applicable water quality objectives. Waters not attaining applicable water quality objectives are deemed to be "impaired" water bodies. Appendix 3-C presents 303(d) impaired water body listings for the Region's streams and rivers (Table C-1), lakes and reservoirs (Table C-2), and coastal/marine waters (Table C-3 and Table C-4).

Table 3-25 summarizes 303(d) listings for inland surface waters of the Region. As shown in this table, 72 inland surface water bodies are currently designated as not attaining applicable water quality objectives (Regional Board, 2009a; State Board, 2010). 303(d)-listed impaired inland surface waters are found in each of the Region's 11 watersheds. Refer to Appendix 3-C for a complete listing of impaired waters.

Table 3-25: Summary of 303(d) Listings for Inland Surface Waters[1]

HU	Watershed	Number of Listed Streams & Rivers[1,2]	Number of Listed Reservoirs & Lakes[1,3]	Impaired Water Parameters within Listed Streams, Rivers, Lakes or Reservoirss[1,4]		
901	San Juan	10	0	• Benzo(b)fluoranthene • Cadmium • Chloride • DDE • Diazinon • Dieldrin	• Indicator bacteria • Nickel • Nitrogen • Phosphorus • Sediment toxicity	• Selenium • Sulfates • Total dissolved solids • Toxicity • Turbidity
902	Santa Margarita River	11	0	• Chlorpyrifos • Copper • Diazinon • E. Coli • Enterococcus	• Fecal coliform • Iron • Manganese • Nitrogen	• Phosphorus • Sulfates • Total dissolved solids • Toxicity
903	San Luis Rey River	3	1	• Chloride • Enterococcus • Eutrophic	• Fecal coliform • Nitrogen • Phosphorus	• Selenium • Total dissolved solids • Toxicity
904	Carlsbad	8	1	• Ammonia • DDE • DDT • Enterococcus • Fecal coliform • Manganese	• Nitrate and nitrite • Nitrogen • Nutrients • Phosphate • Phosphorus	• Sediment toxicity • Selenium • Sulfates • Total dissolved solids • Toxicity
905	San Dieguito River	6	2	• Aluminum • Chloride • Color • Enterococcus • Fecal coliform • Iron	• Manganese • Mercury • Total Nitrogen as N • Pentachlorophenol • pH	• Phosphorus • Sulfate • Total dissolved solids • Toxicity • Turbidity
906	Peñasquitos	5	1	• Cadmium • Copper • Enterococcus • Fecal coliform • Indicator bacteria	• Lead • Nitrogen • Phosphorus • Sediment toxicity • Selenium	• Total dissolved solids • Toxicity • Turbidity • Zinc
907	San Diego River	5	3	• Benthic community effects • Chloride • Color • Dissolved oxygen	• Enterococcus • Fecal coliform • Manganese • Total Nitrogen as N • pH	• Phosphorus • Selenium • Sulfates • Total dissolved solids • Toxicity
908	Pueblo	3	0	• Copper • Diazinon • Indicator bacteria	• Lead • Phosphorus • Total nitrogen	• Trash • Zinc
909	Sweetwater River	2	2	• Aluminum • Dissolved oxygen • Enterococcus • Fecal coliform	• Manganese • Nitrogen • pH • Phosphorus	• Selenium • Total dissolved solids • Toxicity
910	Otay	2	1	• Ammonia • Color • Iron	• Manganese • Nitrogen	• pH • Toxicity
911	Tijuana River	4	2	• Ammonia nitrogen • Color • Dissolved oxygen • Eutrophic • Indicator bacteria • Manganese • Nitrogen	• Perchlorate • Pesticides • pH • Phosphorus • Sediments • Selenium • Solids	• Surfactants • Synthetic organics • Toxicity • Trace elements • Trash • Turbidity

1 From State Water Resources Control Board *Final 2010 Integrated Report, Clean Water Act Section 303(d) List/305(b) Report* (2010), as approved by the U.S. Environmental Protection Agency on October 11, 2011.
2 See Appendix C-3 (Table C-1) for rivers and streams listed as 303(d) impaired within the Region.
3 See Appendix C-3 (Table C-2) for reservoirs and lakes listed as 303(d) impaired within the Region.
4 Impaired water parameters listed for at least one receiving water within the watershed. See Appendix C-3.

Appendix 3-C presents impaired water body listings for coastal and marine waters. Each of the Region's 11 watersheds contains at least one coastal water or beach segment that is currently listed as impaired within the Region. A complete listing of impaired coastal water and beach segments is available in Appendix 3-C.

As part of the 303(d) impaired water designations, the Regional Board establishes priorities for conducting TMDL evaluations to identify and implement required actions to bring the water bodies into compliance with applicable standards. Table 3-26 summarizes TMDLs that have been adopted by the Regional Board to date. Table 3-27 summarizes TMDLs that are in progress.

Table 3-26: Adopted TMDLS

HU	Watershed	Receiving Water	Constituent	Regional Board Resolution (Date of Adoption)	Effective Date[1]
901	San Juan	Baby Beach Dana Point	Indicator bacteria	R9-2008-0027 (June 11, 2008)	September 15, 2009
902	Santa Margarita River	Rainbow Creek	Nitrogen & phosphorus	R9-2005-0036 (February 9, 2005)	February 1, 2006
906	Peñasquitos	Los Peñasquitos Lagoon	Sediment	R9-2012-0022 (June 13, 2012)	Approval pending[3]
908	Pueblo	Shelter Island	Dissolved copper	R9-2005-0019 (February 9, 2005)	December 2, 2005
		Shelter Island Shoreline Park	Indicator bacteria	R9-2008-0027 (June 11, 2008)	September 15, 2009
		Chollas Creek	Diazanon	R9-2002-0123 (August 14, 2002)	September 11, 2003
		Chollas Creek	Copper, lead, zinc	R9-2007-0043 (June 13, 2007)	October 22, 2008
Various		Project I beaches & creeks[2]	Indicator bacteria	R9-2010-0001 (February 10, 2010)	April 4, 2011

1 After Regional Board approval, the TMDL is approved by the State Water Resources Control Board, State of California Office of Administrative Law), and U.S. EPA. After EPA approval, the effective date of the TMDL becomes the date the TMDL was approved by the California Office of Administrative Law.

2 Includes Pacific Ocean shorelines in the San Joaquin Hills Hydrologic Subarea (901.11), Laguna Beach Hydrologic Subarea (902.12), Aliso Hydrologic Subarea (901.13), and Dana Point Hydrologic Subarea (901.14); Aliso Creek and mouth of Aliso Creek Estuary (901.13); San Juan Creek and mouth of San Juan Creek Estuary (901.27); Pacific Ocean shorelines at the Lower San Juan Hydrologic Subarea (901.27), San Clemente Hydrologic Area (901.3), San Luis Rey Watershed (903.0), San Marcos Hydrologic Area (904.5), San Dieguito Watershed (905.0), and Miramar Reservoir Hydrologic Area (906.1), and Scripps Hydrologic Area (906.3); Tecolote Creek (906.5), Forrester Creek (907.12), Lower San Diego River (907.11/907.12), Pacific Ocean shoreline in the San Diego Watershed (907.0), and Chollas Creek (908.22).

3 TMDL review by the State Water Resources Control Board, State of California of California Office of Administrative Law, and U.S. EPA is pending.

Table 3-27: Summary of TMDLS in Progress[1]

HU	Watershed	Receiving Water	Pollutants to be Addressed in TMDLs	
902	Santa Margarita River	Santa Margarita River Lagoon	• Nutrients	
904	Carlsbad	Loma Alta Slough	• Bacteria	• Nutrients
		Pacific Ocean shoreline at Loma Alta Creek	• Bacteria	
		Buena Vista Lagoon	• Bacteria • Nutrients	• Sediments
		Pacific Ocean shoreline at Buena Vista Creek	• Bacteria	
		Agua Hedionda Lagoon	• Bacteria	• Sediments
		Lower Agua Hedionda Creek	• Bacteria	
		San Elijo Lagoon	• Bacteria • Nutrients	• Sediments
		Pacific Ocean at San Elijo Lagoon Outlet	• Bacteria	
		San Marcos Creek/Lake San Marcos (Voluntary Agreement)	• Nutrients	
906	Peñasquitos	Los Peñasquitos Lagoon	• Sedimentation/ Siltation	
907	San Diego River	Famosa Slough and channel	• Nutrients/ Eutrophication	
908	Pueblo	Downtown anchorage	• Chlordane • PAH	• PCB
		B Street Pier	• PAH • PCB	• Zinc
		Mouth of Chollas Creek	• Chlordane • PAH	• PCB
		Mouth of Paleta Creek	• Chlordane • PAH	• PCB
		Mouth of Switzer Creek	• Chlordane • PAH	• PCB
911	Tijuana River	Tijuana River and Estuary	• Sedimentation	• Trash

1 TMDLs in progress, as documented on the Regional Board TMDL website located at: www.srwcb.gov/rwqcb9.

Additional Constituents of Concern

The San Diego County separate storm sewer system (MS4) Copermittees coordinate in the development and implementation of a regional watershed-based receiving water monitoring program. Results of this comprehensive Receiving Waters and Urban Runoff Monitoring effort are evaluated and assessed on an annual basis. Table 3-28 summarizes high priority constituents of concern identified within this regional monitoring effort.

Table 3-28: High Priority Dry and Wet Weather Constituents[1]

HU	Watershed	Mass Loading Station	Dry Weather Priority Constituents	Wet Weather Priority Constituents
906	Peñasquitos	Rose Creek	• Total dissolved solids • *C. dubia* reproduction[2] • *S. capricornutum* growth[3]	• Turbidity • Total dissolved solids • Bifenthrin
		Tecolote Creek	• Enterococcus • *C. dubia* chronic survival[2] • *C. dubia* reproduction[2] • *S. capricornutum* growt3	• Fecal coliform • Total suspended solids • Turbidity • Bifenthrin • Permethrin
907	San Diego River	San Diego River	• Enterococcus • Fecal coliform • Total nitrogen • Dissolved phosphorus • Total phosphorus • Total dissolved solids • *S. capricornutum* growth	• Fecal coliform • Turbidity • Bifenthrin • *S. capricornutum* growth[3]
908	Pueblo	Chollas Creek	• Enterococcus • C. dubia reproduction[2]	• Fecal coliform • Chemical oxygen demand • Total suspended solids • Turbidity • Bifenthrin • Permethrin
909	Sweetwater River	Sweetwater River	• Total phosphorus • Total dissolved solids • *C. dubia* reproduction[2] • *S. capricornutum* growth[3]	• Total dissolved solids • *S. capricornutum* growth[3]
910	Otay	Otay River	• Dissolved phosphorus • Total phosphorus • Total dissolved solids	• NA
911	Tijuana River	Tijuana River	• Enterococcus • Ammonia as nitrogen • Turbidity • Total nitrogen • Dissolved phosphorus • Total phosphorus • Total dissolved solids • *C. dubia*reproduction[2]	• Fecal coliform • Biochemical oxygen demand • Chemical oxygen demand • Total suspended solids • Turbidity • Dissolved phosphorus • Total phosphorus • Total dissolved solids • Diazinon • Bifenthrin • Permethrin • *C. dubia* acute survival[2] • *C. dubia* chronic survival[2] • *C. dubia* reproduction[2] • *H. azteca* acute survival[4]

1 High priority constituents identified through the Watershed Management Assessment process within *2011-2012 Receiving Waters and Urban Waters Runoff Report* (Weston Solutions, 2012) on the basis of recent and historic monitoring within the watersheds.
2 *Ceriodaphniadubia* (water flea) used as a test species in freshwater toxicity tests.
3 *Selenastrumcapricornutum* (freshwater algae) used as a test species in freshwater toxicity tests.
4 *Hyalellaazteca* (freshwater amphipod) used as a test species in freshwater toxicity tests.

On the basis of the 303(d) listings and monitoring conducted as part of region-wide monitoring programs, Table 3-29 summarizes region-wide water quality issues and constituents of concern for inland surface waters and coastal waters of the Region's 11 watersheds. Key water quality issues of interest in the Region include:

- *Indicator Bacteria*. Elevated concentrations of total or fecal coliform bacteria indicate the potential for elevated concentrations of pathogens. High concentrations of coliform bacteria resulted in beach advisories along each of the Region's watersheds. Table 3-30 summarizes beach advisories and closures during 2007-2011. Observed elevated coliform bacteria concentrations have occurred as a result of stormwater runoff, urban runoff, and sewer spills.
- *Sediment and Turbidity*. Discharges of sediment can adversely impact water clarity, wildlife habitat, and aquatic habitat. Additionally, sediment can adversely affect the hydraulics of lagoons and estuaries, decrease tidal flushing, and contribute to the transport of bacteria. Turbidity can adversely affect aquatic habitats by limiting light penetration and overall aesthetics.

Do TMDLs Address Critical Needs?

In 2010, the San Diego Regional Board adopted a TMDL for indicator bacteria at 20 beaches and creeks in the San Diego County Region (Resolution No. R9-2010-0001). The TMDL was adopted to address routine exceedances of water quality objectives for Enterococcus, fecal, and total coliform bacteria, which are indicators intended to protect primary contact recreation (REC-1) activities like swimming. Although Enterococcus and coliform bacteria are a commonly-used indicator of human pathogens, and can cause illness in recreational users, the presence of indicator bacteria in some of the TMDL's designated water bodies does not present the most critical water quality problem facing beneficial uses. In these cases, the adopted bacteria TMDL has established a de-facto priority for resource allocation within local stormwater programs. Many affected stakeholders have indicated that the implementation actions needed to comply with the TMDL during wet weather events drive costs and resources, diverting attention from other important issues. Use of alternative compliance methods rather than TMDLs would help to resolve resource allocation issues so that implementation actions truly address the most critical water quality and public health issues.

- *Nutrients*. Elevated concentrations of nitrogen and phosphorus can result in algal blooms and impacts associated with emergent and submergent vegetation. Nutrients are of particular concern in watersheds that discharge to coastal lagoons and estuaries, as summer temperatures and lagoon hydraulics that limit tidal flushing may lead to algal blooms and fish kills due to decreased dissolved oxygen levels. Nutrients are also a concern in inland creek and lake systems for the same algal bloom concerns, which may occur due to water stagnancy. Nutrients can also be of concern in potable water reservoirs, as biostimulation effects can adversely affect reservoir dissolved oxygen, the treatability of supplies, and taste and odor.
- *Salinity*. Concentrations of TDS and dissolved mineral constituents can adversely impact aquatic and wildlife habitat and the usability of waters for municipal and irrigation supply. TDS concentrations in Region surface waters vary significantly, with TDS concentrations being lower during periods of extreme flow and higher during periods of lower flow.
- *Toxic Inorganic Compounds*. Toxic inorganic compounds (e.g., metals, nitrates, cyanide, and unionized ammonia) can adversely impact aquatic habitat, wildlife habitat, and water supply uses. As no inland point-source discharges of toxic inorganic pollutants exist within the Region, toxic inorganic compounds in the Region's surface waters can be presumed to originate from non-point sources.

- *Toxic Organic Compounds*. Toxic organic compounds (e.g., pesticides and other EPA-designated priority pollutants) can adversely impact aquatic habitat, wildlife habitat, and water supply uses. Since no inland point-source discharges of toxic organic pollutants exist within the Region, toxic organic compounds in the Region's waters can be presumed to originate from non-point sources. As shown in Table 3-28, toxic organic compounds that have resulted in 303(d) impairment listings within the Region include benzo(b)fluoranthene, diazanon, dieldrin, DDT, pentachlorophenol, and perchlorate.

Table 3-29: Summary of Water Quality Issues for Surface Waters

HU[1]	Watershed	Water Quality Issues/Constituents of Concern[1]								
		Trash & Debris	Fecal Indicator Bacteria	Nutrients	Dissolved Oxygen	Turbidity	Sediment	Toxic Organics	Metals	TDS
901	San Juan		✓	✓		✓		✓	✓	✓
902	Santa Margarita River		✓	✓				✓	✓	✓
903	San Luis Rey River		✓	✓					✓	✓
904	Carlsbad		✓	✓				✓	✓	✓
905	San Dieguito River		✓	✓				✓	✓	✓
906	Peñasquitos		✓	✓		✓	✓		✓	✓
907	San Diego River		✓	✓	✓				✓	✓
908	Pueblo[2]	✓	✓	✓			✓	✓	✓	✓
909	Sweetwater[2]		✓	✓	✓				✓	✓
910	Otay[2]			✓	✓			✓		✓
911	Tijuana River	✓	✓	✓	✓	✓	✓	✓	✓	✓

1 Constituent category is either listed as 303(d) impaired within the watershed (see Table 3-25 and Appendix C), or is identified as a high priority wet-weather or dry-weather constituent (see Table 3-28) as part of the 2011 *Receiving Waters and Urban Runoff Report* (Weston Solutions, 2012).

2 Pueblo, Sweetwater, and Otay are monitored and assessed separately, but are all a part of the San Diego Bay Watershed Management Area.

Table 3-30: Summary of Beach Advisory and Closures, 2007-2011[1]

Parameter	Year				
	2011	2010	2009	2008	2007
Total number of samples	3,523	3,493	3,905	4,741	5,566
Number of beach monitoring stations	90	87	95	126	115
Closures					
Tijuana River beach closure days[2]	218	266	112	153	128
SSO closure days[3]	67	61	23	55	29
Total closure days	285	327	135	208	157
Advisory Days					
Rain advisory days[4]	70	70	30	38	37
Bacterial exceedance advisories[5]	117	163	254	174	350
Precautionary advisory days[6]	30	40	24	57	85
Total advisory days	217	273	308	269	472

1 From San Diego County Department of Environmental Health Annual Beach Monitoring Summaries, 2007-2011.
2 Closure due to Tijuana River flow that may impact or threaten to impact beach water quality.
3 Closure due to reported sewage spill that may impact or threaten to impact beach water quality.
4 Advisory to refrain from water contact within 72 hours of precipitation runoff.
5 Advisory due to exceedance of body contact recreation (REC-1) bacteriological standards.
6 Advisory due to lagoon outlet excavations or localized runoff/discharges that may impact or threaten to impact beach water quality.

3.7.3 Wastewater Quality

Wastewater from municipal agencies along the coastal corridor in excess of recycled water needs is treated via secondary treatment and discharged through regional ocean outfalls. Secondary treatment standards require treatment to achieve a monthly average TSS and BOD concentrations of 30 mg/L, but most of the Region's wastewater plants produce secondary effluent that contains concentrations significantly below these limits.

The City of San Diego currently has a Clean Water Act Section 301(h) waiver from secondary treatment requirements for its Point Loma Wastewater Treatment Plant. Advanced primary treatment at Point Loma achieves an average TSS concentration of approximately 35 mg/L, slightly above the mandated federal limit. The Metropolitan Sewer System, however, is required to implement additional pretreatment to ensure that concentrations of toxic organic and inorganic pollutants in the Point Loma discharge are equivalent to secondary treatment.

All of the Region's ocean outfall discharges comply with California Ocean Plan receiving water standards for toxic constituents. The City of San Diego's Ocean Monitoring Program monitors 120 square miles of ocean for the effects of ocean outfall discharges on marine health and identifies potential threats to public health.

3.7.4 Water Reuse Quality

Non-Potable Reuse

Non-potable reuse water (tertiary-treated recycled water) produced within the Region conforms to California Department of Public Health Title 22 requirements for disinfected tertiary recycled water, which requires disinfection and filtration to achieve:

- a 99.999% removal of indicator poliovirus (or provide equivalent disinfectant dose/contact time to achieve the same),
- median total coliform concentrations of less than 2.2 organisms per 100 milliliters,
- no more than 23 total coliform organisms per 100 ml in more than one sample during any 30 day period, and
- no sample exceeding a total coliform concentration of 240 organisms per 100 ml.

Concentrations of dissolved minerals in the Region's recycled water supplies vary depending on the quality of the source supply. Recycled water TDS concentrations are typically about 250 to 350 mg/L higher than the source water supply.

The City of San Diego Advanced Water Purification Facility is conducting pilot testing for indirect potable reuse.

Photo credit: City of San Diego

Table 3-31 summarizes water quality requirements for dissolved minerals that are established by the Regional Board for the Region's recycled water facilities. As shown in the table, recycled water TDS effluent limits typically range from 1000-1200 mg/L. To prevent salinity-related impacts to landscape and agricultural vegetation, most recycled water producers target recycled water TDS concentrations of 1000 mg/L or less. Several of the Region's coastal recycled water facilities include demineralization treatment that can be used during times of high TDS supply water to ensure conformance with recycled water TDS limits, including the Carlsbad Water Recycling Facility, San Elijo Water Reclamation Facility, and City of San Diego North City Water Reclamation Plant.

Potable Reuse

The water resulting from indirect potable reuse (discussed in detail in Section 3.5.5), which is referred to as purified water, is of similar quality to distilled water, containing 15 mg/L of TDS. During the demonstration and pilot study stages of IPR being conducted by the City of San Diego, this purified water is discharged to the recycled water system, helping to improve recycled water quality (City of San Diego, 2013). If IPR is fully implemented, the purified water would be blended with the lower-quality imported and local supplies in the San Vicente Reservoir, improving overall water quality in the reservoir.

Table 3-31: Recycled Water Quality

HU	Recycled Water Agency	Recycled Water Facility (Permit Number)	Permitted Recycled Water Concentration[1] (mg/l) (Average annual value unless noted)				
			TDS	Chloride	Boron	Iron	Manganese
902	Camp Pendleton	Southern Regional (Order R9-2009-0021)	1200[2]	325[3]	0.6[3]	0.3[3]	0.05[3]
903	City of Oceanside	San Luis Rey (Order No. 93-07)	1200[2]	350[2]	0.5[2]	0.3[2]	0.15[2]
	Fallbrook Public Utility District	Plant No. 1 (Order No. 91-39)	See note[5]	See note[6]	0.5[3]	0.85[3]	0.15[3]
	Valley Center Municipal Water District	Woods Valley Ranch (Order No. 98-09)	1100[2]	300[2]	0.75[2]	0.3[2]	0.05[2]
904	Buena Sanitation District/City of Vista	Shadowridge[7]	1200[4]	300[2]	0.5[2]	0.3[2]	0.07[2]
	Carlsbad Municipal Water District	Carlsbad (Order R9-2012-0027)	1100[2]	350[3]	0.75[2]	0.3[2]	0.1[2]
	Leucadia Wastewater District	Gafner (Order No. 93-41)	1500[4]	500[4]	0.5[2]	0.3[2]	0.05[2]
	Vallecitos Water District	Meadowlark (Order No. 93-23)	1500[4]	500[4]	0.5[3]	0.3[3]	0.05[3]
	City of Escondido	Hale Avenue (Order R9-2010-0032)	1000[2]	300[2]	0.75[2]	0.5[2]	0.2[2]
	San Elijo Joint Powers Authority	San Elijo (Order No. 2000-10)	1200[2]	400[2]	0.75[2]	0.3[2]	0.15[2]
905	Olivenhain Municipal Water District	4-S Ranch (Order R9-2003-0007)	1200[4]	350 daily	0.75[3]	0.85[3]	0.15[3]
	Ramona Municipal Water District	Santa Maria (Order No. 2000-177)	800[2]	200[2]	0.5[2]	0.3[2]	0.05[2]
	Rancho Santa Fe Community Services District	Santa Fe Valley (Order No. 92-04)	1500[4]	500[4]	0.5[3]	0.85[3]	0.15[3]
906	City of San Diego	North City (Order No. 97-03)	1200[2]	300[2]	0.7[2]	0.3[2]	0.05[2]
907	Padre Dam Municipal Water District	Padre Dam (Order NO. 97-49)	1100[2]	250[2]	0.6[2]	0.3[2]	0.05[2]
	Ramona Municipal Water District	San Vicente (Order R9-2009-0005)	550[2]	145[2]	0.7[2]	0.3[2]	0.06[2]
910	Otay Water District	R.W. Chapman (Order R9-2007-0038)	1376[3]	440[3]	0.7[3]	0.2[3]	0.03[3]
911	City of San Diego	South Bay (Order 2000-203)	1200[3]	260[3]	0.75[3]	0.3[3]	0.05[3]

1 Recycled water effluent quality limit established within the listed Regional Board recycled water permit or waste discharge requirements.
2 Effluent Limit expressed as an annual (12-month) average.
3 Effluent limit expressed as a monthly (30-day) average.
4 Effluent limit expressed as a daily maximum.
5 Recycled water TDS concentration not to exceed potable supply concentration by 450 mg/l.
6 Recycled water chloride concentration not to exceed potable supply concentration by more than 150 mg/l.
7 Shadowridge plant currently not in operation but Regional Board permit remains active.

3.7.5 Groundwater Quality

Designated Beneficial Uses

The Basin Plan designates beneficial uses for groundwater within each hydrologic area of the Region's eleven watersheds. Appendix 3-A presents beneficial uses for groundwater designated in the Basin Plan.

The Basin Plan designates municipal supply, agricultural supply, and industrial service supply as beneficial uses within a significant majority of the Region's hydrologic areas. Industrial process supply and fresh water replenishment (maintaining surface flows) are listed as beneficial uses within several of the Region's hydrologic areas. The Basin Plan does not designate wildlife habitat as a beneficial use of groundwater, but significant areas of riparian habitat and groundwater-dependent vegetation exist within each of the eleven watersheds.

Groundwater Quality Objectives

The Basin Plan establishes numerical groundwater quality objectives on a watershed-by-watershed basis for color, turbidity, detergent (methylene blue active substances, or MBAS), TDS, and mineral constituents. Additionally, the Basin Plan imposes state and federal drinking water standards for toxic inorganic and toxic organic constituents on groundwaters designated for domestic use.

Appendix 3-B presents Basin Plan numerical groundwater quality objectives within the Region. Groundwater quality objectives for TDS and mineral constituents are established as lower concentrations in the upstream portions of the watersheds and at higher concentrations in downstream portions of the watersheds.

Regional Constituents of Concern

While alluvial groundwater aquifers can be quickly recharged by stormwater or urban runoff, the porous nature of the aquifers render them susceptible to contamination by activities on the ground surface, contaminated stormwater infiltration, abandoned well heads, and from underground storage tanks.

Table 3-32 summarizes key groundwater quality issues within the Region. Constituents of concern within Region's groundwater aquifers include TDS, nitrate, iron and manganese, and toxic organic pollutants.

- *Total Dissolved Solids (TDS)*. TDS can affect both the usability of groundwater as a domestic water source and as an irrigation water source. Groundwater TDS concentrations within coastal groundwater basins vary significantly, but have generally exhibited a trend of deteriorating water quality in recent decades as a result of seawater intrusion and salt load imbalances associated with imported water use (Water Authority, 1997). Coastal alluvial groundwater aquifers in the region that have experienced significant degradation from elevated TDS concentrations include the Lower Santa Margarita River Basin, Mission Basin (lower San Luis Rey Basin), Lower San Dieguito River Valley, Mission Valley (lower San Diego River Basin), Lower Sweetwater River Valley, and Lower Tijuana River Valley. Groundwater TDS concentrations in these coastal alluvial aquifers currently range from approximately 750 mg/l to more than 2000 mg/l. Among the principal alluvial groundwater aquifers within the Region, only the Pala/Pauma Basin, Warner Basin, and the upstream portions of the San Pasqual, El Monte, and Middle Sweetwater Basins contain groundwater TDS concentrations below the 500 mg/L state and federal secondary (non-enforceable) drinking water limits for TDS. Water quality in the San Diego Formation (a deep consolidated sediments aquifer that underlies a central portion of the City of San Diego) is

highly variable. Groundwater TDS concentrations in this aquifer may range from below 500 mg/L to more than 12,000 mg/L. Groundwater TDS concentrations within inland fractured rock aquifers are variable, but most wells produce groundwater that contains TDS concentrations that are suitable for potable water uses (Water Authority, 1997).

- *Nitrate.* State and federal primary (enforceable) drinking water MCLs for nitrate are established at 10 mg/L (as nitrogen). The Basin Plan establishes more stringent nitrate objectives (as low as 2.2 mg/L as nitrogen) for many of the Region's groundwater basins. Alluvial aquifers are susceptible to nitrate contamination from fertilizer application, animal confinement, wastewater percolation, and septic tank discharges. Exceedance of the Basin Plan nitrate objectives has been documented in portions of the San Luis Rey River and San Dieguito River Watersheds (Water Authority, 1997).
- *Iron and Manganese.* Iron and manganese occur naturally in Region's alluvial groundwaters. Groundwater from the Region's coastal aquifers periodically exceeds recommended state and federal secondary (non-enforceable) drinking water standards (0.3 mg/L for iron and 0.05 mg/L for manganese). Aquifers that have exhibited iron and manganese compliance problems include portions of the Santa Margarita River, San Luis Rey River, San Dieguito River, and San Diego River Watersheds (Water Authority, 1997).
- *Toxic Organic Compounds.* Several toxic organic compounds have been detected in groundwater within several of the Region's aquifers. Underground fuel tanks are a common source of groundwater contamination that may result in noncompliance with state and federal drinking water limits for benzene, methyl-tertiary-butyl ether (MTBE), and other volatile organic compounds. MTBE, in particular, is a key contaminant due to its low State of California primary MCL of 5 micrograms per liter (µg/L) and its ability to be rapidly dispersed by diffusion and advection throughout an aquifer. The State Board's Geotracker database system lists more than 100 sites of documented leaking underground fuel tanks within the Region's eleven watersheds. Although contamination effects from most of these sites are localized, a mile-long plume of petroleum derivatives from the Mission Valley Terminal (a fuel storage facility) contaminates portions of the Mission Valley aquifer in the San Diego River Watershed. The Mission Valley Terminal is under a Regional Board Order to reduce concentrations of dissolved phase petroleum hydrocarbon constituents to attain background water quality conditions by December 31, 2013(Regional Board, 2005b).

High TDS and other constituents in groundwater can impact large scale irrigation operations (Torrey Pines Golf Course shown above).

Photo credit: Jeff Pasek, City of San Diego

In February 2009, the State Board adopted Resolution No. 2009-011, which established a statewide Recycled Water Policy. The Recycled Water Policy requires the State Board and the Regional Boards to exercise their authority to the fullest extent possible to encourage the use of recycled water, consistent with state and federal water quality regulations. The Recycled Water Policy identifies

stakeholder-driven salinity/nutrient management plans (SNMPs) as the appropriate means for identifying and managing salinity and nutrient loads associated with recycled water use. *Chapter 7, Regional Coordination* includes a detailed discussion of the Policy and SNMPs under development within the Region.

Table 3-32: Summary of Water Quality Issues for Principal Groundwater Aqufiers[1]

HU[2]	Watershed	HA[2]	Name of Aquifer	TDS Concentration Range (mg/l)	Water Quality Constituents of Concern[3]			
					TDS	Nitrate	Iron & Manganese	Toxic Organics
901	San Juan	901.4	San Mateo	400 – 800	●	●		●
		901.5	San Onofre	600 - 1500	●	●		●
902	Santa Margarita River	902.00	Lower Santa Margarita[4]	600 – 750	●		●	●
903	San Luis Rey River	903.1	Mission	500 - 2000	●		●	●
			Bonsall	600 - 3400	●	●		
			Moosa Canyon	200 – 900	●	●		
		903.2	Pala/Pauma	350 - 1400	●	●		
		903.3	Warner	250 – 350				
905	San Dieguito River	905.1	Lower San Dieguito	1000 - 27,000	●		●	
		905.3	San Pasqual	320 - 2500	●	●		
		905.4	Santa Maria	500 - 1500	●	●		
907	San Diego River	907.1	Mission Valley	1000 - 3000	●		●	●
			Santee/El Monte	500 - 3000	●		●	
909	Sweetwater	909.1	Lower Sweetwater	1700 - 3100	●			
		909.2	Middle Sweetwater	300 - 1400	●			
911	Tijuana River	911.1	Lower Tijuana	500 - 3000	●			
Vary	Pueblo Sweetwater Otay Tijuana River	908.00 909.00 910.00 911.00	San Diego Formation	340 – 12,000	●			

1 From Water Authority *Groundwater Report* (1997).
2 Numerical watershed (hydrologic unit and hydrologic area) designations per Regional Water Quality Control Board (1994) and California Department of Water Resources *Hydrologic Data* (Bulletin 130).
3 Constituents that have exceeded state or federal drinking water primary or secondary standards in untreated groundwater (prior to treatment).

3.7.6 Desalinated Water Quality

As described within Section 3.5.7, desalination supply from the Carlsbad Desalination Plant is to be blended into the Water Authority's aqueduct system. Concentrations of dissolved minerals are low in desalinated product water. To prevent corrosive effects associated with these low concentrations of alkalinity and dissolved minerals, product water from the Carlsbad Desalination Plant will be stabilized prior to blending into the Water Authority aqueducts. After product water stabilization, TDS concentrations in the desalination supply are projected to average approximately 350 mg/L. Table 3-33 summarizes projected quality of the desalination supply from the Carlsbad Desalination Plant.

Table 3-33: Quality of Seawater Desalination Supply

Parameter	Projected Desalination Water Quality Carlsbad Desalination Facility	
	Central Tendency[1] (not to be exceeded more than 50% of the time)	Extreme Value[1] (not to be exceeded more than 10% of the time)
Total dissolved solids	350 mg/l	400 mg/l
Boron	0.75 mg/l	1.0 mg/l
Bromide	0.5 mg/l	0.8 mg/l
Chloride	180 mg/l	210 mg/l
Turbidity	0.3 NTU[2]	0.5 NTU[2]

1 Water quality terms incorporated into water purchase agreement between Poseidon Resources and the Water Authority.
2 Nephelometric Turbidity Units

3.8 Environmental Resources

Habitat Resources

The Region's 11 watersheds support many habitat communities and contain more rare, threatened, and endangered plant and animal species than any comparable land area in the continental United States (Pulliam and Babbitt, 1997). The County Multiple Species Conservation Program (MSCP) and Multiple Habitat Conservation Program (MHCP) are being implemented by the County and local jurisdictions to protect these resources. Figure 3-16 presents the boundaries of the MSCP and MHCP areas.

In addition to the 900-square-mile area covered by the MSCP and 175-square-mile area covered by the MHCP, the County is in the process of developing a North County MSCP encompassing approximately 487 square miles in the northwestern portion of the county, and an East County MSCP that addresses habitat needs within a 2,420-square-mile area. Approximately 41% of the MSCP Plan area is developed or urbanized, and about 5% is used for agriculture.

There is some disagreement about the effect of MSCP and MHCP programs that locate mitigation projects outside of the general area where an impact occurs. Because these programs establish formal mitigation areas, if the MSCP and MHCP areas are physically distant from the impact area, the mitigation site may be located at a distance from the physical biological impact. Outside-area mitigation or mitigation exportation has been noted as a concern by some IRWM stakeholders concerned that certain watersheds that do not contain MSCP and MHCP lands may be continually degraded as a result of this practice.

Other IRWM stakeholders hold that, while individual watersheds may be affected, federal and state policies governing no-net-loss of wetlands ensure that regional wetland functions and services will not decrease. Most on-site compensatory mitigation projects yield widely scattered, small, and isolated or "patch" wetlands, which are not buffered by adjacent uses because they are created at an actual project site to compensate only for a particular project's wetland losses. Ultimately, "patch" wetlands probably will fail not only because of their location and size, but because their ecological potential is limited by their separation from broader wetlands ecosystems. Larger mitigation efforts, such as MSCP and MHCP, consolidate resources and create an economy of scale, yielding more efficient wetlands protection. These off-site wetlands systems are more ecologically valuable than the isolated, on-site "patch" wetlands created from individual mitigation efforts. The ecological

benefits include: providing a habitat for a larger variety of wildlife; accommodating larger populations of the present species, which prevents inbreeding and promotes species stabilization; and allowing the wetlands to adapt to changes in the ecosystem.

Vegetation Communities

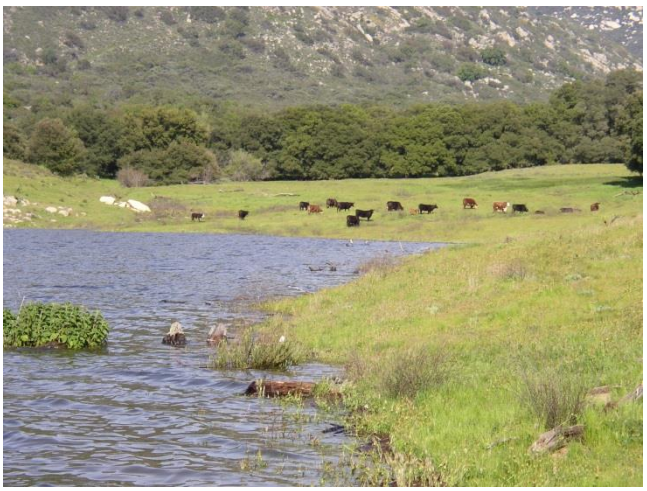
Table 3-34 describes the principal vegetation communities and characteristic species in the Region. In addition to the vegetation communities summarized in Table 3-3 vernal pools are also known to occur in San Diego County within the Santa Margarita River, Carlsbad, San Dieguito River, Peñasquitos, Otay River, and Tijuana River Watersheds. Vernal pool sites are characterized by fine textured soils underlain by cemented hardpan. Vernal pool vegetation typically consists of a low, herbaceous community dominated by annual herbs and grasses.

Wildlife and Endangered Species

The Region's vegetation communities support a wide array of wildlife species. San Diego County is home to approximately:

- 1534 total native plant species
- 75 species of reptiles and amphibians
- 140 species of mammals, including 23 species of bats
- 20,000 species of insects
- 492 species of birds, of which about 70 breed within the County

Over 200 plant and animals species in the County are listed as endangered, threatened, rare, or are candidates for listing (USFWS and DFW, 1998). Over half of these species occur in the southwest portion of Region within the MSCP area. Appendix 3-D presents listed species covered under the MSCP and describes their associated habitats. Appendix 3-D also presents non-listed species that occur within the MSCP area that are considered sensitive. Appendix 3-D acknowledges that the federal listing for Southern California steelhead refers to a population ranging from Santa Maria River to San Mateo Creek; despite the federal listing of this population's range, the historical southern boundary of the species' range is the United States-Mexico border.



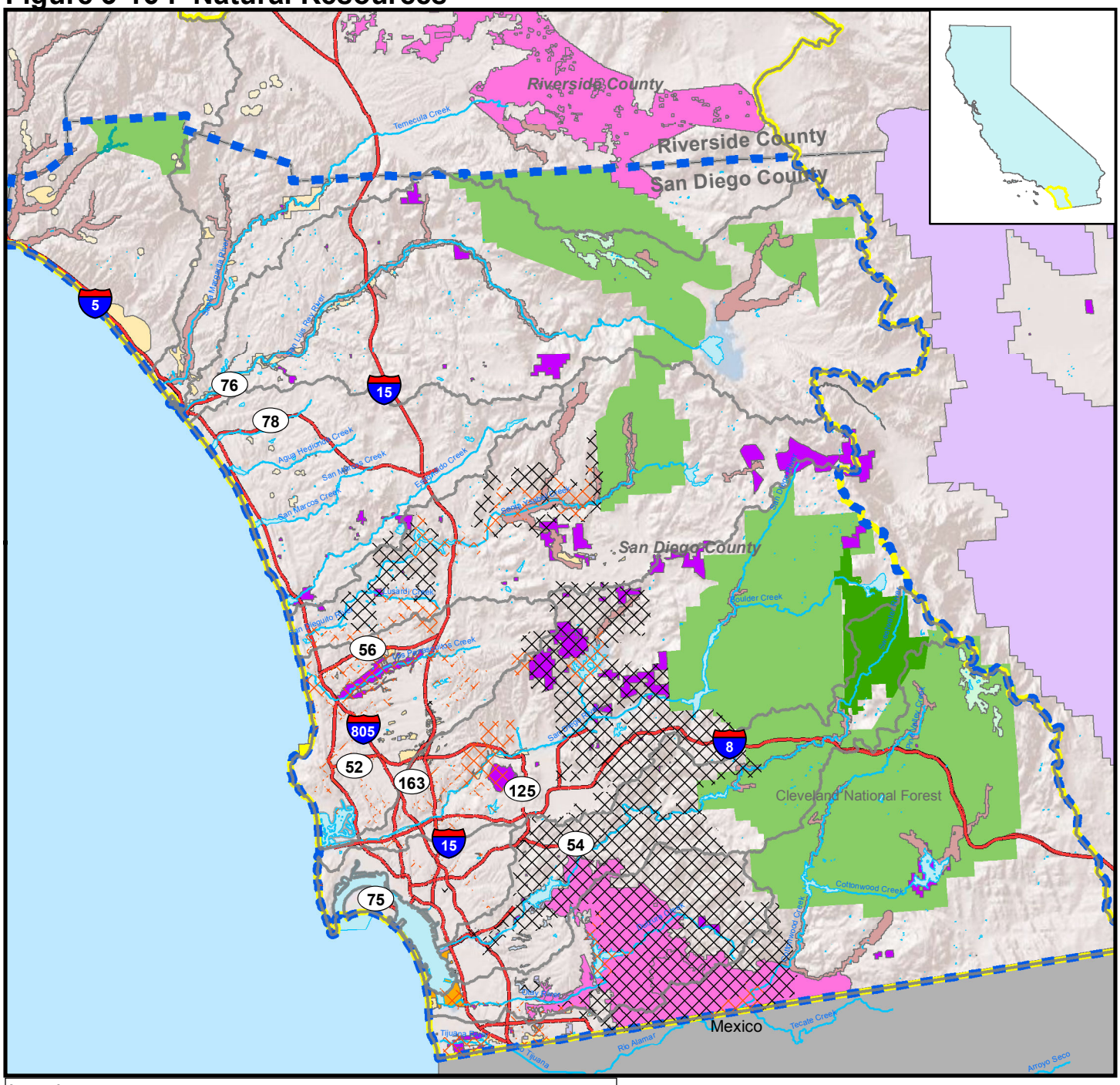
Water supply reservoirs, such as Lake Sutherland, provide important habitat corridors for native wildlife and livestock.

Photo credit: Jeff Pasek, City of San Diego

Wildlife corridors and linkages are a key component of the Region's species protection plans. The conservation programs identify primary wildlife corridors/linkages that (1) connect core biological resource areas within the protection plan boundaries, and (2) provide connections to habitat outside the boundaries. As an example, identified linkages in the MSCP include:

- Otay Ranch to Sycuan
- Sweetwater Reservoir to McGinty Mountain
- Interstate-8 at Lakeside
- Dehesa to El Capitan Reservoir
- Boden Canyon

Figure 3-16 : Natural Resources



Legend

Critical Habitat Areas
- Laguna Mountains Skipper Habitat
- Bufo Californicus Habitat
- Thread-Leaved Brodiaea Habitat
- Deinandra Conjugens Habitat
- Least Bell's Vireo Habitat
- Spreading Navarretia Habitat
- Peninsular Big Horn Sheep
- Quino Checkerspot Butterfly Habitat
- Riverside Fairy Shrimp Habitat
- San Diego Fairy Shrimp Habitat
- Southwestern Willow Flycatcher Habitat
- Western Snowy Plover Habitat
- Cuyama State Park
- San Diego Bay National Wildlife Refuge
- SC Steelhead Habitat

- Area of Special Biological Significance
- Cleveland National Forest
- Parks
- City of San Diego Multi-Habitat Planning Area (MHPA)
- San Diego County Multiple Species Conservation Program (MSCP)
- San Diego IRWM Region
- Funding Area Boundary
- County
- Watershed
- Waterbody
- River
- Freeway

0 2.5 5 10
Miles

N

Critical Habitat, USFWS, Available: http://criticalhabitat.fws.gov/Areas of Special Biological Significance, SWRCB, Available: http://www.swrcb.ca.gov/water_issues/programs/ocean/asbs_areas.shtml
Parks, Cleveland Nat'l Forest, MCSP & MHPA, SANGIS, Available: http://www.sangis.org/Download_GIS_Data.htm
L:\Projects GIS\0188-003 SDIRWM Plan Update\MXD\Set 060713\Fig3-16ab_NatResources.mxd

RMC

Table 3-34: Summary of Vegetation Communities[1]

Community	Range	Characteristic Vegetation Species
Coastal Sage Scrub	Extends from the coast to approximately a 1,500-foot elevation. Over 70% of the County's coastal sage scrub has been removed by urban development, but the habitat is found in portions of most of the Region's eleven watersheds.	• California sagebrush (*Artemisia californica*) • flat-top buckwheat (*Eriogonum fasciculatum*) • laurel sumac (*Malosmalaurina*) • white and black sage (*Salvia apiana* and *S. mellifera*)
Chaparral	Exists within an elevation range of 1,000 to 5,000 feet. Vegetation survives the prolonged summer drought season through deep root structure, leaves that minimize evaporation losses, and an ability to recover from wildfire.	• manzanita (*Arctostaphylos* spp.) • red shank (*Adenostoma sparsifolium*) • oaks (*Quercus* spp.) • chamise (*Adenostoma fasciculatum*) • California lilac (*Ceanothus* spp.)
Coastal Sage-Chaparral Scrub	Transition community containing species typical of both chaparral and coastal sage scrub	• (See Coastal Sage Scrub and Chaparral)
Grassland	Native and non-native grasslands occur throughout the Region's eleven watersheds. The largest mountain grassland in the County is at Lake Henshaw and Warner Ranch (San Luis Rey River watershed).	• purple needlegrass (*Nasella pulchra*) • wild barley (*Hordeum murinum*) • rip-gut (*Bromus diandrus*) • slender wild oat (*Avena barbata*) • foxtail (*Bromus madritensis*).
Riparian/Wetlands	Occurs along watercourses within each of the Region's eleven watersheds. Consists of tall, open, broadleafed riparian forests, woodlands, and dense, broadleafed riparian thickets. Herbaceous plants dominate the understory.	• willows (*Salix* spp.) • western cottonwood (*Populus fremontii*) • western sycamore (*Platanus racemosa*) • mule fat (*Baccharis salicifolia*) • Douglas mugwort (*Artemisia douglasiana*) • cattails (*Typha* spp.), bulrush (*Scirpus* spp.) • sedges (*Carex* spp.), primrose (*Oenothera* spp.)
Oak Woodlands	Consists of open or closed canopy woodlands dominated by oaks, including coast live oaks.	• coast live oaks (*Quercus agrifolia*) • Engelmann oaks (*Quercus en gelmannii*)
Coniferous Forest	Found at elevations above 3,500 feet in the northeastern portion of the Region, including Palomar State Park, and the Laguna recreation area in Cleveland National Forest.	• Jeffrey pine (*Pinus jeffreyi*) • Coulter pine (*Pinus coulteri*) • California Black Oak (*Quercus kelloggii*) • incense cedar (*Libocedrus decurrens*) • white fir (*Abies concolor*)
Beach/Foredunes	Found along the coast and bay shores, and characterized by stretches of loose, windswept, sandy dunes that vary in width from a few to several hundred feet.	• Beach sun cup (*Cammissionia cheirianthifolia)* • Beach bur (*Ambrosia bipinnatifida)* • Sea rockets (*Cakile maritima)*
Eucalyptus Woodland	Consists of open to dense stands of eucalyptus trees, which are an invasive, non-native species. The understory can include grasslands and chaparral habitats.	• Eucalyptus (*Eucalyptus* spp.)
Disturbed Habitat	Disturbed habitat consists of previously disturbed areas that are either devoid of vegetation (dirt roads/trails) or support scattered non-native species	• wild radish (*Raphanus sativus*) • tumbleweed (*Salsola tragus*) • tocalote (*Centaurea meletinsis*)
Shallow Bay	Includes Mission Bay and portions of San Diego Bay. Shallow bay areas may support some scattered emergent wetland vegetation.	• None - primarily open water

3 Adapted from USFWS and DFW(1998).

Core biological resource areas and corridors within the City of San Diego portion of the MSCP area that are targeted for conservation include the Otay Lakes Cornerstone Lands, Marron Valley Cornerstone Lands, and San Vicente Cornerstone Lands. Similar linkages and core biological resource conservation lands are addressed within the North and East County habitat protection programs.

The Region's inland surface waters support both warm freshwater aquatic habitat and cold freshwater aquatic habitat. Common channel flow regimes within the Region include alluvial reaches, with pools, bars, and shallow riffles. Upstream sections of the Region's major watercourses may contain cobble and bedrock reaches. In 1998, the Regional Board implemented a four-year bioassessment program to expand ongoing efforts to assess the integrity of the Region's waters, develop indices of biological integrity, identify reference conditions, and develop baseline data. Assessment work completed to date indicates significant geographic and temporal variation in habitat integrity indices within the Region. The studies recommended designating the lower 25th percentile of reference site data as representing "poor" or "very poor" quality habitat. Monitoring sites with habitat indices in this lower 25th percentile were identified in portions of most of the Region's watersheds (DFW, 1999, 2001, 2002).

Aquatic, Estuarine, and Marine Habitats

Estuarine habitats within the Region include coastal lagoons, seagrass beds, southern coastal salt marsh, and brackish marsh. A wide range of intertidal marine habitats exist along the Region's coast, including: intertidal sandy beach, cobble beach, intertidal platform, intertidal boulder field, tidal pool, and rocky headland. Submerged marine habitats along the Region's coastline include: soft/sand bottom, rocky reef, seagrass beds, surfgrass, and kelp beds.

Many of the Region's estuarine habitats are located within coastal lagoons, which receive water from upstream creeks and rivers and also receive saline water from the Pacific Ocean. Due to their coastal nature, the inlets (openings) to the lagoons may become blocked by sand that is transported by tides, surf, and storm surges (San Elijo Lagoon Conservancy 2013). In order to maintain connectivity with the ocean, several of the Region's coastal lagoons are dredged on a regular basis. Dredging activities often require excavation equipment to remove sediment and sand accumulations that block lagoon inlets, and can temporarily prevent recreational access to the Region's lagoons. Although impacts from dredging may occur, these activities are considered necessary to maintaining lagoon health and ensuring that the Region's lagoons do not become stagnant for long periods of time (San Elijo Lagoon Conservancy 2013). **Invasive Species**

Non-native invasive vegetation species have become established in portions of all of the Region's watersheds. The non-native invasive vegetation can alter fire frequencies, soil conditions, local hydrology, and reduce the reproductive ability of native vegetation. Once established, the non-native vegetation can displace the native vegetation community and dependent wildlife. Invasive species impacting the Region's riparian community include, but are not limited to, giant reed (*Arundo donax*) and salt cedar (*Tamarix* spp.). Through increased water uptake, these species can lower natural water tables, limit groundwater recharge, and reduce streamflow. In addition to hydrological changes, salt cedar leaf litter can sufficiently increase soil salinity such that areas can become unsuitable for native vegetation and dependent wildlife. *Arundo* and *Tamarix* support few insects, the main food supply for insectivorous birds, while limiting or eliminating native vegetation and their associated habitats.

Invasive species also negatively affect aesthetics and recreational access, and can increase the potential for flooding. Other key invasive species within the Region include: iceplant (*Carpobrotus edulis*), Pampas grass (*Cortaderia selloana*), and German ivy (*Senecio mikanioides*). Iceplant

occupies significant areas of the Region, including coastal dunes, and can deprive native vegetation of moisture and nutrients. German ivy can cover native vegetation and reduce access to light and air. Pampas grass out-competes native vegetation through its aggressive root system. Invasive species eradication efforts are currently underway in many of the Region's watersheds.

Water quality monitoring and invasive removal, such as Arundo Donax, will improve the habitat quality of Chollas Creek.

Photo credit: Travis Prichard, San Diego CoastKeeper

The marine algae *Caulerpa taxifolia* is an invasive species of concern for the Region's coastal and marine waters. *Caulerpa taxifolia* grows as a dense blanket that covers and kills native aquatic vegetation. Once established, *Caulerpa taxifolia* results in the displacement of fish, invertebrates, marine mammals, and sea birds that are dependent on the displaced native marine vegetation (Regional Board, 2006b). In 2000, *Caulerpa taxifolia* was found in Agua Hedionda Lagoon (Carlsbad Watershed). Eradication efforts including chemical treatment, tarping, surveillance, and public outreach efforts were conducted by the Southern California *Caulerpa* Action Team. As a result of these efforts, full eradication of *Caulerpa taxifolia* has been achieved.

The Quagga mussel is a recent invasive species of critical concern within the Region. The Quagga mussel is a small mollusk that can adversely impact the Region's water supply operations and facilities by clogging pumps, clogging water lines, creating taste and odor problems in treated water supplies, and adversely altering ecosystems within the Region's surface water reservoirs. In February 2007, Metropolitan launched a comprehensive program to detect and control an invasion of Quagga mussels within Metropolitan's imported water supply network. Quagga mussels were confirmed in several of the Region's imported water supply reservoirs in August 2007. In 2010, a Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) was formulated by the Water Authority, along with DFW and others, to conserve and manage covered species under a comprehensive approach that contributes to the ongoing conservation and management efforts in San Diego County. The plan included a quagga and zebra mussel response and control action plan to control the spread of quagga and zebra mussels in San Diego County.

Invasive species within San Diego Bay represents an additional concern within the Region. Biological surveys conducted by DFW have confirmed the presence of over 50 non-native species within San Diego Bay (DFW, 2006).

3.9 Recreational Resources

The Region supports a wide array of recreational resources, with 70 miles of recreational beaches, which include:

- Nine California State Beaches: Cardiff, Carlsbad, Leucadia, Moonlight (operated by the City of Encinitas), San Elijo, San Onofre, Silver Strand, South Carlsbad, and Torrey Pines
- municipal beaches in Oceanside, Encinitas, Solana Beach, Del Mar, San Diego, Coronado, La Jolla, Mission Bay, Mission Beach, Ocean Beach, Pacific Beach, Point Loma, and Imperial Beach

Important coastal preserves and recreational areas include State, county and local parks, beaches and ecological reserves. Table 3-35 presents the larger State and regional recreational areas and ecological reserves within the Region.

As noted, there are two ASBS sites in the region: the La Jolla ASBS and the San Diego-Scripps ASBS. Together, these areas are part of the San Diego-La Jolla Underwater Park. The 6,000-acre underwater park (established by the City of San Diego) stretches from La Jolla Cove in the south to the north end of Torrey Pines Reserve.

The County Department of Parks and Recreation maintains 90 parks and recreational facilities covering over 40,000 acres, including local and regional parks, fishing lakes, community centers, special-use facilities, ecological preserves, and open spaces. The County also operates the County Trails Program that includes (1) a Regional Trails Plan that addresses over 650 miles of existing and planned trails, and (2) a Community Trails Master Plan that addresses over 1,400 miles of new and existing trails.

The City of San Diego maintains a parks system that includes three regional parks, six open space parks, three golf courses and numerous community parks. The City also maintains a lakes recreation program that offers fishing and water contact sports to visitors at nine surface water reservoirs. Additionally, the Region's other 17 municipalities maintain numerous community parks, regional parks, and open space preserves.

Cleveland National Forest covers significant portions of the Region, including upstream areas of the San Luis Rey River, San Dieguito River, San Diego River, Sweetwater, and Tijuana River Watersheds. Mountain area state parks within the Region include Palomar Mountain State Park (San Luis Rey River Watershed) and Cuyamaca Rancho State Park (San Diego and Sweetwater River Watersheds).

Table 3-35: Summary of Regional Parks and Reserves

HU	Watershed	Regional Park or Reserve[1,2,3]
903	San Luis Rey	• Pilgrim Creek State Ecological Reserve • San Luis Rey River Park (land acquisition in progress)
904	Carlsbad	• Agua Hedionda Lagoon State Ecological Reserve • Batiquitos Lagoon State Marine Park • Buena Vista Creek State Ecological Reserve • Buena Vista Lagoon State Ecological Reserve • Carlsbad Highlands State Ecological Reserve • San Elijo Lagoon State Ecological Reserve • San Elijo State Marine Conservation Area • Swami's State Marine Conservation Area
905	San Dieguito	• Boden Canyon State Ecological Reserve (San Dieguito Watershed) • San Dieguito Lagoon State Marine Park and Ecological Reserve (San Dieguito Watershed)
906	Peñasquitos	• Blue Sky State Ecological Reserve • La Jolla State Marine Conservation Area • Matlahuayl State Marine Conservation Area • Meadowbrook State Ecological Reserve • San Diego Scripps State Marine Conservation Area • South La Jolla State Marine Reserve • Torrey Pines State Reserve
907	San Diego	• Famosa Slough State Marine Conservation Area • Mission Trails Regional Park • San Diego National Wildlife Refuge
908	Pueblo	• Cabrillo State Marine Reserve •
909	Sweetwater	• Chula Vista Wildlife Reserve • Crestridge State Ecological Reserve • McGinty Mountain State Ecological Reserve • Rancho Jamul State Ecological Reserve • San Diego National Wildlife Refuge • Sweetwater Marsh National Wildlife Refuge • Sweetwater Regional Park • Sycuan Peak State Ecological Reserve
910	Otay	• Otay Mountain State Ecological Reserve • Otay Valley Regional Park • San Diego National Wildlife Refuge • South Bay County Biological Study Area
911	Tijuana	• Border Field State Park • Tijuana National Estuarine Sanctuary • Tijuana River Mouth State Marine Conservation Area • Tijuana River Valley Regional Park • Tijuana Slough National Wildlife Refuge • Walker Canyon State Ecological Reserve

1 List of County of San Diego parks from County of San Diego (2012).
2 List of City of San Diego parks from City of San Diego (2012).
3 List of marine protected areas and preserves adapted from DFW (2012).

3.10 Water Demand and Supply Diversification

Demand Forecasts

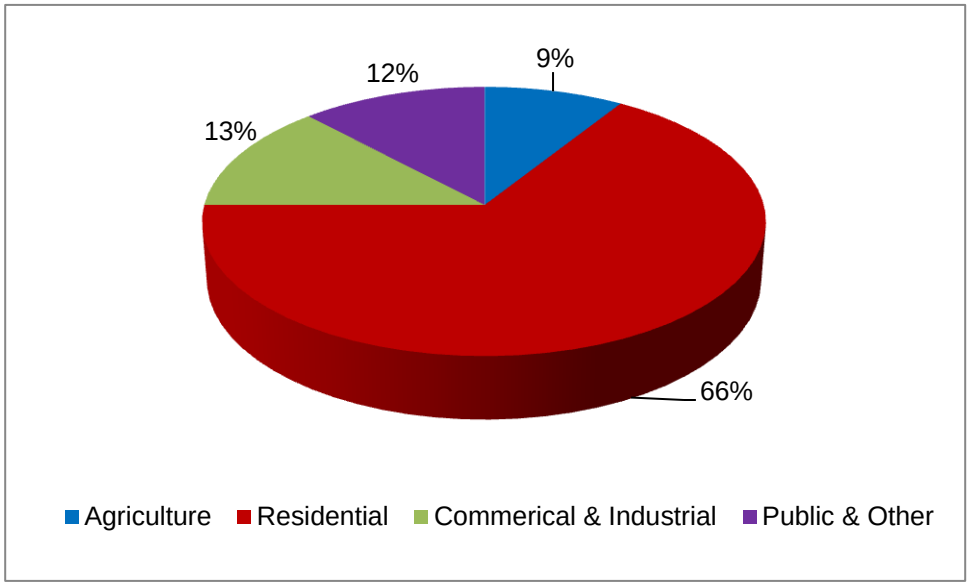
Demand for water in the Water Authority's service area includes municipal and industrial (M&I) demand and agricultural demand. M&I demand comprises 91% of regional water consumption and can be subdivided into residential demand and commercial/industrial demand (Water Authority, 2011a).

Approximately two-thirds of the M&I demand is currently for residential use. Residential water consumption includes both indoor and outdoor uses. Indoor water use includes sanitation, bathing, laundry, cooking, and drinking, while most outdoor use is for landscape irrigation. Outdoor residential M&I demands for single family homes may comprise up to 60% of total residential use (Water Authority, 2011a). Industrial water consumption consists of a wide range of uses, including product processing, aggregate washing, concrete batching, dust control, cooling, air conditioning, sanitation, and landscape irrigation. Commercial water demand is typically for sanitation, landscape irrigation, and drinking.

In recent years, agriculture demands have dropped significantly due to several factors, including water supply cutbacks, water rate increases, and economic downturn. Agricultural demand declined 55% between 2007 and 2010, from 98,000 AFY to 43,000 AFY. Agricultural water demand now accounts for less than 10% of the Water Authority's total water demand. All but a small fraction of the agricultural demand is for irrigation. Primary crops within the Region include avocados, citrus, flowers, and nursery products. Agricultural water use within the Water Authority's service area is concentrated mainly in the northern portion of the Region within the Fallbrook Public Utility District, the City of Escondido, Rainbow, Valley Center, Ramona, and Yuima Municipal Water Districts (Water Authority, 2011a).

Figure 3-17 shows FY 2012 water demand by customer sector.

Figure 3-17: FY 2012 Water Demand by Customer Sector Use



Source: Water Authority FY 2012 Annual Report

Because a significant portion of the overall regional water demand is for irrigation, weather and hydrologic conditions (precipitation, temperature, evaporation) have a significant effect on water demands within the Water Authority service area. Population, housing, and employment are also key factors in influencing the regional water demand. Over the last several decades a prosperous economy had stimulated local development and population growth, which in turn produced a relatively steady increase in water demand. However, by the late-2000s, the combination of economic recession, drought messaging, implementation of member agency mandatory water use restrictions, water rate increases, and mild local weather culminated in a dramatic multi-year decrease in total water demand. In fiscal year 2007, water demand in the Water Authority's service area reached a record level of 741,893 AF, only to drop roughly 24% to 566,443 AF by fiscal year 2010 (Water Authority, 2011a).

To forecast future M&I water use, the Water Authority selected the IWR-MAIN (Institute for Water Resources – Municipal and Industrial Needs) computer model. Versions of this econometric model have evolved over a 20-year period and are being used by many U.S. cities and water agencies. The IWR-MAIN system is designed to utilize projections of local population, housing, and employment and other demographic data to forecast M&I water demand. The Water Authority's version of the IWR-MAIN model was modified to reflect the Region's unique parameters and is known as CWA-MAIN.

Per a 1992 Memorandum of Agreement (MOA) between SANDAG and the Water Authority, the Water Authority agreed to use SANDAG's most recent regional growth forecasts for planning purposes. Water demands presented in the Water Authority's *2010 Urban Water Management Plan* were developed using the CWA-MAIN model and the SANDAG *2050 Regional Growth Forecast*. The CWA-MAIN model was adjusted to incorporate:

- estimated demands for Camp Pendleton that are based on historic trends, and
- a separate agricultural demand model that estimates demand on the basis of projected agricultural acreage, and updated crop distribution and irrigation management data.

Using this modeling approach, Table 3-36 presents projected water demands through 2035 under "normal year" hydrologic conditions.

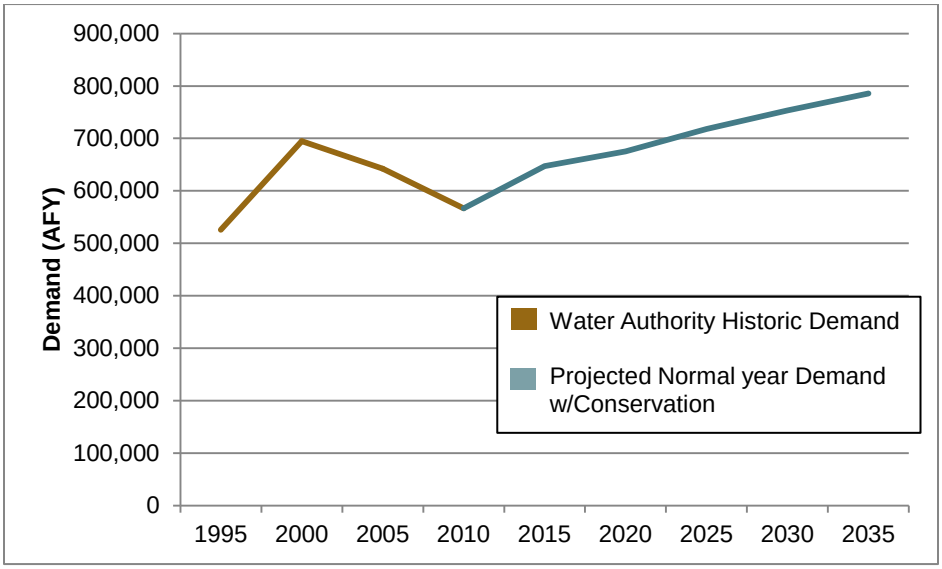
Table 3-36: Normal Year Water Demand Forecast – Water Authority Service Area[1]

Demand Parameter	Projected Water Demand (acre-feet per year)				
	2015	2020	2025	2030	2035
M&I Baseline Forecast[2]	590,731	661,415	728,574	788,174	839,417
Estimated Conservation Savings	6,737	46,951	72,234	97,280	117,528
M&I Forecast Reduced by Conservation	583,994	614,464	656,340	690,894	721,889
Agricultural Forecast	55,358	49,534	48,380	47,279	46,178
Total Projected Demand	639,352	663,998	704,720	738,173	768,067
Total Projected Demand with Pending Annexations and Additional Anticipated Growth	647,285	675,089	717,995	753,619	785,685

1 From *2010 Urban Water Management Plan* (Water Authority, 2011a). Water demand estimates for the portion of the Region outside the Water Authority service area are not available.
2 Includes M&I demands for Camp Pendleton area customers.

Figure 3-18 shows these projected demands alongside historic water demands. As described earlier, the decrease in water demand in 2010 is attributed to regulatory and conservation efforts, as well as the economy, water costs, and home foreclosures. Information presented in Table 3-36 and Figure 3-18 reflects current demand projections presented within the *2010 Urban Water Management Plan* (Water Authority, 2011a).

Figure 3-18: Historic Water Use and Projected Water Demands



Water Supply Diversification

The *California Water Plan Update 2009* (DWR, 2009) identifies short-term and long-term issues that may impact water supply availability and include (in part): population growth, drought, flood, earthquake, aging infrastructure, global climate change, and environmental restrictions. The *California Water Plan Update 2009* promotes diversification of regional water portfolios.

Recognizing that imported SWP and Colorado River supplies are subject to legal, environmental, drought, and other uncertainties, a key result area of the Water Authority's *Strategic Plan* is diversification of the Region's water portfolio. This diversification plan is based on:

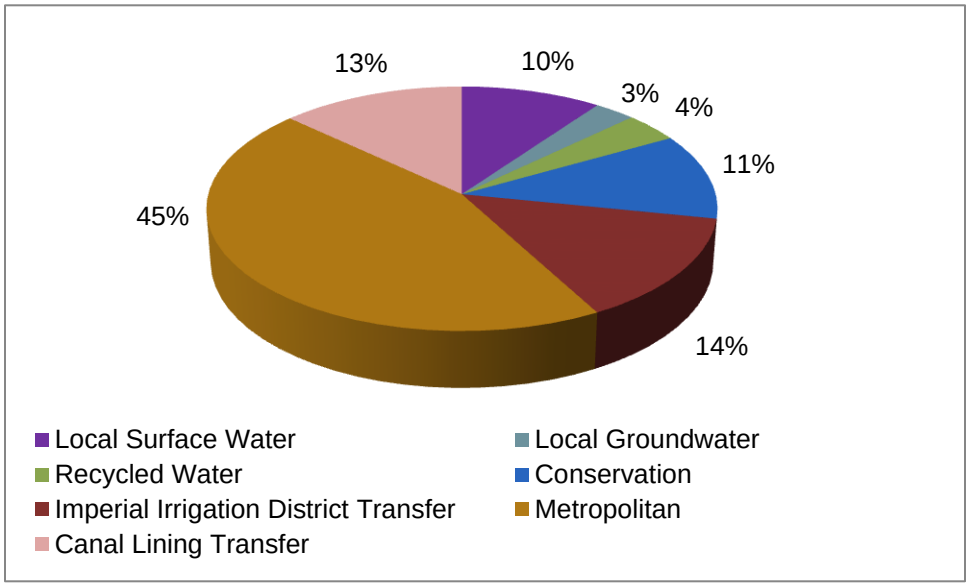
- Retail member agency compliance with Senate Bill (SB) X7-7 water conservation targets, requiring 20% reduction in potable water use by 2020.
- Completion of the Carlsbad Seawater Desalination Project by 2016.
- Increasing the amount of recycled water use and brackish groundwater demineralization facility yield implemented by member agencies.
- Full implementation of the IID water transfers.

Water conservation is a fundamental component of the Region's water diversification plan. The Water Authority and its member agencies have aggressively supported water conservation since 1990. Significant Water Authority and member agency funding has been directed toward implementing comprehensive conservation programs to reduce water use for residential, commercial, and agricultural irrigation, and to reduce water use in homes, businesses, industries, and institutions.

Water transfers that incorporate water conservation represent another key element of the Water Authority's water supply diversification effort. In 1998, the Water Authority executed an agreement with the IID for the conservation and transfer of agricultural water. Under the agreement, water conserved by Imperial County farmers who participate in a voluntary program would be transferred to the Water Authority. Water transferred to the Water Authority totaled 70,000 AF during 2010 and will increase annually to a maximum annual total of 200,000 AF in 2021.

Additionally, in 2003, the Water Authority contracted rights to 77,700 AFY of water conserved through projects that lined 24 miles of the All-American Canal and 37 miles of the Coachella Canal in Imperial County. An additional amount up to 4,850 AFY is available to the Water Authority depending on environmental requirements associated with the Coachella Canal. Work on the Coachella Canal lining project was initiated in 2004 and was completed in 2006. Work on the All-American Canal began in 2005 and was completed in 2010. Deliveries of conserved water to the Region began in 2007. Figure 3-19 shows FY 2012 water supply sources for the Region.

Figure 3-19: FY 2012 Water Supply Sources



Source: Water Authority FY 2012 Annual Report

Conserved IID agricultural water and water conserved through the canal lining projects is credited to the Water Authority through a 2003 agreement between the Water Authority and Metropolitan. Under the agreement, Metropolitan takes delivery of conserved IID agricultural water and water conserved by the canal lining projects. Metropolitan, in turn, provides the Water Authority with a like quality and quantity of water. Other components of the supply diversification effort undertaken by the Water Authority and its member agencies include the following:

- **Groundwater** – Groundwater supplies are developed through management and recovery of good-quality alluvial groundwater or demineralization of poor-quality groundwater. Private wells are used to meet domestic and agricultural water needs within and outside the Water Authority's service area. A lack of groundwater use and demand data is a significant water management challenge in rural areas.

- **Seawater Desalination** – A seawater desalination facility is being built at the Encina Power Station in Carlsbad, and is expected to project 50 MGD of potable water when it reaches full capacity. The Water Authority has already entered into an agreement to purchase up to 56,000 AFY once production begins.
- **Indirect Potable Reuse** – IPR is being studied by the City of San Diego and partner organizations as an option for supplementing potable water supplies with highly-treated recycled water. A demonstration facility operational at the North City Water Reclamation Plant site has a 1 MGD capacity.

Taking into account projected water conservation savings, Table 3-37 presents a breakdown of projected water supplies and compares projected supplies with the demand forecast for a normal hydrologic year. As shown in Table 3-37, imported supplies from Metropolitan are projected to comprise approximately 41% of the total regional water demand by year 2035.

Table 3-37: Water Authority Water Supply Portfolio – Normal Water Year[1]

Demand Parameter	Projected Water Supply (acre-feet per year)				
	2015	2020	2025	2030	2035
Water Authority Supplies					
• IID Water transfer[1,2]	100,000	190,000	200,000	200,000	200,000
• Canal Lining projects[1,3]	80,200	80,200	80,200	80,200	80,200
Coachella Lining	24,000	24,000	24,000	24,000	24,000
All American Lining	56,200	56,200	56,200	56,200	56,200
• Seawater desalination[1,4]	0	56,000	56,000	56,000	56,000
Water Authority Member Agency Supplies					
• Local surface water[1,5]	48,210	47,940	47,880	47,540	47,290
• Water recycling[6]	38,660	43,730	46,600	48,280	50,000
• Groundwater[1,7]	22,030	26,620	27,620	28,360	28,360
Groundwater	11,710	11,100	12,100	12,840	12,840
Groundwater Recovery	10,320	15,520	15,520	15,520	15,520
Metropolitan Supplies[1]	358,190	230,600	259,690	293,240	323,840
Total Supplies[1,8]	647,290	675,090	717,990	753,620	785,690
Total Projected Demand with Conservation[1,8]	647,290	675,090	718,000	753,620	785,690

1 Verifiable expected water supplies for the Water Authority service area, as presented in 2010 Urban Water Management Plan (Water Authority, 2011a). Water budget data for the rural portion of the Region outside the Water Authority service area not available. Values rounded to nearest 10 acre-feet per year.

2 Expected Water Authority supply, per 1997 Water Conservation and Transfer Agreement between the Water Authority and the Imperial Irrigation District for the transfer of conserved agricultural water.

3 Expected Water Authority supply, per Quantification Settlement Agreement on the Colorado River. The supply includes 2,500 acre-feet of environmental water deliveries.

4 Proposed Carlsbad Desalination Project at Encina Power Station. Other desalination projects are currently being considered but are not considered verifiable supplies.

5 Expected average yield of member agency surface reservoirs during normal year hydrologic conditions.

6 Projected recycled water development based on member agency project implementation schedules.

7 Projected groundwater extraction yields by Water Authority member agencies during normal year hydrologic conditions. Includes groundwater recovery through demineralization treatment of brackish groundwaters.

8 Values may not add to exact total due to rounding.

In addition to assessing a normal hydrologic year, the Water Authority's *2010 Urban Water Management Plan* also developed supply estimates under single dry and multiple dry water years. Table 3-38 presents the Water Authority's water supply and demand assessment for a single dry water year. The *2010 Urban Water Management Plan* concludes that no shortages are anticipated within the Water Authority's service area under single dry-year through 2035 provided that (1) projected Metropolitan, Water Authority and member agency supplies are developed as planned, and (2) retail conservation targets are achieved.

The *2010 Urban Water Management Plan* indicates that, in multiple dry water years, the Region is at risk for shortages. The plan also notes that the most reliable method for alleviating shortages during a dry period is to enhance regional storage and local water supply development (Water Authority, 2011a). The Water Authority has also developed a *Water Shortage and Drought Response Plan* (Water Authority, 2006) that identifies shortage management actions to minimize the impacts of drought-related imported water shortages and to equitably allocate supplies to member agencies.

Table 3-38: Water Authority Water Supply Portfolio – Single Dry Water Year[1]

Demand Parameter	Projected Water Supply (acre-feet per year)				
	2015	2020	2025	2030	2035
Water Authority Supplies					
• IID Water transfer[1,2]	100,000	190,000	200,000	200,000	200,000
• Canal Lining projects[1,3]	80,200	80,200	80,200	80,200	80,200
Coachella Lining	*24,000*	*24,000*	*24,000*	*24,000*	*24,000*
All American Lining	*56,200*	*56,200*	*56,200*	*56,200*	*56,200*
• Seawater desalination[1,4]	0	56,000	56,000	56,000	56,000
Water Authority Member Agency Supplies					
• Local surface water[1,5]	17,930	17,930	17,930	17,930	17,930
• Water recycling[6]	38,660	43,730	46,600	48,280	50,000
• Groundwater[1,7]	20,300	25,500	25,500	25,500	25,500
Groundwater	9,980	9,980	9,980	9,980	9,980
Groundwater Recovery	10,320	15,520	15,520	15,520	15,520
Metropolitan Supplies[1]	430,430	305,100	338,500	376,020	409,390
Total Supplies[1,8]	687,520	718,460	764,730	803,930	839,020
Total Projected Demand with Conservation[1,8]	687,520	718,460	764,730	803,930	839,020

1 Verifiable expected water supplies for the Water Authority service area, as presented in *2010 Urban Water* Management Plan (Water Authority, 2011a). Water budget data for the rural portion of the Region outside the Water Authority service area not available. Values rounded to nearest 10 acre-feet per year.

2 Expected Water Authority supply, per 1997 Water Conservation and Transfer Agreement between the Water Authority and the Imperial Irrigation District for the transfer of conserved agricultural water. Expected Water Authority supply, per Quantification Settlement Agreement on the Colorado River. The supply includes 2,500 acre-feet of environmental water deliveries.

3 Proposed Carlsbad Desalination Project at Encina Power Station. Other desalination projects are currently being considered but are not considered verifiable supplies.

4 Expected average yield of member agency surface reservoirs during single dry year hydrologic conditions.

5 Projected recycled water development based on member agency project implementation schedules.

6 Projected groundwater extraction yields by Water Authority member agencies during single dry year hydrologic conditions. Projected groundwater recovery is through demineralization treatment of brackish groundwaters.

7 Values may not add to exact total due to rounding.

Water demand projections and water supply diversification strategies developed by the Water Authority are acknowledged by the DWR in the *California Water Plan Update 2009* (Bulletin No.

160). The *California Water Plan Update 2009* notes the importance of regional water supply planning, and describes water supply diversification strategies of the Water Authority and other Southern California agencies.

Cost of Water Supply Diversification

To meet the Region's water supply diversification goals, additional sources of local supply will need to be developed. However, development of new supplies to diversify the Region's portfolio will likely be more expensive than existing supplies. There are a number of factors that can influence supply development costs, such as, location, size, and configuration of a project. For example, brackish and seawater desalination project unit costs can vary based on the extent of the product water conveyance required, pumping requirements, access to existing infrastructure, and method of brine disposal.

Proposed groundwater desalination projects have an estimated unit cost of $800-$2,000 per acre-foot (Water Authority, 2010). The purchase and delivery of water from the Carlsbad Seawater Desalination Facility (currently under construction) has an estimated total unit cost that ranges between $2,014 and $2,257 per acre-foot, depending upon how much water is purchased annually.

The City of San Diego recently completed the Water Purification Demonstration Project, which demonstrated the feasibility of a full-scale reservoir augmentation project that could produce 15 MGD of potable water via reuse (refer to Section 3.5.5 for more information). The most recent cost estimate for a 15 MGD potable reuse facility was $2,000 per acre-foot with an avoided wastewater cost of $1,000 per acre-foot. In July 2012, the City of San Diego completed a *Recycled Water Study* that identified potable reuse opportunities in the Metropolitan Wastewater System service area (see Figure 3-10: Regional Wastewater/Recycled Water Infrastructure for map) and determined that 83 MGD of potable water production via reuse was foreseeable from various treatment sites. The estimated cost to produce 83 MGD of potable water via reuse is $1,700-$1,900 per acre-foot with an avoid wastewater cost of $1,100 per acre-foot in 2011 dollars (City of San Diego, 2006).

The primary drivers influencing wholesale water rates are the costs related to the purchase and treatment of water. Supply costs are tied to the purchase of imported water from Metropolitan and of transfer supplies through the Water Authority's transfer agreement with IID. As the cost of imported water increases, local supply options become more cost-competitive and cost-effective in comparison. Despite higher water rates that may be associated with water supply diversification, these efforts have largely received support from local residents and water rate payers, and such support has been documented in a number of public opinion polls. A 2011 public opinion poll conducted by the Water Authority indicated that the vast majority of respondents (80%) support the Water Authority's diversification plan, with seawater desalination being identified as the most important component (Water Authority , 2011c). A 2012 Water Authority poll showed that 62% of residents felt that rate increases are necessary to maintain water supply reliability. Specifically, the 2012 poll found 58% of those surveyed would pay an additional $5 per month to support adding seawater desalination to the Region's water supply.

3.11 Major Water Related Issues and Conflicts

As documented in this section, significant interrelationships exist among the Region's key water resources needs and IRWM Plan goals of enhancing water supply, enhancing recreation, and providing environmental stewardship. Table 3-39 summarizes key water management issues within the Region and potential conflicts that may occur in resolving the issues.

Table 3-39: Summary of Water Management Issues and Potential Conflicts

Water Management Issue	Potential Conflicts
Flood Control	• Difficulty in permitting invasive species removal and limitations on geographical or seasonal access to channel • Potential conflicts with environmental enhancement goals • Inconsistent or unreliable funding sources for flood control projects? • Zoning or land use restrictions for protection flood prone areas?
Stormwater	• Diverting noncompliant stormwater to groundwater recharge may conflict with groundwater protection goals • Proposed stormwater BMPs may conflict with local land use regulation
Water Supply	• Imported water may not comply with Basin Plan water quality objectives • Basin Plan objectives may conflict with indirect potable reuse operations • Groundwater production or recharge may conflict with environmental protection needs of groundwater-dependent vegetation • Managing supply cost increases
Water Quality Standards	• The need to meet water quality concentration limits may result in reduced discharges or flows required to support downstream beneficial uses • 303(d) listing/TMDL process may prevent implementation of projects that improve water quality but do not result in attainment of water quality goals • Existing standards may not be representative of actual beneficial use protection needs • Current "one-size-fits-all" Basin Plan objectives do not take into account seasonal or flow influences
Institutional Issues	• Potential conflicts may occur between land use regulations and water quality protection needs • Available Regional board staffing levels may be inconsistent with staffing needs required to address priority Basin Plan modifications • Interborder jurisdictional issues may hamper actions to achieve water quality objectives • Water rights may limit development of certain groundwater basins and may conflict with use of return flows from imported water irrigation
Salinity/Brine Management	• Water conservation measures may lead to increased wastewater salinity • Brine discharges to sewer may conflict with recycled water use needs • Brine discharges to ocean may conflict with environmental protection needs
Recreation	• Body contact and non-contact recreation may impact the water quality standards implemented to support such recreational uses • Sediment controls in watercourses may impact sand availability at downstream beaches
Climate Change	• Climate change may affect water supply availability because of droughts, seawater intrusion, changes in precipitation volumes and timing, altered fire and weather regimes, and potential changes in the availability of imported water supplies • Beneficial uses may be impacted by climate change or water quality standards more difficult to meet or no longer appropriate • Uncertainty related to climate change impacts make responses and mitigation efforts difficult to plan
Wastewater	• Regulatory pressure to upgrade the Point Loma Wastewater Treatment Plant • Cost drivers associated with wastewater systems, including treatment plant upgrades, ongoing treatment and operations, and infrastructure maintenance • Regulatory pressure associated with wastewater operations, including upgrading regional facilities such as the Point Loma Wastewater Treatment Plant

3.12 Neighboring and/or Overlapping IRWM Efforts

The San Diego IRWM is one of three IRWM efforts within the San Diego Regional Board (Region 9) jurisdiction, which is designated by DWR as the San Diego Funding Area for the IRWM Program. The other two IRWM regions in the San Diego Funding Area are the South Orange County IRWM and the Upper Santa Margarita River IRWM. The South Orange County IRWM effort is led by an RWMG that is comprised of the County of Orange, Municipal Water District of Orange County, and South Orange County Wastewater Authority. The Upper Santa Margarita IRWM effort is led by an RWMG comprised of the Rancho California Water District, County of Riverside, and Riverside County Flood Control and Conservation District.

RWMG agencies from the three San Diego Funding Area IRWM groups have formed the Tri-County Funding Area Coordinating Committee (Tri-County FACC) through a Memorandum of Understanding (MOU), and have been meeting regularly since 2008. The Tri-County FACC facilitates integration of projects and policies across the San Diego Funding Area where appropriate, and helps provide balance to the individual interests of the three IRWM Regions.

The Tri-County FACC governance structure also enables integrated management of watersheds and resources that cross jurisdictions, and specifically aims to coordinate work in the San Juan Watershed and the Santa Margarita River Watershed, both of which lie within at least two of the three IRWM regions (see Figure 3-20). As part of the MOU, the Tri-County FACC RWMGs have committed to coordinated planning and identification of opportunities to support common projects and goals. One example of this effort is a joint project between the Upper Santa Margarita River IRWM Region and the San Diego IRWM Region that seeks to provide better understanding of nutrient impacts in the Santa Margarita River Watershed, and to help determine appropriate levels of nutrients to protect beneficial uses. This project received Proposition 84, Round 1 funding from both planning regions.

The Tri-County FACC has entered into an agreement to share the IRWM funds allocated by DWR to the San Diego Funding Area. This agreement has facilitated coordination between RWMGs by reducing competition and conflicts over funding. The Tri-County FACC agreement is described below, and manages three different aspects: information sharing, shared infrastructure, and competing interests.

Information Sharing

The RWMGs have agreed to share data and information to inform efforts within the Funding Area and inter-regionally. This information sharing helps to facilitate collaboration and address interregional needs. Some of the organizations that help in this data sharing effort include the San Diego Regional Water Quality Control Board and the Stormwater Monitoring Coalition.

Each of the IRWM Plans in the San Diego Funding Area includes sections on data management and project selection. The Tri-County FACC acts as an advisory council to assist in the development of these sections, particularly in projects or programs that may cross IRWM Region boundaries, which may be funded, administered, or implemented by multiple Regions. Additionally, projects of importance to the watersheds that exist in multiple IRWM Regions are identified for coordination and prioritization in each of the relevant regions' project selection process.

The Stormwater Monitoring Coalition (SMC) is comprised of all Phase I municipal stormwater NPDES Principal Permittees and NPDES regulatory agencies in Southern California. This coalition includes Tri-County FACC RWMG members from the County of Orange, Riverside County Flood Control and Water Conservation District, and County of San Diego. SMC members have pooled

resources to address data gaps, develop technical information and tools, and improve monitoring effectiveness.

Tri-County FACC members also participate in the Regional Board's stakeholder groups for the development of TMDLs during the TMDL Basin Plan amendment process. Within the San Diego IRWM Region, members of the Upper Santa Margarita RWMG and the South Orange County RWMG are invited to attend RAC meetings, in order to stay better informed of the priorities and needs of the San Diego IRWM Region, and provide feedback through the public participation process.

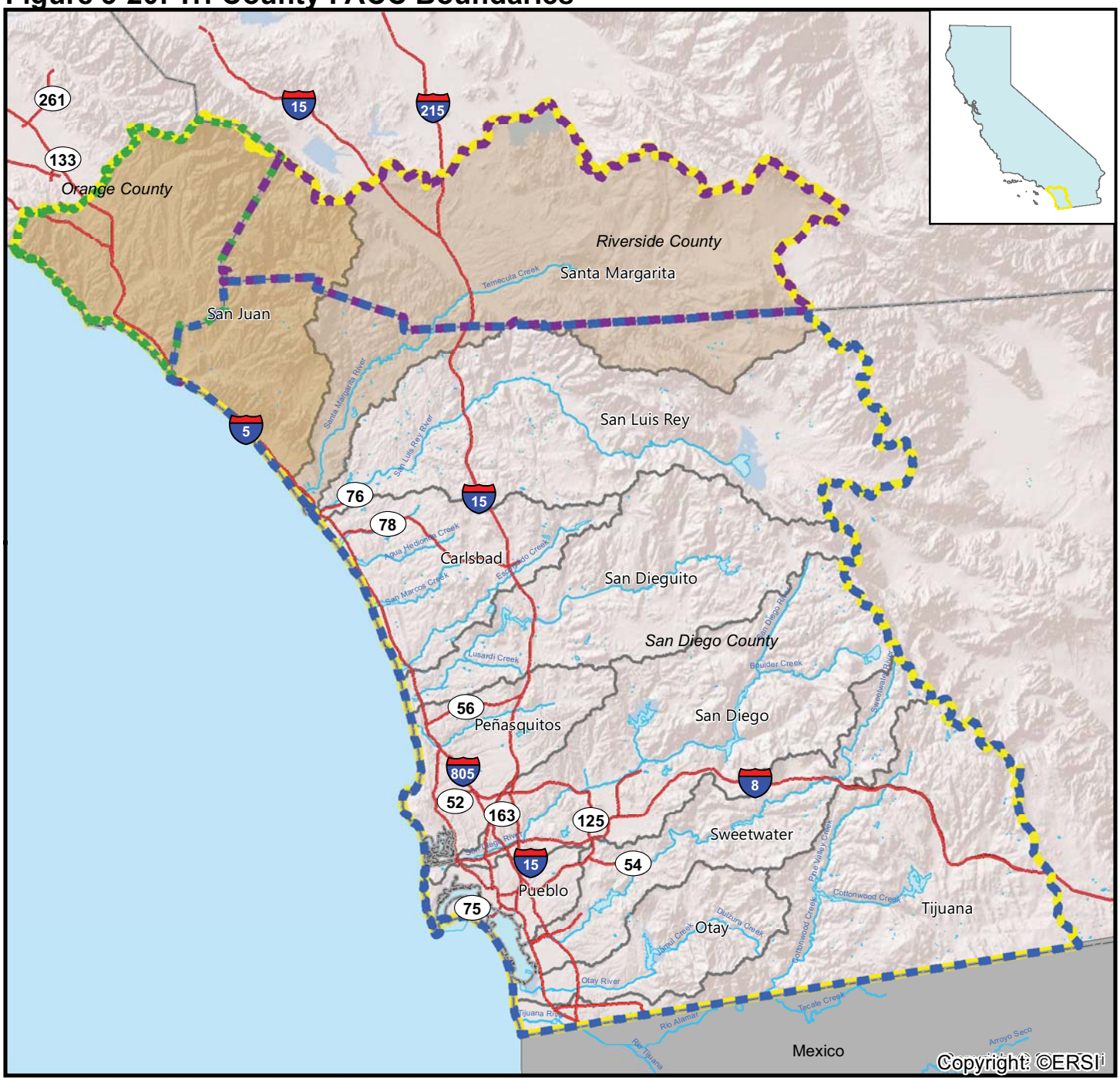
Shared Infrastructure

Each of the IRWM Regions in the Tri-County FACC is dependent on imported water, supplied through Metropolitan. As such, they share much of the same water infrastructure. Shared imported water infrastructure includes the Colorado River Aqueduct, Diamond Valley Lake, Lake Skinner, and other major pipelines, all of which are owned and operated by Metropolitan. The Lake Skinner Water Treatment Plant, also owned by Metropolitan, serves over 4 million people in the Tri-County FACC area. In addition to Metropolitan-owned imported water infrastructure, members of the Tri-County FACC also share pipelines used to supply parts of Camp Pendleton. This use of shared infrastructure helps provide common interests between the members of the Tri-County FACC, promoting collaboration between the RWMGs.

Competing Interests

Entities in the three Tri-County FACC regions have occasionally found themselves in conflict over water supply issues in the watersheds in overlay areas. However, various agreements and legal settlements have led to a cooperative management of water allocations between these entities. Currently, there is significant agreement on water allocations, and the Tri-County FACC is supporting collaborative efforts to improve the storage and management of water resources. Recently, some long-standing conflicts have been resolved, and cooperative projects funded. The Tri-County FACC MOU has also established how IRWM Proposition 84 grant funds will be allocated to each of the IRWM Regions in the Funding Area, making grant applications non-competitive within the San Diego Funding Area, and improving relations between RWMGs by reducing funding-related conflict. Though not all water-related conflicts have been resolved, the Tri-County FACC MOU shows the willingness of these agencies to work collaboratively to solve important water resource conflicts, furthering the integration of water resource management.

Figure 3-20: Tri-County FACC Boundaries



Legend

- South Orange County Region
- Upper Santa Margarita Region
- San Juan Overlay
- Santa Margarita Overlay
- San Diego IRWM Region
- Funding Area and Tri-County FACC Boundary
- Waterbody
- Watershed
- County
- Mexico
- River
- Freeway

N

0 2.5 5 10
Miles

RMC

Sources: San Diego Association of Governments (SANDAG) - GIS Data Warehouse
L:\Projects GIS\0188-003 SDIRWM Plan Update\MXD\Set 060713\Fig3-18_TriCountyFACCBdy.mxd

3.13 United States–Mexico Border Coordination

In addition to neighboring IRWM regions located to the north, the San Diego IRWM Region is bounded to the south by the country of Mexico. Due to this proximity, the Region shares several water resource planning and coordination efforts with Mexico.

With specific regards to water supply resources, the South Bay International Wastewater Treatment Plant, located in San Ysidro, was built to address issues associated with wastewater treatment needs in Mexico that had resulted in contamination of portions of the Tijuana River located in the United States (International Boundary and Water Commission, ND). In addition, the Otay Water District located in the Region has an emergency connection with Mexico to provide water supplies to the city of Tijuana in an emergency situation.

With respect to water quality, efforts have been underway to address pollution issues in the Tijuana River Valley Floodplain through the Tijuana River Valley Recovery Team (Recovery Team). The Recovery Team is organized through the San Diego Regional Water Quality Control Board, and has the goal of partnering with Mexico to implement watershed-based solutions to address issues that affect United States and Mexico portions of the Tijuana Watershed (Regional Board, 2013b).

Coordination with Mexico on water-related issues continues to grow in the Region, and in 2012 the U.S. Environmental Protection Agency and the Secretary for the Environment and Natural Resources of Mexico signed the Border 2020 agreement, which aims to address environmental issues such as water quality pollution (EPA 2013). Further, the Otay Water District recognizes that Mexico may be a potential future customer for recycled water supplies, and also has plans to develop a bi-national seawater desalination plant in Rosarito, Mexico (Otay Water District, 2011).

As stated in the *Tijuana River Valley Recovery Strategy (TRVRS)*, efforts to protect and restore Tijuana River Valley resources are not new; sediment management, land preservation and habitat restoration have been conducted in the Tijuana Watershed for many years. Local, state, and federal management agencies, along with non-governmental organizations and other stakeholders have invested substantial effort and funding in project planning and implementation both in the United States and in Mexico to improve conditions. Investments to improve wastewater treatment began in the 1980s and 1990s. Recent activities have included pollution prevention and source control for sediment and trash, water quality improvements, flood control, improved recreational opportunities, and public education and outreach. These projects demonstrate the dedication and wealth of experience that the various operating agencies and stakeholders have invested in the Valley and watershed (TRVRS 2012).

The future brings many challenges for the Tijuana River Valley Recovery Team. The bi-national nature of the watershed is one major hurdle. It is well known that source control and pollution prevention activities can be the most cost-effective solutions to reduce sediment and trash loading. With the majority of the watershed situated in Mexico, planning and implementing source control and other projects across the international border present an added challenge to an already complex issue.

Despite existing and future planned efforts to coordinate with Mexico on water management and watershed-based solutions, the limited decision making authority of bi-national agencies results in long processes and implementation challenges. . The IRWM Program will continue to work with existing organizations in the Region to address cross-border issues and implement integrated water management solutions, as appropriate.

3.14 Climate Change

Hydrologic conditions in the Region, within California, and in the Colorado River Basin will likely be altered as a result of global climate change (based on conditions observed over the past century). DWR coordinated a literature search on global warming issues and summarized probable global warming impacts within Chapter 4 of the *California Water Plan Update 2005* (DWR, 2005) and within *Progress on Incorporating Climate Change into Management of California's Water Resources* (DWR, 2006). Key changes in hydrologic conditions forecasted by these DWR reports include:

- *Snowpack Changes.* While snowpack represents a negligible component of the water balance within the Region's local water supplies, snowpack in the Sierra Nevada Mountains represents California's largest water storage component. Decreased snowpack in the Sierras will result in increased runoff during October through March, adversely affecting California's water storage and potentially affecting the amount of imported water available to the Region.
- *Hydrologic Patterns.* Global warming may result in a shift in storm tracks. Existing data (DWR, 2006) show a trend of increasing precipitation in Northern California and decreasing precipitation in Southern California during the past century, but El Niño effects (increased Pacific Ocean temperatures) have been shown to result in a shift of the Pacific Coast winter storm tracks toward the south. Other patterns may emerge over time.
- *Storm Intensity.* Flood management, erosion, and water quality impacts could occur if climate change results in increased precipitation intensity and reduced health plant cover.
- *Sea Level Rise.* Sea level rises associated with global warming could increase coastal erosion, impacting ecosystems and tidal wetlands. Sea level rises would also increase salinity intrusion into the Sacramento Bay Delta, adversely impacting the quality of SWP supplies delivered to the Region.
- *Water Temperatures.* Increased air temperatures and modified storm patterns may result in increased reservoir water temperatures, adversely affecting cold water and other species and increasing the intensity of algae blooms.
- *Increased Regional Temperatures*. Increased air temperatures will lead to greater evaporation of reservoirs and lakes, higher demand in energy for cooling, and greater demand for agriculture.
- *Water Demand.* Potential global warming effects on vegetation evapotranspiration are currently unknown; however, irrigation demands could potentially increase. While increased temperature results in increased evapotranspiration, this may be partially offset by the fact that increased atmospheric carbon dioxide can result in reduced vegetation water consumption.
- *Energy Demand.* Global warming effects may result in increased energy demands that will require increased conservation and efficiency measures.

DWR has also identified needs for further research in each of these areas to assess how global climate change may affect California water planning. Regardless of the projected altered conditions, improving local stewardship of the Region's water resources will likely improve the Region's ability to more robustly deal with changed climatic conditions.

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4 Tribal Nations of San Diego County

This chapter presents an overall summary of the Tribal Nations of San Diego County and the water resources on their reservations. A brief description of each Tribe, along with a summary of available information on each Tribe's water resources, is provided. The water management issues provided by the Tribe's representatives at the San Diego IRWM outreach meetings are also presented.

4.1 Reservations

San Diego County features the largest number of Tribes and Reservations of any county in the United States. There are 18 federally-recognized Tribal Nation Reservations and 17 Tribal Governments, because the Barona and Viejas Bands share joint-trust and administrative responsibility for the Capitan Grande Reservation. All of the Tribes within the San Diego IRWM Region are also recognized as California Native American Tribes. These Reservation lands, which are governed by Tribal Nations, total approximately 127,000 acres or 198 square miles. The locations of the Tribal Reservations are presented in Figure 4-1 and summarized in Table 4-1.

Two additional Tribal Governments do not have federally recognized lands: 1) the San Luis Rey Band of Luiseño Indians (though the Band remains active in the San Diego region) and 2) the Mount Laguna Band of Luiseño Indians.

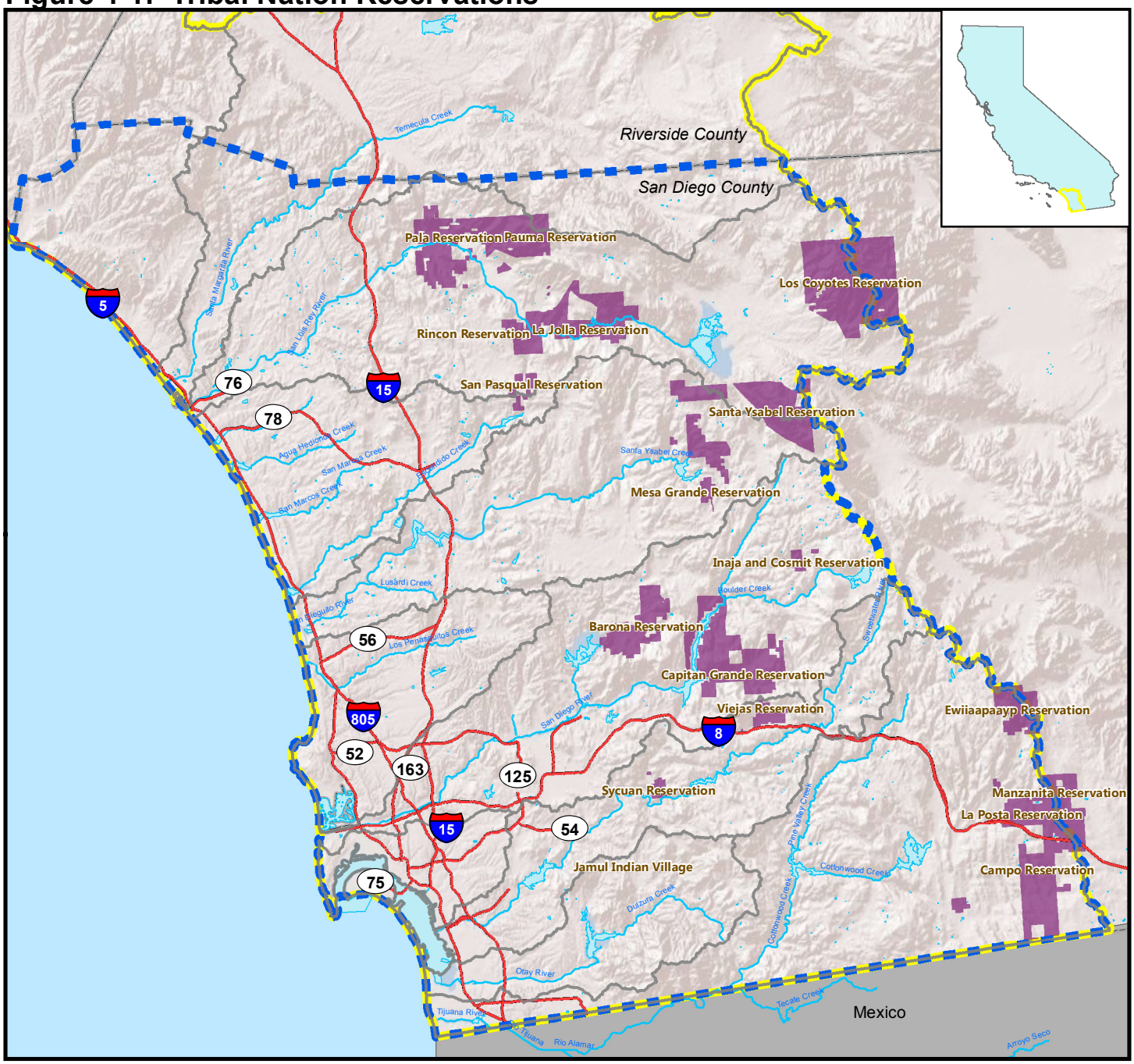
Note that there may appear to be inconsistencies related to population sizes of tribes in Table 4-1. This is because not all Tribes may choose to participate in population surveys, or may identify with multiple heritages.

4.2 Cultural Groups

Native Americans within the San Diego IRWM Region generally comprise four distinct cultural groups (Kumeyaay/Diegueno, Luiseño, Cahuilla, and Cupeño), which are from two distinct language families (Uto-Aztecan and Yuman-Cochimi). These cultural groups are distributed throughout San Diego County and their respective traditional territories include areas in neighboring counties. In general, Luiseño, Cupeño, and Cahuilla cultural groups are located in the northern half of San Diego County, while Kumeyaay/Diegueno cultural groups are located in the southern half of San Diego County (see Figure 4-2). However, members of the various tribes in San Diego County have interacted for centuries and individuals may consider themselves part of multiple cultural traditions, despite being enrolled in a particular tribe (e.g., Barona Band of Mission Indians) or living on a particular reservation.

Neighboring Tribes whose land falls outside the San Diego IRWM Region, but may have an interest in, or impact on, the water management and water issues of the Region include the Pechanga Band of Luiseño Indians, located near Temecula, CA; the Cahuilla Band of Indians, located near Anza, CA; and the Torres-Martinez Desert Cahuilla Indians, located near Coachella, CA.

Figure 4-1: Tribal Nation Reservations



Legend

- Tribal Lands
- Watershed
- San Diego IRWM Region
- Funding Area Boundary
- Waterbody
- County
- River
- Freeway

N

0 2.5 5 10
Miles

RMC

Source: San Diego Association of Governments (SANDAG) - GIS Data Warehouse
\\rmcsd\RMCSD\Projects GIS\0188-003 SDIRWM Plan Update\AdminDraftMaps\060713_JD\Fig4-1_Tribal Reservations 060713.mxd

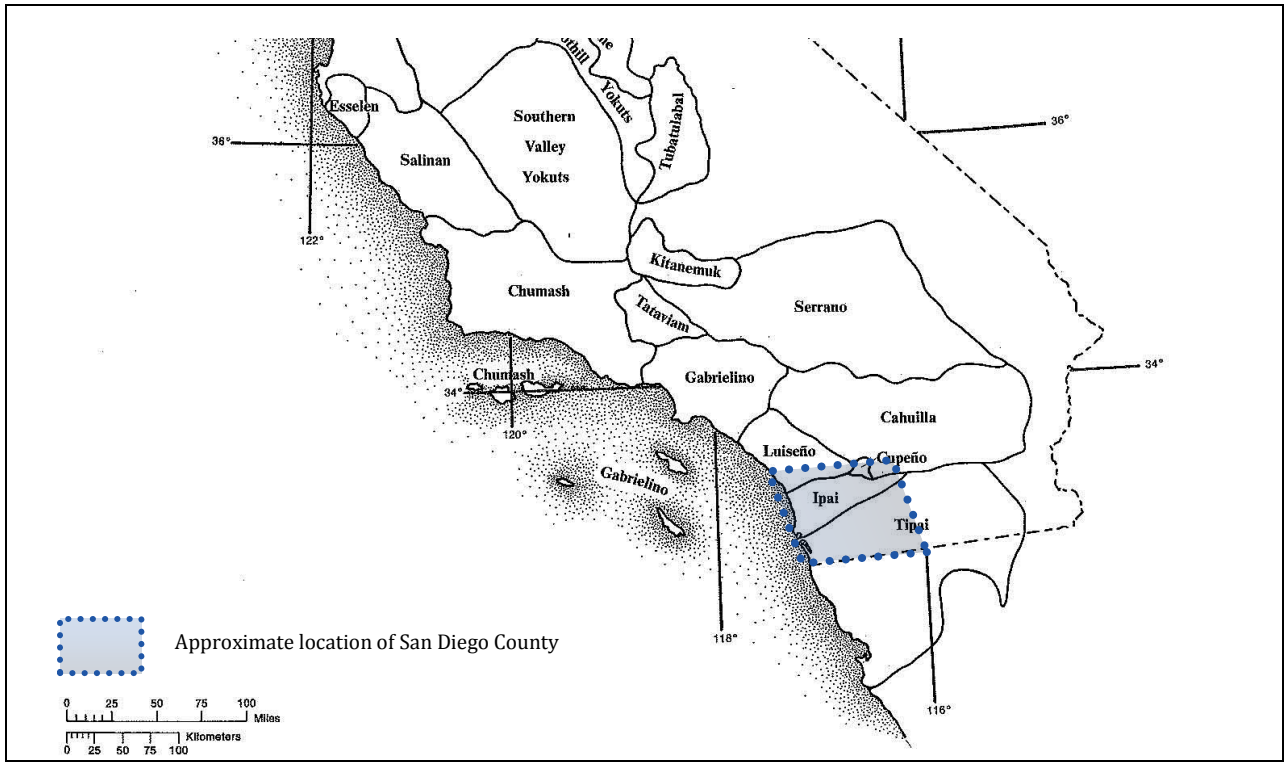
Table 4-1: San Diego County Tribal Governments and Reservations

No.	Name		Ethnology/Language	Acreage	Population		Housing Units
	Reservation	Tribal Nation			Total Tribal Members[1]	Reservation Population (Tribal members and non-members)[2]	
1	Barona Reservation	Barona Band of Mission Indians	Ipai-Tipai/Diegueno	5,664	536	640	219
2	Campo Reservation	Campo Band of Kumeyaay Indians	Kumeyaay/Diegueno	15,336	351	362	140
3	Capitan Grande Reservation	Capitan Grande Band of Mission Indians, consisting of the Barona and Viejas Bands	Kumeyaay/Diegueno	15,615	33	0	0
4	Ewiiaapaayp Reservation	Ewiiaapaayp Band of Kumeyaay Indians (formerly Cuyapaipe Band of Mission Indians)	Kumeyaay/Diegueno	4,156	N/A	0	0
5	Inaja & Cosmit Reservation	Inaja – Cosmit Band of Indian	Kumeyaay/Diegueno	846	15[2]	0	0
6	Jamul Indian Village	Jamul Indian Village	Kumeyaay/Diegueno	6.2[3]	60	0	0
7	La Jolla Reservation	La Jolla Band of Indians	Luiseño	8,822	390	476	181
8	La Posta Reservation	La Posta Band of Mission Indians	Kumeyaay/Diegueno	3,471	18	55	19
9	Los Coyotes Reservation	Los Coyotes Band of Cahuilla and Cupeño Indians	Cahuilla, Cupeño	25,050[3]	328[4]	98	35
10	Manzanita Reservation	Manzanita Band of the Kumeyaay Nation	Kumeyaay/Diegueno	3,563	69	78	35
11	Mesa Grande Reservation	Mesa Grande Band of Mission Indians	Kumeyaay/Diegueno	1,820	75	98	24
12	Pala Reservation	Pala Band of Mission Indians	Luiseño, Cupeño	12,333	1,573	1,315	425
13	Pauma and Yuima Reservation	Pauma/Yuima Band of Mission Indians	Luiseño	5,826[6]	186	206	63
14	Rincon Reservation	Rincon Nation of Luiseño Indians	Luiseño	5,500[3]	1,495	1,215	357
15	San Pasqual Reservation	San Pasqual Band of Indians	Ipai/Kumeyaay	1,500	500[3]	1,097	298
16	Santa Ysabel Reservation	Ipay Nation of Santa Ysabel	Diegueno	15,270	250	330	140
17	Sycuan Reservation	Sycuan Band of the Kumeyaay Nation	Kumeyaay/Diegueno	632	33	211	76
18	Viejas Reservation	Viejas Band of Kumeyaay Indians	Kumeyaay/Diegueno	1,696[3]	394	520	192
19	N/A	San Luis Rey Band of Luiseño Indians[5]	Luiseño	N/A		N/A	N/A
20	N/A	Mount Laguna Band of Kwaaymii Indians[5]		N/A		N/A	N/A

1 Based on latest information from Indian Reservations in San Diego County. Available: http://www.sandiego.edu/nativeamerican/reservations.php (Accessed 25 March 2012).
2 Based on U.S. Census Bureau. 2010. *U.S. Census Demographic Profiles*. Available: http://www.census.gov/2010census/popmap/ (Accessed: 26 April 2013).
3 Based on information from the Tribal Characterization Form submitted by the Tribes.
4 Based on information from Los Coyotes Indian Reservation. Available: http://www.kumeyaay.info/los_coyotes.html (Accessed 3/25/2013).
5 The San Luis Rey Band of Luiseño Indians and the Mount Laguna Band of Luiseño Indians are not federally-recognized tribes.
6 Of the 5,826 acres of the reservation, only 200 acres are developable.

As of 2010 only a small percentage of the Region's Native American population of 17,000 lived within the Tribal Nation Reservation lands. Brief descriptions for each Tribal Nation Reservation are presented in Section 4.6 below.

Figure 4-2: Traditional Territories of Tribal Nations in California



Source: *Handbook of North American Indians*, Robert F. Heiner, ed. Vol. 8: California. 1978.

4.3 Tribal Autonomy

While the Tribal Nations are sovereign and have autonomy over their lands, they are subject to Federal environmental laws and regulations. Sovereign Tribal Nations are not subject to State and local environmental laws and regulations, except for those required under a Compact with the State, and other independent agreements between the Tribal Governments and local agencies. While State and local governments do not have any authority over Tribal Lands, in a few cases, working relationships exists between the Tribes and local jurisdictions to address water and habitat issues. For example, Tribal representatives regularly meet with officials from with the San Diego Association of Governments (SANDAG) and serve on various working groups and committees. A position reserved for a Tribal representative on the Regional Advisory Committee (RAC) is open and awaits filling by the Southern California Tribal Chairmen's Association; in the past, Tribal representatives have participated on the RAC and on RAC workgroups.

Understanding that Tribes are important partners in water resources management, and acknowledging their cultural and historical ties to the Region and its resources, the Regional Water Management Group has made a concerted effort to reach out to the Tribes within the Region. These efforts are described in detail in *Chapter 6, Governance and Stakeholder Involvement*.

4.4 Tribal Resource Management

The primary function of each of the Region's Tribes is to serve as a government for the members of the Tribe. As such, many Tribes have environmental departments tasked with setting environmental regulations on Tribal lands and monitoring water resources for compliance with applicable federal laws and regulations. These tribal environmental agencies manage groundwater levels through recharge from rainfall on reservation land.

In addition to formal oversight through Tribal agencies, many Tribes have a cultural connection with their water resources. This is captured, in part, in the *Tribal Water Stories of Coastal Southern California* document produced during the tribal outreach conducted during development of the 2013 IRWM Plan. This document is a collection of stories, myths, songs, and poems from Tribes in Southern California, and is meant to educate and inform the reader, as well as honor the cultures and peoples from whom these stories come. The *Tribal Water Stories of Coastal Southern California* is included as Appendix 4-A.

Excerpt from Tribal Water Stories of Coastal Southern California*, a collection of stories, myths, and songs from Tribes in San Diego County, collected to entertain and educate readers, while honoring and celebrating the people and cultures from which these stories come. To download the entire collection, visit: www.sdirwmp.org*

AH-HA' WI-AH-AH' *WATER COLDER WATER*

The cold spring, located on the high peak of the Cuyamacas, is well known to all lovers of these mountains, and the Indians, who must ever have a reason for the existence of things, tell how it was created and named by one of their mythical creatures long ago.

At one time in the ages past, the Ah-ha' Kwe-ah-mac' (Water Beyond) mountains were infested by monstrous giants with loathsome, ill-shapen bodies, who terrorized the surrounding country. These marauders, lurking and watching their opportunity, frequently stole the Indian maids from their villages, keeping them in bondage as slaves.

One of the giants, named Hum-am' Kwish'wash (Whip to Kill People), lived in the vicinity of Pam-mum'am-wah' (Green Valley).

He reveled in the most fiendish greediness, but his innate sense of the beautiful was keen and strong. He not only selected the most delightful places to live, but surrounded himself with objects pleasing to the eye. Always he stole the fairest of the Indian maids and required them to weave the most exquisite designs known in their art of basket making.

His cruelty was extreme, and did his slaves displease him in the least, they met with the most horrible death imaginable.

This hideous being possessed supernatural powers, which he employed in various ways. It seems that he wanted nothing but the coldest water to drink. He tried the water in the streams and tried the water in the springs that abound throughout the country, but never did any of it suit his taste, so he created for himself a spring of colder water.

Tribal ecological knowledge (TEK) could be a valuable resource for water managers in the Region, because Tribes have been managing their water resources for thousands of years. Land management techniques of local tribes included irrigation, burning, pruning, sowing, selective harvesting, and tilling (Anderson and Nabhan 1991). Locally, the Kumeyaay Diegueno Land Conservancy (KDLC) actively uses tribal ecological knowledge to manage conservancy lands, and these practices are integrated within their partnerships and coordination efforts with Tribal, federal, and non-profit groups, including the Wildlife Conservation Board, US Fish and Wildlife (Tribal Wildlife Grant Program), Cuyamaca State Park, Back Country Land Trust, San Diego Parks and Recreation, and the US Bureau of Land Management, among others (Connolly 2013).

Two TEK practices highlighted by the KDLC that most influence and benefit water and water management systems are fire mosaics and rock drop/gabion structures.

Fire Mosaics

The TEK fire mosaic management technique involves applying fire to particular vegetation areas under specified environmental conditions and descriptors such as seasonality, fire-return interval, and dimensions to achieve select cultural purposes (Anderson and Nabhan 1991). Burning vegetation helps to recycle nutrients within the soil, promotes soil fertility, destroys insects, disease, and quick growing invasive plant species, and promotes a lush understory of vegetation that was essential to the Native American subsistence food supply (Martinez 1993). In addition to the benefits fire mosaics provide as land management, this practice directly influences the way water is retained and controlled. A post burn, open-growth landscape is known to make large trees more drought-tolerant, attract more native grasses, and create a permeable soil surface that manages surface erosion (Martinez 1993). The post burn environment sometimes includes downed logs that act as reservoirs, creating microclimates and promoting moisture retention (Martinez 1993). Fire mosaics promote the carrying capacity of the soil and increase groundwater recharge, both of which are very important to the southern Californian landscape (Connolly 2013).

Rock Drops and Gabions

One particularly important TEK water management technique used on Tribal lands and conservancy efforts is irrigation, by supplying select land areas with water through means of diversion and artificial channels (Anderson and Nabhan 1991). Rock drops and gabions are two types of water management tools used to manipulate the movement of water to increase its potential positive benefits in an area. When a stream or river runs too fast, the surrounding banks tend to erode, habitat potential is lost, and groundwater recharge is limited. In order to stabilize stream flow, enhance groundwater recharge, and create riparian habitats, rock drops are used (Connolly 2013). Similar to a dam, but much less invasive, rock drops are created by the dry (non-cemented) layering of large boulders perpendicular to the natural water flow. This causes the flow to slow and water to saturate the ground more deeply and with more breadth, recharging the water table and stabilizing the stream. The following images, presented by Michael Connolly of the Campo Kumeyaay Nation at the 2013 Tribal Water Summit, illustrate the substantial effect rock drop structures have on an environment.

River landscape before and after rock drop structure installation at Campo Reservation.

Photo credit: Michael Connolly at the 2013 Tribal Water Summit

Gabions are usually made of pillar-like installations of boulders, held together by wire mesh, and placed along the interior banks of a waterway. By manipulating the water flow patterns and creating areas of varying water speed, gabions help to create riparian habitat, stabilize stream flow, and increase groundwater recharge (Connolly 2013). Both rock drops and gabions have been shown to increase Native American traditional food supply, medicine, and building and craft materials, by attracting and fostering the growth of certain plants and cultivating additional biodynamic processes (Connolly 2013).

Following the Winters Doctrine (see box to the right), tribal water rights were established with the reservations, and have precedence over subsequent water claims – whether or not Tribes use their full allocation. In the San Diego IRWM Region, most Tribes have senior water rights over local agencies. Tribes in the San Diego Region also have full rights to the water that falls on their land.

Winters v. United States

The *Winters v. United States* Supreme Court Case (1907-1908) settled questions of water rights of Reservations. The court found that water rights were implied with the creation of a reservation, even if not explicitly stated. Further, the rights are in an amount to allow for a productive, successful settlement on the reservation. These rights have priority over other subsequent water rights. Further, the rights claimed by the reservation are not forfeited through lack of use.

Source: Winters v. United States: http://supreme.justia.com/cases/federal/us/207/564/case.html

4.5 Development on Tribal Lands

San Diego County has a semi-arid environment with limited local surface water and groundwater supply. The major forecasts for regional growth in San Diego County are conducted by SANDAG and the County of San Diego. SANDAG has recently completed its 2050 Regional Growth Forecast and the County of San Diego has prepared the San Diego County General Plan. These documents are used by the San Diego County Water Authority and other regional and local agencies for planning current and future water demand and water supply for the region. However, the recent and planned future developments on Tribal lands may not be adequately represented or considered in these planning efforts.

Development on tribal lands is driven by economic factors. Economic growth on the reservations has primarily come from the advent of gaming, though it is also driven by the renewable energy industry and agriculture, among others. Land use on Tribal lands in San Diego County was mostly limited to residential and minor agricultural activities until the Indian Gaming Regulatory Act of 1988 which regulated gaming activities on the Tribal Nations Reservations. Ten gaming facilities have been started on Tribal Reservations in San Diego County since 1988, more than in any other county in the United States, and more are under development. Some of the Tribes have also added malls, resorts, hotels, restaurants, and golfing to their reservation lands.

Development of gaming, visitor, recreational, and associated facilities on the Tribal lands, and the economic benefits associated with them, has resulted in increased development on the reservations. This trend is expected to continue. To support economic development on the reservations, tribes are relying on their previously unclaimed water rights under the Winters Doctrine to extract water from the underlying groundwater basins. The combined impact of water extractions both on and off reservation lands may result in overdraft of the groundwater basins. As such, improved regional and local planning efforts may be needed to maintain local groundwater supplies and incorporate future developments on Tribal Reservations when considering potential off-reservation development, particularly upstream of reservation lands. Tribal water rights, including for economic development, often take precedence over new, off-reservation development, so consideration of development on tribal lands is important when allocating water to new off-

reservation development projects. Because many Tribes have environmental and planning departments that regulate development on tribal lands, communication between these and other agencies may be necessary when considering development projects sharing tribal groundwater sources. In the past, the Water Authority and other agencies in the Region have coordinated with tribes regarding annexation and exploring the potential for water supply delivery to reservation lands due to interest among some Tribes in obtaining imported water supplies.

Development on tribal lands is regulated by tribal planning agencies and departments. These planning efforts comply with federal law, including Tribal Environmental Impact Report (TEIR) requirements. TEIRs developed for the gaming and associated facilities generally present the following protection measures to manage local water and wastewater in a sustainable manner:

- Minimizing groundwater use by:
  - Using recycled water for irrigation
  - Enhancing infiltration systems and capacity for groundwater recharge
  - Accommodating all wastewater flows on Tribal lands
  - Maintaining groundwater extractions to below local basin's sustainable yield levels
  - Implementing Groundwater Monitoring and Mitigation Plans (GMMPs)
- Maximizing water conservation by:
  - Using native, drought-resistant plants in landscaping
  - Using proper irrigation timing and duration
  - Implementing indoor water conservation practices in kitchens
  - Using waterless urinals
  - Using low flow toilets
- Managing water quality by:
  - Establishing and enforcing tribal water quality standards under the Clean Water Act
  - U.S. Environmental Protection Agency oversight of drinking water facilities to ensure compliance with the Safe Drinking Water Act
  - Complying with tribal environmental departments' water quality programs

4.6 Tribal Nation Water Resources

A brief description of demographic information, environmental programs, and water resources for each Tribal Nation Reservation is provided below. The amount or detail of information available varies greatly by Tribe. The information contained in this section reflects the responses provided through a questionnaire sent to each Tribe, as well as other sources. Tribal participation in the questionnaire varied, as reflected by the varying level of detail presented herein, and some tribes expressed concern over how such data may be used.

4.6.1 Barona Band of Mission Indians

The Barona Indian Reservation was established in 1932, and is home to the Barona Band of Mission Indians. The Barona Band of Mission Indians is a federally-recognized Tribe governed by an elected Tribal Council. The reservation has its own museum, school, fire station, gas station, church, and community center, as well as the Barona Valley Ranch Resort & Casino. In the Tribe's continued efforts to preserve its culture, the reservation is also home to the Barona Cultural Center & Museum, a hands-on educational museum. Displays of handmade pottery, reed baskets, paintings, arrowheads, and other artifacts - over 2,000 in all - date back

thousands of years, and bring to life the rich culture and history of San Diego's Native American community.

Barona's Water Resources

Barona's reverence for the environment spans thousands of years and the tribe practices energy and resource conservation throughout the reservation and resort property. Barona's first on-site water treatment facility went online in 1994; a second, more advanced water reclamation plant was completed and implemented in 2000. This facility uses ultraviolet (UV) disinfection to safely and efficiently produce sufficient supplies of clean water. Following its construction, the Tribe converted the Barona Indian Charter School from septic to sewer service. Barona's water reclamation plant treats water from many sources on the resort. At peak capacity, it can treat and filter 750,000 gallons of water per day.

An extensive water recovery program captures irrigation runoff from the golf course and resort landscaping, and rainwater from building rooftops, parking lots, storm gutters, and drains. The collected water is channeled to a series of retention ponds via an aqueduct. There, it is blended with treated water from the water reclamation plant. Four retention ponds have a total capacity of approximately 12 million gallons of water. Combined with the golf course ponds, Barona has a water storage capacity of almost 47 million gallons.

In addition to an aggressive water collection and reclamation system, Barona uses reclaimed water for golf course and landscaping irrigation, and further conserves water through the use of native, water-efficient plants and efficient irrigation systems in landscaping. Equipment, foot traffic, and pesticides are restricted in all habitat and nesting areas, providing protection for native wildlife and the environment.

In order to protect the groundwater resources, the Barona Band is trying to add an additional 600 acres of land to their reservation, which would allow it to pump from two separate aquifers, reducing their impact on a single aquifer.

4.6.2 Campo Band of Kumeyaay Indians

The Kumeyaay Nation once encompassed the lands from northern San Diego County to the dunes of the Imperial Valley and south beyond Ensenada, Mexico. The Kumeyaay were originally organized along clan lines called Sh'mulq, but when the Mexican-American War ended in 1848, the new international border was drawn through the heart of Kumeyaay lands. By 1875, the first of the Kumeyaay territories began to be converted to Reservation trust land. Further additions were taken into trust over the next 25 years, including the first portion of the Campo Indian Reservation in 1893.

In 1978, the Campo people designated the area near the Crestwood freeway off-ramp as an area for economic development. After considerable debate over various development proposals, a casino facility was constructed in 2001.

Campo's Water Resources

The Campo Environmental Protection Agency (CEPA) was created by order of the General Council of the Campo Band of Kumeyaay Indians in July 1990. Originally created to address concerns relating to a commercial development, the scope of CEPA activities has grown to all areas of environmental protection and protection of public health.

Traditional water management techniques, such as rock drop structures, are used on Campo lands. Without a natural fire regime and fire mosaic in the area, vegetation has become less diverse, and more of a monoculture, which has reduced the capacity of streams.

Commercial grazing was banned on tribal lands in January 1995, which has significantly assisted in the recovery of wetland species in riparian areas on tribal lands. CEPA anticipates expanding its stewardship efforts into the 36 miles of perennial and ephemeral streams of the reservation. The Campo Wetlands Restoration Project on Diebold Creek has received national recognition for restoring large stretches of stream habitat. Originally, an overgrazed stretch of valley with a 12 foot deep arroyo and ephemeral water flow, the creek now flows perennially, the arroyo is silted in and new riparian vegetation has grown to over 20 feet. This has all occurred since the original erosion structures were emplaced in 1992.

4.6.3 Capitan Grande Group of Mission Indians

During the 1840s and 1850s, San Diego experienced so much growth that some groups of Indians living in the Mission Valley area were pushed into what is now the East County. In 1853, many of these people established a village in the Capitan Grande area of the upper San Diego River. In 1875 the U.S. Army issued a federal permit for the Indians to inhabit the area, and the general public was warned against disturbing the Indians who resided there. The Capitan Grande Reservation was patented in 1891, and is jointly owned and managed by the Barona Band of Mission Indians and the Viejas Band of Kumeyaay Indians.

Capitan Grande's Water Resources

The Capitan Grande Reservation initially had extensive water resources from the upper San Diego River. However, through non-Tribal policy decisions, much of the water was diverted to meet the increasing water needs of a growing San Diego urban population. Much of the water that originally flowed through the Capitan Grande lands is now diverted to Lake Cuyamaca and El Capitan Reservoir.

4.6.4 Ewiiaapaayp Band of Kumeyaay Indians

The Ewiiaapaayp Reservation, formerly known as the Cuyapaipe Reservation, is a federal Indian Reservation created in 1891 by the US Congress. This Reservation is owned and managed by the Ewiiaapaayp Band, which is headquartered in Alpine, California.

The Ewiiaapaayp Reservation is mostly undeveloped, with no utilities and only a single, unpaved, narrow, and steeply graded access road. This limits the economic development of the Reservation. Additionally, the Ewiiaapaayp Reservation has limited water resources, and is considering the possibility of constructing a connection to the Padre Dam Water District distribution system. In 1986, the 8.6 acre Little Ewiiaapaayp trust land was taken into trust for the Ewiiaapaayp Band, and an additional 1.42 acre parcel was taken into trust in 1997. These parcels are not proclaimed as a part of the Ewiiaapaayp Indian Reservation. These two parcels are leased to the Southern Indian Health Council (SIHC) to host the SIHC Clinic. The SIHC is a healthcare organization formed in 1982 as a tribal organization by the Ewiiaapaayp along with several other local tribes (Campo Band of Diegueno Mission Indians, Jamul Indian Village, the Manzanita Band of Diegueno Mission Indians, La Posta Band of Diegueno Mission Indians, and the Capitan Grande Band of Diegueno Mission Indians (the Barona Group of the Barona Reservation and the Viejas Group of the Viejas Reservation) and Sycuan Band of the Kumeyaay Nation). Recently, the

Ewiiaapaayp approached the National Indian Gaming Commission for a review a consulting services agreement and a development services agreement with WGSD, LLC, a subsidiary of Warner Gaming, LLC for a gaming facility on the lands where the SIHC is currently located.

4.6.5 Inaja-Cosmit Band of Indians

The Inaja-Cosmit Band of Indians is a federally-recognized tribe of Kumeyaay Indians. The Inaja-Cosmit Reservation was established in 1875 and is located in eastern San Diego County near the US-Mexico Border, though the Inaja–Cosmit Band is headquartered in Escondido, California.

The Inaja-Cosmit Reservation consists of two parcels of remote and inaccessible land near Cuyamaca Peak. At present there are no permanent inhabitants of these 852 acres, though some remodeling is underway on Inaja. Winter snows and a lack of facilities make these locations relatively inhospitable. However, the Tribe has received an approximately $21,000 grant under the American Recovery and Reinvestment Act of 2009 to rehabilitate tribal housing to make it more energy efficient.

4.6.6 Jamul Indian Village of California

The Jamul Indian Village sits on six acres east of the town of Jamul. After years of tenacious endurance, the Jamul village was finally declared a reservation. The reservation has administration offices and a community center.

The reservation receives drinking water from Otay Water District and wastewater is managed with onsite (septic) systems, which are pumped monthly. Upstream cattle and failing septic systems cause high nutrient levels and algae growth in surface water. Additionally, there is new development upstream that impacts the flow of stormwater through the reservation. The Tribe's stream, Willow Creek, is a direct result of runoff from the highway.

The Jamul Indian Village has a dedicated environmental protection group, the Jamul Environmental Agency (JEA). The JEA was created in 2001 to administer United States Environmental Protection Agency (EPA) related programs, monitor environmental issues, implement tribal environmental ordinances, consult with government agencies, and provide environmental education. JEA produces literature for members on pesticide safety, announces environmental and health hazards, and attends environmental trainings.

4.6.7 La Jolla Band of Luiseño Indians

La Jolla Indian Reservation, consisting of approximately 8,822 acres, is located in the foothills of the Palomar Mountains, on the banks of the San Luis Rey River.

The La Jolla Indian Reservation was established in 1875, though it has been home to the Luiseño (Payomkawichum) people for at least the last 10,000 years. Today, there are about 700 tribal members and a Tribal Council that governs the Tribe.

The La Jolla Tribe operates three EPA-regulated Public Water Supply Systems that provide treated groundwater to Tribal residents. La Jolla has had great success in properly managing water resources and has constructed a domestic water filtration plant, a groundwater monitoring system, and a wastewater treatment facility. The Tribe was the first in California to have an approved Drought Mitigation Plan. La Jolla maintains an Environmental Protection Office that manages

multiple programs including a water quality monitoring program and a nonpoint source pollution control program, under Sections 106 and 319 of the Clean Water Act. Additionally, re-vegetation projects help to protect the natural environment. The Tribe has numerous other environmental initiatives including a wastewater management program, an Integrated Solid Waste Management Plan, Household Hazardous Waste and E-Waste collection for residents, and Source Waster Assessment Planning, that protect the environment and local water resources.

The Tribe is continually working on emergency preparedness and planning for natural disasters. Encroachment of the urban population and vehicular traffic on Highway 76 stresses the Tribal infrastructure, and a lack of sufficient funding to implement needed programs is an issue.

4.6.8 La Posta Band of Mission Indians

La Posta is a 3.8-acre reservation near Mount Laguna and the Cleveland National Forest. The La Posta Reservation is a federal Indian reservation, and was established in 1893.

It has occasional residents, and access to the land is mostly limited to Tribal members. The one entry road is either dusty or muddy, and is fenced off from intruders.

4.6.9 Los Coyotes Band of Cahuilla and Cupeño Indians

With approximately 25,000 acres of tribal land, the Los Coyotes Indian Reservation is the largest reservation in San Diego County. The Los Coyotes Reservation water source is groundwater and the wastewater system consists of septic systems for each house. The tribe does not have sufficient funds to hire a full time operator. The Los Coyotes Band has established the Los Coyotes Campground and Los Coyotes Horse Camp on their property for camping, hiking trails, horse riding, and biking.

Los Coyotes Indians and La Jolla Band of Luiseño Indians have a joint Tribal Wetlands Program. Los Coyotes Indian Reservation and the La Jolla Band of Luiseño Indians jointly obtained a Wetlands Development Grant from EPA in 2006 to initiate a watershed-based dual tribal Wetlands Program for the Upper San Luis Rey River and build on existing capacity for environmental management and study in the La Jolla Tribal Water and Environmental Resources Office. This program will characterize the wetlands of Los Coyotes Indian Reservation and study nutrient flow in the upper San Luis Rey River that may be impairing wetlands function.

4.6.10 Manzanita Band of the Kumeyaay Nation

The Manzanita Reservation was established in 1893 and is located in southeastern San Diego County within ten miles of the US-Mexico Border. The Manzanita, named for the brushy brush so common over drier California, occupies a 3,580-acre rectangle of infertile upland valleys and meadows in the western part of the Carrizo Desert. Homes of the residents are widely scattered, tucked behind boulders and hillsides for protection from the uncompromising summer sun.

4.6.11 Mesa Grande Band of Mission Indians

The Mesa Grande Reservation, a federal Indian reservation, was founded in 1875. Situated in a group of hills above the forests of Black Canyon (part of Cleveland National Forest), the Mesa Grande Reservation is often covered with snow in winter.

Water resources of the Tribe consist solely of groundwater pumped from wells on the Reservation. For their living during the year, the families commute to nearby towns, but also keep some horses and cows and maintain a few farms in a variety of frame, rock, adobe and mobile homes on 920 acres of land (some newly acquired from the Bureau of Land Management).

4.6.12 Pala Band of Mission Indians

The Pala Band of Mission Indians is comprised of two groups: Luiseños and Cupeños. The Luiseño people of Pala were given a reservation in 1875. In 1903, they were joined by the Cupeños, who had been evicted from the village of Cupa (present-day Warner Springs) and forcibly removed to the reservation at Pala. The San Luis Rey River runs through the Pala Reservation.

The Pala Casino Spa and Resort is the major economic driver of the reservation. Pala also has avocado and citrus groves. The tribe provides land for housing for tribal members and has an active construction program for tribal residents.

Pala's Water Resources

The Pala Tribe created the Pala Environmental Department (PED) in 1997 to protect and preserve the natural resources of the Pala Reservation. The San Luis Rey River is an important tribal resource, along with the groundwater throughout the Pala Basin. The river itself is a cultural feature, as water is considered a sacred resource to the Pala Tribe. PED's Water Resources Program oversees the protection of the Pala Tribe's water resources, including surface and groundwater resources, as well as the Tribe's drinking water system and compliance with federal Safe Drinking Water Act regulations. This program conducts various activities, including: monitoring both the water quality and quantity on the reservation, on-the-ground projects to reduce erosion and remove nonpoint source pollution, and identification of any water resource issues that might impact the Pala Tribe.

The Pala Reservation has two public water systems, both of which are served by local wells, and treated before use. These water systems comply with all Safe Drinking Water Act regulations. The Pala Environmental Department and Pala Utilities Department conduct bi-weekly tests of water safety and quality.

The Pala Band has a tertiary wastewater treatment plant that services most of the buildings on the reservation, including the casino. Many of the homes south of the San Luis Rey River still have septic tanks, although the majority of the reservation is on sewer service. Areas still on septic are monitored to ensure groundwater protection.

During exceptionally rainy years, the San Luis Rey River and tributary creeks can flood and cause problems on roads and for some buildings, including the casino. The Pala Tribe is continually working on emergency preparedness and long-term mitigation measures to prevent stormwater

and flooding damage. Pala Environmental Department has installed some flood-warning stream gages around the reservation in order to monitor potential flooding.

4.6.13 Pauma Band of Mission Indians

Officially established in 1893, the nearly 6,000-acre Pauma reservation currently encompasses only a small portion of traditional Pauma territory, which expands into Northern San Diego, Riverside and Orange counties.

Pauma Band of Luiseño Indians has a thriving agricultural program, which are relatively sustainably managed. The T-Y Nursery, however, is impacting reservation wells. Tribal lands consist of four parcels equaling approximately 5,800 acres. The Tribe grows 60 acres of avocados, Valencia oranges, and lemons.

4.6.14 Rincon Band of Luiseño Indians

The Rincon reservation was established in 1875 and is home to the Rincon Luiseño Indian. Historically, the Luiseño tribes lived in the areas of San Diego, Riverside and San Bernardino Counties. The reservation is comprised of residential, agricultural, preserve/habitat, private and tribal land.

Rincon's Water Resources

The San Luis Rey River runs through the reservation. This riparian habitat is monitored by the Tribe and is a sanctuary for some endangered species. The Tribal Environmental Office oversees the natural resources on the reservation and works with the Tribal Council to ensure the land is protected. The Tribe collects and analyzes surface water and groundwater samples. No water quality issues have been observed and the sample results are within the limits.

The City of Escondido and the Vista Irrigation District [VID] deliver water from the San Luis Rey River to the Rincon Band of Mission Indians. The amount of water delivered depends upon the amount of surface water and groundwater available, and therefore varies on an annual basis.

The reservation is serviced by scattered site septic systems; however, the Tribe is interested in installing a sewer system on the reservation for protection of the groundwater.

4.6.15 San Pasqual Band of Indians

The San Pasqual Indian Reservation is located in northeastern San Diego County, California, near Valley Center. The ancestors of the San Pasqual Indians lived for thousands of years in the valley carved by the Santa Ysabel Creek, where modern Highway 78 now winds, near the present site of the San Diego Zoo's Safari Park. The San Pasqual Indian Reservation is adjacent to the Rincon Band of Mission Indians, and is nearby several other Indian Reservations, including Pauma, Pala, La Jolla, Santa Ysabel, Mesa Grande, Los Coyotes, and Pechanga.

The San Pasqual Indian Reservation was established by Presidential decree in 1910. Despite being one of the last reservations to be established in Southern California, much of the San Pasqual Indian Reservation has been removed from its original location. The original site is now occupied by Lake Wohlford and the San Diego Zoo's Safari Park. The compensatory land is now in five parcels,

totaling 1,500 acres of trust land, on dry, scrub oak hills east of Valley Center. Indian administration and activities are centered at the Tribal Hall and education center.

San Pasqual encompasses approximately 1,500 acres of trust land and is considered a "checkerboard" Reservation, as it does not occupy one contiguous land mass. The San Pasqual Reservation is divided into three non-continuous districts: A, B, and C. The topography consists of steep slopes and few irrigable lands and the average annual rainfall varies from 10 – 20 inches a year. The Reservation is near the headwaters of the San Luis Rey Watershed and rainwater falling on the area enters the San Luis Rey River via Paradise Creek to the north and Lake Wohlford to the south. Lake Wohlford is a storage reservoir for the City of Escondido. The Reservation land is located in both the San Luis Rey watershed and the Carlsbad watershed.

Tribal membership consists of approximately 500 people. The Reservation population is approximately 1,097 total residents, occupying 298 homes. The majority of homes and residents on the Reservation currently reside in Districts A and B, with a small population and clusters of homes in District C.

San Pasqual's Water Resources

The San Pasqual Water Department manages and operates a Public Water System serving the Tribal communities in Districts A and B. The majority of the Tribe's drinking water is purchased from Valley Center Municipal Water District.

The Reservation does not have a community sewer system and relies on individual home septic tanks and leach fields for collection and disposal of its waste water. The Tribe's Environmental Protection and Compliance Department monitors and manages the environmental health and quality of the Reservation including monitoring and testing surface water and groundwater quality.

4.6.16 Iipay Nation of Santa Ysabel

The Santa Ysabel Reservation was established in 1893. The Reservation is located on Hwy 79, in North San Diego County near Lake Henshaw between the towns of Santa Ysabel and Warner Springs. The homes on these 15,527 acres are mostly older. There have been some improvements to the tribal hall and clinic.

Historically, the area surrounding the Santa Ysabel Valley was known by the Indian name "Ellykwanan." The original inhabitants who lived in the Santa Ysabel village called themselves "Iipay," "the People." The Iipay are part of the larger Kumeyaay people who once populated much of the geographic area of present day San Diego County. The Iipay of "Ellykwanan" lived in the general vicinity of the Santa Ysabel Valley as well as the villages of Mataguay and San Felipe near S-2. The Iipay were governed by a "Kuseyaay" or "Captain" who managed the religious, political and economic life of the people as well as trade relations with other tribes.

The Santa Ysabel Patent to create the Reservation was approved in 1893. The villages of Ellykwanan, Mataguay, and San Felipe along with Tekemuk would be combined to comprise Tracts 1, 2, and 3 of the Santa Ysabel Reservation and would make up the population of the Santa Ysabel Band of Mission (Diegueno) Indians, the name by which the Tribe is most commonly known.

The Santa Ysabel Indian Reservation ranges from 3,200 feet to 5,700 feet in elevation and comprises a land base of over 15,000 acres on three tracts of land. The mountainous topography of the Reservation is home to a wide variety of indigenous plants and trees, including seven different

species of oak trees, musky sage plants, verdant wild ferns, vibrantly blue lilacs, and waves of golden poppies that flourish along the hillsides and ridges of Volcan Mountain.

4.6.17 Sycuan Band of the Kumeyaay Nation

The Sycuan Reservation was established in 1891; however, Sycuan ancestors have lived in the San Diego area for nearly 12,000 years. Currently, there are 130 Sycuan tribal members.

As specified in the Tribal Outreach meeting held by the San Diego IRWM Program in August 2012, Sycuan has basic water resources needs including an antiquated water distribution on the reservation that should be modernized. The reservation also needs a new reservoir and to maximize its well system. The Sycuan Band has investigated the possibility of connecting to the Otay and Padre Dam water systems, in order to receive water from these water districts.

4.6.18 Viejas Band of Kumeyaay Indians

The Viejas Band of Kumeyaay Indians, one of the remaining 12 bands of the Kumeyaay Indian Nation, resides on a 1,600-acre reservation in the Viejas Valley, east of the community of Alpine. In 1875, a presidential executive order withdrew lands from the federal domain, setting aside a number of small reservations, including the Capitan Grande Reservation from which the Viejas Band descended. Capitan Grande, patented in 1891, included portions of ancestral land of the Los Coñejos Band.

As the non-Indian population grew, demand for water increased. The City of San Diego diverted most of the San Diego River water originally used by the Kumeyaay. The City later decided to dam the river and create El Capitan Reservoir. Congress granted the city permission to purchase much of the Capitan Grande Reservation, where many Kumeyaay had built homes. From the proceeds of this forced "sale" of lands, some of the valley's inhabitants, the Coapan Band, or Capitan Grande, bought Barona Valley and are now known as the Barona Band of Mission Indians.

Another 28 families, including members of the Los Coñejos Band, purchased the Viejas Valley land (once a ranch owned by Baron Long) and incorporated the name Viejas. After the move, the Viejas and Barona Bands were denied their water rights and each valley became solely dependent on meager supplies of rainfall and groundwater until the issue was resolved by court action.

Today, members of the Viejas Band of Kumeyaay Indians are the direct descendants of the families who pooled their shares of dam-site purchase money to buy Viejas Valley. The Viejas band continues to share a joint-trust patent with the Barona Band for the 15,000 remaining acres of the Capitan Grande Reservation. Tribal landscapes consist of wetlands and coastal mountain slopes. The key land use drivers within the tribal lands are agricultural, residential and commercial.

Viejas' Water Resources

Viejas operates a municipal water system to American Water Works Association (AWWA) water standards, including domestic water supply and wastewater compliance with Title 22. There are no identified water quality issues or stormwater or flood management issues. Storm water and floodwater are managed within federal standards.

The Viejas Band has converted all homes on the Reservation from septic to sewer in order to protect groundwater and has instituted water conservation measures at their casino and outlets, as well as at governmental facilities.

4.6.19 San Luis Rey Band of Luiseño Indians

The Spaniards established the Mission San Luis Rey in 1798 as part of the El Camino Real trail between Mission San Diego (1769) and Mission San Juan Capistrano (1776). During this period, the missionaries imposed the name San Luiseño on the original inhabitants of the land. The Mexican Period (1832 - 1848) included further social, cultural, economic, and political changes by relocating the Tribes to newly established ranchos. During the American Period and treaty negotiations of 1851, the American government wanted to consolidate all the San Luiseño people into a single representative group. In the 1870s, a few reservations were established for some of the San Luiseño people near Palomar Mountain. However, a reservation in the San Luis Rey Valley was denied the San Luis Rey Band of Luiseño Indians.

The San Luis Rey Band of Luiseño Indians has kept its identity as a people within the local communities that now exist on ancestral tribal lands. Elective leadership committees and volunteers help to oversee the affairs of the San Luis Rey Band. Today, the San Luis Rey Band of Luiseño Indians is focused on preserving and sharing their culture and heritage with future generations. The San Luis Rey Band of Luiseño Indians is associated with the other six Luiseño and Cupeño tribes: La Jolla, Pala, Pauma, Pechanga, Rincon, Saboba and their cultural departments as a Tribal Coalition, working together to preserve sacred ancestral cultural heritage with local governments and museums.

4.6.20 Mount Laguna Band of Kwaaymii Indians

The Mount Laguna Band of Kwaaymii Indians, and was once federally recognized with reservation lands. However, with only one surviving full-blooded member of the tribe, in 1947 the Mount Laguna reservation lands were transferred into private property – the 320-acre Lucas Ranch. It remains the only tribal reservation that has been successfully transferred from reservation into private land. The Lucas Ranch is located in the Laguna Mountains, and burned during the Cedar fire in 2003. Today, it is owned and managed by the daughters of the last of the Kwaaymii, who are committed to preserving both the land and legacy of their tribe.

4.7 Water Management Issues on Tribal Lands

Water resources of San Diego County consist of local surface water, local groundwater, imported surface water, reclaimed water and, soon, desalted seawater. San Diego County has eleven principal stream systems originating in the higher elevations of the eastern parts of the County that flow west to the Pacific Ocean. Dams and reservoirs have been built on most of these streams to capture and store the natural runoff and imported water.

The Water Authority was created in 1944 as a public agency to administer the region's Colorado River water rights and later State Water Project water from Northern California. The Water Authority delivers imported water through several regional pipelines to its 24 member retail water agencies. A major effort in the region with significant impact on Tribal water resources is the San Luis Rey Indian Rights Settlement Act of 1988. Some of the reservations would benefit from water deliveries under this agreement; however, most Tribes have to rely on the limited water resources of the reservations.

4.7.1 Santa Margarita River Watershed Conflicts

The Santa Margarita River Watershed has been subject to over 80 years of litigation and conflicts over water rights. Conflicts began in 1926, with a lawsuit between Vail Ranch and Rancho Santa Margarita, which resulted in a division of water rights between the two parties, but failed to consider the 1930 water rights permit issued to Fallbrook Irrigation District. In 1966, after a series of court cases and appeals that included Congress, the federal government, the State of California, Department of Justice, and the Navy, in addition to the original parties, the water rights issue was decided by the Appellate Court, which upheld the original decision and validated Fallbrook's water rights. However, in the 1980s, studies by the Navy, BLM, and Fallbrook resulted in conflicting findings over the feasibility of implementation of solutions to the water rights conflict (Davies 2004).

Further water conflicts arose over the issues of recycled water and water quality. Under the "Four Part Agreement" in 1990, downstream users recognized the benefits of upstream users discharging recycled water into the river. An agreement was made to operate groundwater basins and treatment facilities as a conjunctive use project (Davies 2004). However, in 1992, effluent limits allowed by the Regional Board permit at the upstream Santa Rosa Water Reclamation Facility were found to exceed the water quality objectives of the downstream Murrieta Creek. This had led to conflict over the appropriateness of existing water quality objectives in the watershed and applicable permits, which has resulted in a decreased ability to recharge groundwater basins with recycled water.

The Santa Margarita River IRWM project, funded through a Proposition 84 – Round 1 Implementation Grant, aims to study the beneficial uses and water quality objectives, to determine if current objectives are appropriate and protective of beneficial uses, or if the Regional Board should consider changes to water quality objectives in the watershed.

The Anza and Cahuilla Indian Tribe is located in the Riverside County portion of the Santa Margarita River Watershed. In 2006, the Cahuilla tribe asked the courts to recognize their water rights, granted to them with the establishment of the reservation in 1908, prior to the water rights of other parties involved in litigation. The Cahuilla have rights to water flowing through and under their lands, which total approximately 13,000 acres. There is concern from the Tribe that these rights will be impacted with large developments in neighboring areas that also use groundwater. The result of this case may affect Rancho California, which has been involved in water rights disputes in the watershed for decades and serves over 130,000 people. Previously Rancho California was able to resolve water rights conflicts with the Pechanga tribe through an aquifer-sharing agreement (Kumeyaay 2010).

4.7.2 Waters of the San Luis Rey River and Colorado River

The San Luis Rey River, originating in Cleveland National Forest, is approximately 70 miles long and drains 560 square miles of northern San Diego County lands. The stream flow of this river ranges from 6 cubic feet per second (CFS) to as high as 170 CFS, with most months averaging less than 30 CFS. Portions of the river are dry for several months each year; however, flows as high as 95,500 CFS have been recorded during flood years prior to the completion of the Lake Henshaw Dam. Streamflow was measured near the City of Oceanside, where stream data has been collected (with some gaps) since 1913 (DFW 2010). The reservations of Los Coyotes, Santa Ysabel, San Pasqual, La Jolla, Rincon, Pauma/Yuima, and Pala are located within the San Luis Rey watershed.

Lake Henshaw, a reservoir with an area of more than 1,100 acres and a capacity of 52,000 AF, is located on the San Luis Rey River, about five miles east of the La Jolla Reservation.. The lake was constructed in 1923 with construction of the 123-foot tall and 650-foot wide Henshaw Dam on the San Luis Rey River. Lake Henshaw is owned by VID.

A 200 square-mile watershed, mostly undeveloped and shared by Santa Ysabel and Los Coyotes Reservations and VID, provides runoff to Lake Henshaw. Natural runoff from this watershed along with groundwater pumped from the Warner Basin, a 37 square-mile basin to the east of Lake Henshaw, is stored in Lake Henshaw. Henshaw water is delivered to VID, the City of Escondido and the Rincon Band of Indians.

Lake Henshaw from Mesa Grande Road

Photo credit: Philip Erdelsky

In 1969, the Rincon and La Jolla Indian Bands initiated litigation against the City of Escondido and VID concerning use of the waters of the San Luis Rey River, Lake Henshaw and Warner Basin. The Indian Bands now included in this litigation are La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands. A tentative settlement was reached in 1985 and enacted on November 17, 1988 as the San Luis Rey Indian Rights Settlement Act. The Settlement Act provided the following:

- Indian Bands were authorized to enter into a settlement agreement,
- A $30 million federal trust fund was established for settlement implementation, and
- The Secretary of the Interior was directed to arrange for the development of 16,000 acre-feet/year of supplemental water for use by the settlement parties.

However, it should be noted that at the time of the 2013 IRWM Plan, the settlement has not been implemented, and therefore no water has been delivered yet to the settlement parties.

The source of the supplemental water is a portion of the water savings produced by Water Authority projects to line portions of two large earthen canals that convey water from the Colorado River to the Imperial and Coachella valleys in Southern California, reducing water loss.

Three additional agreements were needed to bring the Colorado River water to the Bands. These agreements were signed in 2003 and consist of the following:

- Allocation Agreement – Water saved by lining portions of the All-American and Coachella Canals will be allocated as follows:
    - The first 16,000 acre-feet/year of the conserved water is allocated to the San Luis Rey Settlement Parties, consisting of the five Bands, VID, and City of Escondido.
    - The remaining conserved water, approximately 77,000 acre-feet/year, is allocated to the San Diego County Water Authority.
- Water Delivery Agreement – Metropolitan Water District will transfer the conserved Colorado River water from Lake Havasu, located on the border between California and Arizona, to northern San Diego County.

- Water Conveyance Agreement – San Diego County Water Authority will transfer the settlement water from northern San Diego County to the five reservations, Escondido, and VID. Any water not needed by the Bands may be sold to Escondido and VID.

To ensure that the Indian Bands have input in the San Luis Rey River Basin's water use and supply, the San Luis Rey Indian Water Authority was created by the La Jolla, Pala, Pauma, Rincon and San Pasqual Bands of Mission Indians. Based on the information available from the San Luis Rey Indian Water Authority website, no settlement water has been delivered to the Bands' reservations.

4.7.3 Water Management Issues

Tribal Nations within the Region are located on lands mostly outside of the Water Authority's service area and are wholly dependent on local sources of water. However, in the past, the Water Authority has coordinated with tribes regarding potential annexation and exploring the potential for water supply delivery to reservation lands. Also, the Barona Band has approached the City of San Diego to explore means of delivering City water supplies to the reservation via a proposed agreement that would transfer supplies from a Colorado River Tribal Nation to San Vicente Reservoir. The San Pasqual Band already purchases water from Valley Center Municipal Water District. Though tribes may have adequate, modern, systems in place, they cannot purchase or receive imported water without annexing all or part of their systems to a water district, which can be a barrier because it may be considered a lack of acknowledgement of Tribes' sovereign governmental status.

The summary list below provides an overview of water management issues on tribal lands, which was compiled using information from: 1) Tribal outreach meetings in June 2010, 2) Tribal outreach meetings in August 2012, and 3) San Diego County General Plan Update Final Environmental Impact Report.

1. **Groundwater Management** – Some groundwater basins shared by tribes and other basin users are being overdrafted. Possible solutions include extending access by basin users to regional conveyance systems or a financial incentive system to eliminate overdraft. Because off- and on-reservation groundwater use affecting groundwater basins within some tribal lands may be unsustainable, supplemental water sources are already required to reduce potential overdraft concerns. Consideration of both reservation and non-reservation water rights when planning development could also help reduce potential future overdraft.
2. **Water from Water Agencies** - Tribes may concurrently annex into retail and wholesale water agency service areas in order to obtain imported water supplies, but prefer to manage their own water supplies. State law prevents both retail and wholesale water agencies from waiving water agency annexation requirements. Many tribes have viewed the annexation requirements as an infringement on their sovereign rights. Where tribes can locate alternative supplies, local agencies can assist the tribes with delivery of the water to their reservation through wheeling or other agreements. The Water Authority considers annexation of tribal lands consistent with its 2006 Annexation Policies. The 2006 Annexation Policies acknowledge the tribes as sovereign governments and provides an approach to handling the annexation of tribal lands.
3. **Future Water Demands** - County land use planning and associated groundwater basin demand projections need to consider reservation build-out and the associated assertion of tribal water rights. For planning purposes only, the Water Authority's long-term water demand forecast, included in its 2010 Urban Water Management Plan, does contain

estimated demands of tribes that have demonstrated interest in the past to annex tribal lands, but does not include all tribal lands within the San Diego IRWM Region.

4. **County Groundwater Ordinance** - Tribal lands generally are not subject to the San Diego County Groundwater Ordinance; some Tribes have tribal groundwater ordinances in place to protect groundwater supplies. As a result, County and Tribal planning strategies may not consider the entire demand on the basins. Better coordination of planning for future groundwater use would ensure that all parties understand the full impact on groundwater supplies. Where imported water supplies are unavailable and groundwater is not adequate to meet all needs, this may inherently lead to conflict.
5. **Impact of Neighboring Communities** – Tribal lands located near other communities, areas with high development densities, or near land uses with large water demands will likely experience more substantial groundwater availability issues than average tribal lands, which are generally located in rural areas away from water-intensive land uses.
6. **Water Recycling Facilities** - Expansion of water recycling facilities at casino sites and other developed areas on tribal lands would provide greater supply reliability.
7. **Additional Wastewater Treatment** - Cumulative development within tribal lands, like other development, could result in the need for additional wastewater treatment services.
8. **Adverse Impact of Groundwater Depletion on Water Quality** - Groundwater depletion can concentrate adverse water quality constituents (such as radio-nucleotides). Naturally occurring uranium has also been identified in groundwater in rural areas in levels above drinking water standards.
9. **Increased Runoff from Newly Developed Impervious Surfaces** - Development of tribal lands, like other development, can potentially increase impervious surfaces and cause water quality impacts.
10. **Impact of Imported Water** – Concern has been expressed about the water quality impacts associated with imported water supplies, namely the importing of constituents of concern (e.g., TDS), to the Region.
11. **Chlorine Sediments** – Chlorine sediments in the watershed are an issue for area tribes. Possible sources may be imported water from Northern California.
12. **Inadequate Flood Protection Infrastructure** - Need to mitigate flooding on tribal lands. Culverts are undersized; only a portion of culverts were improved using FEMA funding after 2007 wildfires. Section 3.5.10 in this Plan addresses flood protection infrastructure and the County's Flood Warning Program, which includes tribal lands within the County's jurisdiction.
13. **Tribal Lands in Flood and Inundation Areas** - Tribal lands may be located within known flood areas or downstream of a dam (within a dam inundation area).
14. **Coordination of Multiple Species Conservation Planning** – Tribes would like to see better coordination of planning and implementation of MSCP and habitat conservation plans in areas adjacent to Tribal lands. Coordination is important, because many tribal lands have been mapped as assumed wildlife corridors or natural spaces that will not be developed in the County's MSCP without consultation with tribes or acknowledgement of tribal development plans.

15. **Water quality impact from off-reservation sources** – Off-reservation activities can impact water quality on tribal lands. Some sources of water quality issues on tribal lands that originate off-reservation include: atmospheric deposition from poor air quality in surrounding areas, high nitrates from pesticide and fertilizer use on agricultural lands, sedimentation from erosion, and nutrients from cattle operations.

Related to some of the issues described above, there exists conflict between Tribes and surrounding communities over water supplies and quality. Of particular concern are the availability of groundwater supplies and the impact of projects on water quality and runoff. The County of San Diego has identified actions to help address some of the water conflicts that exist between Tribes and other communities. These actions include increased communication and cooperation between Tribal and local governments, and an increased awareness of how one party's projects will impact another party's water resources.

The regulatory framework for environmental compliance on tribal lands includes development and enforcement of tribal environmental policies, compliance with the Federal Clean Water Act and Safe Drinking Water Act, and compliance with NEPA for Federal projects. Most tribes are delegated primacy for implementation of the Clean Water Act and develop their own set of water quality standards. Most tribes rely on the EPA to oversee their drinking water supplies to ensure compliance with the Safe Drinking Water Act. State environmental laws, including the California Environmental Quality Act (CEQA), do not apply to tribal reservations. Funding agreements for project sponsors under Proposition 84 require submittal of documentation of compliance for applicable CEQA requirements to the Department of Water Resources. However, for the tribes there are no applicable requirements. Any attempt to apply CEQA requirements to tribes would be a significant barrier to tribal participation in the IRWM Program since it would require tribes to give up their tribal sovereignty in order to use State funding for a project on tribal land.

This chapter mainly addresses the water resources conditions of the Tribal Nations Reservations. Several other factors that may impact the quantity and quality of available water at the reservations were not considered. These factors include endangered species and the Multiple Species Conservation Plan in San Diego County, climate change impacts, developments in areas neighboring the Tribal Reservations, excluding long-term needs of Indian Reservations in shared basins, and county-wide flood management planning and implementation activities.

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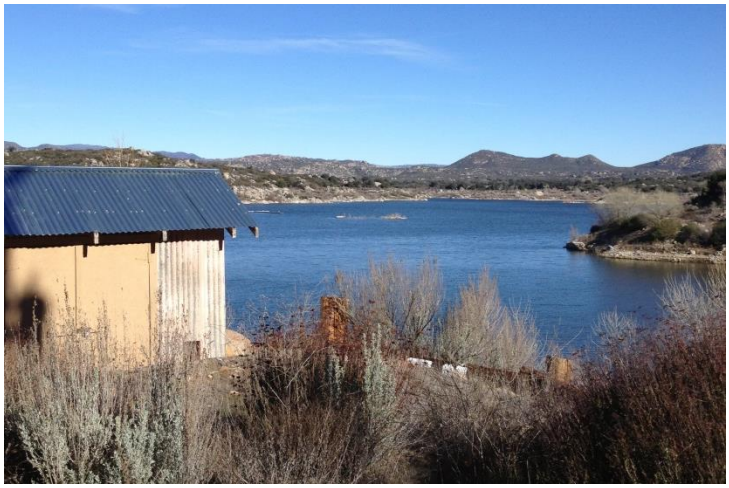
5 Watershed Characterizations

The San Diego IRWM Region addressed in this IRWM Plan is comprised of eleven hydrologic units (HUS) or watersheds that are defined by the San Diego Regional Water Quality Control Board (Regional Board) and are tributary to coastal waters. Seven of the watersheds comprise major regional water courses and four of the watersheds are comprised of multiple small sub-watersheds, each draining to coastal waters or coastal wetlands. In this Plan, the eleven HUs are referred to as watersheds.

This chapter was developed in conjunction with watershed-based stakeholders throughout the Region. As discussed in *Chapter 6, Governance and Stakeholder Involvement,* four watershed workshops were held in September 2012 throughout the Region to solicit input and information from watershed-based stakeholders. Due to the variation in stakeholders, available data, and other factors between each of the Region's watersheds, the information in the following sections may vary in terms of detail and content.

El Capitan Reservoir with snow-capped Cuyamaca Mountain in background.

Photo credit: Rob Hutsel, San Diego River Park Foundation



Morena Reservoir, looking east.

Photo credit: Jeff Pasek, City of San Diego

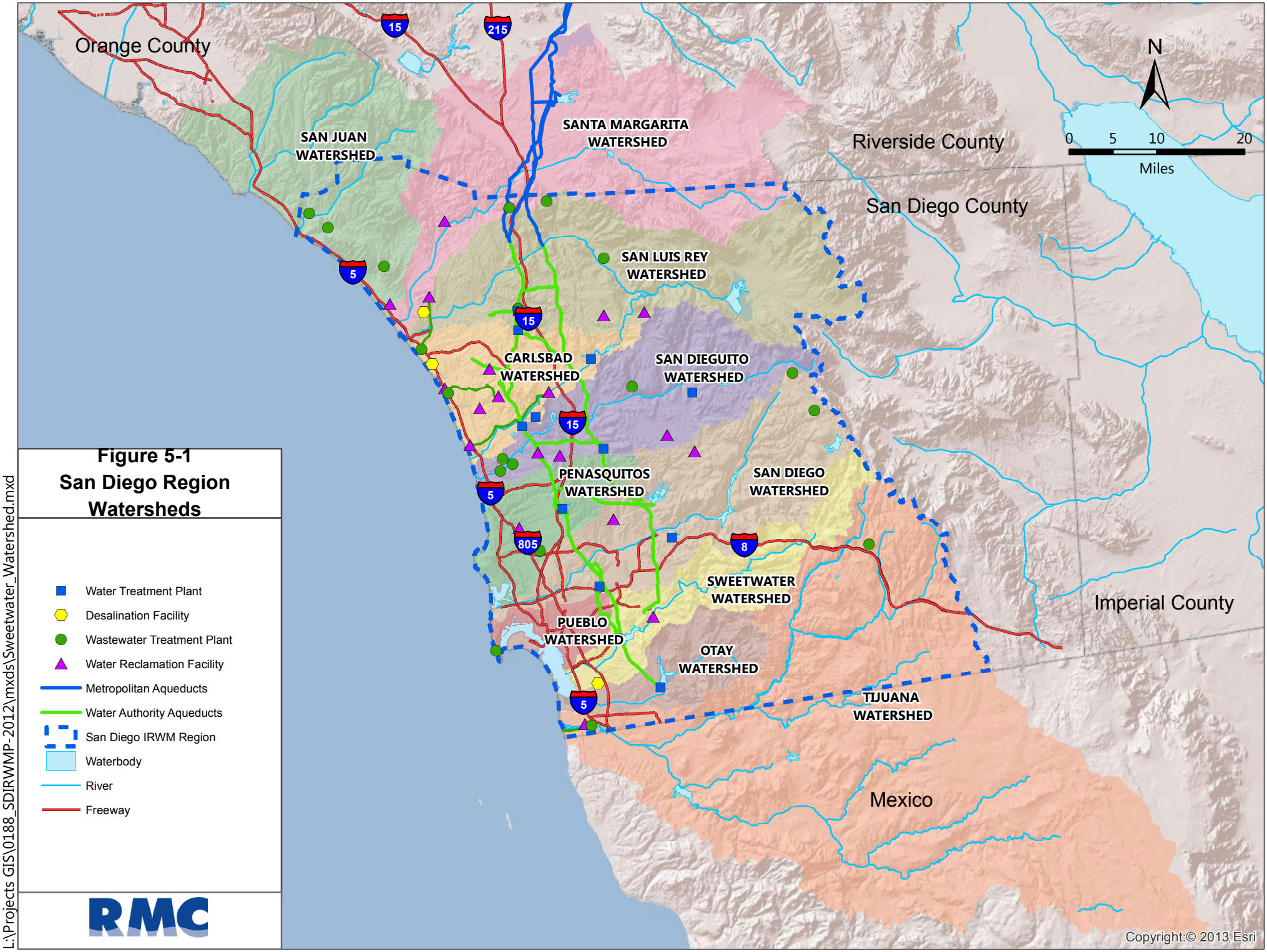


Figure 5-1
San Diego Region Watersheds

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5.1 San Juan Watershed

The San Juan Watershed (San Juan Hydrologic Unit or San Juan HU (901)) is comprised of five hydrologic areas, and lies within all three of the IRWM Regions in the San Diego IRWM Funding Area designated by DWR (refer to Section 3.14 in *Chapter 3, Region Description* for more information on neighboring IRWM Regions). Two of the watershed's five hydrologic areas are within San Diego County:

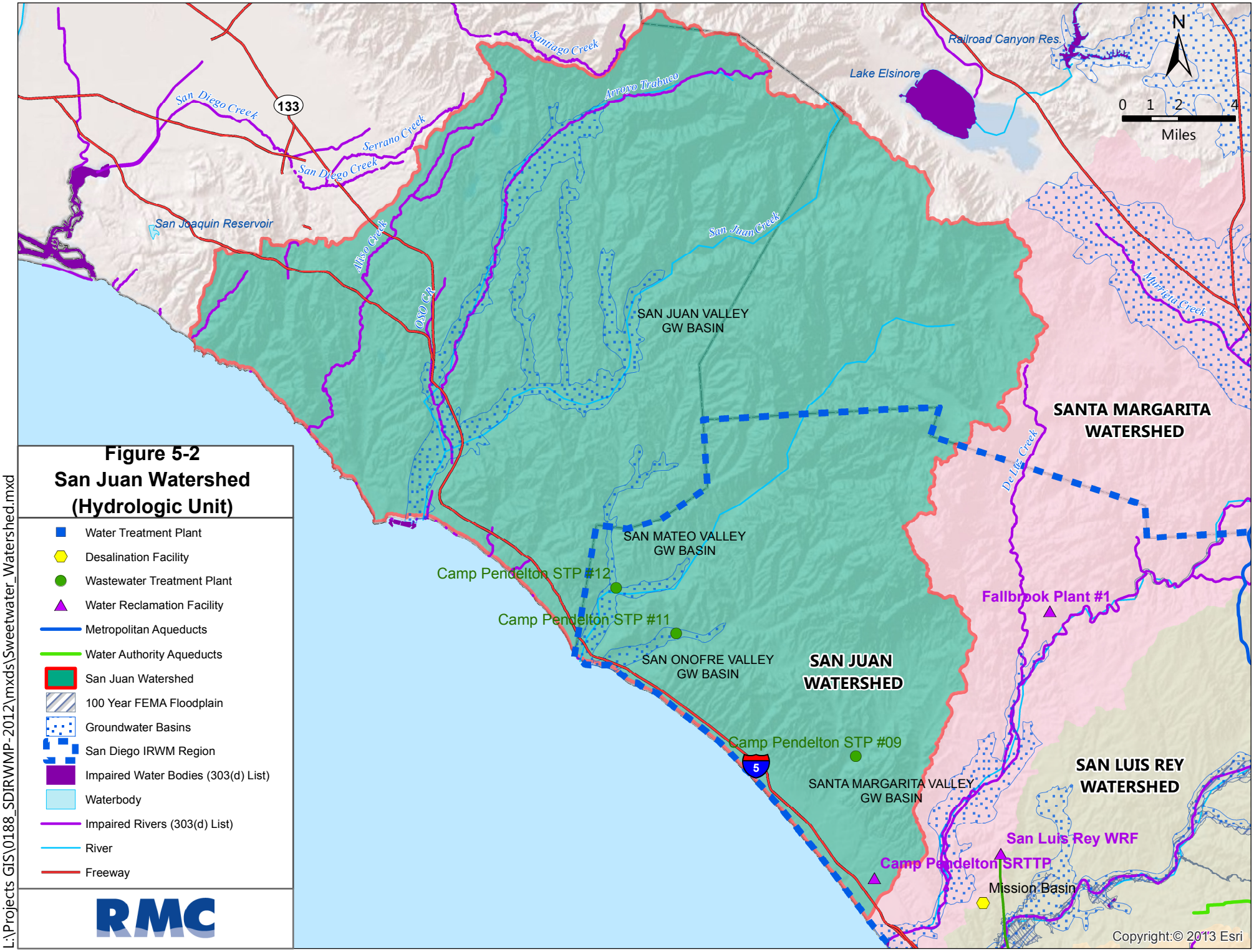
- San Mateo Hydrologic Area (HA) (the drainage area of San Mateo Creek)
- San Onofre HA (which includes drainage areas of San Onofre Creek, Las Pulgas Creek, and Stuart Mesa)

Approximately 30% of the San Juan Watershed is located within San Diego County, covering approximately 150 square miles and lying within the jurisdiction of the Camp Pendleton, a United States Marine Corps (USMC) Base. Figure 5-2 presents a map showing boundaries of the watershed and its principal features.

Camp Pendleton lands are largely open space and support nearly intact habitats. Water supply within the Camp Pendleton portion of the San Juan Watershed is from local groundwater and imported water.

A portion of the San Mateo HA lies within Riverside County, and while this hydrologic area is included in the Upper Santa Margarita Watershed IRWM Region, it does not have developed water infrastructure or identified water management needs (RCWD, 2009).

The majority of the remaining three hydrologic areas are located within the South Orange County IRWM Region. The South Orange County IRWM Region defines the San Juan Watershed on a finer scale than hydrologic areas in their 2013 IRWM Plan, describing seven sub-watersheds of the larger San Juan Watershed that are located within the South Orange County IRWM Region (County of Orange, 2013).


Santiago Creek
Arroyo Trabuco
Railroad Canyon Res.
Lake Elsinore
N
0 1 2 4
Miles
San Diego Creek
133
Serrano Creek
San Diego Creek
San Joaquin Reservoir
Aliso Creek
OSO CR
San Juan Creek
SAN JUAN VALLEY GW BASIN
Murrieta Creek
SANTA MARGARITA WATERSHED
De Luz Creek
SAN MATEO VALLEY GW BASIN
Camp Pendelton STP #12
Camp Pendelton STP #11
Fallbrook Plant #1
SAN ONOFRE VALLEY GW BASIN
SAN JUAN WATERSHED
Camp Pendelton STP #09
5
SANTA MARGARITA VALLEY GW BASIN
SAN LUIS REY WATERSHED
San Luis Rey WRF
Camp Pendelton SRTTP
Mission Basin
Copyright:© 2013 Esri
Figure 5-2
San Juan Watershed
(Hydrologic Unit)
Water Treatment Plant
Desalination Facility
Wastewater Treatment Plant
Water Reclamation Facility
Metropolitan Aqueducts
Water Authority Aqueducts
San Juan Watershed
100 Year FEMA Floodplain
Groundwater Basins
San Diego IRWM Region
Impaired Water Bodies (303(d) List)
Waterbody
Impaired Rivers (303(d) List)
River
Freeway
RMC
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San Juan Watershed
Hydrology The San Juan Watershed has major creek systems within the San Mateo and San Onofre HAs, all of which drain west into the Pacific Ocean. The creeks within the San Juan Watershed are generally intermittent, and may run dry from July through November (PCW, No Date [N.D.]). In the watershed as a whole, the two major drainages are associated with the San Juan Creek (located in the South Orange County IRWM Region) and the San Mateo Creek (within both the San Diego IRWM Region and the South Orange County IRWM Region). The San Mateo HA drains San Mateo Creek, which is the second largest creek in the San Juan Watershed and is located in all three IRWM Regions in the San Diego Funding Area. The San Onofre HA includes drainage areas of San Onofre Creek, Las Flores Creek, and Aliso Canyon basin (PCW, N.D.).
Water Systems Water systems within the San Diego IRWM Region's portion of the San Juan Watershed lie largely within the jurisdiction of the USMC, which is responsible for providing water and wastewater services within Camp Pendleton. Camp Pendleton receives imported water supplies from the San Diego County Water Authority, although these supplies are generally limited to approximately 850 acre-feet per year (SDCWA, 2011). Water supply for Camp Pendleton is primarily provided by surface water and local groundwater basins (USMC, 2011). Much of the water in the South Orange County portion of the watershed is imported, though some areas rely heavily on groundwater as well (County of Orange, 2013). Groundwater basins within the San Juan Watershed include the San Juan Valley (9-01), San Mateo Valley (9-02) and the San Onofre Valley (9-03) basins. According to Bulletin 118, the San Mateo Valley basin has recharge areas along San Mateo Creek, and the San Onofre Valley basin has recharge derived from percolation of runoff from rainfall and from treated wastewater effluent (DWR, 2003 and DWR (a), 2004). While treated wastewater recharges groundwater, recharge occurs downgradient from drinking water supply wells in the San Mateo and San Onofre basins; treated wastewater does not contribute to the drinking water supply. Camp Pendleton extracts groundwater for use within each basin in San Diego County, as well as for transfer between the San Mateo and San Onofre Basins (USMC, 2011). The San Juan groundwater basin is a high priority basin for a Salt and Nutrient Management Plan (SNMP), but lies within the South Orange County IRWM Region, and is not discussed further in this Plan. Both the San Mateo and San Onofre groundwater basins are considered medium priority (Tier B) for SNMPs. Water supply and wastewater agencies within the portion of the San Juan Watershed that lies within the Region include USMC Camp Pendleton and Fallbrook Public Utilities District.
Internal Boundaries and Land Uses The San Juan Watershed spans Riverside, Orange, and San Diego Counties. Within San Diego County, the San Juan Watershed is primarily within the jurisdiction of the Federal Government, and specifically within the jurisdiction of the USMC Base Camp Pendleton. The San Juan Watershed also includes jurisdictional boundaries for the County of San Diego, and the Fallbrook Public Utility District (PUD). Furthermore, the USMC Base Camp Pendleton and the Fallbrook Public Utilities District are member agencies of the San Diego County Water Authority, so portions of the San Juan Watershed lie within the Water Authority's service area. Nearby jurisdictions include the cities of Oceanside and San Clemente to the south and north, respectively, and the community of Fallbrook to the east. Within the South Orange County IRWM Region, the coastal portions of the watershed are highly developed, and include ten incorporated cities (County of Orange, 2013). The land uses within the San Onofre and San Mateo HAs include open space, military base operations, agriculture, and very limited residential areas. In addition, there is a state beach and campground along the Interstate 5 corridor near the northern boundary of Camp Pendleton, and a golf course near the southern boundary (PCW, N.D.). The San Onofre nuclear power plant is also located within the watershed, in proximity to Camp Pendleton. There are no tribal lands located within the portion of the San Juan Watershed that lies within the San Diego IRWM Region.

San Juan Watershed

Water Quality and Water Quality Impairments

There are no water bodies within the San Diego County portion of the San Juan Watershed on the 303(d) list of impaired water bodies. However, past water quality monitoring has indicated that surface waters in the San Juan Watershed are high in total dissolved solids (TDS) (SCCWRP, 2007). In addition, several elevated constituents have been reported in groundwater wells at Camp Pendleton, including nitrates, TDS, iron, and sodium, although there appear to be no long-term trends in the occurrence of these constituents (PCW, N.D.). The South Orange County portion of the watershed has multiple 303(d)-listed waterways including all or part of: Aliso Creek, Dana Point Harbor, San Juan Creek, Aliso Beach, Dana Point Hydrologic Subarea, Laguna Beach Hydrologic Subarea, lower San Juan hydrologic subarea, Poche Beach. San Clemente City Beach, San Capistrano Beach, South Capistrano County Beach, Arroyo Trabuco, English Canyon, Laguna Canyon Channel, Moro Canyon Creek, Oso Creek, Prima Deshecha Creek, and Segunda Deshecha Creek for selenium, toxicity, nutrients, pesticides, metals, total coliform, *Enterococcus*, or bacteria.

A Water Quality Improvement Plan will be developed for the entire San Juan Watershed in accordance with the 2013 MS4 Permit, which will address some of the sources of pollutant loading into the water bodies and determine actions that can be taken to improve water quality. Efforts associated with the 2013 MS4 Permit will present opportunities for coordinated IRWM projects to ensure that the efforts are integrated to achieve maximum benefits.

There are specific water quality objectives established in the Basin Plan for the San Mateo and San Onofre HAs. Water quality objectives are established separately for inland surface water bodies, groundwater. There are specific water quality objectives established for TDS, chlorides, sulfates, sodium, nitrates, nitrogen-phosphorus ratios, iron, manganese, methylene blue-activated substances (MBAS), boron, turbidity, color, and fluoride (SDRWQCB, 2010).

Stormwater and Flood Management

Stormwater and flood management within the San Juan Watershed portions of San Diego County fall under the jurisdiction of the County of San Diego and the USMC Base Camp Pendleton. Most of the San Diego County lands within the San Juan Watershed consist of undeveloped, park, and agricultural uses, so stormwater management by San Diego County is limited in the San Juan Watershed. However, Camp Pendleton stormwater management activities focus on water quality protection where parking lots and other developed areas feed surface waters (USMC, 2011). Flood control in the South Orange County IRWM Region portion of the watershed fall under the jurisdiction of the Orange County Flood Control District, which manages Orange County's Regional Backbone Flood Control Infrastructure to protect against the 100-year flood event (County of Orange, 2013).

Natural Resources

Only 7% of the watershed is developed, primarily in the northwestern portion of the San Juan watershed along the coast, with the remaining 93 percent undeveloped land in the southern and eastern portions of the watershed. Due to the largely undeveloped nature of the San Juan Watershed, it contains various wildlife, habitats, and special-status species. Within San Diego County, Camp Pendleton contains 21 recognized plant communities including coastal sage scrub, oak woodlands, chaparral, grasslands, coastal dunes, salt marshes, and riparian woodlands and also supports 16 threatened or endangered plant and animal species. In addition, the undeveloped low-lying creeks and streambeds found within Camp Pendleton function as wildlife corridors for various wildlife species to travel within the base, as well as travel to surrounding open space areas such as the Cleveland National Forest located in Riverside County (PCW, N.D.).

There are sixteen species of plants and animals listed under the federal Endangered Species Act (ESA) that reside within Camp Pendleton. Of particular interest from a water resource standpoint are: the Southern California steelhead, and the arroyo toad, both of which utilize stream corridors on Camp Pendleton; the tidewater goby, which resides in brackish water and coastal lagoon habitats on Base; and least Bell's vireo and southwestern willow flycatcher, two bird species that rely on riparian habitats on Base (USMC, 2011).

San Juan Watershed
Potential Climate Change Impacts Climate change vulnerabilities that have been identified for the San Diego IRWM Region and are relevant to the San Juan Watershed include but are not limited to: • Decrease in imported water supply • Decrease in groundwater supply • Decrease in surface water availability • Water quality concerns related to lower surface water flows • Sea level rise • Decrease in availability of necessary habitat • Exacerbation of wildfires Due to the relatively low level of imported water supply used within the San Diego IRWM Region portion of the San Juan Watershed, decreases in imported water supply are anticipated to be a potential although non-critical climate change impact. However, due to the use of groundwater and surface water within the San Juan Watershed, reductions of these resources could impact water users including the USMC Base Camp Pendleton and the Fallbrook PUD. Furthermore, due to the extensive amount of habitat and open space located within the San Juan Watershed, reduced water availability and potential water quality concerns could impact or decrease available habitat that is necessary for species survival. Due to the San Juan Watershed's location along the coast, sea level rise could potentially impact this watershed and its coastal ecosystems and habitats. Lastly, wildfires, which occurred within the San Juan Watershed as recently as 2007, could potentially occur more frequently due to climate change, which could substantially impact water quality and habitat within the watershed (RWMG, 2009).
Management Issues and Conflicts Management of the San Juan Watershed presents unique challenges due to its location within three different counties. Through the IRWM Program, the San Diego IRWM Region coordinates with Orange County and Riverside County (the Tri-County FACC) to discuss and address relevant issues within overlapping watersheds such as the San Juan Watershed. Furthermore, high military presence within the San Juan Watershed presents an additional jurisdictional layer (the Federal Government), which can impart management challenges and conflicts.

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5.2 Santa Margarita Watershed

The Santa Margarita Watershed (Santa Margarita Hydrologic Unit or Santa Margarita HU (902)) encompasses 750 square miles in northern San Diego and southwestern Riverside Counties. Twenty-seven percent (200 square miles) of the watershed is within San Diego County (and the region addressed in this 2013 IRWM Plan). Figure 5-3 presents a map showing primary features and boundaries of the Santa Margarita Watershed.

The Santa Margarita River is the primary watercourse in the watershed. The river is formed by the confluence of Temecula and Murrieta Creeks immediately upstream from the San Diego-Riverside County border. Rapidly urbanizing areas of Riverside County exist in the basin upstream of the confluence, while the lower portion of the watershed within San Diego County is largely undeveloped and includes portions of the USMC Base Camp Pendleton. The watershed features annual grasslands, coniferous forests, broad-leaved forests, desert transition, chaparral-covered hillsides, riparian woodlands, and coastal marshes. The San Diego Region portion is primarily chaparral, riparian woodlands, and coastal marshes. The Santa Margarita River discharges to an estuary in an undeveloped downstream portion of Camp Pendleton.

Groundwater basins within the lower portion of the Santa Margarita River Watershed represent an important local water supply source within the Region, and represent the primary source of supply to Camp Pendleton. Camp Pendleton is in the process of implementing a series of federally-funded master-planned water supply projects that include groundwater treatment for iron and manganese and a future-proposed groundwater demineralization facility.

The Santa Margarita Conjunctive Use Project – funding by Proposition 50 – provides for enhanced recharge and recovery from the groundwater basin to provide a water supply for both Camp Pendleton and Fallbrook as resolution of a long-standing water rights dispute with input from the United States Bureau of Reclamation.

Photo credit: Jack Bebe, Fallbrook Public Utilities District

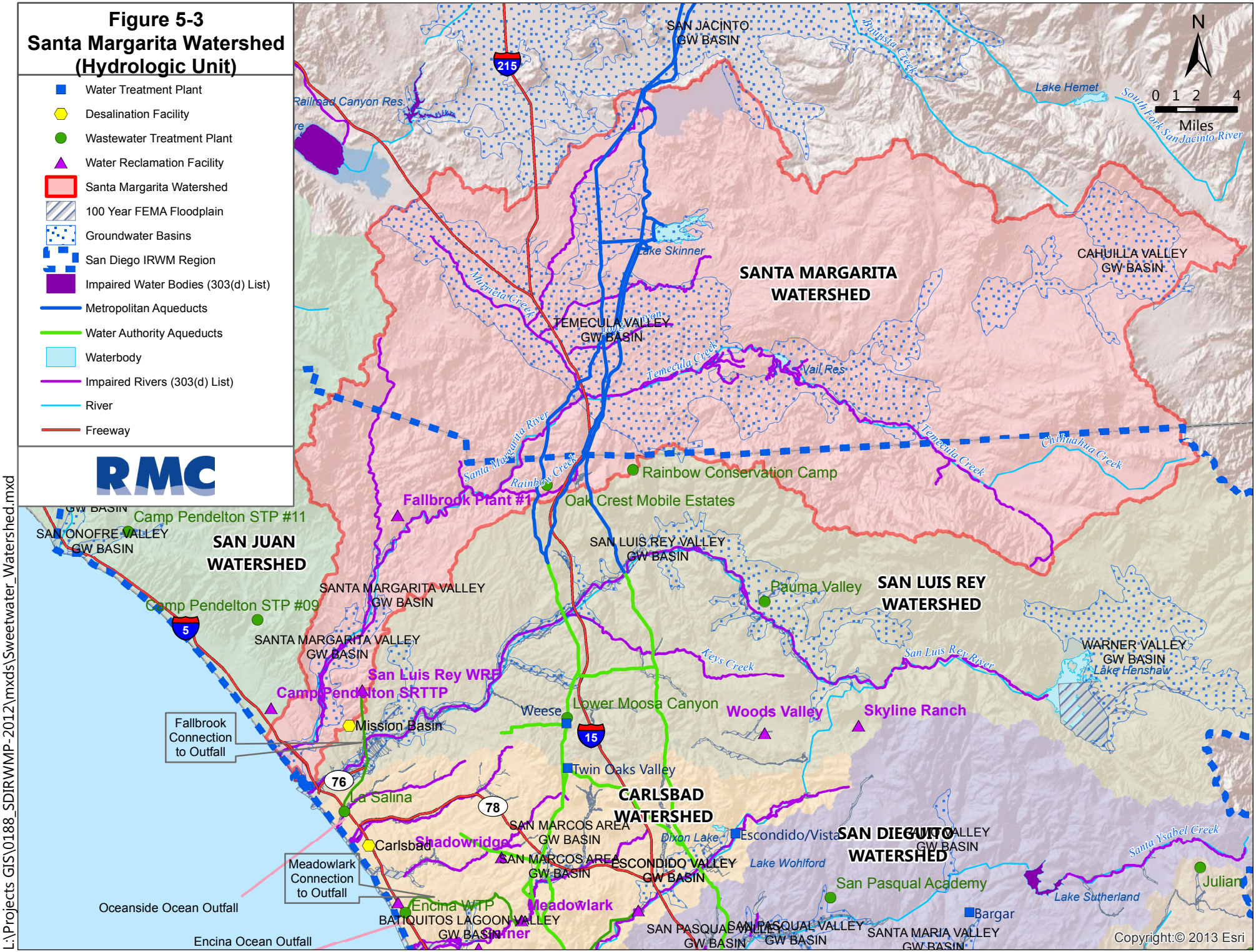
Figure 5-3
Santa Margarita Watershed
(Hydrologic Unit)
Water Treatment Plant
Desalination Facility
Wastewater Treatment Plant
Water Reclamation Facility
Santa Margarita Watershed
100 Year FEMA Floodplain
Groundwater Basins
San Diego IRWM Region
Impaired Water Bodies (303(d) List)
Metropolitan Aqueducts
Water Authority Aqueducts
Waterbody
Impaired Rivers (303(d) List)
River
Freeway
RMC
N
0 1 2 4
Miles
SANTA MARGARITA WATERSHED
SAN JUAN WATERSHED
SAN LUIS REY WATERSHED
CARLSBAD WATERSHED
SAN DIEGUITO WATERSHED
SAN JACINTO GW BASIN
CAHUILLA VALLEY GW BASIN
TEMECULA VALLEY GW BASIN
SAN ONOFRE VALLEY GW BASIN
SAN LUIS REY VALLEY GW BASIN
SANTA MARGARITA VALLEY GW BASIN
WARNER VALLEY GW BASIN
SAN MARCOS AREA GW BASIN
ESCONDIDO VALLEY GW BASIN
BATIQUITOS LAGOON VALLEY GW BASIN
SAN PASQUAL VALLEY GW BASIN
SANTA MARIA VALLEY GW BASIN
Railroad Canyon Res.
Lake Hemet
South Fork San Jacinto River
Bautista Creek
Lake Skinner
Murrieta Creek
Temecula Creek
Vail Res.
Santa Margarita River
Rainbow Creek
Chihuahua Creek
Keys Creek
San Luis Rey River
Lake Henshaw
Dixon Lake
Lake Wohlford
Santa Ysabel Creek
Lake Sutherland
Rainbow Conservation Camp
Oak Crest Mobile Estates
Fallbrook Plant #1
Camp Pendleton STP #11
Camp Pendleton STP #09
Pauma Valley
San Luis Rey WRF
Camp Pendleton SRTTP
Mission Basin
Weese
Lower Moosa Canyon
Woods Valley
Skyline Ranch
Twin Oaks Valley
La Salina
Carlsbad
Shadowridge
Escondido/Vista
San Pasqual Academy
Bargar
Julian
Encina WTP
Meadowlark
Encina
Fallbrook Connection to Outfall
Meadowlark Connection to Outfall
Oceanside Ocean Outfall
Encina Ocean Outfall
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Santa Margarita Watershed

Hydrology

The major surface water body within the Santa Margarita Watershed is the Santa Margarita River, which drains in a westerly direction from headwaters in Riverside County to the Santa Margarita Estuary and the Pacific Ocean. Major tributaries to the Santa Margarita River include Temecula Creek, Murrieta Creek, De Luz Creek, Sandia Creek, and Rainbow Creek (County of San Diego, 2008).

The Santa Margarita Watershed is comprised of nine hydrologic areas (HAs), five of which have portions within the San Diego IRWM Region. These hydrologic areas include Ysidora HA (902.1), De Luz HA (902.2), Pechanga HA (902.5), Aguanga HA (902.8), and Oakgrove HA (902.9). Four HAs lie entirely within the Upper Santa Margarita Watershed IRWM Region: Murrieta HA (902.3), Auld HA (902.4), Wilson HA (902.6), and Cave Rocks HA (902.7), De Luz, Pechanga, Aguanga, and Oakgrove HAs are in both the Upper Santa Margarita and San Diego IRWM Regions. Oceanside Harbor exists along the Pacific Ocean within the watershed but is not hydrologically connected to the watershed. The Santa Margarita River estuary (river mouth) fluctuates between being open to tidal flushing and closed due to lack of flow along the river.

According to the County of San Diego, the Santa Margarita River is the longest free-flowing, un-dammed river along the southern California coast. The Santa Margarita River is largely undeveloped and has not been channelized within the lower 27 miles (County of San Diego, 2008).

Water Systems

The westernmost segment of the Santa Margarita Watershed lies largely within the jurisdiction of the San Diego County Water Authority, which provides imported water supplies to three of its member agencies located in the watershed: USMC Base Camp Pendleton, Fallbrook PUD, and Rainbow Municipal Water District. In addition, localized groundwater pumping and surface water diversions from the Santa Margarita River provide water supplies to Camp Pendleton and the unincorporated community of De Luz (County of San Diego, 2005). Groundwater supplies are sourced from the Santa Margarita Valley Groundwater Basin (9-04) (DWR (b), 2004). According to Bulletin 118, natural recharge to the Santa Margarita Valley Groundwater Basin occurs primarily from percolation of the Santa Margarita River (DWR (b), 2004). As described in *Chapter 7, Regional Coordination* (see Section 7.5.3 Salt/Nutrient Management Plans in the Region), the Lower Santa Margarita River Basin is a high priority Salt and Nutrient Management Plan (SNMP) basin. RCWD and USMC Camp Pendleton are developing an SNMP for the greater basin, with Fallbrook Public Utility District providing support. The Temecula/Murrieta groundwater basins, located in the Upper Santa Margarita IRWM Region are also considered high priority (Tier A) basins for SNMPs, but lie outside the bounds of the San Diego IRWM Region. While the Temecula/Murrieta groundwater basins are not discussed in detail in this Plan due to their distance from the San Diego IRWM Region, those basins are high-priority basins and are being actively managed by local stakeholders for both water quantity and water quality purposes.

Water use varies between the upper portion of the Santa Margarita (located in Riverside County) and the lower portion of the Santa Margarita (located in the San Diego IRWM Region). Within the San Diego IRWM Region, surface water from the Santa Margarita River is diverted and used directly, and is also used to recharge local groundwater basins. Within Camp Pendleton, water from the Santa Margarita River is diverted to Lake O'Neill through a diversion weir, which also diverts surface water from the Santa Margarita River to recharge ponds that are used to recharge the Santa Margarita Valley Groundwater Basin (USMC, 2011). Fallbrook PUD, Camp Pendleton and the United States Bureau of Reclamation are moving forward on a conjunctive use project that would extract and treat additional groundwater from the basin.

Although surface water, groundwater, and imported water comprise all current water supplies within the Santa Margarita Watershed, it is possible that desalination and indirect potable reuse will provide future water supply sources within this watershed. The USMC and the Water Authority are currently working on feasibility studies for a potential seawater desalination plant on Camp Pendleton near the mouth of the Santa Margarita River. Desalination efforts are still in the planning stage within Camp Pendleton, but could potentially result in a 50 to 150 million gallons per-day (MGD) seawater desalination plant (SDCWA, 2011).

Water supply agencies within the portion of the Santa Margarita Watershed that lies in the Region include USMC Camp Pendleton, Fallbrook PUD, and Rainbow Municipal Water District. The aforementioned agencies also

Santa Margarita Watershed
function as wastewater agencies within the watershed. The Cahuilla, Pechanga, and Ramona tribal reservations are located within the Upper Santa Margarita Watershed IRWM Region, and a portion of the Pauma Reservation is located within the San Diego IRWM Region's portion of the Santa Margarita Watershed (RCWD, 2007). The Pechanga Reservation pumps groundwater from the Temecula and Pauma groundwater basins, and the Pauma Reservation uses groundwater wells on reservation lands. Water rights have been a challenge for this watershed since the 1920s beginning with Rancho Santa Margarita suing Vail Ranch (both land grants) for water rights. The legal conflict over water rights was further complicated in 1930 when the state of California issued an appropriate permit to Fallbrook Irrigation District (later to become Fallbrook PUD). Groundwater use in the Temecula Valley Groundwater Basin (located in Riverside County) further complicated matters by reducing downstream flows necessary to recharge the groundwater basins on Camp Pendleton. Since 1975, a Court-appointed Watermaster has been tasked with administering and enforcing various legal provisions pertaining to water rights and water systems associated with underground and sub-surface waters within the Santa Margarita River Watershed that support the sub-surface flow of all creeks, rivers, and stream systems (USMC, 2011). In 1989, the Court appointed a Steering Committee to oversee actions of the Watermaster. The Steering Committee is comprised of representatives from the following entities: United States (USMC Base Camp Pendleton) Eastern Municipal Water District, Fallbrook PUD, Metropolitan Water District of Southern California, Pechanga Tribe, Western Municipal Water District, and Rancho California Water District (RCWD) (Santa Margarita Watermaster, 2011).
Internal Boundaries and Land Uses Within San Diego County, land use authority for the lower Santa Margarita Watershed is split between the jurisdiction of San Diego County, covering the unincorporated communities of De Luz, Fallbrook, and Rainbow, and federal lands belonging to Marine Corp Base Camp Pendleton and Naval Weapons Station Fallbrook (County of San Diego, 2008). In addition, the lower Santa Margarita Watershed includes jurisdictional boundaries for the USMC Base Camp Pendleton, Fallbrook PUD, a small portion of the City of Oceanside, and Rainbow Municipal Water District, all of which are member agencies of the San Diego County Water Authority. In the upper Santa Margarita Watershed falling within the San Diego IRWM Region, portions of Pechanga HA, Oakgrove HA, and Aguanga HA include Cleveland National Forest lands, which fall under the jurisdiction of the U.S. Forest Service, portions of the Pauma Indian Reservation, Bureau of Land Management lands, and rural unincorporated areas of San Diego County (County of San Diego, 2005). In the Upper Santa Margarita Watershed IRWM Region, internal boundaries include the cities of Murrieta and Temecula, Riverside County, Anza Borrego State Park, Bureau of Land Management and U.S. Forest Service lands, ecological reserves, and water and wastewater agencies. Land uses within the San Diego County portion of the Santa Margarita Watershed include undeveloped, military uses, open space, spaced rural residential, and agriculture (County of San Diego, 2008). Of these, undeveloped and military uses dominate the watershed, comprising 39% and 30% of the watershed, respectively. There are tribal reservations associated with four tribes in the Santa Margarita Watershed. These lands are largely located within the Riverside County (upper) portion of the watershed, although a small portion of the Pauma Reservation is located within the lower Santa Margarita Watershed in San Diego County. Less than 1% of the lower Santa Margarita Watershed (within San Diego County) includes tribal lands.
Water Quality and Water Quality Impairments Several water bodies within the Santa Margarita Watershed are listed on the 303(d) list of impaired water bodies. Due to management issues and rapid population growth expected in the Riverside County portion of the watershed, water quality issues may worsen in the future (County of San Diego 2008). In 2011, the following 303(d) listings were applied to water bodies within the San Diego County portion of the Santa Margarita Watershed (SDRWQCB, 2009): • Oceanside Harbor for copper • Santa Margarita Lagoon for eutrophication • Lower Santa Margarita River for *Enterococcus*, fecal coliform, phosphorus, and total nitrogen

Santa Margarita Watershed
• Upper Santa Margarita River for phosphorus and toxicity • De Luz Creek for iron, manganese, nitrogen, and sulfates • Rainbow Creek for iron, nitrogen, phosphorus, sulfates, and TDS • Sandia Creek for TDS, iron and sulfates Within the Santa Margarita Watershed as a whole, Warm Springs Creek, Long Canyon Creek, Santa Gertrudis Creek, Redhawk Channel, Temecula Creek, and Murrieta Creek, are also listed as impaired for metals, nutrients, TDS, toxicity, E. coli, fecal coliform, or pesticides (SDRWQCB, 2009). In 2005, a TMDL was adopted for total nitrogen and total phosphorus in Rainbow Creek. Water quality listings stated above pertaining to eutrophication, nitrogen, and phosphorus are likely due to nutrient applications from agriculture, nursery operations, municipal wastewater discharges, urban runoff, and septic systems (PCW, N.D.). In addition to nutrient-related concerns, other water quality concerns within the watershed include excessive sedimentation, groundwater degradation and contamination, habitat loss, channelization, flooding, and scour (erosion) (Project Clean Water, N.D.). There is concern that imported water upstream is contributing to increased levels of salts through the lower Santa Margarita Watershed (County of San Diego, 2005). Rancho California Water District is preparing a salt and nutrient management plan (see below), which may result in potential Basin Plan amendments and mitigation measures for the future control of salinity, which would benefit the Lower Santa Margarita Watershed. In light of these water quality concerns in the watershed, efforts are underway to address the water quality needs of the watershed and the sources of pollution. For example, the Santa Margarita Watershed Nutrient Initiative is working with stakeholders to develop and use modeling and the nutrient numeric endpoint (NNE) methodology to assess and address water quality in the watershed. It is hoped that this effort will clarify appropriate water quality standards in the watershed, and through stakeholder outreach and involvement, engage communities in working towards protecting and improving water quality in the watershed. Furthermore, a Water Quality Improvement Plan will be developed for the entire Santa Margarita Watershed in accordance with the 2013 MS4 Permit, which will address some of the sources of pollutant loading into the water bodies and determine actions that can be taken to improve water quality. Efforts associated with the 2013 MS4 Permit will present opportunities for coordinated IRWM projects to ensure that the efforts are integrated to achieve maximum benefits. USMC Base Camp Pendleton has specific water quality concerns pertaining to groundwater quality. Manganese levels within on-base groundwater wells have been detected at levels exceeding secondary drinking water standards; this water quality concern is likely due to natural features associated with the surrounding bedrock. In addition, the Naval Facilities Engineering Command is currently managing groundwater monitoring and remediation activities on Camp Pendleton to address volatile organic compounds in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (USMC, 2011). Per the State's Recycled Water Policy, Camp Pendleton is developing and implementing strategies to reduce salts and nutrients in groundwater in the Lower Santa Margarita River. Additionally, RCWD is leading development of a salt and nutrient management plan for the Upper Santa Margarita River that overlies the Temecula Valley Groundwater Basin (within Riverside County and the Upper Santa Margarita River IRWM Region). More information on the SNMP is found in *Chapter 7, Regional Coordination*. The Basin Plan establishes specific water quality objectives for all hydrologic areas included within the Santa Margarita Watershed (SDRWQCB, 1994). For the HAs included within San Diego County, there are specific water quality objectives established for TDS, chlorides, sulfates, sodium, nitrates, nitrogen-phosphorus ratios, iron, manganese, methylene blue-activated substances (MBAS), boron, turbidity, color, and fluoride.

Santa Margarita Watershed

Stormwater and Flood Management

Within the watershed, the acreage of land uses within mapped flood hazard zones total more than 500 acres, and includes the following: agriculture, 146 acres; commercial and services, 38 acres; industrial, 4 acres; open space and recreation, 273 acres; residential, 42 ; and transportation, communications, and utilities, 40 acres.

Stormwater and flood management within the San Diego County portions of the Santa Margarita Watershed fall under the jurisdiction of the County of San Diego and the USMC Camp Pendleton. In 2008, the County of San Diego updated the Santa Margarita Watershed Urban Runoff Management Plan (WURMP) to meet revised requirements of the 2007 San Diego Municipal Stormwater Permit (County of San Diego, 2008). The 2008 WURMP focuses on management activities that can be taken to reduce urban runoff draining into the Santa Margarita Watershed, and therefore focuses on addressing water quality concerns associated with urban runoff. Stormwater and floodwater management in the Riverside County portions of the Santa Margarita Watershed can impact those portions falling within the San Diego IRWM region. Specifically, channelization and other flood management efforts can lead to increased sedimentation and debris downstream following a storm event (County of San Diego, 2005). The Riverside County Flood Control and Water Conservation District is responsible for stormwater and flood management in the Upper Santa Margarita watershed.

The County of San Diego conducts additional flood management efforts within the Santa Margarita River to reduce and address flood flows associated with FEMA-designated flood areas. According to the County of San Diego, localized flooding within Sandia Creek, a tributary of the Santa Margarita River, impacts access to the communities of Fallbrook and De Luz (County of San Diego, 2007).

The USMC reports that flooding on the Santa Margarita River has damaged infrastructure on Camp Pendleton several times since 1943 (USMC, 2011). Specifically, floods in 1969, 1978, 1980, and 1993 damaged the diversion weir on the Santa Margarita River that diverts water to Lake O'Neill. Flood protection measures on USMC Base Camp Pendleton consist of an earthen levee constructed along the southern edge of the main-stem of the Santa Margarita River channel. Completed in 1999, the levee construction also included the replacement of the bridge over the Santa Margarita River on Basilone Road. The levee and bridge are designed to protect against the 100-year storm event. Camp Pendleton's flood protection program also includes detention basins distributed throughout cantonment areas for the purpose of flood control, as well as measures to safeguard potable water wells in the floodplain against flood damage (USMC, 2011).

Natural Resources

Due to relatively undeveloped nature of the Santa Margarita Watershed, this watershed contains an abundance of habitats and wildlife (County of San Diego, 2008). Habitats within the Santa Margarita River Watershed include chaparral, riparian woodlands, coastal marshes, oak woodlands and montane habitats (PCW, N.D.). These habitats also support the largest populations of seven federally or state-listed endangered species (County of San Diego, 2008). Tribal nations in the Region have indicated concern that jurisdictional habitat conservation efforts to address sensitive habitats and species may not consider current or future tribal developments, and tend to categorize tribal lands as open space.

According to the USMC, there are sixteen special-status species located on Camp Pendleton (USMC, 2011). Of these species, the southern population of steelhead trout and the arroyo toad use stream corridors on Camp Pendleton, the tidewater goby uses brackish water and coastal lagoon habitats associated with the Santa Margarita Estuary, and the least Bell's vireo and the southwestern willow flycatcher both rely on riparian habitats (USMC, 2011). The Santa Margarita River steelhead population is considered a Core 1 population, assigned highest priority in recovery actions (NMFS, 2012). Fish passage was previously thought to be impeded by the Lake O'Neill diversion weir, but confirmed sightings of the Southern California steelhead in 2009 above the Lake O'Neill diversion weir indicate that fish passage is possible. Several invasive species have been identified on Camp Pendleton, including the bullfrog (*Lithobates catesbeiana*), the salt cedar (*Tamarix spp.*), and the giant reed (*Arundo donax*) (USMC Camp Pendleton 2011). Additionally, the perennial pepperweed (*Lepidium latifolium*) has been identified as a threat to Santa Margarita River habitat, while crayfish has been identified as widespread in the watershed (County of San Diego, 2005).

Santa Margarita Watershed

In 2006, stakeholders from the Santa Margarita Watershed and the San Luis Rey Watershed signed a Memorandum of Understanding that established a Weed Management Area and defined actions necessary to prevent the introduction, establishment, and spread of invasive non-native plants within the Santa Margarita and San Luis Rey Watersheds (Mission Resource Conservation District et al, 2006).

Potential Climate Change Impacts

Climate change vulnerabilities that have been identified for the San Diego IRWM Region and are relevant to the Santa Margarita Watershed include but are not limited to:

- Decrease in imported water supply
- Decrease in groundwater supply
- Decrease in surface water availability
- Water quality concerns related to lower surface water flows
- Sea level rise
- Saltwater intrusion
- Decrease in availability of necessary habitat
- Exacerbation of wildfires

Due to the relatively low level of imported water supply used within the San Diego IRWM Region portion of the Santa Margarita Watershed, decreases in imported water supply are anticipated to be a potential although non-critical climate change impact. However, due to the use of groundwater and surface water within the Santa Margarita Watershed, reductions of these resources could impact water users including the USMC Base Camp Pendleton and Fallbrook PUD. Furthermore, due to the extensive amount of habitat and open space located within the Santa Margarita Watershed, reduced water availability and potential water quality concerns could impact or decrease available habitat that is necessary to support endangered species.

Due to the Santa Margarita Watershed's location along the coast, sea level rise could potentially impact this watershed and its coastal ecosystems and habitats. Furthermore, several military support facilities and training areas are located within proximity to the coast, and could potentially be impacted by sea level rise. Lastly, major wildfires, which occurred within the Santa Margarita Watershed as recently as 2007, could potentially occur more frequently due to climate change, which could substantially impact water quality and habitat within the watershed (RWMG, 2009).

Management Issues and Conflicts

Management of the Santa Margarita Watershed presents unique challenges due to cross-jurisdictional management issues, as well as ongoing water quality and water rights litigation within the watershed. In addition, rapid development within the upper watershed area (primarily within Riverside County) and corresponding urbanization and population growth present further challenges associated with increased impervious surfaces, exacerbated water quality issues, and loss of natural resources (County of San Diego, 2005).

Through the IRWM Program and other efforts, local jurisdictions are working collaboratively to address issues within the watershed, and in particular have focused on water quality issues within the Santa Margarita River. In 2011, the San Diego IRWM Region and the Upper Santa Margarita IRWM Region were awarded grant money from DWR to implement a multi-jurisdictional project that will evaluate nutrient water quality objectives for the Santa Margarita River Estuary and the entire Santa Margarita River.

In 1940, a Stipulated Judgment ("1940 Judgment") was issued directing the use and allocation of groundwater and surface water for the stipulating parties. Although considered an adjudicated basin, quantified water rights have not been assigned. In 1963, a Final Judgment and Decree was issued further defining the use of groundwater in the region, and in 1966, a Modified Final Judgment and Decree ("Fallbrook Case") was entered incorporating interlocutory judgments and the 1940 Stipulated Judgment. This document produced an Application to Appropriate Unappropriated Water to the Department of Water Resources (DWR) in the Temecula

Santa Margarita Watershed
Creek, but was not fully executed until 2009 when the State Water Resources Control Board (SWRCB). These judgments were followed by years of court cases and power struggles by multiple parties, including the Federal government (U.S. Marine Corps Camp Pendleton) over water use in the watershed basins, citing the judgments did not fully meet the needs of the parties for effective water management. Finally, after many years, a settlement agreement, "Cooperative Water Resource Management Agreement between Camp Pendleton and Rancho California Water District", was reached and executed in March 2002. This agreement does not supersede the previous judgments (1940 Judgment and Fallbrook Case), but suspends inconsistent terms of the 1940 Stipulated Judgment for so long as the Cooperative Water Resource Management Agreement remains in effect. The Watermaster prepares the "Santa Margarita Watershed Annual Watermaster Report", providing annual reporting of water conditions in the watershed, but does not manage the groundwater basin. The Court has retained jurisdiction over all surface flows of the Santa Margarita River Watershed and all underground waters determined by the Court to be subsurface flow of streams or creeks or which is determined by the Court to add to, support or contribute to the Santa Margarita River stream system. Local vagrant groundwaters that do not support the Santa Margarita River stream system are outside the Court jurisdiction.

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5.3 San Luis Rey Watershed

The San Luis Rey Watershed (San Luis Rey Hydrologic Unit or San Luis Rey HU (903)) is the largest watershed completely within the San Diego IRWM Region. Figure 5-4 presents a map showing the watershed boundaries and primary features.

The San Luis Rey River is the primary watercourse within the watershed, and discharges to the Pacific Ocean north of the City of Oceanside. The watershed is bounded by the Monserate Mountains to the north, Cleveland National Forest and Camp Pendleton to the northwest, and the cities of Oceanside, Vista, San Marcos, and Escondido to the south. Lake Henshaw is the only major drinking water reservoir in the San Luis Rey Watershed.

Roughly one-fourth of the land area in the watershed is located west of Interstate 15, and this area has multiple uses including open space/ undeveloped, residential, commercial/industrial, and agricultural. East of Interstate 15, most of the land is either undeveloped or agricultural. Land use authorities include the County, the State, the Federal government, and several tribal nations.

Groundwater and surface waters in the upstream portion of the San Luis Rey Watershed are an important local supply source for the Vista Irrigation District, City of Escondido, Pala/Pauma communities, and local Indian Tribes. However, several large water agencies within the watershed (e.g. Valley Center Municipal Water District, Rainbow Municipal Water District, Fallbrook PUD) are virtually 100% reliant on the availability of imported water. The City of Oceanside, which is also a member agency of the San Diego County Water Authority and relies on imported water sources, is the only agency in the downstream portion of the watershed that develops any sort of local water supplies, through demineralization of brackish groundwater from the Mission Groundwater Basin.

The North San Diego County Regional Recycled Water Project – funded by Proposition 84-Round 1 – enables expansion of recycled water throughout the North County watersheds.

Photo credit: Kim Thorner, Olivenhain Municipal Water District

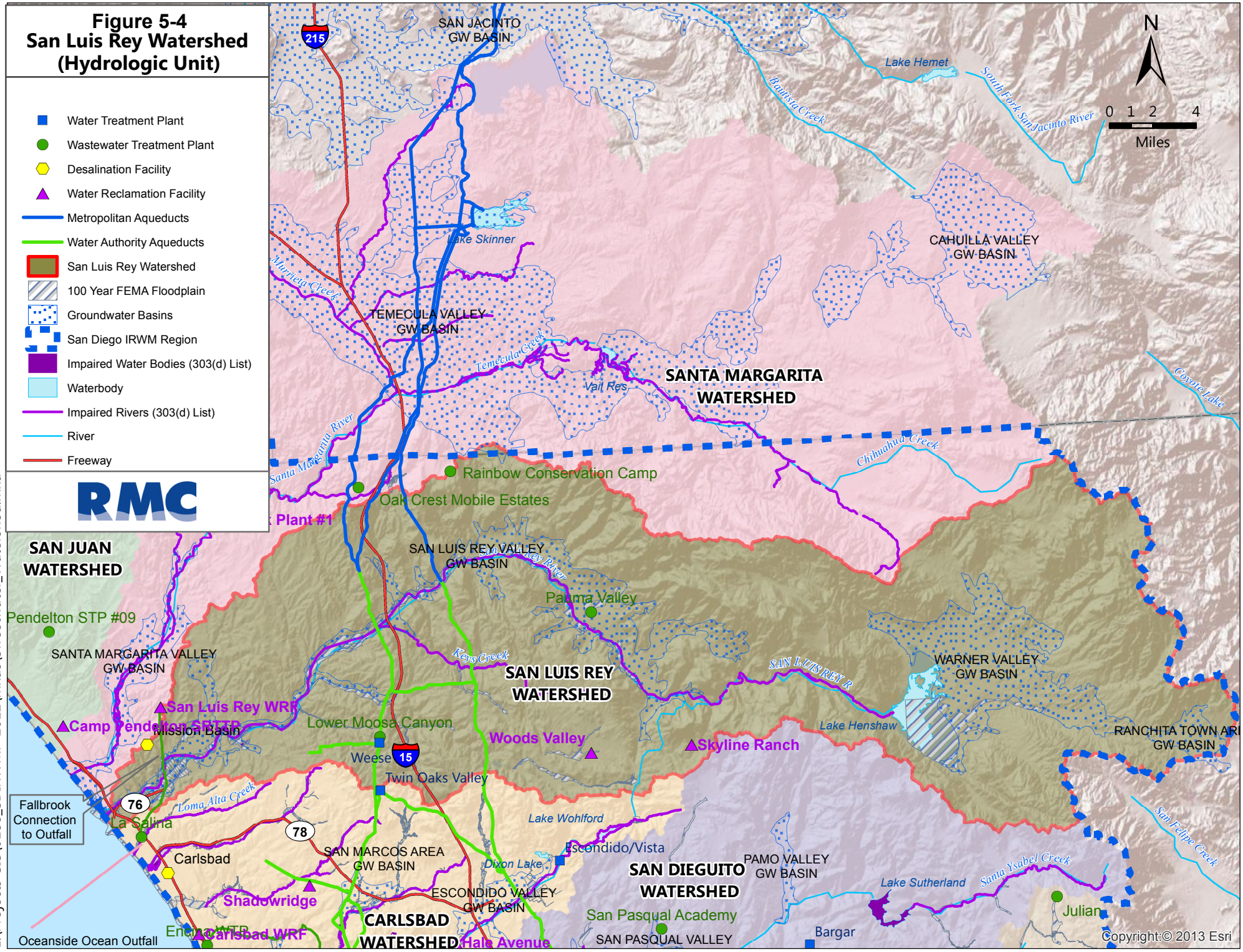
Figure 5-4
San Luis Rey Watershed
(Hydrologic Unit)
Water Treatment Plant
Wastewater Treatment Plant
Desalination Facility
Water Reclamation Facility
Metropolitan Aqueducts
Water Authority Aqueducts
San Luis Rey Watershed
100 Year FEMA Floodplain
Groundwater Basins
San Diego IRWM Region
Impaired Water Bodies (303(d) List)
Waterbody
Impaired Rivers (303(d) List)
River
Freeway
RMC
N
0 1 2 4
Miles
SAN JACINTO GW BASIN
Lake Hemet
Bautista Creek
South Fork San Jacinto River
Lake Skinner
CAHUILLA VALLEY GW BASIN
Murrieta Creek
TEMECULA VALLEY GW BASIN
Temecula Creek
Vail Res
SANTA MARGARITA WATERSHED
Coyote Lake
Santa Margarita River
Chihuahua Creek
Rainbow Conservation Camp
Oak Crest Mobile Estates
Plant #1
SAN JUAN WATERSHED
SAN LUIS REY VALLEY GW BASIN
San Luis Rey River
Pauma Valley
Pendelton STP #09
SANTA MARGARITA VALLEY GW BASIN
Keys Creek
SAN LUIS REY WATERSHED
SAN LUIS REY R
WARNER VALLEY GW BASIN
San Luis Rey WRF
Camp Pendelton SRTTP
Mission Basin
Lower Moosa Canyon
Woods Valley
Lake Henshaw
Skyline Ranch
RANCHITA TOWN AR GW BASIN
Weese
15
Twin Oaks Valley
Fallbrook Connection to Outfall
76
Loma Alta Creek
La Salina
78
Lake Wohlford
San Felipe Creek
Carlsbad
SAN MARCOS AREA GW BASIN
Escondido/Vista
Dixon Lake
PAMO VALLEY GW BASIN
SAN DIEGUITO WATERSHED
Santa Ysabel Creek
Lake Sutherland
Shadowridge
ESCONDIDO VALLEY GW BASIN
CARLSBAD WATERSHED
San Pasqual Academy
Julian
Encina WTP
Carlsbad WRF
Hale Avenue
SAN PASQUAL VALLEY
Bargar
Oceanside Ocean Outfall
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San Luis Rey Watershed

Hydrology

The 562-square mile San Luis Rey Watershed is the largest watershed completely within the San Diego IRWM Region. The San Luis Rey Watershed is comprised of three hydrologic areas (HAs) including: Lower San Luis HA (903.1), Monserate HA (903.2), and Warner Valley HA (903.3).

The major surface water body within the San Luis Rey Watershed is the San Luis Rey River. The San Luis Rey River has headwaters in the Palomar Mountains and the Hot Springs Mountains, as well as several other mountain ranges along the eastern border of the San Diego IRWM Region. The San Luis Rey River flows in a westerly direction, draining into the Pacific Ocean near the City of Oceanside (Project Clean Water, N.D.).

There are four water supply reservoirs in the San Luis Rey Watershed, described in *Water Systems* below. The San Luis Rey River is hydrologically connected to Lake Henshaw, a manmade impoundment created by the Henshaw Dam (Vista Irrigation District, 2011). The Escondido Canal, located downstream of Lake Henshaw, conveys flows from Lake Henshaw to the City of Escondido via Lake Wohlford in the Carlsbad Watershed (City of Oceanside et al, 2008). West of the Escondido Canal, the San Luis Rey River is intermittent and perennial, as is common for many streams within Southern California (Oceanside et al, 2008).

Guajome Lake, a manmade lake located in Guajome Regional Park, is a small surface water body that is primarily used for recreational purposes (City of Oceanside, N.D.). Foss Lake, one of the only inland salt water wetlands in San Diego County, was previously expanded over 75 acres within the San Luis Rey Watershed (City of Oceanside et al., 2008).

Water Systems

Water systems within the San Luis Rey Watershed include those used to convey flows from the reservoirs and the San Luis Rey River. There are two water supply reservoirs in the San Luis Rey Watershed, including:

- Lake Henshaw, owned by Vista Irrigation District and stores surface water
- Turner Reservoir, owned by Valley Center Municipal Water District and stores surface water

Lake Henshaw, which is owned and operated by Vista Irrigation District, which has a cooperative agreement with the City of Escondido to provide flows to Lake Wohlford (located within the Carlsbad Watershed) through the Escondido Canal (City of Oceanside et al., 2008).

Water supply agencies within the San Luis Rey Watershed include the City of Oceanside, Vista Irrigation District, Valley Center Municipal Water District, Fallbrook PUD, Rainbow Municipal Water District, and Yuima Municipal Water District. In addition, a small portion of the USMC Base Camp Pendleton is located within the San Luis Rey Watershed; the USMC is responsible for providing water services within Camp Pendleton. All of the aforementioned water supply agencies are member agencies of the San Diego County Water Authority, and therefore receive imported water through the Water Authority's imported water aqueducts. In addition, three of the tribal nations located within the San Luis Rey Watershed have regulated Public Water Systems that supply water to their respective reservations. Those tribal nations include: Pala Band of Mission Indians, La Jolla Band of Luiseño Indians, and San Pasqual Band of Indians. The Rincon Band of Luiseño Indians purchases raw water from Escondido and the Vista Irrigation District, and the San Pasqual Band of Indians purchases treated water from Valley Center Municipal Water District.

Wastewater agencies within the San Luis Rey Watershed include the City of Oceanside, Fallbrook PUD, the Valley Center Community Services District, the City of Vista, the Rainbow Municipal Water District, and the Pauma Valley Community Services District. The Pala Band of Mission Indians operates a tertiary wastewater treatment plant that serves most of the buildings located on the Pala Reservation.

Groundwater basins underlying the San Luis Rey Watershed include the San Luis Rey Valley (9-7), Warner Valley (9-8), and Ranchita Town Area (9-25) basins defined according to DWR Bulletin 118. According to DWR, major recharge areas within the aforementioned groundwater basins include the San Luis Rey River and its tributaries and infiltration of runoff (DWR (c), 2004, DWR (d), 2004, and DWR (e), 2004). Vista Irrigation District operates groundwater wells in the Warner Valley basin, and groundwater from the basin is generally conveyed to Lake Henshaw, and then to the San Luis Rey River/Escondido Canal (Vista Irrigation District, 2011). The City of

San Luis Rey Watershed

Oceanside also operates groundwater wells to extract brackish groundwater from the Mission Basin, which is part of the San Luis Rey Valley basin (City of Oceanside, 2011). The Salt and Nutrient Management Planning guidance document developed by the Southern California Salinity Coalition and the San Diego County Water Authority further divides the San Luis Rey Valley groundwater basin into five subbasins: Oceanside/Mission, Bonsall, Pala, Pauma, and Moosa. The Pauma and Pala subbasins are a medium priority (Tier B) basin for SNMPs, while the Bonsall and Moosa subbasins are low priority (Tier D-2) for SNMPs. The Warner Valley groundwater basin is a lowest priority (Tier E) basin for SNMP. See *Chapter 7, Regional Coordination,* for more information on basin SNMP prioritization.

Internal Boundaries and Land Uses

The San Luis Rey Watershed resides almost entirely within San Diego County, although a small portion (0.2% of the total watershed) lies within Riverside County. Within San Diego County, the San Luis Rey Watershed is primarily within the jurisdiction of San Diego County (95.2% of the watershed), but is also within the jurisdiction of the City of Oceanside (4.4%), the City of Vista (0.2%), and the City of Escondido (<0.1%). Other governmental agencies residing within the watershed include the United States (USMC Base Camp Pendleton), the Forest Service (Cleveland National Forest), and State of California lands (parks, state roadways, etc.) (City of Oceanside et al, 2008). Furthermore, there are several tribal land holdings within the watershed, including the Pala Reservation (approximately 12,333 acres), the Pauma and Yuima Reservation (approximately 5,826 acres), the Rincon Reservation (approximately 3,918 acres), the La Jolla Reservation (approximately 8,798 acres), the San Pasqual Reservation (approximately 1,412 acres), the Santa Ysabel Reservation (approximately 15, 270 acres), and the Los Coyotes Reservation (approximately 24,762 acres) (University of San Diego, N.D.). Approximately 15% of the total area within the San Luis Rey Watershed contains tribal lands.

The majority of the watershed is undeveloped (55%); agriculture and residential uses serve as the most dominant land uses in developed areas. The remaining 22% of the watershed contains residential, parks/open space, commercial/industrial, recreation, and schools (City of Oceanside et al, 2008).

Water Quality and Water Quality Impairments

Several water bodies within the San Luis Rey Watershed are listed on the 303(d) list of impaired water bodies. Impaired water bodies include:

- Guajome Lake for eutrophication
- San Luis Rey River (lower) for chloride, TDS, *Enterococcus*, fecal coliform, phosphorus, nitrogen, and toxicity
- San Luis Rey River (upper) for nitrogen
- Keys Creek for selenium
- Pacific Ocean Shoreline, Mouth of the San Luis Rey River for *Enterococcus* and total coliform

Monitoring data suggests that nutrients entering Guajome Lake from residences, commercial nurseries, commercial horse facilities, and residential horse facilities could be the cause of eutrophication. Chloride and TDS within the San Luis Rey River may be due to salt water intrusion, and may also be due to natural causes. Foss Lake, one of the only inland salt water wetlands in San Diego County, has naturally elevated salt levels. The source of bacteria along the Pacific Ocean Shoreline within the San Luis Rey Watershed is unknown at this time. Nitrogen and phosphorous-containing compounds found in the local streams are known to originate from urban runoff, wastewater/sewage spills, septic tank leaks, and agriculture sources (City of Oceanside et al., 2011).

The 2011-2012 Annual Report for the San Luis Rey River Watershed Urban Runoff Management Program (WURMP) noted that a number of activities aimed at improving water quality are underway in the watershed. For example, two pet waste removal projects removed an estimated 8,823 pounds of pet wastes from the watershed, reducing the bacteria entering the waterways. It also described the water quality in the upper part of the watershed as generally high (City of Oceanside et al., 2013). Furthermore, a Water Quality Improvement Plan will be developed for the entire San Luis Rey Watershed in accordance with the 2013 MS4 Permit, which

San Luis Rey Watershed
will address some of the sources of pollutant loading into the water bodies and determine actions that can be taken to improve water quality. Efforts associated with the 2013 MS4 Permit will present opportunities for coordinated IRWM projects to ensure that the efforts are integrated to achieve maximum benefits. The Basin Plan establishes specific water quality objectives for all hydrologic areas included within the San Luis Rey Watershed. For the three specific HAs included within the San Luis Rey Watershed, there are specific water quality objectives established for TDS, chlorides, sulfates, sodium, nitrates, nitrogen-phosphorus ratios, iron, manganese, methylene blue-activated substances (MBAS), boron, turbidity, color, and fluoride. The Water Board has the authority to waive the requirements for a person to file a report of waste discharge and/or be issued waste discharge requirements (WDRs) and instead grant waivers for applicable discharges. One of the conditional waivers available, Discharges from Agricultural and Nursery Operations, is for discharges that contain pollutants that can percolate to groundwater or runoff to surface waters (Regional Board, N.D.). Groundwater quality in the San Luis Rey Watershed is generally of low concern, except for the Pala/Pauma subbasin, which is a Tier B basin for SNMPs. To date, there has been no progress towards developing an SNMP for the subbasin, though is it anticipated that an SNMP will be developed in the future (Regional Board, 2013).
Stormwater and Flood Management Major drainages within the watershed include Keys Canyon Creek, Moosa Canyon Creek, Pilgrim Creek, and San Luis Rey River, which encompass drainage areas of approximately 31.58, 34.7, 19, and 562 square miles, respectively. The peak discharges during a 100-year event for Keys Canyon Creek, Moosa Canyon Creek, and Pilgrim Creek are 22,911, 13,000, and 1,925 CFS, respectively. The peak discharges during a 100-year event for San Luis Rey River at three locations range from CFS41,000 to 51,000 CFS. Within the watershed, the acreage of land uses within mapped flood hazard zones total nearly 16,000 acres, and includes the following: agriculture, 2,382 acres; commercial and services, 917 acres; industrial, 264 acres; open space and recreation, 8,262 acres; residential, 1,953; and transportation, communications, and utilities, 1,012 acres (see Appendix 7-B, Integrated Flood Management Planning). Stormwater and flood management within the San Luis Rey Watershed generally fall under the jurisdiction of the County of San Diego, the City of Oceanside, and the City of Vista. The County has jurisdiction over the 95.2% of the watershed. The cities of Oceanside and Vista are also responsible for implementing provisions included in the San Luis Rey River Watershed Urban Runoff Management Program (WURMP), which focuses on management activities that can be taken to reduce stormwater runoff and associated water quality concerns (City of Oceanside et al., 2008). The U.S. Army Corps of Engineers (USACE) has been involved in flood control management associated with the San Luis Rey River since authorization of the San Luis Rey River Flood Control Project in 1970 (USACE, 2013). This project included design and construction of a flood control channel along portions of the San Luis Rey River to convey flood flows during a Standard Project Flood (89,000 CFS), and also includes vegetation and sediment removal operation and maintenance efforts to maintain the channel's flood control capacity (USACE, 2013). Due to funding limitations, the USACE and other jurisdictions have not consistently removed vegetation within the flood channel, which resulted in the establishment of riparian species within and along the San Luis Rey River. The presence of such species has complicated flood maintenance within the San Luis Rey River as agencies must balance vegetation removal efforts that may impact sensitive species with flood control maintenance that is required for flood protection. Although the San Luis Rey Flood Control Project has a rated capacity of 89,000 CFS, local stakeholders are still concerned about future flooding and potential flood impacts. In 1916 the San Luis Rey River experienced a very large flood event that inundated the entire San Luis Rey Valley and had a stakeholder-reported flow rate of 96,000 CFS (USGS 1918). If a flood of this magnitude were to occur again there could be substantial damage to nearby properties and infrastructure as the flood control channel would be unable to handle flood flows greater than those modeled for a Standard Project Flood (89,000 CFS).

San Luis Rey Watershed
Although much of the San Luis Rey River is unchannelized, within the City of Oceanside the river has been channelized by levees for flood control purposes. Flood flows within the San Luis Rey River are limited as this river is intermittent and perennial in nature; stream gage data suggests that flood flows have been substantially reduced within the river since construction of Henshaw Dam (City of Oceanside et al., 2008). The County of San Diego conducts additional flood management efforts throughout the San Luis Rey Watershed to reduce and address flood flows associated with FEMA-designated flood areas, including a comprehensive flood forecast model to cover the entire San Luis Rey Watershed and its primary tributaries (County of San Diego, 2007). According to the County of San Diego, localized flooding occurs in several reaches of the San Luis Rey River, including: • Between Lake Henshaw and the La Jolla Indian Reservation • Along Cole Grade Road • At Shearer Crossing (where the river meets Interstate 15) • Along Pauma Valley Drive • Along Wiskon Way • Along Valley Center Road and in the vicinity of the Rincon Casino Flooding and mudslide events during rain events have occurred in the San Luis Rey Watershed following fires. Wildfires compromise the stability of soils and create land disturbances that increase erosion processes during/after rain events. 55,000 acres of land in the San Luis Rey Watershed burned during the 2007 Rice and Poomacha wildfires. Rain events increased sediment runoff (high concentrations of TDS and Total Suspended Solids, and turbidity) and mudslide type events at and around the burned site (DFG, 2010).
Natural Resources Due to relatively undeveloped nature of the San Luis Rey Watershed, the watershed contains intact habitat and wildlife areas comprised of 36 vegetation communities, the dominant of which area coastal sage scrub, chaparral, and grasslands. The San Luis Rey Watershed also contains defined freshwater fish communities including upland, lowland, and coastal lagoons (City of Oceanside et al., 2008). The San Luis Rey Watershed had a historic population of native fish, including the Southern California Steelhead, which declined in the 1930's upon completion of the Henshaw Dam. In 2007, an adult steelhead trout (*Oncorhynchus mykiss*) was observed within the San Luis Rey River, and the northern area of the watershed continues to support a population of native rainbow trout (Coastal Watershed Planning and Assessment Program, 2008). The San Luis Rey Watershed contains numerous protected and special-status species and vegetation communities, and is included in the North County Subarea of San Diego County's Multiple Species Conservation Program (MSCP) (City of Oceanside et al., 2008). Wetland habitats along the San Luis River are inhabited by endangered avian species; development in and around the river may be restricted due to the presence of such species. In 2006, stakeholders from the Santa Margarita Watershed and the San Luis Rey Watershed signed a Memorandum of Understanding that established a Weed Management Area and defined actions necessary to prevent the introduction, establishment, and spread of invasive non-native plants within the Santa Margarita and San Luis Rey Watersheds (Mission Resource Conservation District et al., 2006). Tribal nations located within the watershed have indicated concern that jurisdictional habitat conservation efforts such as the County's MSCP do not consider current or future tribal development plans, and tend to categorize tribal lands as open space.

San Luis Rey Watershed
Potential Climate Change Impacts Climate change vulnerabilities that have been identified for the San Diego IRWM Region and are relevant to the San Luis Rey Watershed include but are not limited to: • Decrease in imported water supply • Decrease in groundwater supply • Decrease in surface water availability • Sea level rise • Decrease in availability of necessary habitat • Exacerbation of wildfires Due to the complicated nexus between imported water, groundwater, and surface water (refer to Management Issues and Conflicts below), climate change could potentially impact water resources within the San Luis Rey Watershed if the availability or quality of any of these resources changes substantially due to climate change. Because of the San Luis Rey Watershed's proximity to the coast, sea level rise has the potential to impact several municipalities and resources within the watershed. Saltwater intrusion has been a historic issue within the San Luis Rey River groundwater basin, and changes to the level of seawater could potentially exacerbate this issue. Lastly, wildfires are an identified issue within the San Luis Rey Watershed, and several recent ones have occurred within the watershed (RWMG, 2009). If the frequency of wildfires increases due to climate change, local water quality and habitat within the watershed could be adversely impacted.
Management Issues and Conflicts The San Luis Rey Watershed had a historical population of native fish, including the Southern California Steelhead, which declined in the 1930's upon completion of the Henshaw Dam (Coastal Watershed Planning and Assessment Program, 2008). Dams, water diversions, and flood control structures have had the most severe impacts on steelhead trout populations throughout California by cutting off access to upstream spawning and rearing habitats and reducing the flows necessary for immigration of adult and emigration of juvenile steelhead trout (Hunt and Associates, 2008). Surface water and shallow aquifer issues within the San Luis Rey Watershed have been well documented and persistent for several decades. Prior to the 1960's, groundwater pumping in the western portion of the watershed led to lowering of groundwater levels, which led to seawater intrusion between two to six miles inland from the Pacific Coast. Delivery of imported water into the San Diego Region after completion of the first San Diego Aqueduct in 1947 led to reduced groundwater pumping. Over time, reduced groundwater pumping allowed groundwater levels to recover to historical levels, which also reduced effects associated with seawater intrusion. However, during this same time period, increased development and increased irrigation with imported water led to increased salt loading into the watershed, which affected groundwater quality to the point that groundwater use declined. As a result of severely reduced groundwater pumping, the depth of groundwater has risen such that perennial waters in the San Luis Rey River have moved upstream (City of Oceanside et al., 2008). The San Luis Rey Watershed Council was created in 1997 to develop and implement a comprehensive resource management plan for the San Luis Rey River and its tributaries. In 2001, the San Luis Rey Watershed Council developed a list of priority issues identified for the watershed, including the following (San Luis Rey Watershed Council, 2001): • Water Quality and Quantity – focusing on NPDES permits and TMDLs, water quality monitoring and analysis, and improving quality of surface water and groundwater. • Heavy Industrial Uses – focusing on the proposed Gregory Canyon Landfill. • Extractive Uses – focusing on sand and gravel mining. • Invasive Plant Species Management – focusing on the San Luis Rey River Weed Management Area.

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• Agricultural Uses – focusing on maximizing irrigation and fertilizer efficiency, maximizing pesticide efficiency/integrated pest management, and improving erosion control measures. • Fire Management – focusing on improving coordination between stakeholders. • Wildlife Management – focusing on the San Diego County MSCP, and City and SANDAG-based Multiple Habitat Conservation Plans. • Public Open Space Management – focusing on recreation and species habitat management. • Floodplain Management and Flood Warning – focusing on National Weather Service Flood Forecasting and San Diego County's ALERT Storm Warning System. • Recreational Uses – focusing on golf courses, parks, tourism, hiking, fishing, and camping. • Wetlands Protection and Restoration – focusing on the Wilderness Gardens Preserve and proposed mitigation sites. • Preserve Historical and Cultural Legacies Future water quality concerns over the proposed 300-acre Gregory Canyon Landfill two miles south of the community of Pala have been an issue in the San Luis Rey Watershed. Many believe the Gregory Canyon Landfill poses a major threat to local surface and groundwater resources (Save Gregory Canyon, N.D.). Potential impacts associated with the landfill could be costly to mitigate. Sand replenishment along the coast has also been an issue in the San Luis Rey Watershed due to upstream development preventing the transport and deposition of sand. The lower San Luis Rey River valley is channelized which prevents sand deposition in the alluvial plain (Coastal Morphology Group et al., N.D.).

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5.4 Carlsbad Watershed

The Carlsbad Watershed (Carlsbad Hydrologic Unit or Carlsbad HU (904)) features a significant number of the Region's coastal lagoons. The Carlsbad Watershed is comprised of six small hydrologic areas, including Loma Alta (904.1), Buena Vista Creek (904.2), Agua Hedionda (904.3), Encinas (904.4), San Marcos (904.5), and Escondido Creek (904.6). The aforementioned creeks all drain in a westerly direction, draining into one of four major coastal lagoons (Buena Vista Lagoon, Agua Hedionda Lagoon, Batiquitos Lagoon, and San Elijo Lagoon), the Loma Alta Slough, or the Pacific Ocean.

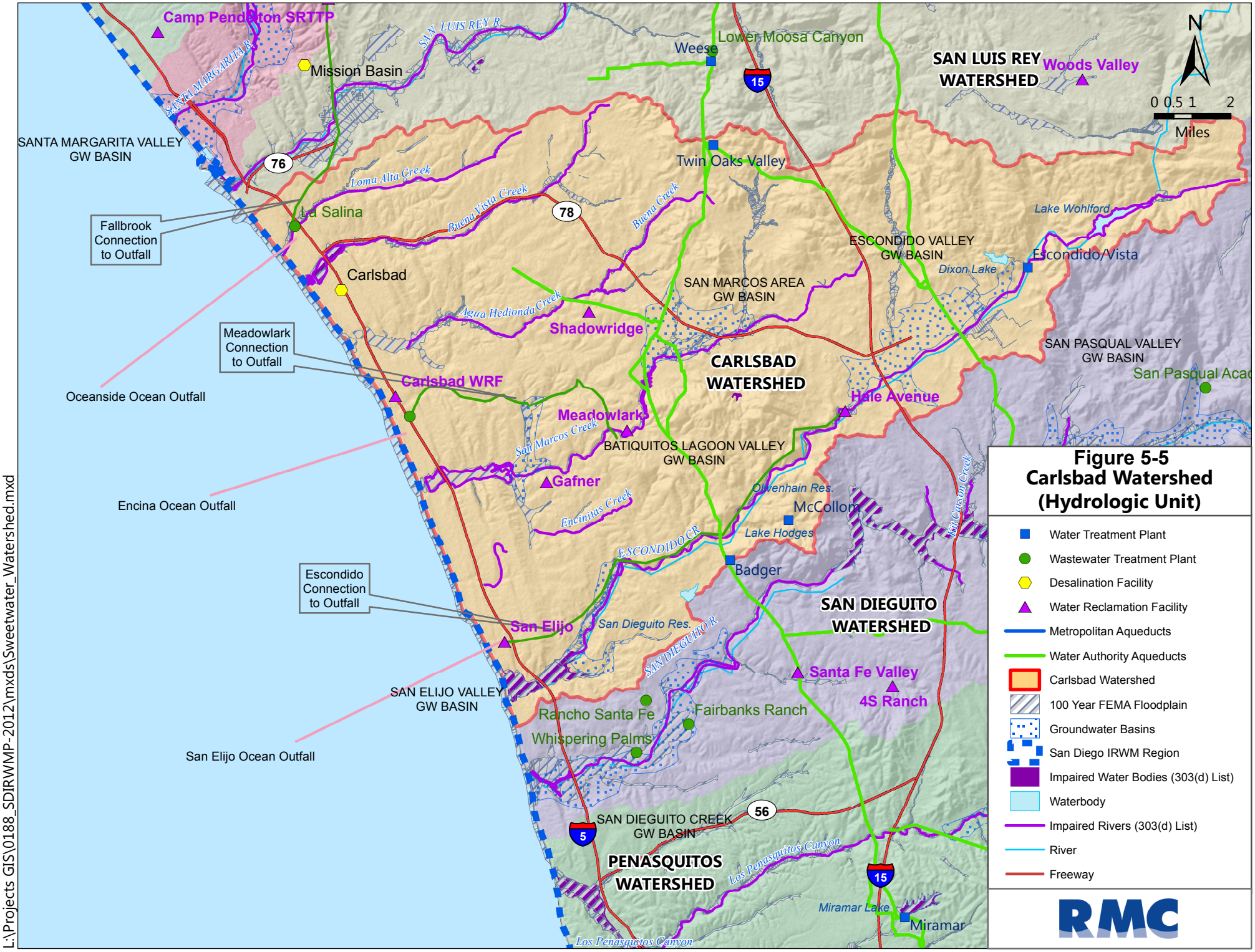
Figure 5-5 presents a map of the Carlsbad Watershed showing principal features and boundaries. Approximately half of the 211 square mile Carlsbad Watershed is urbanized, with a high percentage of the undeveloped land in private ownership. Urban and agricultural runoff is a critical concern within the Carlsbad Watershed, and can impact both the coastal lagoons and local beaches.

Water supply reliability is also critical issue within the Carlsbad Watershed, as some water agencies (e.g. City of Carlsbad) are currently 100% reliant on imported supply. Surface reservoirs within the Carlsbad Watershed include Lake Wohlford, Dixon Lake, Lake San Marcos, Olivenhain Reservoir, and San Dieguito Reservoir.

Only a limited quantity of groundwater exists within the Carlsbad Watershed, and groundwater salinity represents a limitation to its use as a potable supply.

Lake Wohlford is the largest surface water reservoir in the Carlsbad Watershed.

Photo credit: Craig Whitmore, City of Escondido



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Carlsbad Watershed

Hydrology

The Carlsbad Watershed contains several major stream systems that are each associated with the six small hydrologic areas (HAs), including:

- Loma Alta HA (904.1), which drains into Loma Alta Slough,
- Buena Vista Creek HA (904.2), which drains into Buena Vista Lagoon,
- Agua Hedionda HA (904.3), which drains into Agua Hedionda Lagoon,
- Encinas HA (904.4), which drains to the Pacific Ocean,
- San Marcos HA (904.5), which drains into Batiquitos Lagoon, and
- Escondido Creek HA (904.6), which drains into San Elijo Lagoon.

The other major surface water bodies within the Carlsbad Watershed include five reservoirs and storage lakes, described in *Water Systems* below.

Source water for Escondido Creek is from Lake Wohlford and Dixon Lake, which include waters transferred from the San Luis Rey Watershed via the Escondido Canal. San Marcos Creek drains into Lake San Marcos. Olivenhain Reservoir, created by the Olivenhain Dam, is located within the Carlsbad Watershed and is connected to Hodges Reservoir (within the San Dieguito Watershed) as part of the San Diego County Water Authority's Emergency Storage Project (OMWD, 2011). San Dieguito Reservoir, which is located on the border of the Carlsbad and San Dieguito Watersheds, stores raw water and is co-owned and operated by the Santa Fe Irrigation District and the San Dieguito Water District (SFID, 2011).

Water Systems

There are five major surface water bodies in the watershed, which are used to store surface water or imported water:

- Lake Wohlford, owned by City of Escondido and stores surface water
- Dixon Lake, owned by City of Escondido and stores surface water and imported water
- Lake San Marcos, a privately owned lake (Citizens Development Corporation) that stores surface water
- Olivenhain Reservoir: owned by Water Authority, stores natural runoff
- San Dieguito Reservoir: owned by San Dieguito Water District and Santa Fe Irrigation District, stores imported water from the Water Authority's Second Aqueduct and upstream releases

Water systems within the Carlsbad Watershed are complex, containing all or portions of seven cities (Carlsbad, San Marcos, Encinitas, Oceanside, Vista, Escondido, and Solana Beach), the County of San Diego, and a small portion of the San Pasqual Band of Indians' Reservation. In addition, the Carlsbad Watershed contains all or portions of ten water agencies (City of Escondido, City of Oceanside, Carlsbad Municipal Water District, Olivenhain Municipal Water District, Rincon del Diablo Municipal Water District, Santa Fe Irrigation District, San Dieguito Water District, Vallecitos Water District, Valley Center Municipal Water District and Vista Irrigation District) that are member agencies of the San Diego County Water Authority. The San Pasqual Band of Indians operates a Public Water System and also purchases water from the Valley Center Municipal Water District. As such, within the Carlsbad Watershed there is a large amount of imported water use and limited amounts of other water supplies.

Within the Carlsbad Watershed, local water sources include runoff that is collected within Lake Wohlford and Dixon Lake. The Carlsbad Watershed is home to three potable water treatment plants: Escondido/Vista (capacity of 65 MGD), McCollom (capacity of 34 MGD), and Badger (capacity of 40 MGD). Water produced at these plants come from storage or surface water in both the Carlsbad Watershed and the San Dieguito Watershed, and may be used outside the Carlsbad Watershed.

Groundwater basins underlying the Carlsbad Watershed include the Batiquitos Lagoon Valley (9-22), San Elijo Valley (9-23), San Marcos Area (9-32), and Escondido Valley (9-9) basins defined according to DWR Bulletin 118. According to DWR, major recharge areas within the aforementioned groundwater basins include

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corresponding rivers or creeks and their tributaries as well as infiltration of runoff (DWR (f), 2004; DWR (g), 2004; DWR (h), 2004; and DWR (i), 2004). As described in *Chapter 7, Regional Coordination*, Rincon del Diablo Municipal Water District is developing a Salt and Nutrient Management Plan (SNMP) for the medium priority (Tier B) Escondido Valley groundwater basin, in coordination with the Regional Board and the City of Escondido. The San Marcos Basin is also a Tier B groundwater basin, though no SNMP is currently under development for this basin. However, it is anticipated that a SNMP will be developed in the future (Regional Board, 2013). The Batiquitos and San Elijo basins are low priority (Tier D-2) basins, which are unlikely to require a SNMP.

In November 2012, the Water Authority's Board of Directors voted to approve a 30-year Water Purchase Agreement to purchase up to 56,000 acre-feet of water annually from Poseidon Water (Poseidon) (SDCWA, 2012). Poseidon is currently constructing a reverse-osmosis seawater desalination facility and 10 miles of pipeline in Carlsbad. Two Water Authority member agencies, Vallecitos Water District and Carlsbad Municipal Water District, will purchase a combined total of 6,000 acre-feet of the desalinated water as their own local supply under separate agreements with the Water Authority. The facility is expected to produce 50 MGD of water starting in 2016 and by 2020 will generate 7% of the region's water demand (SDCWA, 2011; SDCWA, 2012 and Poseidon 2013). The desalination facility will enhance the Region's water reliability through supply diversification. The plant will be located at the Agua Hedionda Lagoon next to the Encina Power Plant, a favorable location due to its proximity to the ocean and the available use of an existing intake and outfall (Poseidon, 2013).

Upper San Marcos Creek at Via Vera Cruz, San Marcos, CA.

Photo Credit: Erica Ryan, City of San Marcos

Since 2009, the City of San Marcos with oversight from the San Diego Regional Water Quality Control Board, has led a unique consortium of volunteer stakeholders that includes the County of San Diego, City of Escondido, California Department of Transportation, San Marcos Unified School District, and Vallecitos Water District to identify and implement a holistic solution to the estimated 18,000-acre watershed area of Upper San Marcos Creek and Lake San Marcos. In addition, the City of San Marcos has integrated its new downtown, per the San Marcos Creek Specific Plan, with the overall stakeholder effort for the Upper San Marcos Creek through implementing key watershed sustainability goals for water resource management, efficient water use, reduction in reliance on imported water through groundwater resources, creek restoration, improvements in water quality, and reduction of hydromodification effects from the Upper San Marcos Creek.

Internal Boundaries and Land Uses

The Carlsbad Watershed crosses multiple local jurisdictional boundaries including the cities of Carlsbad, San Marcos, Encinitas, Oceanside, Vista, Escondido, Solana Beach, and unincorporated portions of San Diego County (City of Carlsbad et al., 2008). A very small portion of the San Pasqual Reservation is located within the eastern portion of the Carlsbad Watershed, along the border of the San Luis Rey Watershed. Population growth is expected to increase in the aforementioned jurisdictional areas from existing levels of approximately 500,000 to over 700,000 by 2015, making the Carlsbad Watershed the third most populous watershed within San Diego County (PCW, N.D.).

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The majority of the Carlsbad Watershed is urbanized (69%), and is therefore dominated by urban-related land uses including residential (32%), commercial/industrial (13%), freeways and roads (10%), agricultural (6%), open space (11%), leaving a small portion of the watershed (18%) as vacant or undeveloped (Carlsbad et al., 2008). Population increases as described above are anticipated to occur largely on vacant or undeveloped lands, as the majority of these lands are in private ownership (PCW, N.D.). Therefore, as population increases in the watershed, the amount of vacant or undeveloped land is expected to decrease. Tribal lands are limited within the Carlsbad Watershed; less than 1% of the watershed contains tribal lands.

Water Quality and Water Quality Impairments

Multiple water bodies within the Carlsbad Watershed are listed on the 303(d) list of impaired water bodies. Impaired water bodies and the constituents for which they are listed are provided below:

- Agua Hedionda Creek for *Enterococcus*, fecal coliform, phosphorus, nitrogen, toxicity, manganese, selenium, and TDS
- Buena Creek for DDT (dichlorodiphenyltrichloroethane, an insecticide), nitrate, and nitrite
- Buena Vista Creek for sediment toxicity and selenium
- Buena Vista Lagoon for indicator bacteria, nutrients, and sedimentation/siltation
- Pacific Ocean Shoreline, Cardiff State Beach at Cardiff Lagoon for total coliform
- Cottonwood Creek for DDT, selenium, and sediment toxicity
- Encinitas Creek for selenium and toxicity
- Escondido Creek for *Enterococcus*, fecal coliform, DDT, manganese, nitrogen, phosphate, selenium, sulfates, toxicity, and TDS
- Lake San Marcos for ammonia as nitrogen and nutrients
- Loma Alta Creek for selenium and toxicity
- Pacific Ocean Shoreline, Loma Alta Creek mouth for indicator bacteria
- Loma Alta Slough for eutrophication and indicator bacteria
- Pacific Ocean Shoreline, Moonlight State Beach at Cottonwood Creek outlet for total coliform
- San Elijo Lagoon eutrophication, indicator bacteria, and sedimentation/siltation
- San Marcos Creek for DDE (dichlorodiphenyldichloroethylene, a byproduct of DDT), phosphorous, selenium, and sediment toxicity
- Pacific Ocean Shoreline, San Mateo Creek outlet for total coliform

The Basin Plan established specific water quality objectives for the Carlsbad Watershed, as well as beneficial uses for individual water bodies. Due to water quality impairments listed above, several water bodies within the watershed are also experiencing impairments to beneficial uses. Specifically, three of the four coastal lagoons within the watershed (Agua Hedionda, Buena Vista, and San Elijo) are impaired due to excessive bacteria and sediment loading from upstream sources (PCW, N.D.). A Water Quality Improvement Plan will be developed for the entire Carlsbad Watershed in accordance with the 2013 MS4 Permit, which will address some of the sources of pollutant loading into the water bodies and determine actions that can be taken to improve water quality. Efforts associated with the 2013 MS4 Permit will present opportunities for coordinated IRWM projects to ensure that the efforts are integrated to achieve maximum benefits.

In 1997 and 1998, the Carlsbad Watershed Network (CWN) was formed to protect, restore, and enhance water quality, habitat, and natural resources in the Carlsbad Watershed. The CWN is comprised of eleven member organizations that have developed a variety of projects or programs to support the goals of the CWN and benefit the Carlsbad Watershed (CWN, 2004). One of these projects is the Agua Hedionda Watershed Management Plan, developed by the City of Vista, which is a geographically focused plan to manage a smaller area within the watershed (City of Carlsbad et al., 2013). The Agua Hedionda Watershed Management Plan contains a series of recommendations to protect the watershed and improve water quality, such as stream restoration to manage

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sediment (City of Vista). For the Carlsbad Watershed, which contains multiple parallel watersheds, this approach taken by the Agua Hedionda Watershed Management Plan may be more appropriate than a more general, overarching watershed management plan.

Several stakeholders in the Carlsbad Watershed have worked together on successful efforts to reduce pollutant loading into Cottonwood Creek, which drains into Moonlight Beach in Encinitas (Rasmus and Weldon 2003). These efforts have resulted in implementation of upstream best management practices and development of plans to implement an urban runoff treatment facility to further reduce pollutant loading to the beach (Rasmus and Weldon 2003). Efforts associated with Cottonwood Creek and Moonlight Beach have resulted in improved beach water quality ratings for Moonlight Beach; the beach received poor water quality ratings by environmental groups in 2000 (Rasmus and Weldon 2003), but a revised 2012 scoring by the Natural Resources Defense Council showed that the beach received 4 out of 5 stars for water quality (NRDC 2012).

The SNMP currently under development for the Escondido Valley groundwater basin will identify sources of salts and nutrients in the basin, set goals and objectives for the basin, determine if any reduction in loading is necessary and potential ways to achieve load reduction. See Chapter 7, Regional Coordination for more information.

Various Total Maximum Daily Loads (TMDLs) are being developed for the Carlsbad Watershed to improve the water quality of Section 303(d) listed water bodies. TMDLs that are under investigative order or will be completed at a later date include Loma Alta and San Marcos. Loma Alta slough has been identified with bacteria and eutrophication pollutant/stressor (City of Carlsbad, 2011).

Stormwater and Flood Management

Major drainages within the watershed include Agua Hedionda Creek, Buena Vista Creek, Escondido Creek, and San Marcos Creek, which encompass drainage areas of 23.8, 20.8, 77.7, and 28.1 square miles, respectively. The peak discharges during a 100-year event for the above creeks are 9,850, 8,500, 22,000, and 15,700, respectively. Within the watershed, the acreage of land uses within mapped flood hazard zones total more than 5,000 acres, and includes the following: agriculture, 354 acres; commercial and services, 1,345 acres; industrial, 271 acres; open space and recreation, 2,474 acres; residential, 1,721; and transportation, communications, and utilities, 1,082 acres (see Appendix 7-B, Integrated Flood Management Planning Study).

Stormwater and flood management within the Carlsbad Watershed is complex due to multiple jurisdictional agencies involved in these activities, as well as urbanization, which presents unique stormwater and flood management issues. Several jurisdictions within the Carlsbad Watershed work together to jointly implement the Carlsbad Watershed Urban Runoff Management Plan (WURMP), which identifies and prioritizes water quality problems within the Carlsbad Watershed that can be potentially, attributed to discharges from municipal storm drain systems (City of Carlsbad et al., 2008).

Flood control within the Carlsbad Watershed often includes channelizing major surface water bodies to prevent private property flood damage. Major flood control projects were generally constructed from 1950-1980, including channelization of Escondido Creek, channelization of Reidy Creek (connected to Escondido Creek), and channelization of Buena Vista Creek. In addition, detention basins have been constructed within portions of the Buena Vista Creek to address 100-year flood flows. Despite channelization efforts, flooding continues to be a major concern for jurisdictions such as the City of Oceanside (Loma Alta Creek), the City of San Marcos (San Marcos Creek), and the City of Escondido (Escondido Creek) (CWN, 2002).

Natural Resources

Urbanization and development within the Carlsbad Watershed have led to habitat degradation and loss, as well as the introduction of invasive species within the watershed. Remaining native habitats within the watershed primarily include upland vegetation consisting of coastal sage scrub, chaparral scrub, and small areas of oak woodlands. In addition, the watershed contains native grasslands, riparian forests/woodlands, riparian scrubs, marsh/wetlands, and open water areas (CWN, 2002).

All four of the coastal lagoons located in the watershed (Agua Hedionda, Batiquitos, Buena Vista, and San Elijo)

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are important natural resources located within the Carlsbad Watershed. Agua Hedionda Lagoon is characterized as a salt water marsh; however, it is not extensive due to increased urbanization in the region. Most of the salt marsh vegetation can be found in the upper reaches of the lagoon. The lagoon was also recently identified as a critical habitat for the Tidewater Goby (*Eucyclogobius newberryi*), a federally listed endangered species. Much of Agua Hedionda Lagoon is now used for recreational boating and water sports (CWN, 2002). The western portion of the lagoon is used as a cooling water source for the Encina Power Plant as well as for two aquaculture facilities – a white sea bass research facility managed by Hubbs/Seaworld and California Department of Fish and Game and a commercial company cultivating shellfish for a wide-ranging market (City of Carlsbad, N.D. and San Diego Coast Life, N.D.). The power plant cooling intake system will be converted to serve as the intake for the under-construction Carlsbad Desalination Plant (planned for completion in 2016), when the Encina Power Plant is eventually retired (Carlsbad Desalination, N.D.). Batiquitos Lagoon, which is 600 acres in size, is considered one of the most important estuarine systems along the Southern California coast (CWN, 2002). The lagoon is owned by the California Department of Fish and Wildlife (formerly California Department of Fish and Game), and is maintained by the department as an Ecological Reserve (CWN, 2002). Buena Vista Lagoon is one of the largest areas of freshwater marsh habitat in San Diego County. In 1940, a weir was constructed at the mouth of Buena Vista Lagoon eliminating all tidal flow and converting it into a freshwater lake. Sedimentation is one of the most significant issues at Buena Vista Lagoon. This is due to the effects of urbanization, stream channel modification, and lack of tidal flushing of the lagoon system. Sedimentation poses a long-term threat to the freshwater marsh and open water mosaic that currently exists at the lagoon. If sedimentation in the lower portions of the watershed and lagoon are not slowed, Buena Vista Lagoon will be in danger of becoming a large freshwater marsh with no open water mosaic. Increased management of the lagoon is necessary to reduce many of the sedimentation issues. Efforts such as opening the mouth of the Buena Vista Lagoon to increase tidal exchange are currently underway (CWN, 2002). San Elijo Lagoon is the southernmost lagoon in the Carlsbad Watershed, and is noted for being surrounded by steep coastal bluffs that cause sediment issues in the lagoon due to erosion (CWN, 2002). The lagoon also contains the most extensive stands of freshwater marsh vegetation in the watershed (CWN, 2002). Similar to the Buena Vista Lagoon, the San Elijo Lagoon experiences excessive sedimentation associated with erosion; sedimentation and sand deposition require regular dredging of the lagoon to maintain its connectivity with the ocean (CWN, 2002). The Carlsbad Watershed contains numerous protected and special-status species and vegetation communities, and is partially included in the North County Subarea of San Diego County's Multiple Species Conservation Program (MSCP) (CWN 2002). Several of the city jurisdictions, including the City of Carlsbad, City of Encinitas, City of Oceanside, and the City of Escondido have individual habitat management or conservation plans such as Multiple Habitat Conservation Plans (MHCPs) that provide habitat management within the watershed. Special status plant and animal species in the watershed include six estuarine species, eight riparian species, and ten upland species. The Carlsbad Watershed also contains invasive exotic species that may cause water-related issues. Such species include *Arundo donax,* a species of eucalyptus (*Eucalyptus globulus*), Castor Bean (*Ricinus communis*), Pampas Grass (*Cortaderia selloana*), and Tamarisk (*Tamarix* spp.). Although the Agua Hedionda Creek previously experienced issues related to the invasive green algae *Caulerpa taxifolia,* this species was eradicated by the Southern California Caulerpa Action Team (part of the California Regional Water Quality Control Board, San Diego Region SDRWQCB) (CWN, 2002). Tribal nations in the Region have indicated concern that jurisdictional habitat conservation efforts such as those described above may not consider current or future tribal developments, and tend to categorize tribal lands as open space during habitat and conservation planning efforts.

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Potential Climate Change Impacts

Climate change vulnerabilities that have been identified for the San Diego IRWM Region and are relevant to the Carlsbad Watershed include but are not limited to:

- Decrease in imported water supply
- Decrease in groundwater supply
- Decrease in surface water availability
- Water quality concerns related to several factors
- Sea level rise
- Increased severity of storms (flooding)
- Exacerbation of wildfires

Due to the reliance on imported water supplies within the Carlsbad Watershed, decreases in imported water supply availability could have potentially large impacts within the watershed. However, the Water Authority's Emergency Storage Project will help to alleviate such impacts by facilitating water transport to the Carlsbad Watershed from other watersheds and water sources within the Region. Other water-supply related issues could occur due to the reduction of existing (albeit limited) groundwater and surface water sources.

Water quality concerns are already substantial within many water bodies in the Carlsbad Watershed. Climate change-related impacts could potentially exacerbate existing water quality issues due to increased pollutant concentrations (caused by reduced surface water flows and increased flood events) or increases in sedimentation (caused by increased wildfire occurrences and increased flood events). As such, increased wildfire occurrences and increased flood events due to climate change could potentially cause water quality-related issues in the Carlsbad Watershed.

Due to the Carlsbad Watershed's location along the coast, sea level rise could potentially impact this watershed and its coastal ecosystems and habitats (lagoons) or coastal municipalities and associated land uses.

Management Issues and Conflicts

The Carlsbad Watershed has particular water quality-related issues that are generally associated with urban development. Although other issues may exist within the watershed, the WURMP lists sedimentation, nutrient loading, and bacteria and pathogens as the primary management issues within the Carlsbad Watershed (City of Carlsbad et al, 2012).

Due to urban development, many of the surface water bodies that drain into the watershed's lakes and lagoons have been channelized or otherwise modified. Sedimentation has been linked to bacteria loading, as sediments may provide a breeding location for bacteria. Bacteria-related issues have led to temporary closures of recreational areas as well as impacts to natural resources.

Outside of specific sedimentation-related issues, the Carlsbad Watershed is also impacted by general water quality issues associated with bacteria and eutrophication. Agricultural runoff and construction-related runoff have been identified as major contributors to water quality impairments, and have therefore been targeted to address water quality issues. Although to a lesser degree, urban non-stormwater related runoff from pet wastes (bacteria) and excessive fertilizer usage (nutrients) have also been identified as contributors to water quality issues within the Carlsbad Watershed (CWN, 2002).

Potential Impacts to the watershed's water bodies and lagoons due to urbanization and highway development could pose future management issues (i.e. increased sedimentation, and water quality issues). Urbanization may also increase the amount of invasive species in the watershed, which can jeopardize native species and habitats (CWN, 2002).

As described above, Poseidon is in the process of developing an alternative local water supply source via the construction of a reverse-osmosis seawater desalination facility in the Carlsbad Watershed. Construction is underway on the desalination plant and associated pipeline. There have been concerns raised regarding the intake of 300 MGD of water from the Agua Hedionda Lagoon and its impact on fisheries and local habitats. (San

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Diego Coastkeeper, N.D.). Environmental permits that have been issued for the project include provisions to address the potential impacts. These concerns will continue to be addressed through ongoing compliance with permitting requirements during the construction and operation of the desalination facility. Erosion is a concern along coastal bluffs along various cities in the Carlsbad Watershed, and has the potential to impact the watershed's lagoon systems. Upstream development and urbanization along the coast has resulted in a loss of sediment and sand supply, narrowing beaches and exposing the public to potential bluff collapses. Ideas that have been considered to stabilize shorelines have included beach nourishment, shoreline armoring, and improved sediment management strategies (City of Encinitas, 2012).

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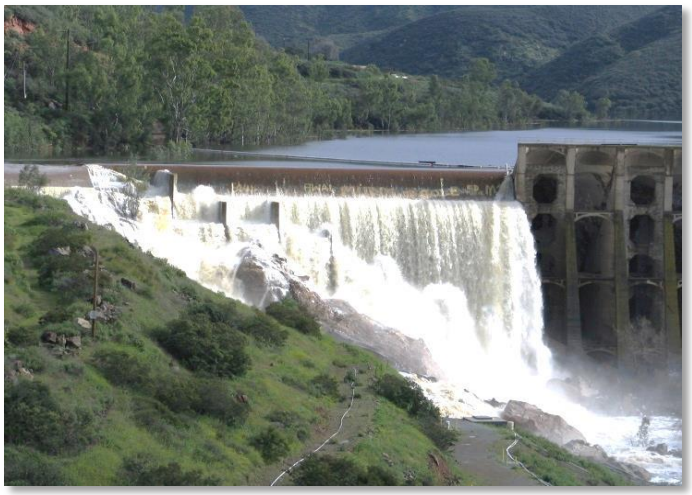
5.5 San Dieguito Watershed

The San Dieguito Watershed (San Dieguito Hydrologic Unit or San Dieguito HU (905)) covers 346 square miles. Eighty percent of the watershed is in the unincorporated portion of San Diego County. Figure 5-6 is a map that shows the principal watershed features and boundaries.

The watershed includes two major surface water reservoirs: Sutherland Reservoir and Hodges Reservoir. The City of San Diego owns a significant portion of the land in the immediate river valley between these two reservoirs and leases much of the land for agriculture. Lake Poway and Lake Ramona are two smaller water supply reservoirs in the watershed.

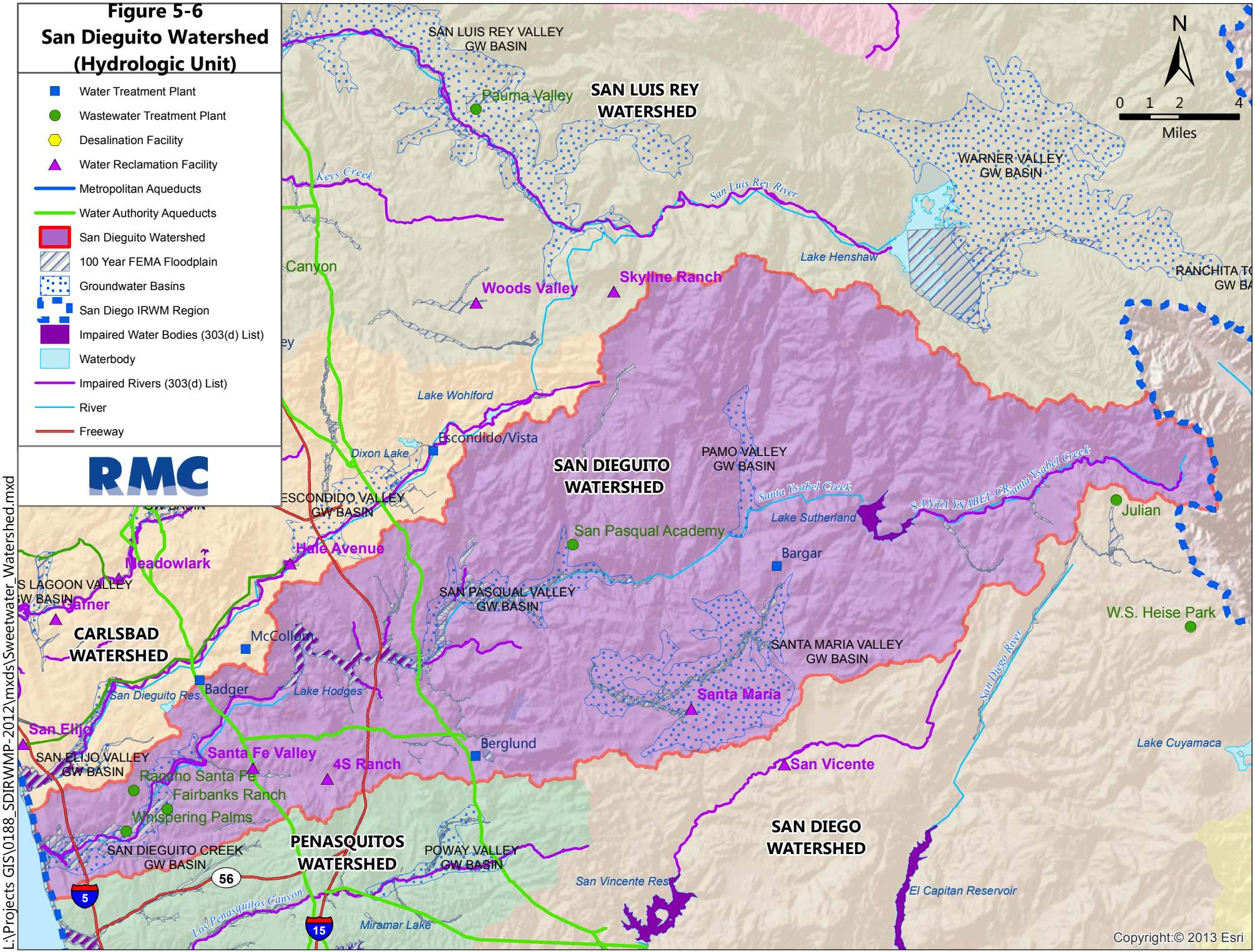
There are four distinct groundwater basins located in the San Dieguito Watershed: Pamo Valley, San Dieguito Valley, San Pasqual Valley and Santa Maria Valley. The majority of the San Pasqual Valley groundwater basin (in the middle watershed) is owned by the City of San Diego. While public water supply is not currently developed from the San Pasqual basin, the basin represents a potential source of local water supply. The San Dieguito Valley, San Pasqual Valley, and Santa Maria Valley basins all have high TDS levels, while the Santa Maria Basin also has high nutrients and selenium levels. According to DWR Bulletin 118, the Pamo Valley groundwater basin is suitable for domestic and irrigation uses, and does not have high TDS levels (DWR 2004).



The Lake Hodges (Hodges Reservoir) Water Quality and Quagga Mitigation Measures Project – funded by Proposition 84-Round 1 – will evaluate options to improve water quality and the ecosystem in Hodges Reservoir to maximize use of the reservoir.

Photo credit: Toby Roy, San Diego County Water Authority

Figure 5-6
San Dieguito Watershed (Hydrologic Unit)



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San Dieguito Watershed

Hydrology

The San Dieguito Watershed is comprised of five Hydrologic Areas (HAs): Solana Beach (905.1), Hodges (905.2), San Pasqual (905.3), Santa Maria Valley (905.4), and Santa Ysabel (905.5). The major surface water bodies within the San Dieguito Watershed are the San Dieguito Lagoon, San Dieguito River, Hodges Reservoir, Santa Ysabel Creek, Santa Maria Creek, Sutherland Reservoir (also referred to as Lake Sutherland), Lake Poway, and Lake Ramona (City of Del Mar et al, 2008).

The San Dieguito River is the primary drainage in the watershed, with headwaters originating in the Witch Creek Basin. Drainage from the Witch Creek and the Sutherland Basins flows into the Sutherland Reservoir, a man-made reservoir that was created in 1954 with construction of the Sutherland Dam. From Sutherland Reservoir, the main drainage, Santa Ysabel Creek, continues westward to the San Pasqual Valley where it becomes San Dieguito River. San Dieguito River then flows into Hodges Reservoir, a water supply reservoir and recreation site located just west of Interstate 15. There are multiple tributaries that join the San Dieguito River below Hodges Reservoir, which all ultimately flow into the Pacific Ocean via the San Dieguito Lagoon (City of Del Mar et al, 2008).

Hydrology within the San Dieguito Watershed is diverse, as the watershed extends from the Pacific Ocean in the west to mountain areas in eastern San Diego County. As such, rainfall varies in the watershed from 10.5 inches along the coast to 31.5 inches in the inland mountain areas (City of Del Mar et al, 2008).

Water Systems

Water supply infrastructure within the San Dieguito Watershed is dominated by local reservoirs that store imported water and surface water runoff for multiple jurisdictions. There are four water supply reservoirs within the San Dieguito Watershed, which contain either imported water or surface water runoff, or a combination of both sources. Each reservoir is summarized below (City of Del Mar et al, 2008):

- Sutherland Reservoir: owned by the City of San Diego, contains natural runoff.
- Lake Ramona: owned by the Ramona Municipal Water District, stores imported water from the Water Authority's First Aqueduct.
- Lake Poway: owned by the City of Poway, stores imported water from the Water Authority's First Aqueduct.
- Hodges Reservoir: owned by the City of San Diego, stores imported water from the Water Authority's First Aqueduct and natural runoff.

Water supply agencies within the San Dieguito Watershed include the Santa Fe Irrigation District, San Dieguito Water District, Olivenhain Municipal Water District, City of San Diego, Rincon del Diablo Municipal Water District, City of Poway, and Ramona Municipal Water District. All of the aforementioned water supply agencies are member agencies of the San Diego County Water Authority, and therefore receive imported water from the Water Authority via the First and Second Aqueducts. Two potable water treatment facilities are located in the San Dieguito Watershed: Bargar, which can treat up to 4 MGD potable water and Berglund, which can produce up to 24 MGD. The Bargar filtration plant is not currently in operation.

Groundwater basins underlying the San Dieguito Watershed include the following four basins as defined according to DWR Bulletin 118:

- San Pasqual Valley: Recharge in the San Pasqual Valley Basin occurs from infiltration of precipitation and percolation of excess irrigation waters. In normal years all surface runoff within the San Pasqual Valley becomes groundwater recharge (DWR (j), 2004).
- Santa Maria Valley: Santa Maria Valley Basin recharge occurs from infiltration of precipitation. In addition, because a large portion of the population within this area is not connected to municipal sewer systems, some recharge likely comes from septic systems (DWR (k), 2004).

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- San Dieguito Valley: Recharge within the San Dieguito Valley Basin comes from many sources, including recharge by percolation of flows in the San Dieguito River, precipitation to the valley floor, underflow beneath Hodges Reservoir, and underflow through other nearby sediments (DWR (l), 2004).
- Pamo Valley: The Pamo Valley Basin has recharge from percolation of ephemeral stream flow in Temescal and Santa Ysabel Creeks (DWR (m), 2004).

A preliminary Salt and Nutrient Management Plan (SNMP) is being developed by the City of San Diego Public Utilities Department for the high priority (Tier A) San Pasqual groundwater basin. The draft SNMP has been completed and characterizes the basin, identifies sources of salts and nutrients, and calls for increased monitoring of well and surface waters and agricultural runoff. The Santa Maria groundwater basin is a medium priority (Tier B) basin, but no progress has yet been made on SNMP development. It is anticipated that a SNMP will be developed in the future (Regional Board, 2013). More information can be found in *Chapter 7, Regional Coordination*. The San Dieguito Valley groundwater basin is a low priority (Tier D-2) basin, and is not anticipated to require a SNMP. Although the Pamo Valley Basin is recognized in this Plan, it is not a designated groundwater basin in the Salinity/Nutrient Management Planning guidance document (Water Authority, 2010).

The San Dieguito Watershed also has facilities that are part of the County Water Authority's Emergency Storage Project. The Hodges Reservoir Projects of the Emergency Storage Project connects Hodges Reservoir to Olivenhain Reservoir (located in the Carlsbad Watershed) through pipelines and pump stations, which provides multiple benefits. First, this connection allows the City to access runoff captured in Hodges Reservoir that the City did not previously have access to. This is in addition to the historical use by Santa Fe Irrigation District and San Dieguito Water District. Second, this connection allows for water conveyance between Olivenhain Reservoir and Hodges Reservoir, which will keep Hodges Reservoir at a more constant level during dry seasons, allowing for more water to be captured during rainy seasons, and reducing spills over Hodges Reservoir (City of San Diego, 2011). Lastly, the Hodges Reservoir Project will make water in Hodges Reservoir potentially available to the Region if needed, because the Olivenhain Reservoir is connected to the Water Authority's Second Aqueduct (San Diego County Water Authority, 2011).

Internal Boundaries and Land Uses

The San Dieguito Watershed resides entirely within San Diego County, and contains multiple land use and water-related agencies. The San Dieguito Watershed includes portions of the cities of Del Mar, Escondido, Poway, San Diego, and Solana Beach, as well as unincorporated County areas. The majority of land within the San Dieguito Watershed (80%) is within the County's jurisdiction. There are seven water-related agencies in the San Dieguito Watershed, which are listed in the section above regarding water systems.

The San Dieguito Watershed also contains lands that are owned and managed by the San Dieguito River Valley Regional Open Space Park Joint Powers Authority (San Dieguito River Park), an agency that was formed in 1989 by the County of San Diego and cities of Del Mar, City of Escondido, City of Poway, City of San Diego, and City of Solana Beach. The San Dieguito River Park's mission is to preserve and restore land within the San Dieguito River Park, a 55- mile long area that extends from the Volcan Mountains in the east to the ocean at Del Mar, focusing on the San Dieguito River corridor and including both Lake Sutherland and Hodges Reservoir (San Dieguito River Park JPA 2002).

Land use within the San Dieguito Watershed is classified primarily as vacant and undeveloped land (39%), and other major land uses are open space/parks and recreation (22%), residential and spaced rural residential (18%), and agriculture (14%) (Copermittees, 2012). Transportation, commercial, industrial, public facility, under construction, and water land use classifications combined comprise the remaining 7% of the watershed (San Diego Association of Governments (SANDAG), 2009). Undeveloped and open space areas reside largely within the eastern portion of the watershed; the developed portion of the western watershed is generally typical of urbanized coastal areas in Southern California (City of Del Mar et al, 2008). The San Dieguito Watershed also contains a variety of land uses that support recreational activities, including Lake Poway, Sutherland Reservoir, and Hodges Reservoir, which support fishing and boating. In addition, there are many hiking trails within the San Dieguito Watershed, including a vision to develop the "Coast to Crest Trail" (City of San Diego, 2006).

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Residential development is expected to increase, along with an equitable loss in undeveloped and agricultural lands, in the San Dieguito Watershed. The 2030 SANDAG Land Use Plan projects almost a 300% increase in residential developed land, while the County of San Diego General Plan 2020 forecasts less residential development (City of San Diego, 2011). A comparison of the 2003 SANDAG and 2030 SANDAG Land Use Plans indicates the largest increase in residential developed land will occur in the middle portion of the watershed (50%) (City of San Diego, 2011). Tribal lands make up approximately 5% of the San Dieguito Watershed. The watershed contains two tribal nations: the Santa Ysabel Reservation and the Mesa Grande Reservation (City of San Diego, 2011). The Santa Ysabel reservation was founded in 1893 and consists of 15,270 acres. The Mesa Grande Reservation was founded in 1875 and consists of 1,820 acres (University of San Diego, N.D. and Pritzker, 2000).
Water Quality and Water Quality Impairments Several water bodies within the San Dieguito Watershed are listed on the Clean Water Act 303(d) list of impaired water bodies. Impaired water bodies include (PCW, N.D.): • Pacific Shoreline, San Dieguito Lagoon Mouth for total coliform • San Dieguito River (19 Miles) for *Enterococcus*, fecal coliform, nitrogen, phosphorus, TDS, toxicity • Cloverdale Creek for phosphorus and TDS • Felicita Creek for aluminum and TDS • Green Valley Creek for chloride, manganese, PCP (pentachlorophenol), and sulfates • Hodges Reservoir for color, manganese, nitrogen, pH, phosphorous, mercury, and turbidity • Kit Carson Creek for PCP and TDS • Sutherland Reservoir for color, manganese, iron, nitrogen, and pH • Santa Ysabel (above Southerland Reservoir) for toxicity Runoff from residential, commercial, industrial, and transportation land uses generally contribute higher pollutant loading within the San Dieguito Watershed. Pollutants of concern and stressors within the watershed include nutrients, pathogens, salinity, pesticides, metals/metalloids, toxicity, and other organics and inorganics (Copermittees, 2012). The sources of these impacts are agriculture, dairies, urban runoff/storm sewers, flow regulation/modification, natural sources, and unknown point and non-point sources (SDRWQCB, 2010). Runoff from open space has the ability to contribute sediment to the watershed, and agricultural uses may impart nutrients and pesticides (City of Del Mar, et al 2008). Further, increased development and agricultural and turf related activities have been identified as the main threats to water quality in the San Dieguito Watershed (City of San Diego, 2006). Water quality threats from agricultural runoff are of particular concern related to the San Pasqual groundwater basin, which is being considered for development as a drinking water supply. Because of this, the City of San Diego is developing a preliminary SNMP, as described in *Chapter 7, Regional Coordination*. The City of San Diego has begun work on developing the 2015 Water Quality Improvement Plan for the San Dieguito Watershed through invitations to stakeholders to attend workshops, join the consultation committee, comment on deliverables when they become available, and provide data for use in the plan. The Watershed Urban Runoff Management Program (WURMP) Annual Report described18 water quality activities that were implemented in 2011-2012, such as the drop-off clean-up event held by the City of San Diego where 112,000 pounds of junk, appliances, mattresses, tires, and other large waste items were collected, and 44,000 pounds recycled (City of Del Mar et al., 2013). The Basin Plan (SDRWQCB, 2007) establishes specific water quality objectives for all hydrologic areas included within the San Dieguito Watershed. For the five specific HAs included within the San Dieguito Watershed, there are specific water quality objectives established for TDS, nutrients, iron, chlorides, and color. A summary of the TMDLs are provided in *Chapter 3, Region Description*.

San Dieguito Watershed

Stormwater and Flood Management

Major drainages within the watershed include Hatfield Creek, San Dieguito River, Santa Maria Creek, and Santa Ysabel Creek, which encompass drainage areas of approximately 20.8, 60, and 290 square miles (no information available for San Dieguito River), respectively. The peak discharges during a 100-year event for the above rivers are 13,700, 41,800, 19,000, and 62,000 CFS. Within the watershed, the acreage of land uses within mapped flood hazard zones total more than 9,800 acres, and includes the following: agriculture, 2,352 acres; commercial and services, 953 acres; industrial, 44 acres; open space and recreation, 4,326 acres; residential, 853; and transportation, communications, and utilities, 344 acres (see Appendix 7-B, Integrated Flood Management Planning).

Stormwater and flood management within the San Dieguito Watershed are the responsibility of all of the municipal jurisdictions within the watershed, including the City of San Diego, the City of Poway, the City of Del Mar, Solana Beach, and the City of Escondido, as well as the County of San Diego. The majority of the watershed lies in unincorporated San Diego County, and fall under the jurisdiction of the County, though the cities of San Diego, Solana Beach, Del Mar, Escondido, and Poway are also responsible for implementing provisions included in the San Dieguito Watershed Urban Runoff Management Program. This program focuses on management activities that can be taken to reduce stormwater runoff and associated water quality concerns (City of Del Mar et al, 2008).

The County of San Diego conducts flood management efforts throughout its jurisdiction, including within the San Dieguito Watershed, to reduce and address flood flows associated with FEMA-designated flood areas (County of San Diego, 2007). According to the County of San Diego, localized flooding occurs in several reaches of the San Dieguito River, including:

- San Dieguito River downstream from Hodges Reservoir to Del Mar
- Santa Maria Creek in Ramona (along Rangeland Road)
- Hatfield Creek in Ramona (along Magnolia Avenue)

Despite two surface water reservoirs along the San Dieguito River, flood control issues remain a key concern in the watershed. Hodges Reservoir spilled 13 times during the period 1955-2005, representing a once-in-four-years period of recurrence. In addition to flooding in the lower San Dieguito basin associated with the Hodges Reservoir spills, local flood threats to developed areas exist within the Escondido and Ramona portions of the watershed. The ESP (described above in Water Systems) that connects Hodges Reservoir to the Olivenhain Reservoir is anticipated to reduce spills from occurring at Hodges Reservoir (City of San Diego, 2011).

Natural Resources

Due to relatively undeveloped nature of the San Dieguito Watershed, the watershed contains a diverse array of habitats that range from Volcan Mountain in the east to the San Dieguito Lagoon and Pacific Ocean in the west. There are several natural areas within the watershed, including the 55-mile long, 80,000 acre San Dieguito River Park, the 150 acre San Dieguito Lagoon, and natural areas associated with the watershed's surface water reservoirs (Project Clean Water, N.D.). Currently, the San Dieguito Lagoon Restoration project is restoring 116 acres of coastal tidal wetland to restore aquatic functions of the lagoon through a permanent inlet and expansion of the tidal basin, as well as create sub-tidal and intertidal habitats (San Dieguito River Park, N.D.).

Plant communities within the San Dieguito Watershed include chaparral (27%), coastal sage scrub (10%), oak woodlands (12%), and grasslands (11%) (City of San Diego 2006). Wetland areas including riparian habitats, marsh, meadows and seeps, and open water constitute approximately 2.5% of the watershed (City of San Diego, 2006).

The San Dieguito Watershed contains numerous protected and special-status species and vegetation communities, and is partially included in the North County Subarea of San Diego County's Multiple Species Conservation Program (MSCP) (City of San Diego 2006). Special status species, including species considered to be of special importance in California, identified in the San Dieguito Watershed include: San Diego horned lizard, orange-throated whiptail, common loon, brown pelican, white-faced ibis, osprey, northern harrier, sharp-

San Dieguito Watershed
shinned hawk, Western snowy plover, long-billed curlew, California gull, elegant tern, California least tern, black skimmer, tricolor blackbird, Belding's Savannah sparrow, and California gnatcatcher (City of Del Mar et al, 2008). Invasive and non-native plants and animals may impact the lower, middle, and upper segments of the San Dieguito Watershed. Such invasive species include but are not limited to bullfrogs, crayfish, sunfish, and bass (City of San Diego, 2006). Tribal nations in the Region have indicated concern that jurisdictional habitat conservation efforts such as those described above may not consider current or future tribal developments, and tend to categorize tribal lands as open space for habitat and conservation planning purposes.
Potential Climate Change Impacts Climate change vulnerabilities that have been identified for the San Diego IRWM Region and are relevant to the San Dieguito Watershed include but are not limited to: • Decrease in imported water supply • Decrease in groundwater supply • Decrease in surface water availability • Impacts to water quality • Sea level rise • Decrease in availability of necessary habitat • Increased flooding • Exacerbation of wildfires Due to the reliance on imported water supplies within the San Dieguito Watershed, decreases in imported water supply availability could have potentially large impacts within the watershed. However, the ESP will help to alleviate such impacts by facilitating water transport to the San Dieguito River Watershed from other watersheds and water sources within the Region. Flooding within the San Dieguito Watershed could be exacerbated due to climate change if the frequency and intensity of storms overwhelm the ability of local reservoirs to capture runoff. Historically there have been spills over Hodges Reservoir due to excessive runoff, and although this issue will be alleviated due to the ESP, it is possible that flood impacts could increase due to climate change. Further, due to the San Dieguito Watershed's proximity to the coast, sea level rise has the potential to impact several municipalities and resources within the watershed. Lastly, wildfires are an identified issue within the San Dieguito Watershed, and several recent wildfires have occurred within the watershed (RWMG, 2009). If the frequency of wildfires increases due to climate change, local water quality and habitat within the watershed could be adversely impacted.
Management Issues and Conflicts Due to the diverse nature of the San Dieguito Watershed, management issues and conflicts are also diverse. Stakeholders within the San Dieguito Watershed have identified a number of major issues and concerns, including physical and hydrologic modifications, water quality, invasive species, and flooding associated with local surface waters (City of San Diego, 2006). The San Dieguito River Park's Concept Plan notes that one of the common planning themes among groups associated with the San Dieguito River Park is to preserve and enhance the rich resources and qualities that make the San Dieguito River Park Focused Planning Area (FPA) unique. One of the purposes of creating the FPA boundary is to identify areas where improper development could significantly impact the existing character of the river valley (San Dieguito River Park JPA, 2002). These statements indicate that one of the key management issues within the San Dieguito Watershed is how to reconcile potentially conflicting land uses and

San Dieguito Watershed
ensure that development does not negatively impact the river. Fires are a threat to the biological resources in the San Dieguito Watershed because they are a source of surface water contamination and habitat disturbances. In 2003, fires burned approximately 13% of the San Dieguito Watershed impacting the native vegetated communities. Post-fire concerns in the watershed include loss of habitat, increased erosion/sedimentation, and the establishment of non-native plant species (City of San Diego, 2006). Over-grazing has also been a concern in the San Dieguito Watershed. Over-grazing has reduced tree regeneration, reduced vegetative cover, caused streambank destabilization, water quality degradation, and spread non-native weeds. With proper management and timed grazing, exotic species can be reduced in the Watershed (City of San Diego, 2006). Stormwater runoff containing pesticides, herbicides, fertilizers, and sediment have been an issue in the San Dieguito Watershed (City of del Mar et al 2008). High nutrient levels in runoff have been impacting surface water quality of several water bodies in the watershed, including Hodges Reservoir (City of del Mar et al 2008). Impacts to Hodges Reservoir from urban and agricultural runoff as well as permitted upstream wastewater discharges and rural development have resulted in poor quality water requiring downstream water agencies to incur additional treatment costs. The agencies involved in managing Hodges Reservoir are committed to finding cost-effective and science-based solutions to addressing water quality concerns for the reservoir. A Water Quality Improvement Plan will be developed for the entire San Dieguito Watershed in accordance with the 2013 MS4 Permit, which will address some of the sources of pollutant loading into water bodies such as Hodges Reservoir and determine actions that can be taken to improve water quality. In addition, several IRWM-funded projects have been directed toward watershed-based solutions and in-reservoir remedies for water quality concerns in Hodges Reservoir. Efforts associated with the 2013 MS4 Permit and the IRWM-funded projects will be coordinated to ensure that the efforts are integrated to achieve maximum benefits.

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5.6 Peñasquitos Watershed

The Peñasquitos Watershed (Peñasquitos Hydrologic Unit or Peñasquitos HU (906)) is a 162 square mile watershed that is comprised of five Hydrologic Areas (HAs): Miramar Reservoir (906.1), Poway (906.2), Scripps (906.3), Miramar (906.4), and Tecolote (906.5). The 2013 NPDES permit (Regional Board) divides this watershed into two Watershed Management Areas (WMAs). The northern Peñasquitos WMA (Miramar Reservoir and Poway) drains to the Peñasquitos Lagoon and ultimately to the Pacific Ocean, while the southern Mission Bay WMA (Scripps, Miramar, and Tecolote) drains to Mission Bay. A map of the major features of the watershed is presented in Figure 5-7.

The Peñasquitos WMA has a drainage area of 94 square miles. There are several water features in the WMA including Carmel Canyon Creek, Los Peñasquitos Creek and Carroll Canyon Creek. It also contains one water storage facility, Lake Miramar, located in the Poway HA. The WMA has a population of 258,331 people. The Peñasquitos Watershed encompasses portions of three cities (San Diego, Poway and Del Mar) and the County of San Diego. The Peñasquitos Watershed has a total population of 490,433 people (2010 Census).

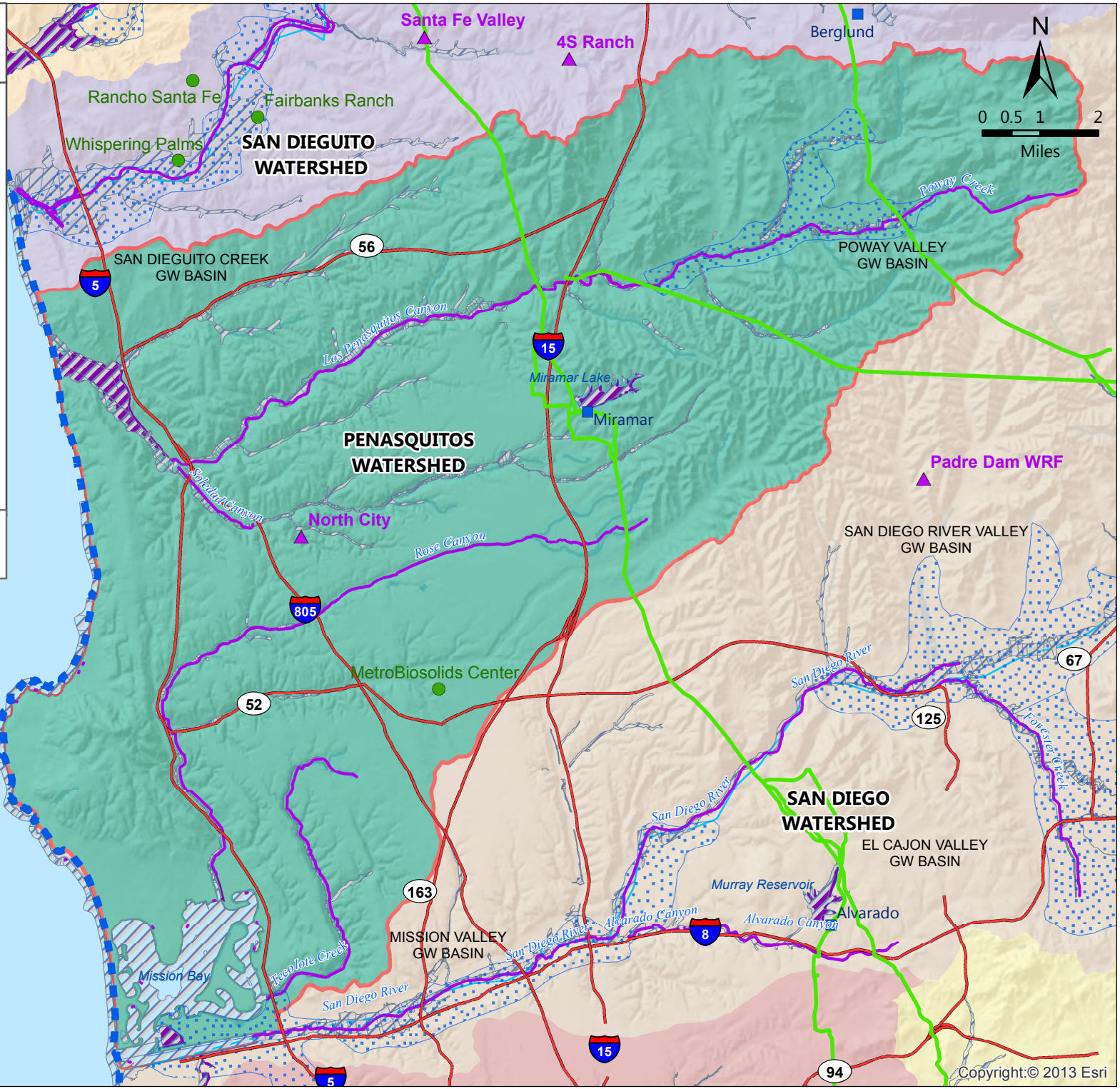
The Mission Bay WMA has a drainage area of 68 square miles. There are several water features in the WMA including Rose Creek and Tecolote Creek. The Scripps HA is included in the Mission Bay WMA although it technically drains to both WMAs and to the Pacific Ocean as well. The WMA has a population of 232,102 people, and is entirely within the jurisdiction of the City of San Diego.

Two small groundwater basins exist within the Peñasquitos Watershed. Except for a small amount of local runoff that enters Miramar Reservoir (a small reservoir used to store imported supply), no water supply is developed within the Peñasquitos Watershed.

The Sustainable Landscapes Program – funded by Proposition 84-Round 1 – aims to increase water efficiency in urban landscapes and improve water quality by reducing runoff associated with excessive irrigation.

Photo credit: Kyrsten Burr-Rosenthal, City of San Diego

Figure 5-7
Penasquitos Watershed (Hydrologic Unit)



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Peñasquitos Watershed

Hydrology

The Peñasquitos Watershed is comprised of five HAs: Miramar Reservoir (906.1), Poway (906.2), Scripps (906.3), Miramar (906.4), and Tecolote (906.5). Within the Peñasquitos Watershed are two WMAs: Los Peñasquitos Creek/Lagoon and Mission Bay. Both drain highly urbanized areas with a combined drainage area of 162 square miles. The major water bodies (receiving waters) within the Peñasquitos Watershed are Carmel Valley Creek, Los Peñasquitos Creek, Carroll Canyon Creek, Los Peñasquitos Lagoon, Rose Creek, Tecolote Creek, Mission Bay, and Miramar Reservoir, and the Pacific Ocean (PCW (a), N.D.).

Los Peñasquitos Lagoon receives fresh water flows from the Los Peñasquitos Canyon, and during periods of high rainfall from the Carmel Valley and the Sorrento Valley (Torrey Pines State Natural Reserve (a), 2010). Mission Bay receives fresh water flows from Rose Creek and Tecolote Creek (PCW (b), N.D.).

The watershed discharges into two Areas of Special Biological Significance (ASBS): (1) La Jolla Ecological Reserve (ASBS # 29); and (2) San Diego-Scripps (ASBS #31) (SWRCB (a), 2006). The La Jolla Ecological Reserve ASBS is approximately 1.7 miles of shoreline adjacent to the City of San Diego and contains 453 acres of marine habitat, including the La Jolla State Marine Conservation Area (SWRCB (a), 2006). Just north of the La Jolla Ecological Reserve is the San Diego-Scripps ASBS. This ASBS consists of 0.6 miles of shoreline in the City of San Diego and includes the San Diego-Scripps State Marine Conservation Area (SWRCB (b), 2006).

The two WMAs drain from as far east as the Iron Mountain to Los Peñasquitos Lagoon and into the Pacific Ocean (PCW (a), N.D. and County of San Diego (d), 2008). Due to increasing impervious surface cover, stream channelization, and flows from excess irrigation, the Los Peñasquitos Creek now carries surface water year-round (AMEC, 2005). Due to these excess runoff flows, Carmel Creek and Carroll Creek have changed from seasonal to perennial flow creeks (AMEC, 2005).

Annual precipitation in the Mission Bay WMA within the Peñasquitos Watershed ranges from 10.5 inches near the coast to 13.5 inches in the eastern portion of the watershed (Copermittees 2012).

Water Systems

Imported water is purchased from the San Diego County Water Authority and stored in local reservoirs (CSD (b), 2012). The Peñasquitos Watershed has one drinking water reservoir:

- Miramar Reservoir: in the Scripps Ranch community, 18 miles north of downtown San Diego. Capacity of 2,341 MG (5,700 AF) (2010 Watershed Sanitary Survey, City of San Diego Sanitary Survey). Stores imported water and is self-contained receiving little runoff from the watershed (AMEC, 2005).

Adjacent to the reservoir is the Miramar Water Treatment Plant (MWTP) operated by the City of San Diego. The MWTP produces 140 million gallons of drinking water a day, but has a 215 MGD total capacity (CSD (c), 2010).

The Los Peñasquitos Watershed Management Plan (AMEC, 2005), identifies two small groundwater basins in the watershed: Los Peñasquitos Canyon and Poway Valley. The Poway Valley Groundwater Basin (9-13) has two water bearing formations: the Alluvium and Residuum, and the Poway Group (DWR (a), 2004)). Recharge in the basin is mainly from direct precipitation on the valley flow and infiltration along Poway Creek, which flows into the basin from the east. Other sources of recharge include septic tank effluent and irrigation waters. It is estimated the Poway Valley Groundwater Basin contains 23,000 acre feet (AF) and is mainly used for agriculture and domestic uses (AMEC, 2005). The Poway Valley basin is a medium priority (Tier B) basin for a Salt and Nutrient Management Plan (SNMP); however no SNMP has yet been developed for the basin. It is anticipated that progress towards an SNMP will occur in the future (Regional Board, 2013). For more information on SNMPs and basin prioritization, see *Chapter 7, Regional Coordination*.

Most of the wastewater in the Peñasquitos Watershed is treated at Point Loma Wastewater Treatment Plant (Pt. Loma WWTP) operated by the City of San Diego. Pt. Loma WWTP is located on the bluffs of Point Loma and treats approximately 175 MGD (CSD (a), 2012). Wastewater is also treated at the North City Water Reclamation Plant (NCWRP), operated by the City of San Diego. The NCWRP is located within Peñasquitos Watershed and can treat up to 30 MGD. Reclaimed water produced by NCWRP is distributed to Mira Mesa, Miramar Ranch North, Scripps Ranch, Torrey Pines, Santaluz, Black Mountain Ranch, and the City of Poway (CSD (d), 2012).

Peñasquitos Watershed

Internal Boundaries and Land Uses

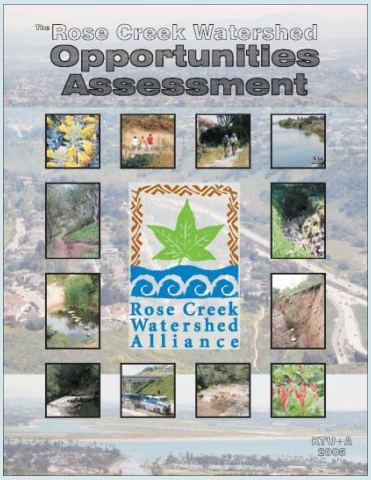
The Peñasquitos Watershed encompasses an area of 94 square miles and covers 60,418 acres (PCW (a), N.D. and County of San Diego (d), 2008). The Peñasquitos Watershed is bordered by the San Dieguito Watershed on the north, San Diego Watershed to the east and south, and the Pacific Ocean to the west. This watershed is centrally located within San Diego County and represents about 4% of the County's land area, making it one of the County's smallest watersheds (KTU+A, 2005).

The Peñasquitos Watershed is mostly within the City of San Diego jurisdiction, with the small remaining areas in the County of San Diego and the cities of Poway and Del Mar (Los Peñasquitos Watershed Copermittees, 2012). Municipal water supply, wastewater collection, and storm drainage are provided to residents by the cities of San Diego, Poway, and Del Mar.

Land use within the Los Peñasquitos Creek WMA is classified as follows: open space/parks and recreation (31%), residential and spaced rural residential (27%), vacant and undeveloped land (12%), transportation (13%), and industrial (7%). Other agriculture, commercial, commercial recreation, military, public facility, under construction, and water uses comprise 3% or less of the total land use (San Diego Association of Governments (SANDAG), 2009).

Land use within the Mission Bay WMA is classified as follows: open space / parks and recreation (26%), residential (26%), and transportation (16%). Other land use classifications include vacant and undeveloped land (6%), water (5%), public facility (5%), military (5%), industrial (4%), commercial (4%), and commercial recreation (3%) (Copermittees, 2012). Less than 1% of the land use acreage is made up by agriculture and under construction uses (SANDAG, 2009). There are no tribal lands located within the Peñasquitos Watershed.

The Rose Creek Watershed is a subset of the Peñasquitos Watershed that includes ten community planning areas, including portions of Scripps Ranch, La Jolla, Mira Mesa, Kearny Mesa, Pacific Beach, Claremont Mesa, and University City. The Rose Creek Watershed Alliance was formed by San Diego Earthworks, and includes members from a variety of business, community, and environmental organizations. The Rose Creek Watershed Alliance has created a vision for the watershed, and working with the California Coastal Conservancy, the County of San Diego, the City of San Diego, and San Diego Earthworks, developed a Rose Creek Watershed Opportunities Assessment. The Rose Creek Watershed Opportunities Assessment is a comprehensive analysis of the needs of the watershed, and provides recommended management solutions to address the issues and achieve the Rose Creek Watershed Vision. The Opportunities Assessment presents a positive example of partnership integration that involves multiple stakeholders from different sectors working together to create a balanced solution to a complex watershed-based issue.



Water Quality and Water Quality Impairments

Eleven water bodies within the Peñasquitos Watershed are listed on the 303(d) list of impaired waters (Los Peñasquitos Watershed Copermittees, 2012 and CSD (e), 2011):

- Los Peñasquitos Creek for *Enterococcus*, fecal coliform, selenium, TDS, nitrogen, and toxicity
- Los Peñasquitos Lagoon for sedimentation/siltation
- Miramar Reservoir for nitrogen
- Mission Bay shoreline for *Enterococcus*, fecal coliform, and total coliform

Peñasquitos Watershed
• Mission Bay mouth of Tecolote Creek for eutrophication and lead • Mission Bay mouth of Rose Creek for eutrophication and lead • Pacific Ocean Shoreline (Los Penasquitos River mouth, Scripps hydrologic area at Children's Pool, La Jolla Shores Beach, La Jolla Cove, Pacific Peach, and Ravina for total coliform, *Enterococcus*, or fecal coliform • Poway Creek for selenium and toxicity • Rose Creek for selenium, and toxicity • Soledad Canyon for sediment toxicity and seleniumTecolote Creek for cadmium, copper, indicator bacteria, lead, nitrogen, phosphorus, selenium, toxicity, turbidity, and zinc Pollutants of concern and stressors impairing water quality within the watershed include eutrophic conditions, nutrients, pathogens, salinity, metals/metalloids, sedimentation/siltation, and toxicity (Copermittees, 2012). The sources of these pollutants in the Peñasquitos WMA are largely unknown point and nonpoint sources, along with urban runoff and storm sewers (SDRWQCB, 2010). Potential sources of these constituents in the Mission Bay WMA may include urban runoff/storm sewers, concentrated animal feeding operations, highway/road/bridge runoff, landfills, nurseries, natural sources, and unknown point and nonpoint sources (SDRWQCB, 2010).T The major impacts from these pollutants/stressors consist of surface water quality degradation, beach closures, sedimentation, eutrophication, and habitat degradation (PCW(a), N.D.). Several of the sources/activities responsible for listed water quality issues consist of urban runoff, sewage spills, dredging, and landfill leachate. Water quality in the Mission Bay WMA has been impacted through urban runoff diversions, irrigation return flows, cleaning practices, and waste disposal (City of San Diego, 2012). As the receiving water body, Mission Bay and ultimately the Pacific Ocean are also impacted by these water quality issues. The key pollution threats to La Jolla Ecological Reserve ASBS and San Diego-Scripps ASBS are from urban and stormwater runoff from development, roadways, and parking lots. There are 184 direct discharges of urban runoff into La Jolla Ecological Reserve ASBS. Nine are naturally occurring streams or gullies with the majority of discharges coming from pipes or holes through seawalls, draining bluffs, and landscaped areas. There are 92 direct discharges into San Diego-Scripps ASBS with most discharges coming from pipes and or holes through seawalls, draining bluffs and urban landscaped areas (SWRCB (b), 2006). There are efforts by groups in the watershed to protect and improve water quality, such as the Rose Canyon Watershed Alliance, which focuses on protecting Rose Creek and its watershed (*see call-out box*). Furthermore, a Water Quality Improvement Plan will be developed for the entire Peñasquitos Watershed in accordance with the 2013 MS4 Permit, which will address some of the sources of pollutant loading into the water bodies and determine actions that can be taken to improve water quality. Efforts associated with the 2013 MS4 Permit will present opportunities for coordinated IRWM projects to ensure that the efforts are integrated to achieve maximum benefits. Specific water quality objectives have been established in the Basin Plan for the Peñasquitos Watershed (SDRWQCB, 2007). The inland surface water quality objectives established are for TDS, chlorides, sulfates, sodium, nitrates, nitrogen phosphorous ratios, iron, manganese, methylene blue-activated substances (MBAS), boron, odor, turbidity, color units and fluoride. Ground water quality objectives were only established for the following HAs: Miramar Reservoir, Poway, and Miramar. The groundwater water quality objectives established consists of TDS, nutrients, and turbidity. Several TMDLs have also been developed within the watershed. In 2006, a TMDL for sedimentation/siltation at Los Peñasquitos Lagoon was adopted. Since then, monitoring has been conducted in support of the TMDL in the lagoon as well as the watersheds that drain to the lagoon. An amendment for this TMDL was adopted in 2012 and set a numeric target for sediment loading of 12,360 tons of sediment per wet period or 58.6 tons per day, requiring a 67% sediment load reduction from the watershed. An additional Beaches and Creeks TMDL for indicator bacteria adopted in 2010 and included the Pacific Ocean Shoreline at Torrey Pines State Beach, the Pacific Ocean Shoreline in the Scripps HA, and Tecolote Creek (Copermittees 2012). A summary of TMDLs are provided in *Chapter 3, Region Description*.

Peñasquitos Watershed

Stormwater and Flood Management

Major drainages within the watershed include Carmel Valley Creek, Los Peñasquitos Creek, Poway Creek, Rose Canyon Creek, San Clemente Canyon Creek, Soledad Canyon, and Tecolote Creek, which encompass drainage areas of approximately 15.7, 101, 31.2, 37, 18.4, 95.5, and 9.29 square miles, respectively. The peak discharges during a 100-year event for Carmel Valley Creek, Poway Creek, Rose Canyon Creek, San Clemente Canyon Creek, Soledad Canyon, and Tecolote Creek are 9,800, 14,000, 12,000, 6,900, 23,000, and 4,900 CFS, respectively. The peak discharges during a 100-year event for Los Peñasquitos Creek at two locations are 16,800 and 15,400 CFS. Within the watershed, the acreage of land uses within mapped flood hazard zones total more than 7,300 acres, and includes the following: agriculture, 38 acres; commercial and services, 461 acres; industrial, 356 acres; open space and recreation, 2,953 acres; residential, 637; and transportation, communications, and utilities, 2,309 acres (see Appendix 7-B, Integrated Flood Management Planning).

Stormwater runoff has been a significant source of pollution in local water bodies as a result of urban runoff from rain or excessive irrigation. Storm drains in the Peñasquitos Watershed convey urban runoff and rainwater from streets, driveways, parking lots, and other impervious surfaces ending up directly in the creeks and eventually into the Pacific Ocean (Los Peñasquitos Watershed Copermittees, 2012).

Significant changes in the natural hydrology and geomorphology in the watershed have led to sedimentation issues. Sources of sediment include erosion of canyon banks, exposed soils, bluffs, scouring of stream banks, and tidal influx which have been exacerbated by land development in the watershed. Sedimentation issues in the watershed have affected the Los Peñasquitos Lagoon and Mission Bay. During rain events, impervious surfaces increase the volume and velocity of runoff resulting in scouring of sediment. This sediment is then transported downstream and deposited on the salt flats, lagoon channels, creek beds, and into Mission Bay. For the Los Peñasquitos Lagoon, sediment loading has affected the lagoon functions and salt marsh characteristics (SDRWQCB, 2012). Sediment loading has also created a flooding vulnerability to the surrounding urban and industrial developments.

Stormwater and flood management within the Peñasquitos Watershed falls under the jurisdictions of the City of Poway, the City of San Diego, the City of Del Mar, and the County of San Diego. The three cities and the County share responsibility for implementation of the stormwater programs and flood management identified in the Peñasquitos Watershed Urban Runoff Management Plan.

All of the stormwater copermittees within Peñasquitos Watershed have Jurisdictional Urban Runoff Management Plans (JURMPs) which are used to show compliance with the jurisdictional component of the NPDES Permit. Additionally, Watershed Urban Runoff Management Plans (WURMP) have been written for the Peñasquitos Watershed (one for each WMA) to outline projects and activities that are planned to protect the watershed from storm water pollution (CSD (e), 2012). For example, the City of San Diego has implemented various outdoor water conservation programs. One of these programs is the outdoor water conservation rebate program which provides commercial and residential customers with rebates to promote outdoor water conservation. This program conserves potable water while helping reduce pollutant-laden dry weather urban runoff flows from entering the local water bodies. In FY2011, it's estimated the program help increase water savings by 4,355 gallons per day and it is estimated the program will continue to grow in FY2012 as multiple applications were in process at the end of FY2011 (CSD (f), N.D.). The 2013 MS4 Permit has divided the Peñasquitos Watershed into two distinct watershed management areas (WMA); Peñasquitos and Mission Bay. The Mission Bay WMA includes the La Jolla Ecological Reserve Area of Special Biological Significance (ASBS) and San Diego-Scripps ASBS.

Natural Resources

The Peñasquitos Watershed contains areas of diverse and undeveloped habitat. These habitats consist of maritime succulent and coastal sage scrubs, coastal salt and brackish water marshes, southern maritime, southern mixed and chemise chaparrals, oak woodlands and oak riparian forests, riparian scrubs and woodlands, marshes and wet meadows, grasslands, and vernal pools. A large block of these habitats provides significant habitat connections between open space, coastal, and inland areas (AMEC, 2005).

The Peñasquitos Watershed is home to over 180 sensitive plant and animal species, many of which are listed as state and federally endangered (County of San Diego (d), 2008). Several of these sensitive species include the

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Salt marsh daisy, Quino checkerspot butterfly, American peregrine falcon, California gnatcatcher, California least tern, Cooper's hawk, Orange-throated whiptail, Western spadefoot toad, and the San Diego back-tailed jackrabbit. The Peñasquitos Watershed is also home to several invasive vegetation species such as pampas grass, giant reed, salt cedar, and Germany ivy (County of San Diego (d), 2008). The watershed is also home to two ASBS (1) La Jolla Ecological Reserve (ASBS # 29); and (2) San Diego-Scripps (ASBS #31) (SWRC (d)). These ASBS support an unusual variety of aquatic life and are considered the building blocks for a sustainable, resilient coastal environment and economy (SWRCB (c), 2012). Therefore these ocean areas are highly monitored and protected for water quality by the State Water Resources Control Board.
Potential Climate Change Impacts Climate change vulnerabilities that have been identified for the San Diego IRWM Region and are relevant to the Peñasquitos Watershed include but are not limited to: • Decrease in imported water supply • Decrease in groundwater supply • Decrease in surface water availability • Impacts to water quality • Sea level rise • Decrease in availability of necessary habitat • Increased flooding • Exacerbation of wildfires Due to the reliance on imported water supplies within the Peñasquitos Watershed, decreases in imported water supply availability could have substantially large impacts within the watershed. Flooding within the Peñasquitos Watershed could be exacerbated due to climate change if the frequency and intensity of storms overwhelm the ability of local creek channels to contain runoff. In contrast, climate change also has the potential to create changes in precipitation which can decrease seasonal stream flows. Decreased seasonal stream flows will create stream flows with irrigation/dry weather flows, thus increasing the concentration of constituents and requiring stream flows to receive a greater level of treatment. Further, due to the Peñasquitos Watershed's proximity to the coast, sea level rise has the potential to impact several municipalities and resources within the watershed. The Peñasquitos Watershed has a widespread beach community and sea level rise has the potential to damage coastal infrastructure, recreation, and negatively impact tourism. Lastly, if the frequency of wildfires increases due to climate change, local water quality and habitat within the watershed could be adversely impacted.
Management Issues and Conflicts Most management issues within the Peñasquitos Watershed revolve around urbanization. In the last 50 to 80 years rapid urbanization has affected the natural drainage and hydrologic characteristics of the watershed (AMEC, 2005). These changes have led to increased pollutants loads within the watershed, increased erosion, and subsequent downstream sedimentation. Sedimentation has been an issue in the lower portions of the watershed including Los Peñasquitos Lagoon. In the Los Peñasquitos WMA increased sediment management is needed to minimize sediment loads and aid in meeting the Los Peñasquitos Lagoon water quality objective for sediment. The buildup of sediments in the Los Peñasquitos Lagoon has and is altering the natural exchange of freshwater and seawater leading to destructive changes of the sensitive salt marsh habitat (Torrey Pines State Natural Reserve (a), 2010). Additionally, addressing the effects of past wildfires can also aid in addressing sediment loads in the watershed. During rain events, the frequency of flash floods has increased after wildfires exacerbating the sediment load issue in the downstream portion of the watershed. A stormwater management plan must be implemented to address the effects of past wildfire events such as sedimentation and associated flood risks.

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Mission Bay Park is one of San Diego's principal tourism and leisure destinations. However, Mission Bay has had a series of issues with, water quality, and loss of marsh land which need to be addressed to ensure Mission Bay's diversity, quality of recreation, and continued protection and enhancement of the Bay environment (CSD (g), 1994). Sediments enter Mission Bay from various sources, including Rose Creek, which impact water quality. The Kendall-Frost Marsh is located on the northern side of Mission Bay and receives flows containing urban runoff, pollutants, and sediments (Rose Creek Watershed Alliance (a), 2013). Rose Creek flows, among other urban development pressures, have contributed to the loss of marsh land at Mission Bay Park including at Kendall-Frost Marsh (Rose Creek Watershed Alliance (a)). To help expand and create marsh land, stakeholders in the watershed have expressed an interest in converting camp lands at Mission Bay Park to marsh land. The landfill site at Mission Bay, which operated as a municipal landfill from 1952 to 1959, was primarily a site for municipal refuse but was also used for industrial waste some of which is now regulated as hazardous waste. The discovery of detectable concentrations from contaminants of potential concern has led to concerns on the impacts these would have to groundwater, surface water, soil, and sediments. The landfill site at Mission Bay, which operated as a municipal landfill from 1952 to 1959, was primarily a site for municipal refuse, but records indicate some industrial waste may have been deposited there. Trace contaminants of potential concern have been discovered in groundwater, soils, and sediments. The presence of these trace contaminants has led to concerns regarding their impact to the environment and human health. In September 2006, the City of San Diego conducted a human health and ecological risk assessment of the Mission Bay Landfill. The conclusion from this assessment reported, "the total Hazard Index (HI) for each ecological receptor was less than 1, indicating no significant likelihood of adverse terrestrial ecological effects (SCS Engineers 2006)." The City of San Diego continues to assess and perform semi-annual groundwater and surface water monitoring at the site. Despite the City of San Diego's monitoring efforts, stakeholders in the watershed continue to express concerns regarding toxicity and potential groundwater and soil contamination from the landfill site.

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5.7 San Diego River Watershed

The San Diego River Watershed (San Diego Hydrologic Unit or San Diego HU (907)) covers 440 square miles and supports the largest population among the Region's watersheds. This population (approximately 509,000 people), however, is largely confined to the urbanized downstream portion of the watershed in the cities of San Diego, El Cajon, La Mesa, Poway and Santee. Figure 5-8 is a map showing the watershed boundaries and principal features.

Approximately 60% of the San Diego River Watershed is currently undeveloped, with most of this undeveloped land being in the eastern upstream portion of the watershed in unincorporated County lands. Cleveland National Forest, Mission Trails Regional Park, and the river floodplain near the community of Lakeside within unincorporated San Diego County represent important undeveloped areas that support intact habitat and endangered species.

Water rights have governed resource development in this watershed since the region was part of Mexico in the early 19th century. Additional development of water resources will have to take into account issues pertaining to water rights and requires coordination among watershed stakeholders. The Mission Valley basin and the Santee-El Monte basin are part of the San Diego River system. The San Diego River Watershed features two large water supply reservoirs: San Vicente and El Capitan. El Capitan Reservoir is an important feature in the watershed and in the Region; regionally, the reservoir provides a large amount of locally sourced water (runoff), locally the reservoir has a large impact on the San Diego River Watershed because it creates a distinct break in the San Diego River.

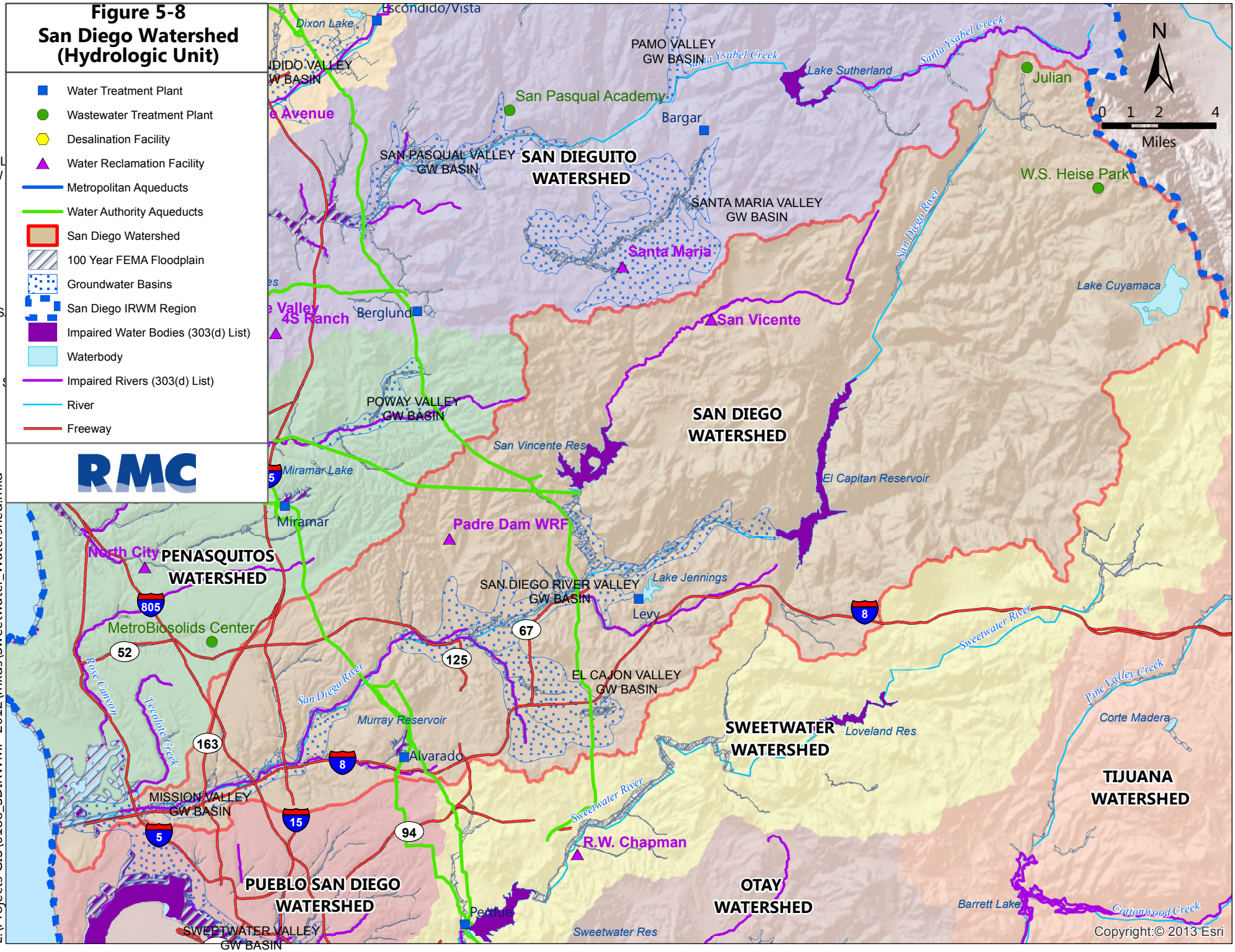
The San Vicente Reservoir is considered to be a key reservoir in the Region because it:

- is a key terminus of the San Diego Aqueduct,
- will be the largest reservoir in the County, totaling 242,000 AF following completion of the ESP,
- can receive diverted supplies from both El Capitan Reservoir and Sutherland Reservoir,
- is connected to one of the Region's largest water filtration plant (the 200 MGD capacity City of San Diego Alvarado Water Treatment Plant), and
- can be used to divert stored supplies to South County water agencies.

Some flood protection within Mission Valley is provided by the First San Diego River Improvement Project (FSDRIP); however, due to the limited nature of the FSDRIP, flooding continues to be an issue in Mission Valley and nearby Grantville. Flooding issues also exist within the middle portions of the watershed (in the communities of Lakeside and Alpine) and in the upper portion of the watershed (in and around the community of Ramona).

Significant groundwater resources exist within the watershed, but groundwater use is limited in downstream portions of the watershed due to high TDS concentrations. Additionally, a petroleum plume underneath Qualcomm Stadium and its parking lot impacts groundwater in Mission Valley.

Figure 5-8
San Diego Watershed (Hydrologic Unit)



San Diego River Watershed

Hydrology

The San Diego River Watershed is comprised of four hydrologic areas (HAs): Lower San Diego (907.1), San Vicente (907.2), El Capitan (907.3), and Boulder Creek (907.4) (PCW (a), N.D.). Major water bodies include the San Diego River, El Capitan Reservoir, San Vicente Reservoir, Lake Murray, Boulder Creek, and Santee Lakes. Surface water in the San Diego River Watershed is primarily governed by precipitation, stream flow, and flow control structures (dams).

The San Diego River flows through the entire San Diego River Watershed originating near the town of Julian and flowing southwest before entering El Capitan Reservoir. Downstream of El Capitan Reservoir, the San Diego River runs westward through the cities of Santee and San Diego, then through to the San Diego River Estuary and finally discharges into the Pacific Ocean (Anchor, 2005). The San Diego River discharges approximately 32,780 AFY of water. Major San Diego River tributaries consist of Boulder Creek, Cedar Creek, Conejos Creek, Chocolate Creek, Los Coches Creek, San Vicente Creek, and Forrester Creek (Anchor, 2005). The Famosa Slough is a tidally influenced area located near the mouth of the San Diego River.

Water Systems

Imported water is purchased from the local wholesaler San Diego County Water Authority. Imported water is brought into the region by massive aqueduct systems from the Colorado River (approximately 240 miles away) and from the State Water Project carrying water from the Sacramento-San Joaquin Bay Delta (approximately 700 miles away) (SWA (a), 2012). The imported water that is applied to the land as irrigation water (for agriculture and domestic irrigation) contributes to the groundwater supply in the form of return flows and may be a resource for agencies that have usable aquifers. The San Diego River Watershed contains five water supply reservoirs:

- El Capitan Reservoir owned by City of San Diego and stores 112,800 AF of primarily local surface water.
- San Vicente Reservoir, owned by the City of San Diego and will store 242,000 AF of both imported and surface water following completion of the ESP
- Cuyamaca Reservoir, owned by Helix Water District and stores 8,200 AF of surface water
- Lake Jennings, owned by Helix Water District and stores 9,800 AF of both imported and surface water
- Lake Murray, owned by the City of San Diego and stores 4,800 AF of both imported and surface water

Most surface runoff from the eastern portion of the watershed is impounded by El Capitan, San Vicente, and Cuyamaca Reservoirs. Most surface water flows from the western portion of the watershed flow into the Pacific Ocean. Surface water flows also enter Lake Jennings and Lake Murray from relatively small drainage areas; however these are mainly supplied with imported water (Anchor, 2005). Adjacent to Lake Murray is the Alvarado Water Treatment Plant which has a capacity to treat up to 120 MGD of drinking water supply (CSD (c), 2012). Adjacent to Lake Jennings is the Helix Water District R.M. Levy Water Filtration Plant which has a capacity to treat up to 106 MGD of drinking water supply. Water stored in Lake Murray and Lake Jennings does not normally flow downstream on the watershed.

The five reservoirs in the San Diego River Watershed supply water to as many as 760,000 residents in the region (PCW (a), N.D.). The El Capitan Dam impounds primarily surface water, while the San Vicente Dam impounds both surface water and imported water. The El Capitan Reservoir has a water storage capacity of 112,800 AF (CSD (a) (b), 2012). The capacity of the El Capitan Reservoir is important, because it allows this reservoir to capture a large amount of local runoff, which is an important source of local water. The reservoir is also an important feature of the San Diego River Watershed, because it essentially creates a break in the San Diego River, separating the lower river from the upper river entirely.

The San Vicente Reservoir is a key reservoir in the region because it:

- is a key terminus of the San Diego Aqueduct,
- will be the largest reservoir in the County following completion of the ESP,

San Diego River Watershed
• can receive diverted supplies from both El Capitan Reservoir and Sutherland Reservoir, • is connected to the Region's largest water filtration plant (the 120 MGD City of San Diego Alvarado plant), and • can be used to divert stored supplies to South County water agencies. Groundwater use in the uppermost portion of the watershed is limited to private wells and small water systems. Recharge is mainly from streamflow infiltration, percolation of precipitation, and applied waters. However, not much characterization of groundwater in the uppermost portion of the watershed has been completed. The lowermost portion of the watershed is characterized by three large groundwater basins: Mission Valley (9-14), San Diego River Valley (9-15), and El Cajon (9-16). The Santee-El Monte Basin is a subset of the San Diego River Valley groundwater basin. The Mission Valley groundwater basin (9-14) underlies an east-west trending valley which is drained by the San Diego River. The principle water bearing formation is the Quaternary age alluvium with an average well production of 1,000 gpm (DWR (a), 2004)). Recharge in the groundwater basin is primarily from stream flow infiltration from the San Diego River. In an effort to reduce imported water demands, the City of San Diego plans to develop a potable groundwater supply from the Mission Valley groundwater basin. However, due to petroleum contamination in the Mission Valley aquifer, the City of San Diego's ability to implement these plans has stalled. The proposed project (Brackish Groundwater Desalination project) would extract and desalinate native groundwater using reverse osmosis. The approximate sustainable yield and storage capacity of the basin would be 2,000 to 4,000 acre-feet per year (AFY) and 42,000 AF respectively (CSD (d), 2009). The Mission Valley groundwater basin is a low priority (Tier D-1) basin for Salt and Nutrient Management Plans (SNMP), and is not anticipated to require a SNMP in the near future. For more information on SNMPs and basin prioritization, see *Chapter 7, Regional Coordination*. The San Diego River Valley groundwater basin's (9-15) principle water bearing formation is the Quaternary alluvium. The most productive portions of the groundwater basin have wells that can yield up to 2,000 gpm (DWR (b), 2004). Before the El Capitan and San Vicente Dams were built, the San Diego River and San Vicente Creek used to be the primary recharge sources. Groundwater recharge sources for the San Diego River Valley groundwater basin consist of flows from Forrester Creek and other smaller creeks, precipitation, discharge from municipal wastewater treatment plants, underflow below the dam, and return flow from applied imported water and recycled water. The Santee-El Monte Basin is an unconfined groundwater basin located in the eastern portion of the San Diego River watershed near the cities of Santee, La Mesa, El Cajon, and Lemon Grove. The groundwater basin is comprised of commingling alluvial valleys of the San Diego River, San Vicente Creek, Forrester Creek, Los Coches Creek, and Sycamore Canyon Creek. The alluvial aquifer ranges in thickness up to 230 feet or more and is thickest in the eastern portion of the basin. In Santee, the alluvium thickness ranges from less than 10 feet to approximately 150 feet (USBR, 2012). Various agencies have evaluated the potential for groundwater recharge with advance treated recycled water, including Helix Water District that previously conducted a study in the upper Santee-El Monte Basin and Padre Dam Municipal Water District that is currently studying the lower Santee-El Monte Basin. Lakeside Water District is the largest municipal pumper of groundwater in the basin and currently uses approximately 700 AFY from the mid-Santee-El Monte Basin. The Lakeside Water District's wells in Lakeside are treated to remove iron and manganese (Lakeside Water District, 2011). Further development of the basin will require addressing water rights issues that may impede beneficial uses. The Santee-El Monte Basin is a high priority for a Salt and Nutrient Management Plan (SNMP). The Padre Dam Municipal Water District is developing an SNMP for the Santee portion of the basin, and to date has collected water quality data, coordinated a project approach with the Regional Board, and met with stakeholders. More information can be found in *Chapter 7, Regional Coordination*. The El Cajon groundwater basin (9-16) is located in the south central part of San Diego County. The groundwater basin has three water bearing formations: Pleistocene alluvium, Poway conglomerate, and Sandy siltstone. Recharge in the groundwater basin is primarily from precipitation. Other sources of recharge consist of underflow from underlying crystalline rocks, return of applied irrigation water, and percolation of septic tank effluent (DWR (c), 2004). The El Cajon groundwater basin is a low priority (Tier D-2) basin for a SNMP, and is

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not anticipated to require a SNMP in the near future. The Regional Board's Basin Plan includes the San Vicente/Gower groundwater basin as a subbasin the San Diego Watershed. This basin is considered a lower priority SNMP basin. Ramona Municipal Water District is developing an SNMP for this groundwater basin, as described in *Chapter 7, Regional Coordination*. In January 2004, the San Diego City Council authorized a comprehensive evaluation of all viable options to maximize the usage of recycled water (to reduce the City's dependence on imported water) (CSD (g), 2013). The effort resulted in the City recognizing Indirect Potable Reuse/Reservoir Augmentation (IPR/RA) as the preferred alternative. The City is currently pursuing the Water Purification Demonstration Project, which would determine the feasibility of a full-scale reservoir augmentation project (CSD (h), 2013). As part of this Project, the 1 MG of purified water produced by the Advanced Water Purification Facility would be tested; in parallel, a study of the San Vicente Reservoir would test the key functions of reservoir augmentation and to determine the viability of a full-scale project (no purified water has been sent to the reservoir during the demonstration phase). If the Demonstration Project is successful, the City would construct a full-scale advanced water treatment plant that treats recycled water from the NCWRP and conveys the advanced-treated recycled water through a new transmission pipeline to San Vicente Reservoir where it would blend with imported, untreated water and reside for several months prior to being sent to water treatment plants for additional treatment and distribution as potable water (CSD (i), 2013)
Internal Boundaries and Land Uses The San Diego River Watershed encompasses an area of 440 square miles, making it the second largest watershed in San Diego County (PCW (a), N.D.). The watershed contains the highest population of the Region's watersheds at approximately 509,000 (Anchor, 2005). The San Diego River Watershed ranges from sea level at the mouth of the San Diego River to 6,512 ft at the eastern edge of the watershed (Anchor, 2005). The San Diego River Watershed is within the jurisdiction of the cities of San Diego, El Cajon, La Mesa, Poway, and Santee as well as several unincorporated jurisdictions. Water supply agencies within the watershed include: City of San Diego, Helix Water District, Padre Dam Municipal Water District, Lakeside Water District, and Ramona Municipal Water District. Wastewater agencies include: City of San Diego, Padre Dam Municipal Water District, City of La Mesa, and City of El Cajon. The tribal nations of the Barona Band of Mission Indians, the Capitan Grande Group of Mission Indians, and the Inaja-Cosmit Band of Indians are located within the upper San Diego River Watershed. The upper portion of the watershed also contains several small mutual water agencies that provide water services to rural areas. In total, approximately 9% of the San Diego River Watershed contains tribal lands. Within the San Diego River WMA, undeveloped land makes up the primary use (44%). Open space / parks and recreation (23%), residential and spaced rural residential (19%), and transportation (6%) uses are also represented. Agriculture, commercial, commercial recreation, industrial, military, public facility, and water land uses each make up less than 2% of the land use acreage (San Diego Association of Governors (SANDAG), 2009). The majority of undeveloped land is located in the upper and eastern portion of the watershed, while the lower reaches of the San Diego River Watershed are highly urbanized with residential, freeways and roads, and commercial/industrial land uses predominating (Anchor, 2005 and PCW (a), N.D.). The undeveloped lands mainly include Cleveland National Forest and Mission Trails Regional Park.
Water Quality and Water Quality Impairments Ten water bodies within the San Diego Watershed are listed on the Clean Water Act 303(d) list of impaired water bodies: • Alvarado Creek for selenium • El Capitan Lake for color, manganese, pH, phosphorus, and nitrogen • Famosa Slough and Channel for eutrophication • Forester Creek for fecal coliform, pH, selenium, and TDS

San Diego River Watershed
• Murray Reservoir for nitrogen and pH • Pacific Ocean Shoreline, San Diego River at Dog Beach for and total coliform • San Diego River (lower) for *Enterococcus*, fecal coliform, dissolved oxygen (DO), nitrogen, phosphorus, TDS, manganese, and toxicity • Los Coches Creek for selenium • San Vicente Creek for ammonia as nitrogen, benthic community effects, nitrogen, and toxicity • San Vicente Reservoir for chloride, color, sulfates, total nitrogen, and pH. The pollutants/stressors of concern in the watershed are color, manganese, pH, eutrophication, fecal coliform, DO, phosphorus, TDS, chloride, color, and sulfates. The major impacts from these pollutants/stressors consist of surface water quality degradation, sedimentation, eutrophication, and habitat degradation. However, some of the 303(d) listings may be due to natural lake conditions. Further study is needed to determine if the existing basin plan objectives can be met or if they need to be changed to reflect natural lake conditions. Several of the sources/activities responsible for the listed water quality issues consist of urban runoff, agricultural runoff, mining operations, sewage spills, and sand mining (PCW (a), N.D.). Surface water quality in the undeveloped upper portion is of higher quality than the developed lower portion of the watershed due to human development (Anchor, 2005). In terms of river water quality, the lower San Diego River system has the highest water quality in the winter months with greatest streamflow and lowest water quality during the summer with minimum flows (SDRPF (a), 2011). A Water Quality Improvement Plan will be developed for the entire San Diego River Watershed in accordance with the 2013 MS4 Permit, which will address some of the sources of pollutant loading into the water bodies and determine actions that can be taken to improve water quality. Efforts associated with the 2013 MS4 Permit will present opportunities for coordinated IRWM projects to ensure that the efforts are integrated to achieve maximum benefits. Water quality in the lower San Diego River is considered poor by the San Diego River Park Foundation. Low summer and fall river flows in ponded sections, combined with excess nutrients, can accelerate the growth of the aquatic plant water primrose and in other ways decrease DO levels. Trash removal activities by the Foundation are concentrated in areas which receive water from storm drains and which have high concentrations of encampments (SDRPF (b), 2011). Despite the water quality issues in the lower San Diego River, the waters in the upper San Diego Watershed, such as those upstream of El Capitan Reservoir, are considered healthy as indicated by their cold water that is an important habitat for trout and other species. Given the high quality of headwaters in the San Diego River Watershed and their connectivity to regional reservoirs such as El Capitan, development of projects to provide for the continued protection of these waters and their high water quality is of regional importance. Groundwater quality in the uppermost portion of the watershed is generally of good quality. Only one site near Julian is known to have contaminated groundwater by gasoline from leakage of an underground tank. Groundwater quality in the lowermost region of the watershed varies by groundwater basin. The San Diego River Valley groundwater basin is of bicarbonate character in the east and chloride character in the west (DWR (b), 2004). TDS content in the San Diego River Valley groundwater water basin is high on the western portion of the watershed. The El Cajon groundwater basin is generally of sodium chloride character and is known to have high nitrate, chloride, and TDS content (DWR (c), 2004). The Mission Valley groundwater basin is known to have high magnesium and sulfates for domestic use. Chloride and TDS concentrations are also high for irrigation and domestic use. Seawater intrusion is also a possible impairment. (DWR (a), 2004). Portions of the Santee-El Monte Basin are contaminated with nitrates, TDS and methyl tertiary butyl ether (MTBE). Lakeside Water District at one time provided treatment for removal of MTBE and blending for nitrate compliance in the groundwater supply, but has not used this supply since 2007 (Lakeside Water District, 2011). The SNMPs under development by Padre Dam MWD and Ramona MWD will identify salt and nutrient sources, loading estimates, and establish goals, objectives, and mitigation measures to protect and improve water quality in the basin (see *Chapter 7, Regional Coordination*).

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Since 1986, petroleum products have been discharged from an above storage tank facility resulting in a groundwater contamination plume in the Mission Valley groundwater basin (SDRWQCB, 2012). The groundwater contamination plume extends approximately 2,000 feet to the south and southwest beneath Friars Road and the Qualcomm Stadium parking lot. In 1992, the California Regional Water Quality Control Board-San Diego Region (SDRWQCB) issued a clean-up order to the discharger Kinder Morgan Energy Partners, L.P. The City of San Diego intends to develop a potable water supply from the Mission Valley groundwater basin to reduce demands from imported water once clean-up has been completed. Currently the cleanup is focused on two gasoline constituents in groundwater, MTBE, and tertiary butyl alcohol (TBA) and cleanup of contaminated soil (SDRWQCB, 2012). Specific water quality objectives have been established in the Basin Plan for the Lower San Diego, San Vicente, El Capitan, and Boulder Creek HAs (SDRWQCB, 2007). The Inland surface water quality objectives established are for TDS, chlorides, sulfates, nutrients, manganese, turbidity, and color. In 2010, the development of a nutrient TMDL for Famosa Slough was initiated by SDRWQCB Order No R9-2006-0076. Additionally, Forrester Creek and the lower San Diego River were included in the Beaches and Creeks TMDL for indicator bacteria, adopted in 2010 (Copermittees 2012). A summary of TMDLs that have been adopted or are in progress are provided in *Chapter 3, Region Description.*
Stormwater and Flood Management Major drainages within the watershed include Forrester Creek, Murphy Canyon, San Diego River, and San Vicente Creek, which encompass drainage areas of 22.7, 12.1, 710, and 83 square miles, respectively. The peak discharges during a 100-year event for Forrester Creek, Murphy Canyon, and San Vicente Creek are 12,450, 3,500, and 16,000 CFS, respectively. The peak discharges during a 100-year event for San Diego River at two locations are 36,000 and 31,000 CFS. Within the watershed, the acreage of land uses within mapped flood hazard zones total more than 8,300 acres, and includes the following: agriculture, 508 acres; commercial and services, 1,414 acres; industrial, 600 acres; open space and recreation, 2,576 acres; residential 1,577; and transportation, communications, and utilities, 1,272 acres (see Appendix 7-B, Integrated Flood Management Planning). Stormwater and flood management within the San Diego Watershed falls under the jurisdiction of the County of San Diego, and the Cities of San Diego, El Cajon, La Mesa, Poway, and Santee. Each of whom share responsibility for flood control and drainage system facilities as well as maintaining storm drains, channels and debris basins, with the exception of the City of Poway, whose portion of the watershed is protected open space and is not expected to produce urban runoff (City of El Cajon et al., 2008). Stormwater management within the San Diego River Watershed also involves stormwater transfers from other watersheds (namely the Pueblo Watershed) to the San Diego River Watershed. Particularly in the western portion of the watershed near Morena Boulevard (just north of the San Diego River Watershed), stormwater flows are diverted from the Pueblo Watershed to the San Diego River Flood Control Channel, where they are ultimately conveyed to the Pacific Ocean. Flood protection within the Mission Valley area is primarily provided by the San Diego River Flood Control Channel near Mission Bay that was built by the Army Corps of Engineers beginning in 1850. Due to the complexity of flood flows and flood control protection along the San Diego River, it took approximately 100 years of work to configure the flood control channel to its present day configuration. Since the 1940s the San Diego River Flood Control Channel has redirected flows from the San Diego River to the San Diego Bay. In addition, the First San Diego River Improvement Project (FSDRIP) is located in the San Diego River Watershed and provides additional flood control protection. The FSDRIP is a 45-acre flood control and mitigation project along a 7,000 linear flood section of the San Diego River developed by the City of San Diego. The mitigation site was developed as a 100-year flood control project, but due to the limited nature of the FSDRIP (covering only a short portion of the San Diego River), flooding continues to be an issue in Mission Valley and nearby Grantville (CSD (f), 2004). Flooding is a larger issue in the lowermost portion of the watershed due to its highly urbanized landscape. An increase in impervious surfaces has increased urban runoff, pollutant loading, and poor natural pollutant

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assimilation, which has led to poor water quality. Impervious surfaces have also made stormwater flows larger and more frequent, with high sediment loads degrading the stability of the watershed channels. Further, stakeholders have reported that pollution from trash causes flooding issues as trash may impede natural hydrologic flows. Since the uppermost portion of the watershed is undeveloped, the flood potential is generally considered insignificant. Flood hazards and water quality problems associated to urbanized landscapes are not primary issues of concern in the uppermost portion of the watershed (Anchor, 2004). However, repetitive flood losses have been reported in the community of Ramona, which is located in the upper portion of the watershed (County of San Diego 2007). Recent fire events (namely the Cedar Fire of 2003) have resulted in sedimentation; subsequent storms have resulted in sediment-laden runoff flooding numerous homes and causing deposition in and around the community of Ramona (County of San Diego 2007).
Natural Resources The San Diego Watershed supports a diversity of biological resources. The San Diego River supports habitats essential for species dispersal and providing species access to adjacent habitats and resources along the watercourse. Though the riparian vegetation along the River is fragmented, it still provides essential habitat for reproduction, nesting, roosting and foraging (Anchor, 2004). Important undeveloped lands in the San Diego Watershed are the Cleveland National Forest, Mission Trails Regional Park and the river floodplain near Lakeside. These undeveloped lands are home to a variety of habitats and endangered species (PCW (a), N.D.). Since 2002 there has been a formal vision and plan (*San Diego River Park Conceptual Plan*) to establish a connected river park along the length of the San Diego River from El Capitan Reservoir to the Pacific Ocean (San Diego River Park Foundation 2002). The overall goal of this planning effort, which has involved many stakeholders, jurisdictions, and interested parties throughout the Region, is to preserve and celebrate the San Diego River's historic resources, to support the natural stream processes, to preserve and enhance riparian habitat, and to provide recreation access and activities (San Diego River Park Foundation 2002). The easternmost portion of the watershed has notable vegetation communities such as meadows and montane forests of coniferous and Jeffrey pine trees which are rare and localized vegetation in the watershed (Anchor, 2004). These are communities are home to species such as the Mountain Lion, Long-legged Myotis, Fringed Myotis as well as threatened and endangered species such as the Red-legged frog (which is believed no longer survives in the upper most portion of the watershed), Beldings Savannah Sparrow, Southwestern Willow Flycatcher, California Gnatcatcher, and Bald Eagle (Anchor, 2004). The eastern portion of the watershed also contains wild rainbow trout, which is an important species due to its status as a sensitive species; this species is also considered an indicator species, indicating that water bodies in the eastern watershed contain healthy cold water habitat. The central portion of the watershed is dominated by chaparral and sage scrub with a few isolated patches of Oak woodlands and extensive areas of rock outcrops. Important species that occur in this portion of the watershed include the Western Spadefoot Toad, San Diego Banded Gecko, San Diego Ringneck, Prairie Falcon, Ferragunous Hawk, Golden Eagle, Northwestern San Diego Pocket Mouse, Stephen's Kangaroo Rat, Ringtail and Mountain Lion (Anchor, 2004). The lower portion of the watershed is limited to native and semi-native habitats as it consists of mostly developed lands. The most extensive vegetation type in this portion of the watershed consists of coastal sage scrub. Patches of disturbed wetland, native riparian forest and scrub can also be found in the lower watershed. Also of importance is the Famosa Slough, a 37-acre wetland located near the mouth of the San Diego River, which is home to productive wetland habitats and contains detention basins and other features that help with stormwater and flood control. The slough is flushed with salt water from the river channel and collects rainwater from the surrounding urbanized area (Friends of Famosa Slough (a), 2012). The San Diego River Estuary, also located within the lower portion of the watershed is over 300 acres in size and provides important estuarine habitat in the watershed. Species unique to this portion of the watershed include Western Snowy Plover, California Least Tern, Light-footed Clapper Rail, California Brown Pelican, Silvery Legless lizard, two-striped Garter Snake (Anchor, 2004).

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Threatened and endangered species within the San Diego Watershed include San Diego ambrosia, San Diego thorn-mint, San Diego button celery, arroyo toad, southwestern willow flycatcher, least bell's vireo, Encinitas baccharis, California gnatcatcher, bald eagle, San Diego fairy shrimp, quino checkerspot butterfly, California brown pelican, peregrine falcon, western snowy plover, California least tern, Belding's savannah sparrow, and the light-footed clapper rail. The San Diego watershed also supports non-native fishes such as green sunfish, largemouth bass, black bullhead and mosquito fish. The San Diego Estuary supports native fish species such as the killifish and striped mullet (Anchor, 2005). Despite its importance, the San Diego Estuary is highly susceptible to flooding; the estuary was severely impacted by storm events that took place in 2005 and caused over $120 million of damage in the Mission Valley area (County of San Diego 2007). Invasive species, particularly *Arundo donax* are considered an issue throughout the watershed, and can cause threats to native species and may also exacerbate flood-related issues. Tribal nations in the Region have indicated concern that jurisdictional habitat conservation efforts such as those described above may not consider current or future tribal developments, and tend to categorize tribal lands as open space for habitat and conservation planning purposes.
Potential Climate Change Impacts Climate change vulnerabilities that have been identified for the San Diego IRWM Region and are relevant to the San Diego Watershed include but are not limited to: • Decrease in imported water supply • Decrease in groundwater supply • Decrease in surface water availability • Impacts to water quality • Sea level rise • Decrease in availability of necessary habitat • Increased flooding • Exacerbation of wildfires Due to the reliance on imported water supplies within the San Diego Watershed, decreases in imported water supply availability could have substantially large impacts within the watershed. Flooding within the San Diego Watershed could be exacerbated due to climate change if the frequency and intensity of storms overwhelm the ability of local reservoirs to capture runoff. Further, due to the San Diego Watershed's proximity to the coast, sea level rise has the potential to impact several municipalities and resources within the watershed. Wildfires in the San Diego Watershed are a common occurrence, particularly in the undeveloped regions of the watershed such as in Cleveland National Forest. If the frequency of wildfires increases due to climate change, local water quality and habitat within the watershed could be adversely impacted. Rain events after wildfires are also known to create flash floods in the San Diego Watershed. Increased frequency of wildfires will increase the frequency of flash floods which current stormwater infrastructure in the San Diego Watershed may not have the capacity to withstand. Post-fire rain events in the watershed cause erosion, mudslides, and sedimentation which create negative water quality issues. Stormwater runoff from post-fire rain events in the watershed have shown to carry high levels of turbidity, nutrients, and TDS. An increased wildfire season can increase erosion and sedimentation process in the watershed, negatively impacting water quality in streams and local reservoirs. The potential effects on El Capitan, San Vicente, Cuyamaca reservoirs include increased sedimentation with loss of storage, temporary increase in turbidity, and increased water treatment needs and costs. Climate change also has the potential to add stress on ecological systems in the San Diego Watershed. The rapid rate of climate change can pose a problem to many of the watersheds sensitive species, such as endangered and threatened species, that will be unable to adapt fast enough to habitat shifts and increasing temperatures. Species that are unable to adapt fast enough can face potential extinction. Additionally, changes

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in climate can make conditions much more favorable for invasive species in the watershed reducing available habitat space for native species.
Management Issues and Conflicts Major issues in the San Diego Watershed consist of urbanization and its effects on water quality, hydromodification, loss of habitat, and the presence of non-native species. Increased urban development has increased the impervious surface area in the watershed leading to increased urban runoff impacting surface water quality. Urbanization has and will likely continue to affect the watershed hydrology and sediment transport patterns without proper management. Also at risk are the loss of native habitat in the watershed due to increased development and the presence of non-native invasive species (Anchor, 2005). Ongoing efforts in the watershed such as efforts to establish a river park from the El Capitan Reservoir to the Pacific Ocean along the length of the San Diego River can potentially reduce urbanization and its impacts on the watershed. Conservation efforts such as the San Diego River Park present additional issues associated with private land ownership in the watershed; conservation efforts are therefore complex due to multiple conflicting interests within the watershed. Invasive non-native plant species has been a significant problem of concern in the San Diego Watershed for many years. Many of the invasive non-native plants contribute to flooding, are a fire risk, and degrade native habitats (San Diego River Conservancy (a), N.D.). Therefore, projects and programs have been created by various private, non-profit, and government agencies to remove invasive non-natives throughout the watershed and along the San Diego River (San Diego River Conservancy (a), N.D.). The City of San Diego Public Utilities Department and Helix Water District are required to conduct a watershed sanitary surveys for their surface water sources within the watershed to identify actual or potential sources of contamination and any other watershed related factors that are capable of producing adverse effects on the quality of water used for domestic water supply (CSD (j), 2011). Within the San Diego Watershed, the City of San Diego and Helix Water District monitor local water supply reservoirs consistent with the requirements of the Safe Drinking Water Act. Though no significant major water quality issues were detected water quality monitoring will continue and expand to include long-term watershed monitoring for water quality, land use, and land conditions. Centralizing and strengthening relationships among all agencies and jurisdictions within the watershed will be essential to establishing successful inter-jurisdictional coordination for drinking water quality monitoring. The need to reduce imported water demands in the San Diego Watershed has led water managers to consider using previously unused local groundwater supplies. However, the Mission Valley groundwater basin has a documented contamination plume (see discussion in Water Quality above) and most of the San Diego coastal plain is underlain with brackish (2,000 parts per million dissolved solids) groundwater as coastal aquifers are subject to recurring intrusion of saline water from the Pacific Ocean. The challenge for water managers in the San Diego Watershed will consist of capturing fresh groundwater flowing towards the ocean and extracting brackish groundwater for treatment using reverse osmosis (USGS (a), N.D.). This will require further characterization of the coastal plains geologic, hydrologic, and geochemical systems as well as monitoring of seawater intrusion, land deformation, and effects on the coastal riparian system. Padre Dam Municipal Water District is interested in using the lower Santee-El Monte Basin for groundwater recharge with advanced treated recycled water. Padre Dam Municipal Water District also has interest in recovering return flows from application of imported water and recycled water by its customers. The City of San Diego also maintains an interest in the basin due to their Pueblo rights in the San Diego River and associated groundwater basins. These agencies will need to coordinate to ensure full use of the groundwater basin, while at the same time balancing protection of historical water rights with the maximization of beneficial uses. Conflicts between resource protection and flood control in the lower watershed often prevent vegetation control in floodplains. Delayed removal of vegetation that blocks flood flows can then result in channel overflows and flood damage. Conversely, removal of vegetation within flood control channels can fragment habitat, especially riparian habitat that can contain important protected species. To diversify the water portfolio, water managers are considering maximizing water reuse. The City is currently running a water purification demonstration project that examines the use of advanced water purification

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technology to provide safe and reliable water (CSD (g) (h) (i), 2013). If the demonstration project is successful, the full-scale reservoir augmentation, which would involve advance treatment of existing recycled water supply and conveyance into the San Vicente Reservoir for storage and later potable use, would be implemented. The viability of this strategy to produce safe and reliable water that meets all regulations has yet to be determined. Portions of the San Diego River have been altered and constrained due to heavy mining operations. Sand mining has impacted portions of the San Diego River from accumulated sand in the River which creates ponding of water (SDRPF (b), 2001). Ponded water rapidly decreases its DO levels negatively impacting aquatic life. Mining operations along the River have limited the communities' ability to access and enjoy walking, biking or kayaking/canoeing along the river – particularly the community surrounding Lakeside. Many mining operations in the San Diego River valley, however, are currently being phased out and restoration projects are currently underway. Continued restoration and habitat preservation efforts will be needed to restore and enhance the impacted San Diego River areas (Lakeside River Park Conservancy (b), N.D.).

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5.8 Pueblo Watershed

The Pueblo Watershed (Pueblo Hydrologic Unit or Pueblo HU (908)) is contained within the San Diego Bay WMA, and covers 60 square miles of urbanized land along San Diego Bay within the cities of San Diego, La Mesa, Lemon Grove and National City. Figure 5-9 is a map showing the boundaries and principal features of the watershed.

With a population of approximately 520,300, the Pueblo Watershed is the most densely populated watershed in the County (SDBC, 2008). While the primary land use within the watershed is residential, a relatively large percentage of the Pueblo Watershed land is used for transportation corridors and highways. Due to the high level of existing urbanization in the watershed, only small amounts of additional land are projected for development over the next 15 years.

No water supply is currently developed within the Pueblo Watershed, but portions of the San Diego Formation (a deep confined groundwater aquifer) underlie portions of the Pueblo Watershed. Chollas Creek is the largest of several drainage courses within the Pueblo Watershed.

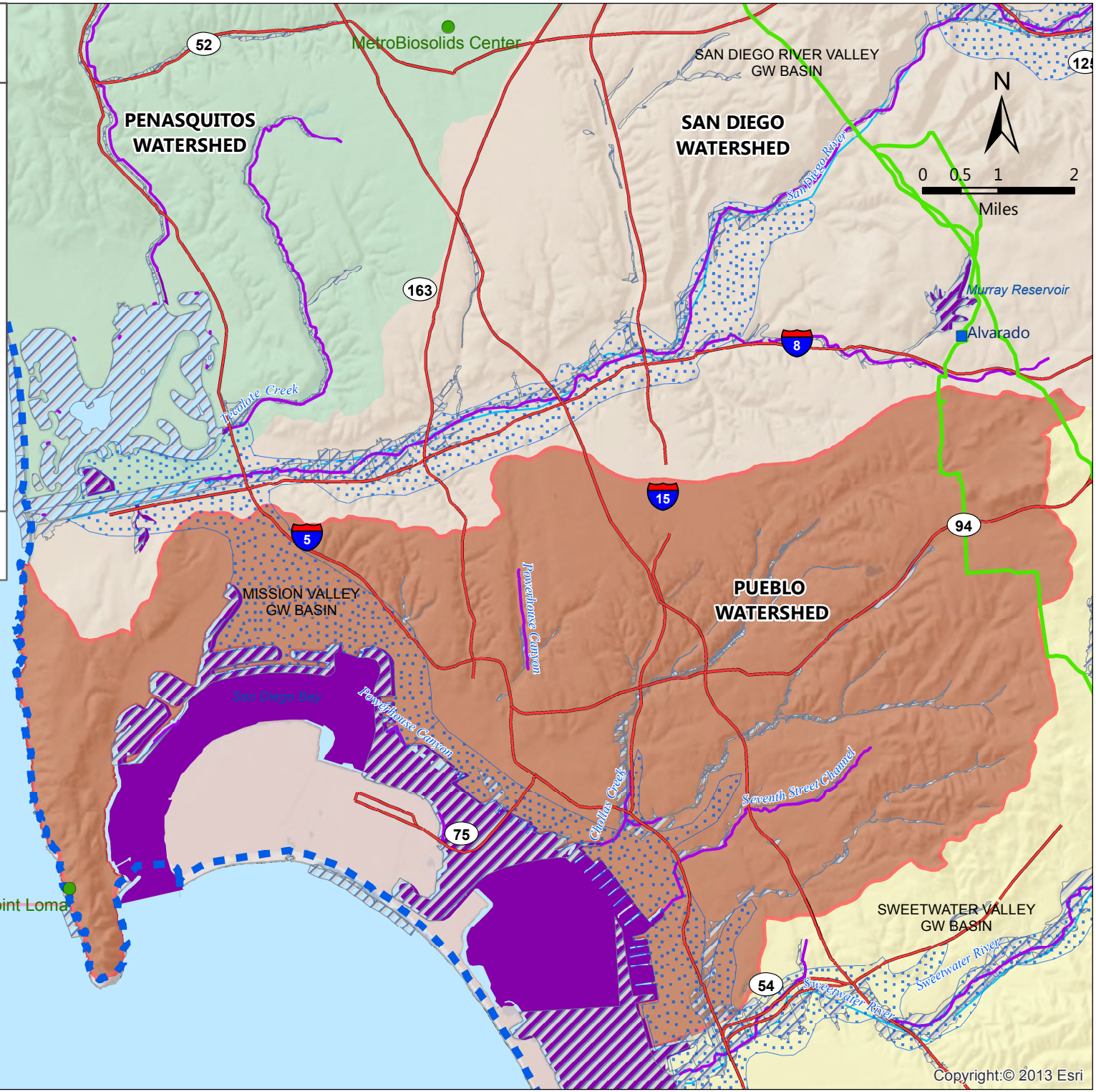
The Chollas Creek Integration Project – funded by Proposition 84-Round 1 – will reduce flooding and improve water quality along Chollas Creek.

Photo credit: Charles Davis, Jacobs Center for Neighborhood Innovation

Figure 5-9
Pueblo Watershed (Hydrologic Unit)

- Water Treatment Plant
- Wastewater Treatment Plant
- Desalination Facility
- Water Reclamation Facility
- Metropolitan Aqueducts
- Water Authority Aqueducts
- Pueblo Watershed
- 100 Year FEMA Floodplain
- Groundwater Basins
- San Diego IRWM Region
- Impaired Water Bodies (303(d) List)
- Waterbody
- Impaired Rivers (303(d) List)
- River
- Freeway

RMC



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Pueblo Watershed

Hydrology

The Pueblo Watershed is comprised of three Hydrologic Areas (HAs): Point Loma HA (908.1), San Diego Mesa HA (908.2), and National City HA (908.3) (SDBC, 2008). The major water bodies within the three HAs include Switzer Creek, Paleta Creek, and Chollas Creek.

The Pueblo Watershed's major water feature is San Diego Bay. The Pueblo Watershed is one of three watersheds that drain into San Diego Bay. The majority of the surface water from the Pueblo HAs drains to San Diego Bay, except for a small portion of the Point Loma HA which drains directly to the Pacific Ocean (CSD (a), 2012). The major waterway in this watershed that drains into San Diego Bay is Chollas Creek; other waterways of importance include Paleta and Switzer Creeks.

Water Systems

Imported water is the largest source (~80%) of water supplied throughout the San Diego Region (SDCWA (a), N.D.). Imported water is currently purchased from the local wholesaler San Diego County Water Authority (SDCWA) (CSD (b), 2012). Imported water is brought into the region by massive aqueduct systems from the Colorado River (240 miles away) and from the State Water Project carrying water from the Sacramento-San Joaquin Bay Delta (700 miles away). Local supplies make up the remaining 20% of water supply for San Diego County (SDCWA (a), N.D.). Surface water is collected as runoff and stored in reservoirs outside the Pueblo Watershed. Surface water is used to maximize local water supplies in conjunction with imported water.

Groundwater production in the Pueblo Watershed is limited due to lack of storage capacity in the basin, availability of groundwater recharge, and degraded water quality (SDCWA (b), N.D.). The Sweetwater Valley Groundwater Basin (9-17) is a large groundwater basin that empties into the San Diego Bay underlying the Pueblo Watershed. The Sweetwater Valley Groundwater Basin consists of two water bearing formations, the Sweetwater Alluvium and the San Diego Groundwater Formation. Recharge of the basin is derived from runoff of seasonal precipitation from the Sweetwater River Valley, Sweetwater Reservoir discharge and underflow, and possible subsurface flows (DWR (a), 2004). A portion of the Mission Valley Groundwater Basin (9-14) also underlies the Pueblo Watershed.

The Metropolitan (Metro) Sewerage System, owned by the City of San Diego and operated by the San Diego Metro Wastewater Joint Powers Authority [JPA]), serves the majority of the Pueblo Watershed (SDCWA (a), N.D. and San Diego Metro Wastewater JPA, 2012). National City has its own wastewater division that maintains the City's sanitary sewer main and lines, closed storm collection systems, and pump stations. The Metro Sewerage System is responsible for treating wastewater from cities located in the Pueblo Watershed. The Wastewater Collection division is responsible for the collection and conveyance of wastewater. Major wastewater infrastructures within the Pueblo Watershed consist of Pump Stations 1 and 2, Pt. Loma Ocean Outfall, and the Pt. Loma WWTP. The Pt. Loma WWTP is located on the bluffs of Point Loma and treats approximately 175 million gallons of wastewater per day (CSD (a), 2012).

Internal Boundaries and Land Uses

The Pueblo watershed is within the jurisdictions of the Cities of San Diego, La Mesa, Lemon Grove, National City, the Port of San Diego, the Regional Airport Authority and a small portion of the County of San Diego (0.3%).The Pueblo Watershed is primarily within the jurisdiction of the City of San Diego. Other jurisdictions in the Pueblo Watershed include National City, Lemon Grove, La Mesa, Port of San Diego, the Regional Airport Authority, and a small portion of the County of San Diego (0.3%) (SDBC, 2008).

The dominant land use within the Pueblo Watershed is residential uses followed by transportation, commercial business/public facilities/schools/parks, military uses, and open spaces/preserves (SDBC, 2008). The Pueblo Watershed is highly developed and one of the most densely populated watersheds in the San Diego Bay Watershed. There are no tribal lands located within the Pueblo Watershed.

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In Chollas Creek, Groundworks San Diego-Cholas Creek has led recent efforts to organize watershed stakeholders in integrating watershed management activities and funding proposals. Stakeholder coordination activities have included the City of San Diego, Jacobs Center for Neighborhood Innovation, San Diego CoastKeeper, Urban Corps of San Diego, EPA, National Parks Service, UCSD, and IRWM Program representatives. From this coordination, the Chollas Creek Integration Project was established as a multi-phased community-driven effort to restore Chollas Creek and provide a safe community recreation space in the neighborhood near Euclid Avenue and Market Street. Continuing the theme of community involvement, the Chollas Creek project aims to conduct outreach to community members about the value of creek water quality and habitats.

Habitat restoration activities along Chollas Creek

Photo Credit: Jacobs Center for Neighborhood Innovation

Water Quality and Water Quality Impairments

The Pueblo Watershed is highly impacted by pollutants carried by urban runoff from residential areas, streets and roadways, commercial and industrial areas, and construction. Such pollutants include metals, bacteria, oil and grease, pesticides, sediment, and trash. The 303(d) list includes the three creeks, a section of San Diego Bay shoreline, and the Point Loma Hydrologic Area within the Pueblo watershed (PCW (a), N.D. and SDBW, N.D.):

- Chollas Creek for copper, lead, zinc, indicator bacteria, phosphorus, nitrogen, diazinon, and trash.
- Switzer Creek for copper, lead, and zinc
- Paleta Creek for copper and lead
- Shelter Island Yacht Basin for dissolved copper
- San Diego Bay shoreline for benthic community effects, sediment toxicity, Enterococcus, fecal coliform, total coliform, copper, chlordane, PAHs
- Pacific Ocean Shoreline, Point Loma hydrologic area at Bermuda Avenue for total coliform

Additionally, there are 303(d) listing for areas of San Diego Bay for copper, benthic community effects, sediment toxicity, bacteria, chlordane, and PAHs. The sources of pollutants are primarily from stormwater discharges, shipyard operations, and dry weather nuisance flows. The bay bottom provides habitat for many aquatic organisms and functions as an important component of aquatic ecosystems. However, the bay bottom sediment serves as a repository for persistent and toxic chemicals causing toxicity to marine life and benthic community impairments.

The major pollutant sources are from residential and street/roadway runoff, followed by runoff from businesses, parks, and construction. All major water bodies, including the San Diego Bay, in the Pueblo Watershed are highly impacted by urban runoff which causes surface water degradation, habitat degradation, and sediment toxicity. The heavily urbanized nature of the watershed contributes to its poor water quality, though neighborhood groups, such as the Jacobs Center for Neighborhood Innovation, are pursuing projects to improve water quality in Pueblo Watershed creeks (*see call-out box*). Furthermore, a Water Quality Improvement Plan will be

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developed for the entire Pueblo Watershed in accordance with the 2013 MS4 Permit, which will address some of the sources of pollutant loading into the water bodies and determine actions that can be taken to improve water quality. Efforts associated with the 2013 MS4 Permit will present opportunities for coordinated IRWM projects to ensure that the efforts are integrated to achieve maximum benefits. Bulletin 118 reports that groundwater quality of the San Diego Formation (Sweetwater Valley Groundwater Basin (9-17)) has been historically brackish, with TDS, chloride, and sodium content at concentration levels that exceed the recommended limits for drinking (DWR (a), 2004). Treatment of the groundwater is necessary for use as potable supply. High TDS concentrations in the groundwater basin are a characteristic of the groundwater when it was deposited in the formation, not from over-pumping (SWA (a), 2012). Specific water quality objectives have been established in the Basin Plan for the Point Loma, San Diego Mesa, and National City HAs (SDRWQCB (c), 2007). The inland surface water quality objectives established are for odor, turbidity, and color units. The groundwater water quality objectives established are only for National City HA which consists of TDS, chlorides, sulfates, sodium, nitrates, iron, manganese, methylene blue-activated substances (MBAS), boron, odor, turbidity, color units and fluoride. TMDL projects have been put in place to assess the impacts of pollutants/toxics at each of the sites for implementation of the most appropriate Best Management Practices (BMPs) for reduction of these pollutants/toxics. TMDLs have been developed and are in the process of being developed to minimize current water quality issues within the Pueblo Watershed as discussed in *Chapter 3, Region Description*. For example, a TMDL has been developed for the Shelter Island Yacht Basin (SIYB) to address dissolved Copper water quality impairments that can have toxic effects on aquatic organisms (SDRWQCB (a),). Other TMDLs that have been adopted that fall within the Pueblo Watershed jurisdiction are Chollas Creek Diazinon, Chollas Creek dissolved metals, Chollas Creek indicator bacteria, and Shelter Island indicator bacteria (UCSD (a), N.D.).
Stormwater and Flood Management Several major drainages within the watershed include Chollas Creek, Paleta Creek, South Chollas Creek, and Switzer Creek, which encompass drainage areas of approximately 54.4, 2.8, 10.9, and 4.3 square miles, respectively. The peak discharges during a 100-year storm event for Chollas Creek range from 7,100-10,000 CFS at three different locations. The peak discharges during a 100-year storm event for Paleta Creek, South Chollas Creek, and Switzer Creek are 1,400, 5,300, and 2,600 CFS, respectively. Within the watershed, the acreage of land uses within mapped flood hazard zones total more than 1,500 acres, and includes the following: commercial and services, 217 acres; industrial, 165 acres; open space and recreation, 330 acres; residential, 306 acres; and transportation, communications, and utilities, 555 acres (see Appendix 7-B, Integrated Flood Management Planning). Stormwater and flood management within the Pueblo Watershed falls under the jurisdiction of the City of San Diego, the City of La Mesa, the City of Lemon Grove, the City of National City, the San Diego County Regional Airport Authority, the San Diego Unified Port District, and the County of San Diego (County). These jurisdictions are responsible for flood control and drainage system facilities as well as maintaining storm drains, channels and debris basins, though the County has minimal lands in the watershed, and is therefore only minimally involved in stormwater management in the Pueblo Watershed. Chollas Creek is one of the natural waterways and drainage systems that runs through the Pueblo Watershed that is used for flood control maintenance activities. Portions of the Chollas Creek are equipped with flood walls and flood dividers to protect the watershed from flood risk (CSD (c), ND). Most natural drainages, such as Chollas Creek, have been channelized for flood control however there have been efforts to restore natural flows in the watershed (CSD (d), 2009). Stormwater runoff is a significant source of pollutants entering San Diego Bay. Pollutants entering San Diego Bay from urban runoff include trash, litter, sand, sediment, petroleum products leaking from motor vehicles, heavy metals from motor vehicle brake pads and diesel exhaust, animal feces, excess fertilizers and pesticides, among other pollutants (Port (b), N.D.). As one of the most developed and populated watersheds, Pueblo Watershed is a significant contributor of urban runoff entering the San Diego Bay. Some of the major inputs of stormwater into San Diego Bay within the Pueblo Watershed are Chollas Creek, Switzer Creek, and all surface runoff from downtown San Diego and surrounding urbanized areas (Port (a), N.D.).

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The County, the Unified Port of San Diego (Port), the San Diego County Regional Airport Authority, the Cities of San Diego, La Mesa, Lemon Grove, and National City, the California Department of Transportation, and the United States Navy have implemented programs to reduce pollutants in urban runoff and stormwater. As part of this effort, the County, two cities, and Port have developed Jurisdictional Urban Runoff Management Plans (JURMP) to reduce stormwater pollution and improve the water quality of rivers/creeks, the San Diego Bay, and ocean.
Natural Resources Only small pockets of riparian and wetland communities are present in the Pueblo Watershed due to heavy development, such as that along Chollas Creek. Some of these riparian and wetland communities include riparian scrub, freshwater marsh, disturbed wetlands, ornamental riparian woodlands, upland communities, and rural communities. Several non-native species located within these communities include giant cane, Spiny cocklebur, white sweet clover, Bermuda grass, castor bean, and sweet fennel (County of San Diego (a) 1998). The San Diego Bay is an ecosystem of concern within the highly developed Pueblo Watershed. San Diego Bay is characterized by salt marshes, tidal flats, bird nesting and foraging sites, essential fish habitats such as eelgrass beds, and diverse wildlife. Several plant and animal species of San Diego Bay are federally protected under the ESA, such as the Salt Marsh Bird's Beak, California Least Tern, Western Snowy Plover, and Eastern Pacific Green Sea Turtle (Port (c)(d), N.D. and Portand NAVFAC, 2011). Invasive species in the San Diego Bay's ecosystem poses a series threat to native species. The following invasive species are present in the San Diego Bay: one species of marine algae, one marine protozoan, 47 marine invertebrates, five marine fish, and 28 species of invasive coastal plants (Port (c), N.D.). There at least 82 non-native species that can be found along the San Diego Bay (Port (c)), N.D.
Potential Climate Change Impacts Climate change has the potential to impact the Pueblo Watershed via potential decrease in freshwater supplies, sea level rise, and changes to the vital San Diego Bay habitats (Port (d), N.D. and CCCC, 2009).The Pueblo Watershed is highly dependent on imported water supplies from the State Water Project and the Colorado River. Climate change is expected to pose challenges to imported water sources to the region as snowmelt is expected to decrease with increasing temperatures. Climate change can have potential effects on water demands; increases in temperature can increase industrial and residential water demands, impacting companies' decisions to locate business within the Pueblo Watershed. Sea level rise along the San Diego Bay and the Pacific Ocean coast will have a significant impact on shoreline structures and for the intertidal and subtidal habitats. Sea level rise has the potential to damage coastal infrastructure, minimize existing intertidal habitat, and negatively impact tourism and recreation in the Pueblo Watershed. Tidal habitats in the San Diego Bay are home to a large diversity of wildlife that is strongly influenced by climate regime shifts (CCCC, 2009). Increases in temperature could shift vital eelgrass beds due to changing water clarity, depth and temperatures. Increased high tides and storm surges may deplete and/or destroy vital tidal habitat for avian species that live and feed in the area. Marginal bay habitats would be at risk as these require special salinity conditions, intermittent inundation, and light penetration. Changes in sea temperature could affect coastal ecosystems dynamics sensitive to temperature changes. With the predicted rapid changes in climate, it is expected the list of species at risk in the Pueblo Watershed region will increase.
Management Issues and Conflicts Major issues in the Pueblo Watershed consist of surface water quality degradation, habitat degradation, sediment toxicity in San Diego Bay (SDBW, N.D.). Potential management related issues within the Pueblo Watershed include coordination amongst the multiple jurisdictions to reduce pollutants currently found in the watershed and successfully removing water bodies from the 303(d) list. Anthropogenic pollution has created various surface water quality issues in the Pueblo Watershed and successful implementation of TMDLs is essential to meeting water quality standards. TMDLs are issued on a watershed basis and could be assigned to various government agencies. Coordination with all agencies involved needs occur to ensure TMDLs within the

Pueblo Watershed
Pueblo Watershed are met (Port (a), N.D.). The high costs of remediating contaminated sediment sites in San Diego Bay has been an issue for the watershed. Eight remediated sites have been completed to-date resulting in the removal of 230,000 cubic yards of contaminated sediment at a cost of $25 million (SWRCB (a), 2009). At the moment there are 21 additional contaminated sediment sites that need to be remediated. Presently, the estimated total cost of cleanup at the Shipyard sediment site would be approximately $96 million (SWRCB (a), 2009). Sea level rise due to climate change has also been identified as a potential threat to San Diego Bay. It is projected that in this century the average high tide could increase in elevation by as much as five feet (ICLEI, 2012). Though the timing and severity of sea level rise is highly uncertain, it is recommended local jurisdictions implement climate mitigation and adaptation plans.

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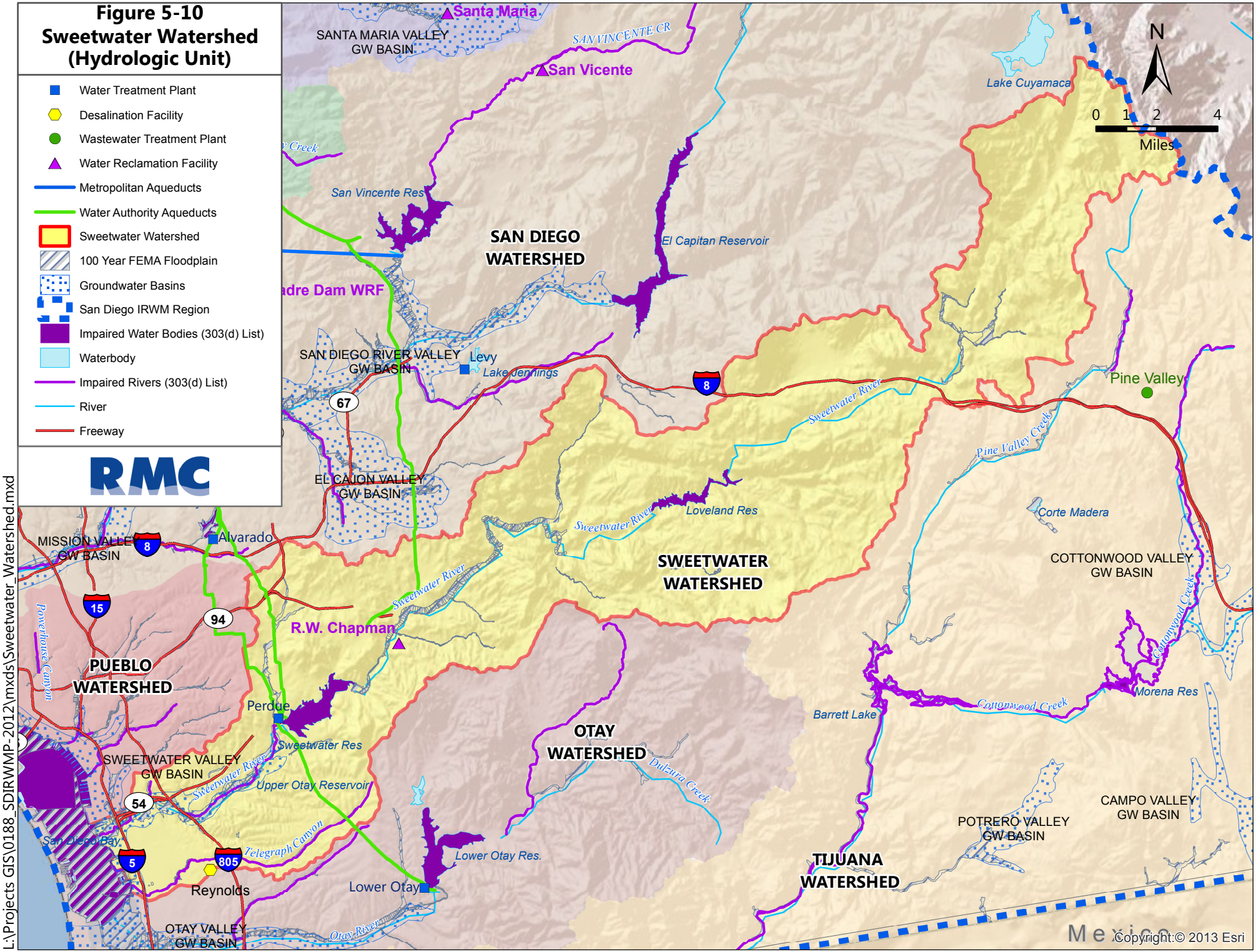
5.9 Sweetwater Watershed

The Sweetwater Watershed (Sweetwater Hydrologic Unit or Sweetwater HU (909)) is contained within the San Diego Bay WMA, and covers 230 square miles in an area extending from the Laguna Mountains in the east to San Diego Bay. Figure 5-10 is a map showing the watershed boundaries and principal features. The Sweetwater River is the primary watercourse within the watershed, and two major reservoirs (Loveland and Sweetwater, both operated by Sweetwater Authority) exist along the river.

The downstream portion of the watershed below Sweetwater Reservoir is urbanized, approximately 20% of the watershed is dedicated open space or used for agriculture, and an additional 50% is undeveloped. Much of the undeveloped land is in the upper one-third of the watershed and is within the unincorporated county, the Cleveland National Forest, and Cuyamaca Rancho State Park. The middle portion of the watershed (between Loveland and Sweetwater Reservoirs) includes the unincorporated communities of Jamul, Dehesa, and Harbison Canyon.

Significant groundwater resources exist in the Middle Sweetwater River Basin (between Loveland and Sweetwater Reservoirs) and the Lower Sweetwater River Basin (downstream from Sweetwater Reservoir). Sweetwater Authority develops potable supply from brackish groundwater from the Lower Sweetwater River Basin.

Sweetwater Reservoir, owned by the Sweetwater Authority, stores natural runoff.



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Sweetwater Watershed

Hydrology

The Sweetwater Watershed is comprised of three Hydrologic Areas (HAs): Lower Sweetwater HA (909.1), Middle Sweetwater HA (909.2), and Upper Sweetwater HA (909.3) (SDBC, 2008). The major water bodies within the three HAs include the Sweetwater River, Sweetwater Reservoir, Loveland Reservoir, and San Diego Bay.

The Sweetwater Watershed's major water feature is the San Diego Bay. The Sweetwater Watershed is one of three watersheds that drain into the San Diego Bay, along with the Pueblo and Otay watersheds. All surface water from Sweetwater Watershed drain into the San Diego Bay (SDBC, 2008). The major waterway that drains into the San Diego Bay is the Sweetwater River which traverses the watershed and enters the bay between the City of National City and the City of Chula Vista.

Water Systems

Two major water supply reservoirs reside in the Sweetwater Watershed:

- Loveland Reservoir: owned by the Sweetwater Authority, stores natural runoff.
- Sweetwater Reservoir: owned by the Sweetwater Authority, stores natural runoff.

Both reservoirs trap rainfall and melting snow from the surrounding mountains. Reservoir water is used to maximize local water supplies in conjunction with imported water. Combined, both reservoirs can store approximately 52,200 AF of water (SWA (b), 2012).

The Sweetwater Valley Groundwater Basin (9-17) is a large groundwater basin that empties into the San Diego Bay underlying the Sweetwater Watershed. The Sweetwater Valley Groundwater Basin consists of two water bearing formations, the Sweetwater Alluvium and the San Diego groundwater formation. Recharge of the basin is derived from runoff of seasonal precipitation from the Sweetwater River Valley, Sweetwater Reservoir discharge and underflow, and possible subsurface flows (DWR (a), 2004). Groundwater in the Sweetwater Watershed is pumped from both the Sweetwater alluvium and the San Diego groundwater formation by the Sweetwater Authority. The Sweetwater Authority pumps fresh water from the San Diego Formation in its National City Wells. Brackish water is extracted from the alluvium of the Sweetwater River and the San Diego Formation and then treated at the Richard A. Reynolds Groundwater Desalination Facility (SWA (c), 2012). It is anticipated that a Salt and Nutrient Management Plan will be developed for the middle portion of the Sweetwater basin, though this effort is not yet underway (Regional Board, 2013).

The Richard A. Reynolds Groundwater Desalination Facility uses reverse osmosis treatment to remove dissolved solids and microscopic particles (such as bacteria and other contaminants) that could be found in alluvial groundwater to produce drinking water (SWA (d) 2012). Four alluvial wells and six deep formation wells along the north side of the Sweetwater River provide source water to the Richard A. Reynolds Groundwater Desalination Facility. The facility can produce 4.0 MG of drinking water per day (MET, 2007). The Robert A. Perdue Treatment Plant at Sweetwater Reservoir treats surface water supplies to produce drinking water. The Robert A. Perdue Treatment Plant processes approximately 30 MG of water each day (SWA (e), 2012).

The Sweetwater Authority also manages the Urban Runoff Diversion System which captures first flush storm flows and low flow runoff before entering the Sweetwater Reservoir. Water containing high salt loads (TDS) is diverted downstream into the Sweetwater River to join the underground alluvium to become a source supply for the Richard A. Reynolds Groundwater Desalination Facility. Water with acceptable TDS concentrations is routed to the Sweetwater Reservoir where water is then treated at the Robert A. Perdue Water Treatment Plant. The urban runoff diversion system reduces the need to add costly treatment to the water treatment plant (SWA (f), 2012).

Sweetwater Authority currently purchases 30% of its water supply as imported water from the Water Authority (CSD (b), 2012; SWA (g), 2012). Imported water is brought into the region by massive aqueduct systems from the Colorado River (approximately 240 miles away) and the State Water Project carrying water from the Sacramento-San Joaquin Bay Delta (approximately 700 miles away) (SWA (a), 2012). During wet years, Sweetwater Authority may not have to purchase imported water to supplement local supplies; however, during

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dry years imported water is purchased and stored in the reservoirs in the fall/winter months (SWA (g), 2012).

The Viejas Reservation and Sycuan Reservation located within the Sweetwater Watershed both operate onsite water systems. The Viejas Reservation operates a municipal water system to American Water Works Association water standards, including domestic water supply and wastewater compliance with Title 22 of the California Code of Regulations. The Sycuan Reservation receives basic water resources from onsite resources, although the tribe has investigated the possibility of connecting to the Otay Water District and Padre Dam Municipal Water District water systems.

Internal Boundaries and Land Uses

The Sweetwater Watershed is the largest of the three San Diego Bay watersheds encompassing 230 square miles and covering over 148,000 acres (SDBC, 2008). The Sweetwater Watershed stretches from Cleveland National Forest to the San Diego Bay as an elongated northeasterly trending strip. The Sweetwater Watershed is bordered on the north by Pueblo Watershed and on the south by the Otay Watershed.

The Sweetwater Watershed is largely (86%) within unincorporated jurisdictions. Other jurisdictions include: Port of San Diego, City of Chula Vista, La Mesa, Lemon Grove, National City and San Diego.. The most urbanized parts in Sweetwater Watershed include portions of the City of Chula Vista, City of Lemon Grove, National City, and the unincorporated communities of Spring Valley and Rancho San Diego. Unincorporated communities include Jamul, Pine Valley, Descanso, Alpine, the Cleveland National Forest, Cuyamaca Rancho State Park, and the Viejas Indian Reservation. Most of the unincorporated communities consist of undeveloped land, with 41% of the land administered by state and federal agencies or controlled by Indian Tribes (SDBC, 2008). There are 2 tribal reservations located within the Sweetwater Watershed: Viejas and Sycuan; in total, tribal lands account for approximately 2% of the total area within the watershed.

The dominant land uses in the Sweetwater Watershed vary by the three HAs (SDBC, 2008). The Lower Sweetwater HA's dominant land use consists of residential followed by transportation, open spaces/preserves, and undeveloped/vacant land. The Middle Sweetwater HA's dominant land use consists of undeveloped/vacant land followed by residential, open spaces/preserves, and transportation. The Upper Sweetwater HA's dominant land use consists of undeveloped/vacant land followed by open space/preserve, residential, and agriculture.

Water Quality and Water Quality Impairments

Six water bodies within the Sweetwater Watershed are listed on the 303(d) list (SDBW (b), N.D.e and PCW (c), N.D.e):

- Telegraph Canyon for selenium
- Sweetwater River for *Enterococcus*, fecal coliform, phosphorus, selenium, TDS, nitrogen, and toxicity
- Sweetwater Reservoir for dissolved oxygen (DO)
- San Diego Bay Shoreline near Bayside Park (J Street) for *Enterococcus and total coliform*
- San Diego Bay Shoreline near Chula Vista Marina for copper
- Loveland Reservoir for aluminum, DO, manganese, and pH

Impacts on water quality within the Sweetwater Watershed include surface and groundwater quality degradation, habitat degradation, and invasive species (Copermittees, 2012). The main pollutants/stressors of concern in the watershed are DO, copper, indicator bacteria, aluminum, and manganese. Water quality in the Sweetwater Watershed is mainly impacted by agricultural and urban runoff. In particular, pesticides have been identified as a high priority water quality problem in the Middle Sweetwater HA.

Though the lower portion of the watershed is heavily developed, and suffers from poor water quality, particularly where it drains to the San Diego Bay, the upper portion of the watershed is largely undeveloped or parkland, and relatively healthy. The San Diego Bay Watershed Urban Runoff Management Program (WURMP) provides an assessment of water quality and presents implementation actions designed to address the identified issues for watersheds draining to the San Diego Bay. This includes the Sweetwater Watershed, whose urbanized lower section is addressed by the San Diego Bay WURMP. Furthermore, a Water Quality Improvement Plan will be

Sweetwater Watershed
developed for the entire Sweetwater Watershed in accordance with the 2013 MS4 Permit, which will address some of the sources of pollutant loading into the water bodies and determine actions that can be taken to improve water quality. Efforts associated with the 2013 MS4 Permit will present opportunities for coordinated IRWM projects to ensure that the efforts are integrated to achieve maximum benefits. Based on DWR's Bulletin 118, groundwater quality of the San Diego Formation (Sweetwater Valley Groundwater Basin (9-17)) is brackish, with TDS, chloride, and sodium content at concentration levels that exceed the recommended limits for drinking (DWR (a), 2004). Treatment of the groundwater is necessary for use as potable supply. Specific water quality objectives have been established in the Basin Plan for the Sweetwater Watershed (SDRWQCB, 2007). The inland surface water quality objectives established are for TDS, chlorides, sulfates, sodium, nitrates, nitrogen phosphorous ratios, iron, manganese, methylene blue-activated substances (MBAS), boron, odor, turbidity, color units and fluoride. The groundwater water quality objectives established consists of TDS, chlorides, sulfates, sodium, nitrates, iron, manganese, MBAS, boron, odor, turbidity, color units and fluoride.
Stormwater and Flood Management Major drainages within the watershed include Spring Valley Creek and Sweetwater River, which encompass drainage areas of 7.1, and 434 square miles, respectively. The peak discharge during a 100-year event for Spring Valley Creek is 3,600 CFS. The peak discharges during a 100-year event for Sweetwater River at three locations are 29,500, 35,000, and 20,300 CFS, respectively. Within the watershed, the acreage of land uses within mapped flood hazard zones total more than 5,000 acres, and includes the following: agriculture, 273 acres; commercial and services, 1,204 acres; industrial, 371 acres; open space and recreation, 1,815 acres; residential, 825; and transportation, communications, and utilities, 751 acres (see Appendix 7-B, Integrated Flood Management Planning). Stormwater and flood management within the Sweetwater Watershed falls primarily under the jurisdiction of the County of San Diego (County). The County is responsible for maintaining the flood control and drainage system facilities as well as maintaining storm drains, channels and debris basins. Specifically, the County is responsible for removing trash and debris and other maintenance activities within the engineered section of the Sweetwater River; several other municipalities are responsible for storm drain maintenance within other portions of the watershed. In general, stormwater and flood management is limited to developed regions in the County due to most lands within the Sweetwater Watershed consisting of undeveloped and agricultural lands, and State and Federal parks. The major input of stormwater to San Diego Bay is via the Sweetwater River. The San Diego Bay Watershed Urban Runoff Management Program (WURMP) includes portions of the Sweetwater Watershed, along with portions of the Pueblo and Otay watersheds. The San Diego Bay WURMP guides efforts to decrease sources and reduce discharge of pollutants to the San Diego Bay from the separate storm sewer system (MS4). Loveland Dam (which forms the Loveland Reservoir) and Sweetwater Dam (which forms the Sweetwater Reservoir) are both used to capture rainfall for flood protection purposes as well as for water supply purposes (SWA (a), 2012). Post-wildfire rain events in the Sweetwater Watershed can impact the quality of flows in the Sweetwater River and the local reservoirs. Total organic carbon (TOC) levels in the Sweetwater River normally increase significantly during rain events after a wildfire (Placencia and Starr, 2007).
Natural Resources The Sweetwater River, Sweetwater Reservoir, Loveland Reservoir, and San Diego Bay support important wildlife habitat in the Sweetwater River Watershed. Between the headwaters and the outlet to San Diego Bay, the watershed contains a variety of habitat types including oak and pine woodlands, riparian forest, chaparral, coastal sage scrub, and coastal salt marsh (PCW (c), N.D.e). The upper watershed contains large sections of the Cleveland National Forest and Cuyamaca Rancho State Park. The Sweetwater River estuary, located on the border of National City and the City of Chula Vista, is a broad, straight, deep channel that forms that mouth of the Sweetwater River. The mouth of the Sweetwater River is the Estuary's primary source of fresh water subject to tidal influences. The outer portion of the Estuary is surrounded

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by commercial and industrial lands uses to the north, whereas the southern side is bordered by the Sweetwater Marsh Unit of the National Wildlife Refuge (SDBW (b). N.D.e). The Sweetwater Marsh National Wildlife Refuge is 316 acres of diverse marshland that supports populations of light-footed clapper rail, California least terns, Belding's savannah sparrows, salt marsh bird's beak, and Palmer's frankenia (USFWS (a), 2011). The Sweetwater Marsh Unit is part of the San Diego National Wildlife Refuge Complex, a series of national wildlife refuges that were established to preserve and protect coastal habitat marshes, as is the San Diego National Wildlife Refuge which lies inland along the middle portion of the Sweetwater Watershed (USFWS (b), 2012). This inland Refuge protects riparian habitat for the endangered least Bell's vireo, southwestern willow flycatcher, and arroyo toad along the Sweetwater River (USFWS 1997). Adjacent uplands support coastal sage scrub, chaparral, vernal pools, and oak woodlands that support rare species such as California gnatcatcher, quino checkerspot butterfly, San Diego fairy shrimp, San Diego ambrosia, and San Diego thorn-mint. The San Diego Bay is characterized with salt marshes, tidal flats, bird nesting, foraging sites, essential fish habitats such as eelgrass beds and home to a diverse wildlife and important species of plants and animals. Several plant and animal species of the San Diego Bay are federally protected under the ESA, including the Salt Marsh Bird's Beak, California Least Tern, Western Snowy Plover, and Eastern Pacific Green Sea Turtle (Port (a), N.D.e and Port (b), 2008). Invasive species in the San Diego Bay's ecosystem poses a serious threat to native species. The following invasive species are present in the San Diego Bay: one species of marine algae, one marine protozoan, 47 marine invertebrates, five marine fish, and 28 species of invasive coastal plants (Port (a), N.D.e). There at least 82 non-native species that can be found along the San Diego Bay (Port (a), N.D.e). Tribal nations in the Region have indicated concern that jurisdictional habitat conservation efforts such as those described above may not consider current or future tribal developments, and tend to categorize tribal lands as open space for habitat and conservation planning purposes.
Potential Climate Change Impacts Climate change has the potential to impact the Sweetwater Watershed via potential decrease in freshwater supplies, sea level rise, changes to the vital San Diego Bay habitats, and increased wildfire frequency (Port (a), N.D.e and CCCC, 2009).The Sweetwater Watershed is highly dependent on imported water supplies from the State Water Project and the Colorado River. Climate change is expected to pose challenges to imported water sources to the region as snowmelt is an important contributor to the region's imported supplies; snowmelt is expected to decrease with increasing temperatures. Climate change can have potential effects on the watersheds water demands; increases in temperature can increase industrial and residential water demands, impacting companies' decisions to locate business within the Sweetwater watershed. Sea level rise in the Sweetwater Watershed along the San Diego Bay will have a significant impact on shoreline structures and intertidal and subtidal habitats. The Sweetwater Watershed has a widespread beach community and sea level rise has the potential to damage coastal infrastructure, recreation, and negatively impact tourism. Tidal habitats in the San Diego Bay are home to a large diversity of wildlife that is strongly influenced by climate regime shifts (CCCC, 2009). Increases in temperature could shift vital eelgrass beds due to changing water clarity, depth and temperatures. Increased high tides and storm surges may deplete and/or destroy vital tidal habitat for avian species that live and feed in the area. Marginal bay habitats would be at risk as these require special salinity conditions, intermittent inundation, and light penetration. Changes in sea temperature could affect coastal ecosystems dynamics sensitive to temperature changes. The rapid rate of climate change can pose a problem to many of the watershed's endangered and threatened species, which may be unable to adapt fast enough to habitat shifts and increasing temperatures. With the predicted rapid changes in climate, it is expected the list of species at risk in the Sweetwater Marsh National Wildlife Refuge will only increase. Additionally, changes in climate can make conditions much more favorable for invasive species in the watershed reducing available habitat space for native species. Climate change also has the potential to create changes in precipitation patterns, which can decrease seasonal stream flows in the Sweetwater River Watershed. Decreased seasonal stream flows will create stream flows with irrigation/dry weather flows, thus increasing the concentration of constituents and requiring stream flows to receive a greater level of treatment.

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Wildfires in the Sweetwater Watershed are a common occurrence, particularly in the undeveloped regions of the watershed. Climate change has the potential to impact the wildfire season in the watershed. Research suggests Santa Ana conditions, dry hot winds which blow from the mountains to the deserts in the east, may increase earlier in the fire season (September) and decrease later in the season (December). A shift to earlier Santa Ana wind occurrences could mean an increase frequency in Santa Ana related wildfires (CCCC, 2009). Longer wildfire seasons can create large scale damage to many residential homes particularly with the increased level of ongoing urbanization in the Sweetwater River Watershed. Post-wildfire rain events in the watershed cause erosion, mudslides, and sedimentation which create negative water quality issues. Stormwater runoff from post-wildfire rain events have been shown to carry high levels of turbidity, nutrients, and TDS. The potential effects on the Loveland and Sweetwater reservoirs include increased sedimentation with loss of storage, temporary increase in turbidity, and increased water treatment needs and costs. Rain events after wildfires are also known to create flash floods in the Sweetwater Watershed. Increased frequency of wildfires will increase the frequency of flash floods which current stormwater infrastructure in the Sweetwater Watershed may not have the capacity to withstand.
Management Issues and Conflicts The Sweetwater Watershed's management issues are mainly related to the protection of municipal water supplies and the protection and restoration of sensitive wetland and wildlife habitats. Because a portion of the watershed's water supply is locally-captured water, it is important to protect the quality of water entering local creeks, Sweetwater River, and the reservoirs. At the mouth of the Sweetwater River is the Sweetwater Marsh, a sensitive marshland that is currently under the management of the San Diego National Wildlife Refuge Complex (USFWS (a), 2011). Continued management of the Sweetwater Marsh is necessary to ensure it remains protected and preserved. Additionally, habitat degradation and loss due to increased development is a growing issue within the Sweetwater River Watershed. Given water quality concerns in this watershed, it is also a notable issue that there are no adopted TMDLs in this watershed; resource limitations such as funding to implement water quality protection and improvement programs are considered a barrier to implementation of such measures. The Sweetwater River is now nearly dry most of the year except during the winter when releases are made from the Loveland Reservoir. The changes to the Sweetwater River flows have had an impact on the arroyo toad, a federally listed endangered species and a state species of special concern. Releases from the Loveland reservoir have been timed by the Sweetwater Authority (SWA) to minimize the impact on the arroyo toad as they use the Sweetwater River and stream habitats for reproduction (Placencia and Starr, 2007). There is also high demand for recreational spaces such as parks and trails within the Sweetwater Watershed. Projects such as the Sweetwater River Trail System by the County of San Diego are helping create more accessible recreation trails for resident of Bonita, Spring Valley, Chula Vista, National City and unincorporated San Diego County (California State Coastal Conservancy, 2011). Existing trails do not reliably support all-season and multiple-use access that is compatible with the surrounding sensitive habitat and species (California State Coastal Conservancy, 2011). Current trail conditions create access interruptions for cyclists and other trail users due to areas of loose sand. The Sweetwater Watershed was historically an inland seabed therefore many of the soils contain naturally occurring salts. From the Loveland Reservoir to the Sweetwater River influent and reservoir, the salt (mineral) concentrations increase significantly which could be caused by the Jamacha landfill, urban runoff, groundwater upwelling, erosion of natural sources, and/or the sand mines located near the reservoir (Placencia and Starr, 2007). These water quality issues at the Sweetwater Reservoir are being addressed by the SWA and will need continued management of the source water quality to the reservoir.

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5.10 Otay Watershed

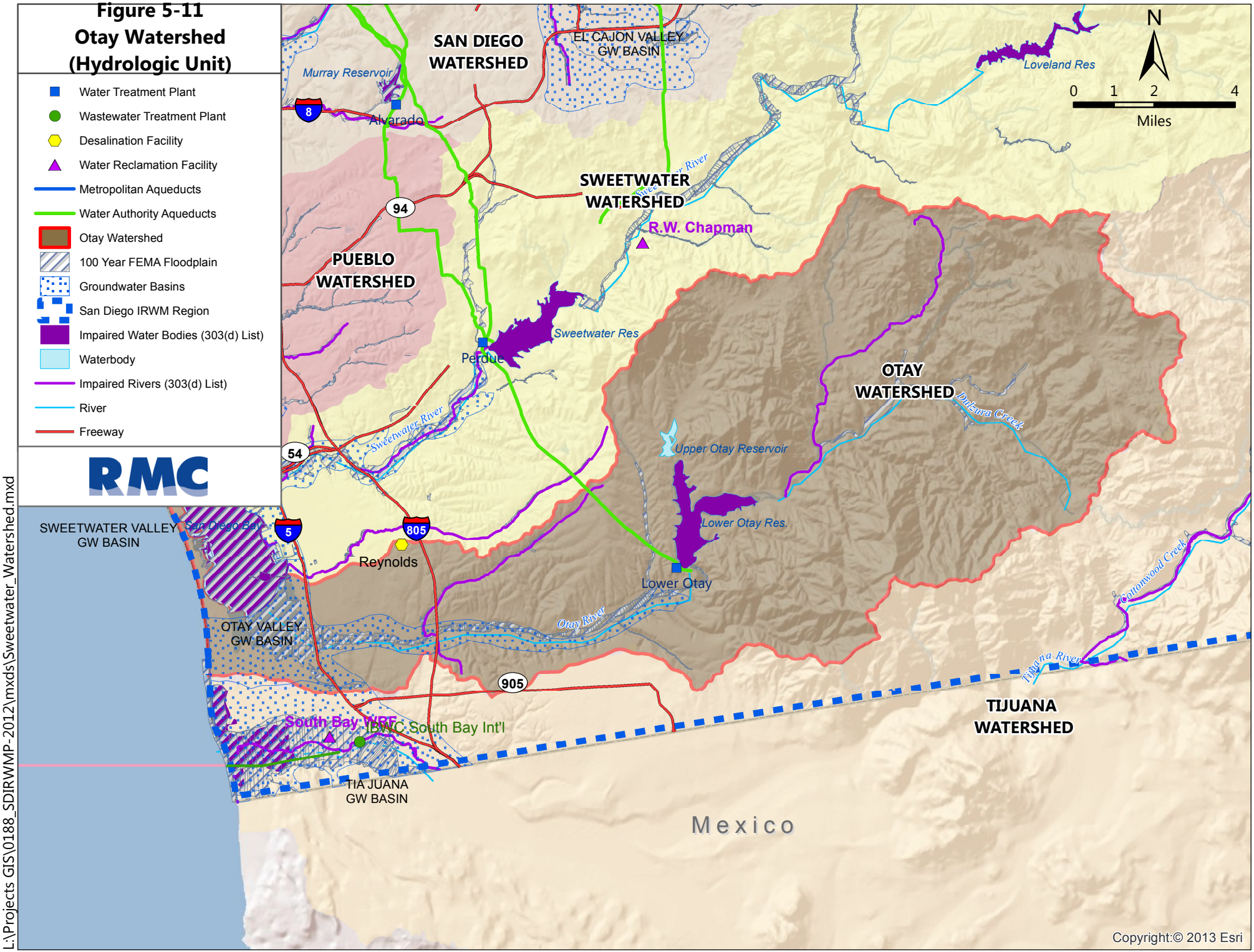
The Otay Watershed (Otay Hydrologic Unit or Otay HU (910)) is contained within the San Diego Bay WMA, and covers 160 square miles. Figure 5-11 presents a map showing the boundaries and principal features of the Otay River Watershed.

The Otay River (which flows to San Diego Bay) is the primary watercourse in the watershed. Upper and Lower Otay Reservoirs (owned and operated by the City of San Diego), are the other major water bodies of the watershed and represent the southernmost terminus of the San Diego Aqueduct. Lower Otay Reservoir impounds imported water and local runoff diverted from the Otay River Watershed. Upper Otay Reservoir impounds only local runoff. Approximately two-thirds of the watershed is currently preserved as open space. The downstream portion of the watershed within the City of Chula Vista is rapidly developing. Urban and residential land use comprises approximately 20% of the watershed. The watershed has a population of approximately 150,000 people.

Thirty-six square miles of the watershed is within the MSCP Plan area. Other important conservation areas within the watershed include the San Diego National Wildlife Refuge, the Rancho Jamul Ecological Reserve, and vernal pool lands.

Lower Otay Reservoir stores raw water from the Water Authority aqueducts.

Photo credit: Jeff Pasek, City of San Diego



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Otay Watershed

Hydrology

The Otay Watershed is comprised of three HAs: Coronado (910.1), Otay (910.2), and Dulzura (910.3) (SDBC, 2008). The major water bodies include the Upper and Lower Otay Reservoirs, Otay River, and San Diego Bay.

The Otay Watershed is one of the three watersheds that discharge into San Diego Bay. Otay Watershed's major water features are the San Diego Bay and the Upper and Lower Otay Lakes. The Otay River is the central drainage system and major stream system traversing the Otay Watershed. The Otay River flows east to west from its headwaters near the Cleveland National Forest, through the valley, and emptying into the San Diego Bay. Significant tributaries on the Otay River include Poggi Canyon Creek, Salt Creek, O'Neal Canyon, Johnson Canyon, Wolf Canyon, and Dennery Canyon (Aspen, 2006). The principal aquifer in the watershed is the San Diego Formation.

Rainfall in this watershed is typically light with an average rainfall ranging from 8.25 inches in coastal areas to 19.5 inches in the eastern portion of the watershed (Copermittees, 2012).

Water Systems

The Otay Watershed contains two major water supply reservoirs, which are part of the City of San Diego municipal drinking water supply system and serve the San Diego Region including the City of Chula Vista:

- Upper Otay Reservoir: Formed by the Upper Otay Dam and is one of the smallest impounding reservoirs in the City of San Diego (CSD (g), 2012).
- Lower Otay Reservoir: Formed by Savage Dam, and has a storage capacity of approximately 49,800 AF. Receives raw water from the San Diego Aqueduct, as well as from the Morena and Barrett reservoirs in the Tijuana Watershed (CSD (h), 2012).

The lower reaches of the Otay River have habitat areas that have been preserved, but most of the riparian habitat along the Otay River in the upper reaches has been altered. The natural flow of the Otay River has been altered since the early part of the twentieth century to accommodate development and for flood control purposes (i.e. constriction of the Otay River into a channel). The Upper and Lower Otay Reservoirs now control 69% of the Otay River flows and have reduced the frequency of flows in the river (USFWS, 2006). Additionally, the Otay River has been subject to past and current sand and gravel mining operations that have altered the characteristics of the river. The mining operations that involved open pit mining in the streambed created a series of ponds that now act as sediment traps which now capture sediments that should be carried downstream by the river.

Otay Water Treatment Plant is located near Savage Dam and is the only water treatment plant in the Otay Watershed. The Otay Water Treatment Plant is a conventional water treatment plant with a capacity to treat up to 40 MGD, though it currently produces approximately 34 MGD (CSD (i), 2012; CSD(j) , 2011). The Otay Water Treatment Plant receives local water (runoff) from the Barrett Reservoir and the Morena Reservoir, which are located in the Tijuana Watershed (Aspen 2006).

Developed cities within the Otay Watershed, including portions of Chula Vista, San Diego, and Imperial Beach, are connected to the sewer system (Aspen, 2006). The few developments in the unincorporated areas in the north, south, and east portion of the Otay Reservoir are all connected to septic systems (Aspen, 2006).

Sweetwater Authority currently purchases 30% of its water supply as imported water from the Water Authority (SWA (g), 2012). Imported water is brought into the region by massive aqueduct systems from the Colorado River (approximately 240 miles away) and the State Water Project carrying water from the Sacramento-San Joaquin Bay Delta (approximately 700 miles away) (SWA (a), 2012).

The Otay Valley Groundwater Basin (9-18) is bounded on the east by the San Ysidro Mountains, on the north and south by semi-permeable marine deposits, and on the west by the Pacific Ocean (DWR (b), 2004). The Otay Valley Groundwater Basin consists of three water bearing formations: the Otay alluvium, the San Diego formation, and the Otay formation. Though groundwater is from private wells in the eastern portion of the

Otay Watershed
watershed, the Otay Valley Groundwater Basin is characterized as a groundwater basin that is presently unused. Groundwater production in the Otay Watershed is mostly all from private wells for domestic use and irrigation in the unincorporated eastern portions of the watershed. Groundwater production on the western portion of the watershed is mainly derived from the San Diego Formation. Recharge in the basin is derived from percolation of precipitation, stream-flow originating in the valley highlands, return of applied water, and from the rare releases from the Lower Otay Reservoir during flood conditions (DWR (b), 2004). The Otay Valley groundwater basin is a low priority basin for Salt and Nutrient Management Planning (SNMP), and it is not anticipated that it will require a SNMP. For more information on SNMPs and basin prioritization, see *Chapter 7, Regional Coordination*.
Internal Boundaries and Land Uses The Otay Watershed encompasses an area of 180 square miles and covers 98,500 acres (SDBW (a), N.D.). The Otay Watershed is bordered by the Sweetwater Watershed on the north and the Tijuana Watershed to the south. The Otay Watershed elevation ranges from sea level at the western extent to approximately 3,740 feet at Lyons Peak (HDR, 2006). The Otay Watershed is primarily unincorporated area (70%) (SDBW (a), N.D.). The rest of the Otay Watershed is divided between the following jurisdictions: Port of San Diego and the Cities of Chula Vista, Coronado, Imperial Beach, National City, and San Diego. The major population centers in the watershed include the Cities of Chula Vista, Imperial Beach, and San Diego. Most of the land ownership in the Otay Watershed is private with a small percentage of local, state, and federally owned lands. The Jamul Indian Village (approximately 6 acres) lies within the Otay Watershed; tribal lands account for less than 1% of the total area of the Otay Watershed. Land use within the three HAs comprising the Otay Watershed varies significantly (Copermittees 2012). In the Coronado HA, land use is predominantly military (52%), residential (15%), and transportation (12%). The Dulzura HA land uses are characterized as predominantly open space/parks and recreation (47%) and vacant and undeveloped land (36%). The Otay Valley HA land use is categorized as 26% open space/parks and recreation, 23% vacant and undeveloped land, and 18% residential (Copermittees ,2012).
Water Quality and Water Quality Impairments Eight water bodies within the Otay Watershed are listed on the 303(d) list (SDBW (c), N.D. and PCW (a), N.D.): • Lower Otay Reservoir for ammonia, color, iron, manganese, nitrogen, and pH • Pacific Ocean Shoreline (at Imperial Beach Pier) for fecal coliform, PCBs, and total coliform • Pacific Ocean Shoreline, Coronado Hydrologic Area (Silver Strand) for *Enterococcus* • Poggi Canyon Creek for toxicity • Pacific Ocean Shoreline, Otay hydrologic unit at Carnation Avenue and Surf Jetty for total coliform • Jamul Creek for toxicity • San Diego Bay for PCBs • San Diego Bay Shoreline for copper, total coliform, or *Enterococcus*. Pollutants of concern and stressors within the watershed include nutrients, pathogens, metals/metalloids, toxicity, and other organics (Copermittees, 2012). Potential sources of these contaminants are largely unknown point and non-point sources, along with urban runoff/storm sewers and natural sources (SDRWQCB, 2010).The major impacts from these pollutants/stressors consist of surface water quality degradation, reduced ground water recharge, sedimentation, and habitat degradation. Several of the sources/activities responsible for the listed water quality issues consist of urban runoff, agricultural runoff, resource extraction, septic systems, marinas and boating activities. Though water quality in the urbanized portion of the watershed is impaired, waters upstream of the Otay Reservoir, which are located in undeveloped or protected areas, are generally of good quality (Aspen, 2006). The 2006 Otay River Watershed Management Plan, which was prepared by the County of San Diego, the City of Chula Vista, the City of San Diego, the City of Imperial Beach, and the San Diego Unified Port District, is a programmatic document that recommends implementation strategies for meeting various water quality and water

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management goals within the watershed. The recommended programs include water quality monitoring and other efforts that aim at addressing some of the aforementioned water quality issues and impairments in the watershed. Furthermore, a Water Quality Improvement Plan will be developed for the entire Otay Watershed in accordance with the 2013 MS4 Permit, which will address some of the sources of pollutant loading into the water bodies and determine actions that can be taken to improve water quality. Efforts associated with the 2013 MS4 Permit will present opportunities for coordinated IRWM projects to ensure that the efforts are integrated to achieve maximum benefits. The Otay Valley Groundwater Basin's costal region contains high concentrations of sodium chloride and TDS (DWR (b), 2004). The coastal plain of the groundwater basin is rated marginal to inferior for domestic use due to the high TDS content. The groundwater in the eastern portion of the watershed is of sodium-calcium and chloride-bicarbonate character. Groundwater for most of the watershed is rated marginal to inferior for irrigation use due to the high chloride concentrations. The San Diego formation water quality can be highly variable with high TDS concentration of marine origin in the western portion of the watershed and decreasing TDS concentrations in the eastern portion of the basin. Specific water quality objectives have been established in the Basin Plan for only the Otay and Dulzura HAs (SDRWQCB, 2007). The inland surface water quality objectives established are TDS, nutrients, iron, manganese, turbidity, and color. A summary of the TMDLs that have been adopted or are in progress for this watershed are provided in *Chapter 3, Region Description.*
Stormwater and Flood Management Major drainages within the watershed include the Otay River and Telegraph Canyon Creek, which encompass drainage areas of approximately 123 and 7 square miles, respectively. The peak discharges during a 100-year event for Otay River and Telegraph Canyon Creek are 22,000 and 2,800 CFS, respectively. Within the watershed, the acreage of land uses within mapped flood hazard zones total nearly 4,400 acres, and includes the following: agriculture, 18 acres; commercial and services, 170 acres; industrial, 1,238 acres; open space and recreation, 2,318 acres; residential, 267acres; and transportation, communications, and utilities, 317 acres (see Appendix 7-B, Integrated Flood Management Planning Study). Stormwater and flood management within the Otay Watershed falls under the jurisdiction of the County of San Diego Flood Control District Zone IV, the City of Chula Vista, the City of Coronado, the City of Imperial Beach, and the City of San Diego. These agencies and municipalities are responsible for flood control and drainage system facilities as well as maintaining storm drains, channels and debris basins. Stormwater and flood management is limited to developed regions in the County because much of the lands within the Otay Watershed consist of undeveloped, agricultural, and State and Federal lands and parks. There are approximately 80 miles of storm drains and drainage channel on the Otay Watershed, with the majority of this infrastructure located in the lower part of the watershed, below the Otay Reservoirs (Aspen, 2006). The Otay Reservoirs were designed primarily for municipal water supply and therefore has limited capacity for flood control. Nevertheless, the reservoirs effectively control most flows from small storms in the upstream watershed and for the most part have eliminated flooding on the main stem of the Otay River. The reservoirs impound most upstream runoff effectively leaving the mainstream of the Otay River downstream dry except during extreme rain events. The primary flood risk in the Otay Watershed is in older urbanized areas in the lower part of the watershed. Flooding issues in this area of the watershed are due to the inherent difficulty in draining low lying coastal areas, as well as from older drainage facilities that are under-sized (Aspen, 2006). Flood risks are less upstream of the Otay Reservoirs due to less development in that part of the watershed. While increased development in these areas could create more impervious areas increasing peak flow and thus flood potential, erosion potential, and modification of the overall hydrologic regime, implementation of best management practices and hydromodification mitigation measures will help to lessen these effects.

Otay Watershed

Natural Resources

The Otay Watershed supports 14 aggregated natural communities/land cover types. Within these communities reside native vegetation such as coast live oak woodland, Engelmann oak woodland, southern willow scrub, cotton-wood willow riparian forest, southern sycamore alder riparian woodlands, amongst many others.

The Otay Watershed contains important conservation areas such as the San Diego National Wildlife Refuge, Rancho Jamul Ecological Reserve and vernal pool lands. Approximately 36 square miles of the Otay Watershed is part of the MSCP effort to preserve habitat for a wide range of endangered plant and animal species. The Otay Watershed has 61 sensitive plant species, seven of which are federally endangered. The seven federally endangered plants consist of the San Diego thorn-mint, San Diego ambrosia, salt marsh birds-beak, San Diego button celery, Mexican flannelbush, willowy monardella, California orcutt grass, and Otay Mesa mint. The Otay Watershed has 57 sensitive animals, nine of which are federally endangered. The nine federally endangered animals consist of the San Diego fairy shrimp, quino checkerspot butterfly, Riverside fairy shrimp, arroyo toad, southwestern willow flycatcher, California brown pelican, light-footed clapper rail, California least tern, and Least Bell's vireo (Aspen, 2006).

The Otay Watershed also contains a significant portion of the Otay Mountain Wilderness. Since 1999, BLM has been managing 18,500 acres of the Otay Mountain Wilderness and has been one of the active participants in the MSCP (BLM (a) and Public Lands Information Center (a), 2012). The Otay Watershed also contains several sensitive habitats which have been impacted by urban and rural development, livestock, grazing, and recreational use. Vernal pools are a highly specialized habitat within the Otay Watershed that supports a unique flora and fauna (Aspen, 2006). Oak woodlands are considered a sensitive habitat as they are scarce, with high wildlife value and the ability to provide watershed protection.

Invasive species have been an issue in the Otay Watershed. In an effort to remove invasive non-natives, the *Habitat Restoration Plan and Non-Native Plant Removal Guidelines* were drafted in 2006 by the City of San Diego, County of San Diego, and the City of Chula Vista for the Otay Valley Regional Park (OVRP). The Guidelines provide information on how to manage and minimize the expansion of invasive non-native species within the OVRP. The OVRP is a 11-mile long park of over 8,500 acres that extends from the southeastern end of the salt ponds through the river valley up to the area surrounding both the upper and lower Otay Reservoirs (HDR, 2006). The OVRP represents one of the largest open space areas within the San Diego County linking the South San Diego Bay with the Upper and Lower Otay Lakes (BLM (a)).

The Otay Watershed landscape and vegetation is also heavily impacted by wildfire, most of which is human-caused (BLM (a)). Wildfires take out a lot of the native vegetation providing an opportunity for invasive species such as arundo and tamarisk to overrun the land, and fragmenting native habitat. Weed control projects have been put in place to help ensure native plants continue to grow in recently fire burned lands. Non-native vegetation in the Otay Watershed includes eucalyptus woodland, arundo, giant reed, salt cedar, and castor bean. The giant reed is estimated to use three times the volume of water used by native vegetation and its presence in the watershed deters the growth of native vegetation. The giant reed affects various riparian native species, alters the hydrologic regimes, reduces groundwater availability, alters channel morphology, and increase fire hazards (River Partners (a), 2012).

The San Diego Bay is an ecosystem of concern associated with the Otay Watershed; while the San Diego Bay is not technically within the watershed, there is hydrologic connectivity between the watershed and the bay. The San Diego Bay is characterized with salt marshes, tidal flats, bird nesting, foraging sites, essential fish habitats such as eelgrass beds and home to a diverse wildlife and important species of plants and animals. Several plant and animal species of the San Diego Bay are federally protected under the ESA act, such as the Salt Marsh Bird's Beak, California Least Tern, Western Snowy Plover, and Eastern Pacific Green Sea Turtle (Port (b), N.D., Port (d), 2008, and Port and NAVFAC, 2011). Invasive species in the San Diego Bay's ecosystem poses a series threat to native species. The following invasive species are present in the San Diego Bay: one species of marine algae, one marine protozoan, 47 marine invertebrates, five marine fish, and 28 species of invasive coastal plants. There at least 82 non-native species that can be found along the San Diego Bay (Port (b), N.D.).

Otay Watershed

Potential Climate Change Impacts

Climate change has the potential to impact the Otay Watershed via potential decrease in freshwater supplies, sea level rise, changes to the vital San Diego Bay habitats, and increased wildfire frequency (Port (d), 2008 and CCCC, 2009).The Otay Watershed is highly dependent on imported water supplies from the State Water Project and the Colorado River. Climate change is expected to pose challenges to imported water sources to the region as snowmelt is an important contributor to the region's imported supplies; snowmelt is expected to decrease with increasing temperatures. Climate change can have potential effects on the watersheds water demands; increases in temperature can increase industrial and residential water demands, impacting companies' decisions to locate business within the Otay Watershed.

Sea level rise in the Otay Watershed along the San Diego Bay and Pacific Ocean will have a potentially significant impact on shoreline structures and intertidal and subtidal habitats. The Otay Watershed has a widespread beach community and sea level rise has the potential to damage coastal infrastructure, recreation, and negatively impact tourism. Tidal habitats in the San Diego Bay are home to a large diversity of wildlife that is strongly influenced by climate regime shifts (CCCC, 2009). Increases in temperature could shift vital eelgrass beds due to changing water clarity, depth and temperatures. Increased high tides and storm surges may deplete and/or destroy vital tidal habitat for avian species that live and feed in the area. Marginal bay habitats would be at risk as these require special salinity conditions, intermittent inundation, and light penetration. Changes in sea temperature could affect coastal ecosystems dynamics sensitive to temperature changes.

The rapid rate of climate change can pose a problem to many of the watershed's endangered and threatened species, which may be unable to adapt fast enough to habitat shifts and increasing temperatures. With the predicted rapid changes in climate, it is expected the list of species at risk in the Otay Watershed will only increase. Additionally, changes in climate can make conditions much more favorable for invasive species in the watershed reducing available habitat space for native species.

Wildfires in the Otay Watershed are a common occurrence, particularly in the undeveloped regions of the watershed. Climate change has the potential to impact the wildfire season in the watershed. Research suggests Santa Ana conditions, dry hot winds which blow from the mountains to the deserts in the east, may increase earlier in the fire season (September) and decrease later in the season (December). A shift to earlier Santa Ana wind occurrences could mean an increase frequency in Santa Ana related wildfires (CCCC, 2009). A longer wildfire season can create large scale damage to many residential homes particularly with the increased level of ongoing urbanization in the Otay Watershed.

Post-wildfire rain events in the watershed cause erosion, mudslides, and sedimentation which create negative water quality issues. Stormwater runoff from post-wildfire rain events in the watershed have shown to carry high levels of turbidity, nutrients, and TDS. An increased wildfire season can increase erosion and sedimentation process in the watershed, negatively impacting water quality in streams and local reservoirs. The potential effects on the Upper and Lower Otay Reservoirs include increased sedimentation with loss of storage, temporary increases in turbidity, and increased water treatment needs and costs. Rain events after wildfires are also known to create flash floods in the Otay Watershed. Increased frequency of wildfires will increase the frequency of flash floods which current stormwater infrastructure in the Otay Watershed may not have the capacity to withstand.

Climate change also has the potential to create changes in precipitation which can decrease seasonal stream flows in the Otay Watershed. Decreased seasonal stream flows will create stream flows with irrigation/dry weather flows, thus increasing the concentration of constituents and requiring stream flows to receive a greater level of treatment.

Otay Watershed
Management Issues and Conflicts Population in the Otay Watershed is expected to double by 2031. An increase in population increases developments, impervious surfaces, and urban runoff which could impact water quality and add additional strain on the dynamic ecosystem of the watershed (Aspen, 2006). Without effective watershed based management in the Otay Watershed, increased developments, impervious surfaces, and population growth could lead to a degrading of the watersheds natural resources. Under the City of Chula Vista General Plan, the land planned for residential use will increase from 3,089 acres to 5,676 acres (84% increase). Land for open space/vacant and water use is expected to decline from 9,624 acres to 5,141 acres representing a 47% loss (Aspen, 2006). In the eastern territories of the Otay Watershed, approximately 10,800 acres have been proposed for residential land use while the proposed open space use would decrease from 34,796 acres to 20,607 acres (Aspen, 2006). Development in the overall Otay Watershed is expected to increase which is likely to create new or increase watershed management issues that need to be addressed before new development commences. Given water quality concerns in this watershed, it is also a notable issue that there are no adopted TMDLs in this watershed; resource limitations such as funding to implement water quality protection and improvement programs are considered a barrier to implementation of such measures. The Otay River flows are significantly controlled (69%) via dams and reservoirs which has significantly altered the river flow regimes. The altered flow regimes have a negative impact on various native plant and wildlife communities that depend on the Otay River flows as a food source, home, and reproduction. The impoundment of water at the reservoirs have reduced natural flows and changed the chemical and physical characteristics of the Otay River. Reduced stream flows can create poor water quality conditions in the lower portion of the Otay River which affect the aquatic communities. Lastly, the reservoirs also distort the sediment equilibrium in the downstream Otay River as nearly all of the bed sediment of the upper watershed is retained by the reservoirs (Aspen, 2006).

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5.11 Tijuana Watershed

The Tijuana Watershed (Tijuana Hydrologic Unit or Tijuana HU (911)) encompasses 1,750 square miles on either side of the U.S./Mexico border. Twenty-seven percent of the watershed area (467 square miles) is within California; a majority of this area is in the upper reaches of the watershed. Figure 5-12 presents a map showing the boundaries and features of the portion of the Tijuana River Watershed that is within the Region.

The lower Tijuana River flows from Mexico across the International Border to the Tijuana Estuary in California. Morena and Barrett Reservoirs are located in the upstream portion of the watershed. Water impounded in these reservoirs is transferred to the Otay River Watershed via the Dulzura Conduit. Urban centers within the watershed include the cities of Imperial Beach and San Diego in the United States, and the cities of Tijuana and Tecate in Mexico. The total population of the watershed is approximately 2.8 million people; according the 2010 U.S. Census data, approximately 83,000 people live within the watershed within the United States.

Urban stormwater runoff pollution from Tijuana, Mexico has created significant impacts within the 8-square mile Tijuana River Valley and Tijuana River Estuary.

Barrett Dam, shown releasing water, stores surface water in the upper portion of the Tijuana Watershed.

Photo credit: Jeff Pasek, City of San Diego

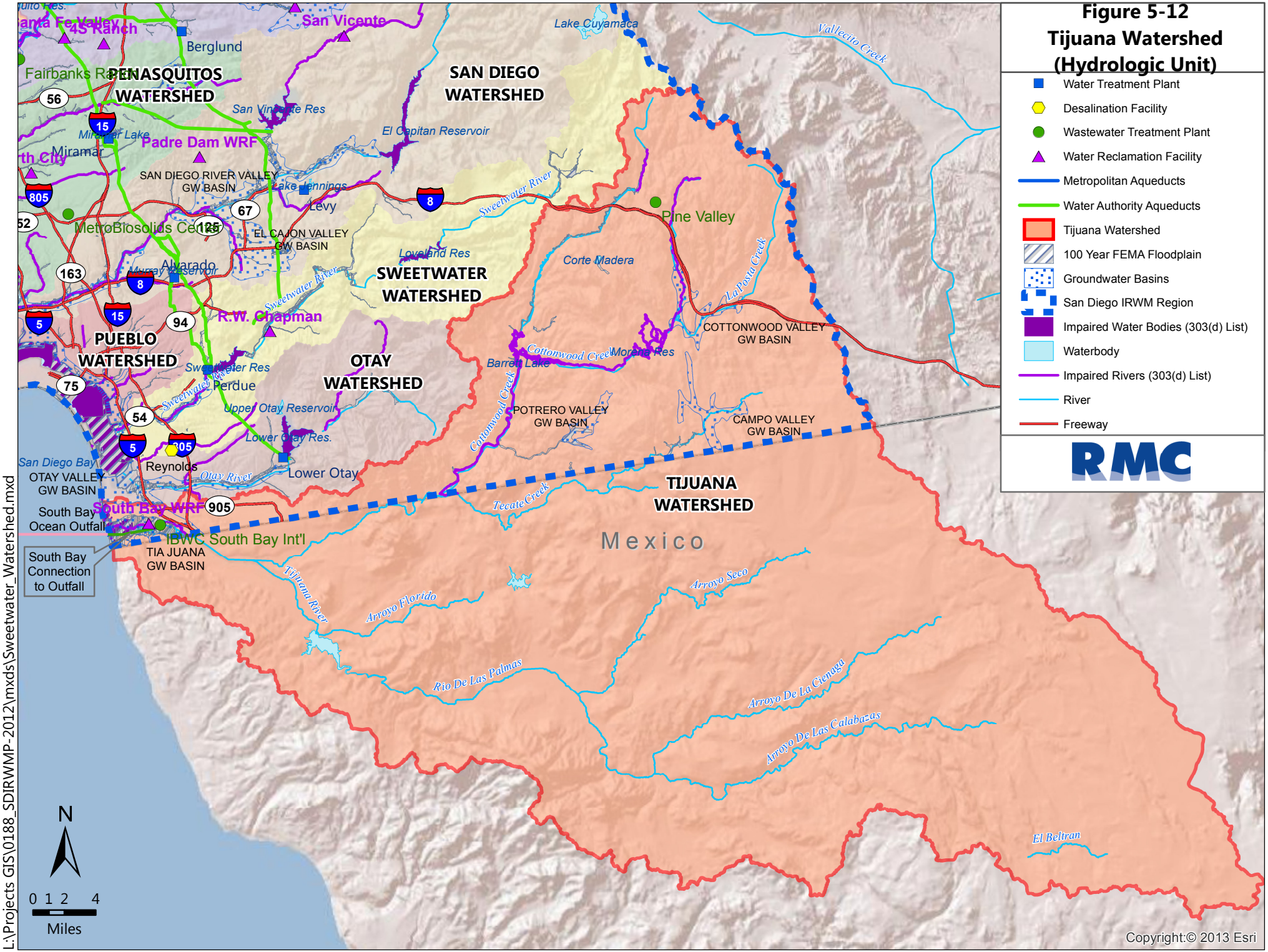
Figure 5-12
Tijuana Watershed
(Hydrologic Unit)
Water Treatment Plant
Desalination Facility
Wastewater Treatment Plant
Water Reclamation Facility
Metropolitan Aqueducts
Water Authority Aqueducts
Tijuana Watershed
100 Year FEMA Floodplain
Groundwater Basins
San Diego IRWM Region
Impaired Water Bodies (303(d) List)
Waterbody
Impaired Rivers (303(d) List)
River
Freeway
RMC
PENASQUITOS WATERSHED
SAN DIEGO WATERSHED
SWEETWATER WATERSHED
OTAY WATERSHED
PUEBLO WATERSHED
TIJUANA WATERSHED
Mexico
Padre Dam WRF
R.W. Chapman
South Bay WRF
IBWC South Bay Int'l
MetroBiosolids Center
Pine Valley
Lake Cuyamaca
El Capitan Reservoir
San Vicente Res
Lake Jennings
Loveland Res
Murray Reservoir
Sweetwater Res
Upper Otay Reservoir
Lower Otay Res.
Barrett Lake
Morena Res
Lower Otay
SAN DIEGO RIVER VALLEY GW BASIN
EL CAJON VALLEY GW BASIN
COTTONWOOD VALLEY GW BASIN
POTRERO VALLEY GW BASIN
CAMPO VALLEY GW BASIN
OTAY VALLEY GW BASIN
TIA JUANA GW BASIN
South Bay Ocean Outfall
South Bay Connection to Outfall
San Diego Bay
Sweetwater River
Otay River
Tijuana River
Tecate Creek
Cottonwood Creek
Corte Madera
La Posta Creek
Vallecito Creek
Arroyo Florido
Rio De Las Palmas
Arroyo Seco
Arroyo De La Cienaga
Arroyo De Las Calabazas
El Beltran
4S Ranch
Berglund
Fairbanks Ranch
Miramar Lake
Miramar
Alvarado
Levy
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Tijuana Watershed

Hydrology

The Tijuana Watershed is comprised of eight HAs on the U.S. side of the border: Tijuana Valley (911.1), Portrero (911.2), Barrett (911.3), Monument (911.4), Morena (911.5), Cottonwood (911.6), Cameron (911.7), and Campo (911.8) HAs (County of San Diego (a), 2008). HAs are designated by the State of California, which has no jurisdiction outside of California. Therefore, HAs are not defined for the entire Tijuana Watershed. Instead, the Binational Vision for the Tijuana River Watershed (2005) defines twelve subbasins. Two are entirely within the United States: Pine Valley and Upper Cottonwood; three are bi-national: Lower Cottonwood/Río Alamar, Río Tijuana, Campo Creek; and seven are entirely within Mexico: El Florido, Río Seco, Las Palmas, La Ciénega, Las Calabazas, Las Canoas, and El Beltrán.

The major water bodies in the United States include the Tijuana Estuary, Tijuana River, Cottonwood Creek, Pine Valley, Campo Creek, Barrett Reservoir, and Lake Moreno. Major water bodies in Mexico include the Rio Las Palmas system which joins with the Cottonwood-Alamar system (primarily in the U.S.) to form the Tijuana River, the El Carrizo Reservoir, and the Abelardo L. Rodríguez Reservoir,

The Tijuana River is an intermittent river that originates in both the United States and Mexico and then enters the U.S. at San Ysidro about five miles east of the Pacific Ocean. The Tijuana River flows through the Tijuana Slough National Wildlife Reserve, one of the largest in Southern California and into the Pacific Ocean about one mile south of Imperial Beach.

The U.S. Border Fence runs along most of the border with Mexico in the San Diego IRWM Region, which has the potential to affect hydrology in the Tijuana Watershed. Some potential impacts of the border fence include increased risk of flooding due to diverted or obstructed water ways, or otherwise altered natural drainages; reduced infiltration and subsequent reduction in groundwater levels; changes in natural drainages that lead to standing water; deflection of runoff (due to obstruction of waterways) to low-lying, often agricultural, areas; public health problems related to stagnant water such as increase in diseases carried by mosquitos (SEMARNAT et al., 2007). The border fence itself is also considered a significant hydromodification that can impact hydrology and natural hydrologic flows.

Annual precipitation varies from less than 10.5 inches near the coast to more than 22.5 inches in the inland areas (Copermittees, 2012).

Water Systems

Water supply for urban uses in the Tijuana Watershed includes surface runoff, imported water, and groundwater pumping. Imported water in the U.S. portion of the watershed is currently purchased from the San Diego County Water Authority. During wet years no imported water is purchased, however during dry years imported water is purchased and stored in reservoirs in the fall/winter months. The Mexico portion of the watershed imports water from the Colorado River through the Colorado River Aqueduct.

Two water supply reservoirs are located in the Tijuana Watershed on the U.S. side:

- Morena Reservoir, owned by City of San Diego and stores surface water. Morena Reservoir is the highest (3,000 feet above sea level) and the most remote of the City's reservoirs. The reservoir has a water storage capacity of approximately 50,700 AF (CSD (a), 2012).
- Barrett Reservoir, owned by City of San Diego and stores surface water. Barrett Reservoir is located 35 miles east of San Diego and has a water storage capacity of approximately 34,800 AF (CSD (b), 2012).

Two other reservoirs located in Mexico also reside in the Tijuana Watershed (BWAC, 2005):

- Abelardo L. Rodríguez Reservoir (Rodriguez Reservoir) has a storage capacity of 111,067 AF, and is the primary local surface water supply for the city of Tijuana.
- El Carrizo Reservoir has a storage capacity of 32,428 AF, and is supplied by the Colorado River Aqueduct.

Tijuana Watershed
Morena Reservoir is connected to Barrett Reservoir by Cottonwood Creek. Water from both the Morena and Barrett reservoirs is transported to the Otay via the Dulzura Conduit when capacity exists within the Lower Otay Reservoir. Therefore, water levels in both the Morena and Barrett Reservoirs are allowed to fluctuate in order to help maintain minimum water levels in the Lower Otay Reservoir (County of San Diego (a), 2008). The South Bay International Wastewater Treatment Plant (SBIWTP), located in San Diego County just 2 miles west of the San Ysidro Port of Entry, can treat 25 MGD of sewage (IBWC (a), N.D.). The SBIWTP treats sewage originating in Tijuana, Mexico and discharges it to the Pacific Ocean. The SBIWTP treats wastewater to minimize and prevent the contamination of the Tijuana River from sewage flows originating from Tijuana. Both the U.S. and Mexico share the operation and maintenance expenses of the SBIWTP. The Mexico portion of the watershed has a 25 MGD wastewater treatment plant, San Antonio de los Buenos Wastewater Treatment Plant. Though a 17 MGD expansion was planned for this plant, it was abandoned when the SBIWTP was built (IBWC (b), N.D.). The South Bay Water Reclamation Plant is a water reclamation plant owned and operated by the City of San Diego, and located in the Tijuana River Valley. This water reclamation plant provides wastewater treatment services to the City's South Bay service area, and also produces recycled water for beneficial reuse purposes. The plant's current capacity is 15 MGD, and in 2010 the plant produced 4.2 MGD of recycled water for beneficial reuse purposes (City of San Diego, 2011). On the U.S. side of the border, the Tijuana Watershed has four underlying groundwater basins: Tijuana (9-19), Cottonwood Valley (9-27), Campo Valley (9-28), and Portrero Valley (9-29). The Mexican side of the border in the Tijuana Watershed has three geohydrologic zones: the Tijuana Valley, Tecate Valley, and Valle de Las Palmas (BWAC, 2005). The Tijuana Watershed's U.S. groundwater basins are considered low priority basins for Salt and Nutrient Management Plans (SNMPs), and it is not anticipated that SNMPs will be required for these basins in the future. For more information on SNMPs and basin prioritization, see *Chapter 7, Regional Coordination*. Tijuana groundwater basin underlies the portion of the coastal Tijuana River Valley that lies in California. The Tijuana basin is bordered by the Mexican international border on the south, the Pacific Ocean on the west, and the semi-permeable Pleistocene and Pliocene marine deposits on the east and north. The Tijuana basin consists of two water bearing units, the quaternary age alluvium and San Diego Formation, with the most productive unit in the basin being the quaternary alluvium. Recharge in the Tijuana basin is mainly from the Tijuana River and from controlled releases from the Barrett, Morena, and Rodriguez reservoirs. Some recharge also occurs from irrigation and discharge from septic tanks (DWR (a), 2006). Cottonwood Valley groundwater basin underlies portions of Cottonwood, Cameron, and La Posta Valley in eastern San Diego County (DWR (b), 2004)). The quaternary alluvium and residuum are the primary water bearing units in Cottonwood Valley basin. Campo Valley groundwater basin underlies the Campo Valley. The quaternary alluvium is the primary water bearing unit in the Campo Valley basin. Recharge is primarily from direct precipitation and effluent from a small number of septic tanks (DWR (c), 2003). Portrero Valley groundwater basin underlies a small valley 30 miles inland from San Diego and about 2 miles from the Mexican border (DWR (d), 2004). The quaternary age alluvium and residuum are the principal water bearing units in the Portrero Valley basin. Recharge is primarily from percolation from ephemeral stream flows. The three groundwater basins in the Mexico portion of the watershed are primarily sandy alluvium, and recharged by creeks and rivers.
Internal Boundaries and Land Uses The Tijuana Watershed encompasses a region approximately 1,720 square miles and covers approximately 1.12 million acres on both sides of the international border between California and Baja California, Mexico. Only 27% (467 square miles) of the Tijuana Watershed is within California (County of San Diego (a), 2008). The Tijuana Watershed is bounded on the north by the Otay Watershed, the south by the remainder of the

Tijuana Watershed

watershed within Baja California, the west by the Pacific Ocean, and the east by the Anza Borrego Watershed of the Colorado River Basin.

The Tijuana Watershed has several jurisdictions with land use authority which include the cities of Imperial Beach and San Diego, the County of San Diego, and several Mexican municipalities. Within the U.S. portion of the watershed, primary land uses are vacant and undeveloped land (59%) and open space/parks and recreation (25%). Other land uses include residential and spaced rural residential (9%), agriculture (3%), and transportation (2%) (Copermittees, 2012). In the Mexican portion of the WMA, land use is predominately vacant and undeveloped land, which is most commonly used for low-intensity cattle and goat grazing (81.8%) (Copermittees, 2012).

Tribal lands associated with four separate tribal reservations are located within the United States portion of the upper Tijuana Watershed. Those tribal reservations include the Ewiiaapaayp Reservation, Manzanita Reservation, La Posta Reservation, and Campo Reservation. These tribal lands account for approximately 8% of the total area of the Tijuana Watershed that is located within the United States.

The South Bay International Wastewater Treatment Plant is a bi-national water quality improvement project headed by the International Boundary and Water Commission (IBWC). This project is an example of a cooperative solution to a complex watershed-based issue that spans multiple jurisdictions. The shared resource of the Tijuana River, which flows indiscriminately between the United States and Mexico and into the Pacific Ocean through the Tijuana River Estuary, was heavily impacted by sewage discharge largely from the City of Tijuana in Mexico. After decades of failed or inadequate solutions to the issue of wastewater impacts on the Tijuana River and Tijuana River Estuary, the IBWC developed an agreement between the United States and Mexico to pump wastewater from the Mexican side of the border to the United States side of the border to a co-owned and operated wastewater treatment facility that would treat sewage to meet water quality standards established by the United States. Currently, the South Bay International Wastewater Treatment Plant treats 25 MGD of wastewater to secondary standards prior to discharge to the Tijuana River. The treatment plant has the capacity to treat approximately 90% of the sewage produced in the urban areas of the City of Tijuana, Mexico, and has led to increased protection of human and environmental health on both sides of the border.

Water Quality and Water Quality Impairments

The Tijuana Watershed is one of the most severely water quality impacted watersheds in the San Diego County, primarily in the western lower portion of the watershed. The eastern portion of the watershed is known to have higher water quality, but with increasing development water quality issues could arise in the near future. The Tijuana Watershed is classified as a Category I (impaired) watershed by the State Board due to its array of water quality problems (PCW (a), N.D.).

Eight water bodies within the U.S. portion of the Tijuana Watershed are listed on the 303(d) list:

- Tijuana River for indicator bacteria, eutrophication, dissolved oxygen (DO), pesticides, solids, synthetic organics, trace elements, trash, phosphorus, sedimentation/siltation, selenium, surfactants, nitrogen, and toxicity,
- Tijuana River Estuary for indicator bacteria, eutrophication, DO, lead, nickel, pesticides, thallium, trash, and turbidity,
- Pacific Ocean shoreline (0.75 miles north of Tijuana River, Monument Road, Tijuana River Mouth, Seacoast drive, and U.S. Border) for *Enterococcus,* fecal coliform, or total coliform

Tijuana Watershed
• Barrett Reservoir for color, manganese, perchlorate, nitrogen, and pH • Pine Valley Creek for turbidity • Tecate Creek for selenium • Cottonwood Creek for selenium • Morena Reservoir for ammonia as nitrogen, color, manganese, pH, and phosphorus Pollutants of concern and stressors within the watershed include eutrophic conditions, nutrients, pathogens, pesticides, metals/metalloids, sedimentation/siltation, salinity, toxicity, trash, and other organics (Copermittees 2012). The sources of the pollutants are varied and include urban runoff/storm sewers, wastewater, agriculture, erosion, streambed modifications and destabilization, natural sources, septic systems, and unknown point and non-point sources (SDRWQCB, 2010).The major impacts from these pollutants/stressors consist of surface water quality degradation, groundwater quality degradation, trash, sedimentation, and eutrophication. Surface water quality in the Tijuana Watershed, primarily the Tijuana River, has been adversely affected by runoff from across the international border with Mexico. Significant improvements have been made in the City of Tijuana to collect and treat its sewage; however not all households are yet connected to the city's sewer system. Following rain events, sewage and trash from the City of Tijuana flow into the Tijuana River and are transported to the Tijuana River Estuary. During rain events, surface runoff containing trash and wastewater enter the Tijuana River and flow through the watershed into the Tijuana Estuary and ultimately into the Pacific Ocean. The lower portion of the Tijuana Watershed receives runoff which has been recorded to contain high concentrations of sediment, trace metals, coliform bacteria, polychlorinated biphenyls (PCBs) and other urban, agricultural, and industrial pollutants. Depending on ocean currents, these pollutants impact the beach water quality from Playas de Tijuana to Coronado (Wildcoast (a), 2012). The Tijuana River Valley Recovery Team (Recovery Team) was created in 2008 in an effort to address water quality issues in the Tijuana River Valley. The Recovery Team completed and released the *Tijuana River Valley Recovery Strategy* in January 2012 (TRVRS, 2012). This document was developed with input from stakeholders on both sides of the border and establishes a strategy for managing sediment and trash in the watershed, as well as, for the protection of natural resources. The upper watershed is primarily open space, with little to no urbanization, while water quality issues are primarily found in the watershed downstream of dams on both sides of the U.S.-Mexico border (TRVRS, 2012).Furthermore, a Water Quality Improvement Plan will be developed for the United States portion of the Tijuana Watershed in accordance with the 2013 MS4 Permit, which will address some of the sources of pollutant loading into the water bodies and determine actions that can be taken to improve water quality. Efforts associated with the 2013 MS4 Permit will present opportunities for coordinated IRWM projects to ensure that the efforts are integrated to achieve maximum benefits. The Tijuana groundwater basin is sodium chloride in character (DWR 2006). The basin contains chloride and sulfate concentrations that exceed the maximum contaminant level (MCL) at some wells, as well as for aluminum, barium, lead, selenium, and silver concentrations. The Cottonwood Valley groundwater basin and the Campo Valley groundwater basin are calcium bicarbonate in character (DWR 2003 and 2004a). The Campo Valley groundwater basin has been rated suitable for domestic and irrigation uses (DWR 2003). The Portrero Valley groundwater basin's water character is variable with calcium and sodium as the dominant anions and bicarbonate and chloride as the dominate anions (DWR 2004b). Specific water quality objectives have been established in the Basin Plan for the eight individual HAs. The inland surface water quality objectives established are for TDS, nutrients, iron, manganese, and color. A summary of TMDLs that have been adopted or are in progress are provided in *Chapter 3, Region Description.*

Tijuana Watershed

Stormwater and Flood Management

A major drainage within the watershed is the Tijuana River, which encompasses a drainage area of 1,700 square miles. The peak discharge during a 100-year event at the mouth of the river is 75,000 CFS. Within the watershed, the acreage of land uses within mapped flood hazard zones total over 7,700 acres, and includes the following: agriculture, 800 acres; commercial and services, 188 acres; industrial, 23 acres, open space and recreation, 4,758 acres; residential, 852 acres; and transportation, communications, and utilities, 319 acres (see Appendix 7-B, Integrated Flood Management Planning).

Stormwater management is limited to the County of San Diego for most of the upper watershed due to its undeveloped, park, and agricultural uses on unincorporated lands. The City of Imperial Beach and the County of San Diego are responsible for municipal stormwater runoff in the lower portion of the watershed. Polluted urban runoff during rain events enters the Tijuana River which affects the water quality of the Tijuana River Estuary downstream, potentially impacting sensitive habitat and ecosystems. Erosion and sedimentation issues, even after light rain events, are a serious issue within the Tijuana Estuary. Sediment in the Tijuana River carried by stormwater originating in Mexico has been responsible for the destruction of at least 20 acres of salt marsh (Wildcoast). The municipality of Tijuana is responsible for stormwater management in its urban center, and Mexico has channelized a portion of the Tijuana River to combat flood risks. A binational flood warning system was installed in 2003 (BWAC, 2005).

The Tijuana Watershed is part of the City of San Diego's planned efforts to further protect the streams and ocean from stormwater pollution. A Watershed Urban Runoff Management Plan (WURMP) was written for the Tijuana Watershed in which it details the projects and activities that are planned for the watershed to protect from storm water pollution (CSD (c), 2012).

Natural Resources

The Tijuana River Estuary occupies over 2,000 acres of land and is one of the few intact wetlands in Southern California. The Tijuana River Estuary is among one of the most biologically productive systems on earth and contains sand dunes to coastal sage scrub, including riparian habitat, mudflat/tidal channels, salt marsh, salt panne, brackish-freshwater marsh, transition habitat, and upland habitat. The Tijuana River Estuary is home to more than 370 species of birds, six of which are threatened or endangered, and several endangered plant species (California's Critical Coastal Areas, 2006). One of the most sensitive habitats in the Tijuana River Watershed is the vernal pools which are highly specialized habitats that support unique flora and fauna (California's Critical Coastal Areas, 2006). The Tijuana River Estuary receives flows from the Tijuana River which carry nonpoint source pollution flows from Tijuana, Mexico. Managing the Tijuana River Estuary's cross-border water quality issues adds an extra layer of complexity to how the estuaries resources are managed (NOAA, 2004).

Tijuana River National Estuarine Research Reserve (TRNERR) encompasses approximately 2,293 acres and is designated by the Ramsar Convention as a *Wetland of International Importance*, (Wetlands Recovery Project (a)). The reserve is owned and operated by the California Department of Parks and Recreation (CDPR), U.S. Fish and Wildlife Service, the City of San Diego, the County of San Diego, and the U.S. Navy. It encompasses beach, dune, mudflat, saltmarsh, riparian, and coastal sage and upland habitats.

Marron Valley occupies approximately 2,300 acres of the southeastern portion of the City of San Diego's MSCP. The valley primarily consists of sage scrub and chaparral vegetation with large drainages that support significant stands of riparian habitat functioning as wildlife corridors (County of San Diego *et. al*., 1997). Marron Valley provides wildlife habitat and protect lands surrounding the San Ysidro Mountains.

The Tijuana River valley floodplain consists of a mixture of agricultural fields, rural housing, and riparian woodland. The mesas and canyon areas in the Tijuana Watershed contain coastal sage, maritime succulent scrub communities, riparian and chaparral habitat. Several species found in the floodplain region of the Tijuana Watershed consist of Shaw's agave, Orcutt's birds-beak, wart-stemmed ceanothus, San Diego barrel cactus, least Bell's vireo, lightfooted clapper rail, Belding's savannah sparrow, California least tern, Western snowy plover, northern harrier, Cooper's hawk, and the California gnatcatcher (County of San Diego (b), 1997).

Tijuana Watershed
Invasive species within the Tijuana Watershed pose series threats to the native species. The following invasive species are present in the Tijuana Watershed: sea fig, tamarisk, giant cane, castor bean, salt cedar, and *arundo donax* (County of San Diego (b), 1997; SMSLRWMA, 2004). Tribal nations in the Region have indicated concern that jurisdictional habitat conservation efforts such as those described above may not consider current or future tribal developments, and tend to categorize tribal lands as open space for habitat and conservation planning purposes.
Potential Climate Change Impacts Climate change vulnerabilities that have been identified for the San Diego IRWM Region and are relevant to the Tijuana Watershed include but are not limited to: • Decrease in imported water supply • Decrease in groundwater supply • Decrease in surface water availability • Water quality concerns related to lower surface water flows • Sea level rise • Decrease in availability of necessary habitat • Exacerbation of wildfires • Due to the importance of imported water supply used within the Tijuana Watershed, decreases in imported water supply are anticipated to be a critical climate change impact. Due to the extensive amount of habitat and open space located within the Tijuana River Estuary, reduced surface water availability and potential water quality concerns could impact or decrease available habitat that is necessary for species survival. The Tijuana River Estuary is a very resilient ecosystem that has remained fairly stable despite its many issues (i.e. pollution and sedimentation) (Tijuana River National Estuarine Research Reserve (a), 2012). However, it is also home to a diverse wildlife that can negatively be potentially affected by significant climate regime shifts. The rapid rate of climate change can pose a problem to many of the sensitive species, such as endangered and threatened species, that will be unable to adapt fast enough to habitat shifts and increasing temperatures. With the predicted rapid changes in climate, it is expected the list of species at risk in the Tijuana Watershed will only increase. Additionally, changes in climate can make conditions much more favorable for invasive species in the watershed reducing available habitat space for native species. Sea level rise in the Tijuana Watershed could have a potentially significant impact on shoreline structures and the Tijuana River Estuary. Sea level rise has the potential to damage coastal infrastructure, recreation, and negatively impact tourism. Wildfires in the Tijuana Watershed are a common occurrence, particularly in the undeveloped regions of the watershed. Climate change has the potential to impact the wildfire season in the watershed. Post-fire rain events in the watershed cause erosion, mudslides, and sedimentation which create negative water quality issues. Stormwater runoff from post-fire rain events in the watershed have shown to carry high levels of turbidity, nutrients, and TDS. An increased wildfire season can increase erosion and sedimentation process in the watershed, negatively impacting water quality in streams, local reservoirs and the Tijuana River Estuary. The potential effects on the Morena and Barrett reservoirs include increased sedimentation with loss of storage, temporary increase in turbidity, and increased water treatment needs and costs. Rain events after wildfires are also known to create flash floods in the Tijuana Watershed.

Tijuana Watershed
Management Issues and Conflicts The Tijuana Watershed has various bi-national environmental problems that require developing and implementing a watershed management plan that addresses the many water resource related issues impacting both sides of the international border. Pollution is a multidimensional problem in the Tijuana Watershed that has impacts to the public health, the environment, and the economy of San Diego-Tijuana border communities (Wildcoast (a), 2012). Various watershed projects have already been undertaken to tackle several of the pollution and flood control issues on both sides of the international border, such as the Tijuana River Recovery Team, the Border 2012 program, BEACH act monitoring program, the Southwest Center for Environmental Research and Policy, the Tijuana Watershed Advisory Committee, and the Baja California/California Water Task Force (EPA). Though progress has been made, more bi-national work and coordination needs to be done to see a significant marked decrease in pollution and flood control related issues (NOAA, 2004). Unplanned development, industry, and population growth in Tijuana, Mexico has led to an increase in water quality issues. Many new developments in Mexico near the Tijuana River have no sewer infrastructure (Campana *et al*., 2006). No programs equivalent to the US EPA's National Discharge Elimination System (NPDES) currently exists in Mexico to minimize the threat of chemical pollutants entering and contaminating the Tijuana River and the Tijuana River Estuary. Wastewater flows originating from Tijuana and inadequate infrastructure to collect, treat, and dispose of those flows have also been long standing issues within the watershed (Wetlands Recovery Project (a), 2001). These are transboundary and cross-cultural water quality management challenges that need to be addressed (Wetlands Recovery Project (a), 2001). The Tijuana River has a diversion structure that sends flows to be treated at the SBIWTP. During periods of low flow the Tijuana River is diverted to the SBIWTP, whereas the Tijuana River flows freely once the water level rises over the diversion structure. Therefore flows downstream in the Tijuana River are nonexistent during low flow periods (summer) (Weston Solutions *et. al*., 2005). Surface water quality pollution has impacted the underlying aquifer in the Tijuana Watershed. The city of Tijuana, Mexico currently uses only 5% of the available groundwater supplies as the quality is poor from surface pollution and salt-water intrusion. The lack of sewer connections on the Mexico side of the Tijuana Watershed will only continue to degrade surface and groundwater quality. At the moment, the Tijuana Watershed relies heavily on surface water however as the population increases, groundwater will become a much needed water supply source that might not be available to either country due to contamination (Campana *et al*., 2006). Another concern in the Tijuana Watershed are the environmental regulation exemptions that have been allowed for Border Infrastructure System projects. The Department of Homeland Security has allowed for construction projects under this program to be exempt from environmental regulations which could degrade habitat and water quality in the Tijuana Watershed.

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6 Governance and Stakeholder Involvement

This chapter addresses requirements set forth in the Governance and Stakeholder Involvement standards included in the 2012 IRWM Program Guidelines (DWR, 2012). The governance structure described in this chapter pertains to governance of the San Diego IRWM Program only.

6.1 Overview

As discussed in *Chapter 2, Vision and Objectives*, the IRWM Plan Vision emphasizes the need for a consensus-based approach to water resources management within the San Diego IRWM Region (Region), and the Mission emphasizes the need for a stakeholder-driven process to develop solutions to water-related conflicts that are economically and environmentally preferable. Maximizing stakeholder and community involvement is essential to the San Diego IRWM Program.

Stakeholder involvement is a cornerstone of IRWM.
Photo credit: Rosalyn Prickett, RMC Water and Environment

The long-term success of an integrated regional planning effort ultimately depends on the degree to which agencies and stakeholders can effectively work together to identify common objectives and develop and implement programs and strategies to achieve them. Establishing an inclusive process that incorporates stakeholder input has been and continues to be a critical component of the IRWM Program.

The Region's IRWM planning process has featured early involvement of water management organizations and affected stakeholders, including regulatory agencies, local jurisdictions, utilities, academic institutions, non-governmental organizations, special interest groups, and the interested public. Involving representatives from disadvantaged communities (DACs) and Native American tribes has been a priority. Stakeholder involvement in key program decisions will remain an ongoing priority in future IRWM planning stages.

This chapter will discuss how the stakeholder involvement process was developed to ensure that an opportunity was given to all stakeholders to actively participate in the IRWM decision-making process on an on-going basis. This chapter will also address how the IRWM governance structure and procedures were chosen to maximize functionality, participation in IRWM Plan implementation, and IRWM Plan longevity.

Since its inception in 2005, the San Diego IRWM Program has evolved in the four distinct phases outlined in Table 6-1. Section 6.4 has further information pertaining to outreach efforts as they relate to each of these four phases of the IRWM Program.

Table 6-1: Evolution of the San Diego IRWM Program

Program Phase	Description and Achievements
Program Initiation (2005-2007)	• Established the Regional Water Management Group (RWMG) as the Program's governing body via Memorandum of Understanding (MOU) • Prepared an unsuccessful Proposition 50-Round 1 implementation grant application • Established the Regional Advisory Committee (RAC) as the Program's stakeholder advisory body • Prepared and adopted the 2007 IRWM Plan • Prepared a successful Proposition 50-Round 2 implementation grant application and was awarded $25 million by the Department of Water Resources (DWR)
IRWM Plan Implementation (2008 to 2013)	• Established the Tri-County Funding Area Coordinating Committee (Tri-County FACC) for inter-regional coordination via MOU • Maintained active RAC meetings on water management topics of interest to the regional stakeholders • Facilitated Workgroups to address issues identified in IRWM Plan • Held first San Diego IRWM Summit to solicit public input into and raise awareness of the 2013 IRWM Plan • Prepared for and received approval in DWR's Region Acceptance Process • Prepared a successful Proposition 84 planning grant application and was awarded $1 million by DWR • Facilitated public workshops and directed outreach to tribes and disadvantaged communities to solicit participation in grant opportunities • Prepared a successful Proposition 84-Round 1 implementation grant application and was awarded $8 million by DWR • Prepared a Proposition 84-Round 2 implementation grant application – award notification pending
Updating the 2007 IRWM Plan (2011-2013)	• Prepared 4 stand-alone planning studies on key water management topics to support the 2013 IRWM Plan; development of each study included support from a Workgroup • Facilitated two Workgroups to define IRWM governance and planning priorities for the 2013 IRWM Plan • Facilitated joint public workshops/RAC meetings to receive input and direction on 2013 IRWM Plan chapters • Facilitated public workshops in the Region's watersheds that emphasized integration in water management planning • Conducted directed outreach to tribes and disadvantaged communities to solicit participation in grant opportunities • Prepared the 2013 IRWM Plan for adoption in October 2013
Future Plan Implementation (2014+)	• Will maintain active RAC meetings on water management topics of interest to the regional stakeholders • Will facilitate Workgroups as appropriate to address issues identified in 2013 IRWM Plan • Will prepare a Proposition 84-Round 3 implementation grant application for submittal to DWR • Will administer and support implementation of projects funded by IRWM grants • Will create a periodic Report Card of 2013 IRWM Plan implementation • Will update the IRWM Plan in approximately five years, which will require corresponding outreach efforts

6.2 Stakeholder Identification and Involvement Approach

Stakeholder involvement is a vital part of the IRWM Program as a means to identify and address public interests and perceptions as well as stakeholder questions and issues. Stakeholder involvement ensures that the IRWM Plan and any proposed solutions are in keeping with public interests, and provides for public ownership and support of those solutions. Stakeholder involvement is also an essential element in identifying and resolving potential water management conflicts within the Region. The Regional Water Management Group (RWMG) – comprised of the City of San Diego, County of San Diego, and San Diego County Water Authority – examined the water management issues and opportunities in the Region's watersheds to identify the stakeholders with a vested interest in local water resources who could assist in articulating regional needs during the planning phase, as well as carry out projects during implementation phases. The agencies and organizations involved in water management within the Region that have been identified and contacted to participate in the IRWM program are listed in Table 6-14 (located in the final pages of this chapter), along with each group's level of actual IRWM participation.

Stakeholders provided input on watersheds for the 2013 IRWM Plan.
Photo credit: Rosalyn Prickett, RMC Water and Environment

During development of the 2007 IRWM Plan, stakeholder participation was initially coordinated through Project Clean Water. The RWMG effectively leveraged the sizeable Project Clean Water database to announce IRWM planning activities to members of the public and related organizations. The Project Clean Water website (www.projectcleanwater.org) also provided a forum for disseminating information on watershed and water quality topics, as well as providing a centralized point of access to water quality information and resources in the San Diego Region. While initial coordination of stakeholder activities took place through the existing Project Clean Water forum, the Regional Advisory Committee (RAC) was formally established in December 2006, and has been the primary advisory body for the IRWM Program since that time (refer to Section 6.3). The RAC was the advisory body responsible for providing final input into and recommending adoption of the 2007 IRWM Plan.

In 2008, a separate website was launched (www.sdirwmp.org) in order to host specific information pertaining to the San Diego IRWM Program and move away from relying on the Project Clean Water website and database. Since adoption of the 2007 IRWM Plan, the RWMG has also developed an email distribution list specifically for the IRWM Program (separate from Project Clean Water). The RWMG uses the stakeholder email list to communicate regularly with specific IRWM stakeholders such as those actively involved in RAC meetings and activities. At key decision points, however – such as project solicitation for upcoming funding cycles and/or IRWM Plan updates – announcements are made to a broader audience to ensure that all interested parties are at the table. The broader IRWM stakeholder list, initially developed from the Project Clean Water

stakeholder list, has grown considerably since the 2007 IRWM Plan adoption. Additional stakeholders included on the IRWM stakeholder list are identified through the ongoing RAC meeting process, through ongoing stakeholder outreach activities or from referrals from other interested parties. Substantial outreach to new stakeholders, interested parties, and DACs has occurred since adoption of the 2007 IRWM Plan. Implementation of the *Public Outreach and Disadvantaged and Environmental Justice Community Involvement Plan* (2007) enabled broad public support for the water management projects included in the Proposition 50 and Proposition 84 Implementation Grant Applications, and the ongoing IRWM Program activities.

6.2.1 Stakeholder Involvement Approach

The San Diego IRWM Program strives to implement a collaborative stakeholder process that involves all interested parties and individuals. The public was, and continues to be, invited to participate in all stakeholder meetings for the IRWM Program. Public participation is welcomed at RAC and workgroup meetings and workshops. Stakeholder participation was also provided through public review and comment on draft versions of the 2013 IRWM Plan and associated deliverables. Standard templates and forms have been provided throughout the process to facilitate stakeholder comments and input into the process and the 2013 IRWM Plan

Meetings and news updates have been announced through both the San Diego IRWM website and through the email distribution list. Presentations have been given to agencies, organizations, and community groups, and input received during presentations has been taken back to the RWMG and the RAC for consideration. In addition, directed outreach has been completed for DACs and Tribes in the Region to increase involvement and participation from stakeholders that represent these groups. For a complete description of the stakeholder involvement program, including directed outreach to DACs and Tribes, please refer to Section 6.4.

Watershed coordination groups, such as watershed councils, provide an efficient means by which a variety of stakeholders can coordinate their work on water management within a watershed. Watershed coordination groups can provide a manageable way for geographical coordination, such as in the identification of critical needs, objectives, and priorities, and the formulation of integrated projects and their coordinated implementation. The recognition of, linkage to, and promotion of watershed coordination groups will help to advance San Diego's IRWM planning process.

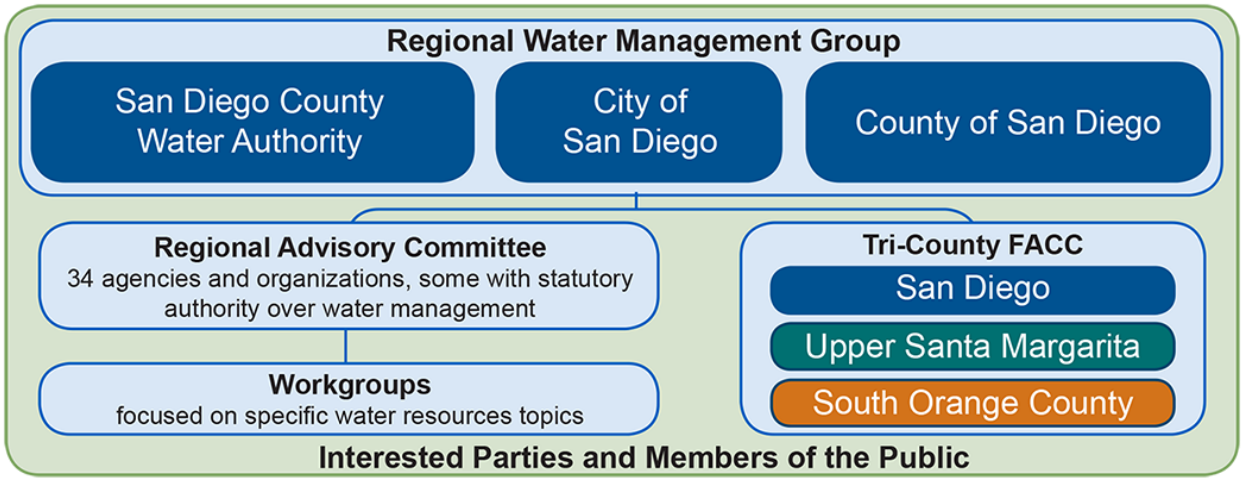
Flyer from the Watershed Workshops

6.3 IRWM Governance Structure

The existing IRWM governance structure, which includes the RWMG as management committee and the RAC as stakeholder advisory committee, has continued since establishment in December 2006. The IRWM governance structure supports balanced access and opportunity for participation in the IRWM Program and ensures diverse stakeholder interests associated with water management in the Region are understood and engaged. In 2007 and again in 2009, the RAC indicated support for the existing institutional structure and in 2011 the RWMG agreed to commit funding support for program management through 2016. As such, the RWMG agencies adopted a new Memorandum of Understanding (MOU) in September 2011 that defined their roles and responsibilities through 2016. This MOU is included as Appendix 6-A. The RWMG is responsible for implementing the IRWM Program, with input and guidance from the RAC. Through bi-monthly meetings, the RAC provides review and recommendations to the RWMG governing bodies on topics relevant to the IRWM Program. Interested stakeholders are encouraged to attend RAC meetings and workshops, submit public comments, and engage in one-on-one communication with RWMG and RAC members.

The San Diego IRWM organizational structure includes five major components – the three-party RWMG, the 34-member RAC, ad hoc Workgroups, the Tri-County Funding Area Coordinating Committee (Tri-County FACC), and interested parties and members of the public. All of these stakeholders are essential to the IRWM decision-making process. Information-sharing and decision-making processes in the Region usually funnel up from the Workgroups and/or Tri-County FACC (if assigned) to the RAC and then proceed to the RWMG governing bodies. Input from the public and interested parties is considered at each level of the process. Figure 6-1 below provides an overview of the San Diego IRWM governance structure. Please note that Figure 6-1 does not necessarily denote the direction of information and input, but rather demonstrates the IRWM governance structure associated with final decision-making. Given that the RWMG agencies have been and are currently financially responsible for the IRWM Program, they are also ultimately responsible for final decision-making.

Figure 6-1: San Diego IRWM Governance Structure



6.3.1 Regional Water Management Group

The combined jurisdiction of the three RWMG agencies encompasses the entire Region, and their combined responsibilities address all facets of water management. The water management responsibilities of the RWMG agencies are summarized in *Chapter 1, Introduction* (see Table 1-1).

The RWMG was formally established in June 2005 through development and adoption of an MOU (FYs 2005-2009), which was later amended and implemented during FYs 2009-2013. The current MOU, signed in 2011, is in effect from 2012-2016. The current MOU reinforces the RWMG structure set forth in the previous two MOUs that identifies the three RWMG agencies as equal partners in management of the IRWM Program. The three agencies share equally in the costs to administer IRWM planning activities. The RWMG recognizes that cooperation and input from stakeholders throughout the Region is a necessary part of an effective IRWM Program. As such, the RWMG has assumed a leadership role in identifying stakeholders and soliciting stakeholder input for the IRWM Program through a variety of methods. The RWMG currently meets bi-weekly to research, review, discuss, and formulate ideas and concepts for the ongoing IRWM Program. The RWMG includes several levels of participation – those levels are described in detail below.

Policy Level: At the policy level, the RWMG consists of the following governing bodies:

- San Diego County Water Authority Board of Directors
- City of San Diego Mayor and City Council
- County of San Diego Board of Supervisors

The RWMG has invested substantial resources in ensuring a successful IRWM Program.
Photo credit: Crystal Mohr, RMC Water and Environment

Through the actions taken by the respective Boards and the San Diego City Council and Mayor, the RWMG management committed to directing staff to actively seek public involvement and stakeholder input; develop and submit Proposition 50 and Proposition 84 grant applications to the appropriate State agencies; and write and adopt the 2007 San Diego IRWM Plan and then update that document to produce the 2013 IRWM Plan. RWMG management is involved in key decisions both during and following RAC review and before presentation to the governing bodies for approval.

Staff Level: Staff from the RWMG agencies, with assistance from consultants, is responsible for day-to-day activities associated with ongoing management of the IRWM Program. Based on the commitments jointly adopted in the MOU, RWMG staff has been responsible for the following activities:

- Developing and maintaining consultant contracts;
- Preparing and submitting Proposition 50 and Proposition 84 grant applications, as well as the associated Region Acceptance Process application;
- Developing and updating project lists for the grant applications;

- Updating the 2007 IRWM Plan in compliance with the *IRWM Grant Program Guidelines* and schedule established by DWR;
- Conducting stakeholder outreach and disseminating information to the public; and
- Supporting the RAC and Workgroups to develop and achieve consensus recommendations on draft documents.

Key decisions made by the RWMG are submitted to the RAC for consideration and input. Topics are generally researched by the RWMG and alternatives are presented for RAC recommendations.

The Water Authority is the lead agency for grant administration. Responsibilities include: contracting with DWR for grant funding, contracting with local project sponsors to distribute the funding, and managing invoicing and reporting to DWR. Water Authority staff work closely with the local project sponsors to ensure that they meet all grant requirements and complete their projects as planned.

6.3.2 Regional Advisory Committee

The RAC was originally formed in December 2006 to assist the RWMG with completion of the 2007 IRWM Plan and prioritization of projects both within the IRWM Plan and for future funding applications as they arose. The first RAC consisted of 28 voting members with expertise in water supply, wastewater, recycled water, stormwater and urban runoff, natural resources, and environmental stewardship. Further, there were four non-voting members who provided perspectives from the resource agencies and adjacent IRWM regions. Table 6-2 provides a listing of the organizations represented on the RAC prior to and following adoption of the new membership structure.

RAC members attend bi-monthly meetings to provide input on IRWM planning topics.

Photo credit: Rosalyn Prickett, RMC Water and Environment

During 2012, a Governance and Financing Workgroup was convened as part of the 2013 IRWM Plan development process to discuss future governance and financing structures for the IRWM Program. This workgroup met three times between January and June of 2012, and ultimately developed recommendations for the IRWM governance structure moving forward. Recommendations from this workgroup that pertain to financing are included in *Chapter 11, Implementation.* The IRWM Governance and Financing Workgroup re-validated the general program structure indicated in Figure 6-1. The workgroup also determined that the structure of the RAC was not formalized in any written format, and that a formal written charter for the RAC would be useful. To formalize the structure and responsibilities of the RAC, the workgroup drafted a RAC charter in 2012 to guide the RAC in its service as an advisory body to the RWMG on key issues related to IRWM planning and funding applications. The draft RAC charter was modified by the RAC and the RWMG, and the final version was approved by the RWMG and the RAC at a joint Public Workshop/RAC meeting on December 5, 2012.

The RAC charter formalizes the establishment of the RAC; sets forth the RAC member composition, duties, and responsibilities; and outlines the organization and operation of the group. The charter

created six membership categories for voting members to maintain diverse representation from the functional areas (three RWMG members, five water supply entities, six water quality entities, five natural resources and watersheds organizations, two DACs/environmental justice organizations, and seven "other" members). The RAC consists of 28 voting members and six non-voting members, which include federal and state regional agencies along with neighboring IRWM regions.

Table 6-2: San Diego RAC 1.0 and 2.0 Membership

RAC Member Category	Organizations in Original RAC 2006 - 2012	Organizations in Reformulated RAC 2013+
Regional Water Management Group	County of San Diego	County of San Diego
	City of San Diego	City of San Diego
	San Diego County Water Authority	San Diego County Water Authority
Water Supply	Santa Fe Irrigation District	Santa Fe Irrigation District
	Sweetwater Authority	City of Oceanside
	Yuima Municipal Water District	Helix Water District
	City of Oceanside	Sweetwater Authority
	Helix Water District	Olivenhain Municipal Water District
Water Quality	Padre Dam Municipal Water District	San Elijo Joint Powers Authority
	San Elijo Joint Powers Authority	City of Chula Vista
	City of Chula Vista	City of Encinitas
	Industrial Environment Association	Otay Water District / Metro Joint Powers Authority
		San Diego Coastkeeper
		University of California Cooperative Extension
Natural Resources / Watersheds	San Dieguito River Valley Conservancy	San Diego River Park Foundation
	The Nature Conservancy	Buena Vista Lagoon Foundation
	San Elijo Lagoon Conservancy	California Landscape Contractors Association
	San Diego River Park Foundation	UCSD Clean Water Utility
	California Coastal Conservancy	Padre Dam Municipal Water District
	Mission Resource Conservation District	
DACs / Environmental Justice		Groundwork San Diego-Chollas Creek
		Rural Community Assistance Corporation
Other / At Large	La Jolla Band of Luiseno Indians	Floodplain Management Association
	Planning & Engineering for Sustainability	Industrial Environment Association
	San Diego Coastkeeper	SDSU Center for Regional Sustainability
	Rural Community Assistance Association	Farm Bureau of San Diego County
	Farm Bureau of San Diego County	San Diego Association of Governments
	San Diego Regional Chamber of Commerce	Zoological Society of San Diego
	San Diego Association of Governments	Tribal (open pending decision by Southern California Tribal Chairmen's Association)
	SDSU Department of Geography	
	USMC Camp Pendleton	
	Floodplain Management Association	
Regulatory / Tri-County FACC (Non-Voting)	San Diego Regional Water Quality Control Board	San Diego Regional Water Quality Control Board
	U.S. Bureau of Reclamation	U.S. Bureau of Reclamation
	County of Orange	County of Orange
	Rancho California Water District	Rancho California Water District
		USMC Camp Pendleton
		California Coastal Conservancy

RAC members will serve a four-year term, with half of the RAC seats opened up for enrollment every two years. Those who have already served on the RAC are not precluded from reapplying as the charter stipulates that there are no term limits. For more information, please see Appendix 6-B. The RAC strives for consensus (i.e., general agreement among all parties) to the maximum extent possible. If consensus is not achievable, the RAC votes on non-consensus issues by simple majority. For approving all financial matters (e.g., submission of projects for a grant application), a super majority (2/3 vote) of the RAC is required.

To date, the RAC has played a critical role in the following IRWM Program decisions:

- Recommending formal adoption of the 2007 IRWM Plan;
- Shaping and developing such key elements of the IRWM Plan as goals and objectives, long-term targets, and resource management strategies;
- Reviewing progress on 2007 IRWM Plan implementation and identifying strategic improvements for the 2013 IRWM Plan;
- Reviewing and recommending a proposed Region boundary for the Region Acceptance Process application;
- Developing and implementing a project prioritization process for the IRWM Plan (i.e., project ranking criteria) and secondary criteria for the Proposition 50 and Proposition 84 applications;
- Recommending projects for IRWM funding;
- Refining and updating the framework for implementation of the 2013 IRWM Plan;
- Recommending formal adoption of the 2013 IRWM Plan; and
- Identifying and directing the formation of Workgroups to facilitate progress toward short-term priorities in the IRWM Plan.

The RAC currently meets on a bi-monthly basis to provide guidance on upcoming IRWM planning and funding application activities. The RAC may be convened more frequently, as needed. In addition to providing IRWM Program updates, the RAC meetings are used as a forum for educating the group on issues that cut across various aspects of water management ("cross-threading") to build a knowledge base for ongoing IRWM planning.

Breakout groups are used at RAC meetings to ensure that all stakeholders have a chance to weigh in.

Photo credit: Rosalyn Prickett, RMC Water and Environment

6.3.3 Workgroups

Workgroups are formed to enable participants in the IRWM Program to work through particular topics and develop recommendations for the larger group. The RAC receives Workgroup recommendation(s) and subsequently makes its final recommendation(s) to the RWMG governing bodies. Workgroups members are nominated by the RAC but are not required to be RAC members; interested parties and members of the public are welcome as long as they have relevant experience and perspective to actively contribute to Workgroup decisions. Eleven Workgroups, described in Table 6-3, have been formed to date to support the IRWM Program.

Table 6-3: Workgroups

Workgroup	Purpose/Objectives	Members	Results
Program Initiation (2005-2007)			
Proposition 50 Project Selection	Develop a package of water management projects for inclusion within the Region's 2008 Proposition 50 Implementation Grant Application	3 RWMG; 1 water supplier; 1 water quality; 2 natural resources; 2 at large = 9 total	Package of 20 water management projects totaling $25 million in grant funding (*Note: Proposition 50 grant package was ultimately reduced to 19 projects by project proponents [one dropped] and DWR, in collaboration with the RWMG and RAC.*)
IRWM Plan Implementation (2008 to 2013)			
Watershed Planning and Outreach	Develop guidance for watershed groups on how to identify competitive multi-benefit projects for the IRWM grant cycle(s); Develop a strategy for outreach/coordination with watershed groups to encourage submittal of multi-benefit projects for the Proposition 84/1E funding cycles; Identify critical water supply and water quality needs for DACs within the Region's watersheds; and Develop a strategy for outreach/ coordination with DACs to encourage submittal of multi-benefit projects for the Props 84/1E funding cycles that address critical needs	RAC member volunteers and representatives from each of Region's 11 watersheds	Developed outreach strategy targeting DACs presented at the February 2009 RAC meeting
Proposition 84-Round 1 Project Selection	Develop a package of water management projects for inclusion in the Region's 2011 Proposition 84-Round 1 Implementation Grant Application	3 RWMG; 1 water supplier; 1 water quality; 2 natural resources; 2 at large = 9 total	Package of 11 water management projects totaling $7.9 million in grant funding
Updating the 2007 IRWM Plan (2011-2013)			
IRWM Governance and Financing	Examine expansion of funding sources for the San Diego IRWM Program; Develop RAC charter, including membership guidelines, definition of "consensus," and potential voting rules	12 RAC members and volunteers	Developed draft RAC Charter for consideration during multiple 2012 RAC meetings and incorporated into 2013 IRWM Plan
Priorities and Metrics	Refine IRWM Program vision, mission, goals, and objectives; Develop a recommended list of IRWM Plan metrics that describes the Region's targets; Address how the IRWM Program will obtain the data needed to measure progress toward implementation of the IRWM Plan; Develop recommendations for prioritization of program objectives, project-prioritization criteria, and funding application prioritization; and Develop a strategy that will provide planning opportunities for integration of projects prior to future "calls for projects" when funding opportunities arise	15 RAC members and volunteers	Developed revised draft Goals, Objectives, Targets and Metrics presented to RAC at October 2012 meeting and incorporated into 2013 IRWM Plan; Developed revised draft Project Evaluation Process presented to RAC at April 2013 meeting and incorporated into 2013 IRWM Plan

Workgroup	Purpose/Objectives	Members	Results
Regulatory	Identify issues affecting the San Diego Regional Water Quality Control Board (Regional Board) regulation and water resources management; Identify IRWM Program needs/activities and how those relate to Regional Board needs/activities; and Identify and prioritize IRWM/Regional Board collaborative opportunities	18 RAC members and volunteers; 2 Regional Board staff members; 1 Regional Board Board member	Developed Regulatory Workgroup Report presented to RAC at February 2013 meeting and incorporated into 2013 IRWM Plan
Land Use Planning	Define current relationships between land use and water managers in the San Diego Region; Identify issues and opportunities related to water resources and land management; and Identify methods to increase collaboration and coordination between land planners and water managers	All interested RAC members and stakeholders	Developed Land Use Planning Study presented to RAC at February 2013 meeting and incorporated into 2013 IRWM Plan
Integrated Flood Management	Develop inventory and assessment of the flood management programs; Develop guidance framework for regional collaborative planning of watershed and flood risk management; and Develop alternative integrated strategies appropriate for the Region	All interested RAC members and stakeholders	Developed Integrated Flood Management Planning Study presented to RAC at June 2013 meeting and incorporated into 2013 IRWM Plan
Climate Change	Summarize available information on climate change for the Region; Prioritize water-related vulnerabilities to climate change; Develop guidance strategies to mitigate/adapt given climate change impacts; and Clarify climate change in project evaluation/ prioritization process	All interested RAC members and stakeholders	Developed Climate Change Planning Study presented to RAC at February 2013 meeting and incorporated into 2013 IRWM Plan
Proposition 84-Round 2 Project Selection	Develop a package of water management projects for inclusion in the Region's 2012 Proposition 84-Round 2 Implementation Grant Application	3 RWMG; 1 water supplier; 1 water quality; 2 natural resources; 2 at large = 9 total	Package of 7 water management projects totaling $10.3 million in grant funding
RAC Membership	Review RAC applications and make recommendations to RWMG	8 RAC members whose terms were not expiring	Recommendations for new RAC 2.0 members to serve 4-year terms
Future Plan Implementation and IRWM Planning Efforts (2014+)			
Proposition 84-Round 3 Project Selection	Develop a package of water management projects for inclusion in the Region's future Proposition 84-Round 3 Implementation Grant Application	TBD	TBD
Ad-Hoc to Address Various Issues Identified in 2013 IRWM Plan	As needed	TBD	TBD

6.3.4 Tri-County Funding Area Coordinating Committee

The San Diego RWMG, Upper Santa Margarita RWMG, and South Orange County RWMG collaborate in an inter-regional body established via MOU and known as the Tri-County FACC. These three RWMGs include the following members:

- San Diego RWMG: City of San Diego, County of San Diego, and San Diego County Water Authority.
- Riverside County Upper Santa Margarita RWMG: Riverside County Flood Control and Water Conservation District, County of Riverside, and Rancho California Water District.
- South Orange County RWMG: County of Orange, Municipal Water District of Orange County, and South Orange County Wastewater Authority.

The MOU established an agreement on how to partition IRWM funding under Proposition 84 for the funding area and set forth a framework for ongoing collaboration between the three IRWM regions. The Tri-County FACC enables the three RWMGs to balance the necessary autonomy of each planning region to plan at the appropriate scale with the need to improve inter-regional cooperation and efficiency. The Tri-County FACC also ensures close coordination of the three planning regions to improve the quality and reliability of water throughout the span of all three IRWM Regions (San Diego, Upper Santa Margarita, and South Orange County), also known as the San Diego Funding Area.

The Tri-County FACC coordinates and works together with their advisory groups to address issues and conflicts across planning regions, identify common objectives and projects that address those needs, and provide general planning cooperation for shared watersheds. The Tri-County FACC meets on an as-needed basis. The Tri-County FACC is described in more detail in *Chapter 3, Region Description*.

6.4 Stakeholder Involvement Program

Building understanding and support for the IRWM Plan and grant application processes among key stakeholders as well as the general public is critical to the success of the IRWM Program. An active approach to implementing public involvement and information dissemination was developed to assist the RWMG in generating broad-based support for the effort. Methods utilized to improve general awareness of the IRWM Program and provide a means for all interested parties to participate in the planning process are described below. Table 6-4 illustrates whether each outreach method involves one-way vs. two-way communication that is internal or external to the IRWM Region. One-way communication is meant to inform and educate stakeholders and the general public, while two-way communication does that and provides mechanisms for stakeholders and the public to respond with comments, feedback, and ideas. Appendix 6-C provides a summary of the outreach efforts to date. Appendix 6-D contains the formal comment letters received on the Public Draft 2013 IRWM Plan, along with a comment matrix of all comments received through a variety of stakeholder outreach activities and responses to those comments. Comments on the Public Draft 2013 IRWM Plan were solicited through RAC meetings and public workshops, targeted watershed workshops, stakeholder email lists, and the IRWM Program website. Communication methods are described in more detail below.

Table 6-4: Outreach Method and Communication Objectives

Outreach Method	Communications		Scale of Focus	
	One-way	Two-way	Internal	External
Website		✓	✓	✓
Emails		✓	✓	
Newsletters	✓		✓	
Public Workshops		✓	✓	
Presentations		✓	✓	
Summits		✓	✓	
Partnerships		✓	✓	✓

Throughout 2012 and 2013, a collaborative process was conducted to involve regional stakeholders in the development of an update to the 2007 IRWM Plan. The 2013 IRWM Plan included information from planning documents published since 2007, as well as information produced from planning studies, workshops, and workgroups that were conducted throughout 2012 and 2013 to address Region-specific issues. The 2013 IRWM Plan allowed the Region to focus on updated priorities and issues, facilitate project integration, forge partnerships with a variety of stakeholders, and move the Region forward in implementing high-priority projects. Stakeholder participation was encouraged through several mechanisms, including the 2012 IRWM Summit, RAC meetings and public workshops, and by reviewing draft materials.

The San Diego IRWM Program is committed to ensuring the long-term sustainability of San Diego's water supply, water quality, and natural resources, and to continuously working with the community to maintain and implement the IRWM Plan. All interested stakeholders have been and will continue to be invited to participate in the IRWM Plan effort. Stakeholders are essential for achieving a higher level of integration of watershed projects, through which the multiple benefits of water supply, water quality, and natural resources can be achieved concurrently.

Website: A website was established as a means of communication with stakeholders, interested parties, and the general public. The San Diego IRWM website (www.sdirwmp.org) provides detailed and up-to-date information on the IRWM Program, including: the adopted 2007 IRWM Plan and 2013 IRWM Plan; the full list of submitted IRWM projects and projects selected for inclusion in the Proposition 50 and Proposition 84-Round 1 and Round 2 grant applications; information about the RWMG, RAC, and Tri-County FACC; RAC and Workgroup meeting agendas, summaries, and presentations; resources for climate change analysis; information about the State's funding programs; RWMG contacts; and other helpful links. The website also provides a discussion forum for stakeholders to initiate discussions on regional planning topics.

Screenshot of the San Diego IRWM Website: www.sdirwmp.org

To facilitate communication among planners and local project sponsors, the website hosts an online project database aimed at providing universal access to information about proposed San Diego IRWM projects. The project database allows project sponsors and other interested parties to log-in and add, revise, and submit project information, as well as view all other submitted projects. This tool, coupled with the Public Workshops, is intended to connect stakeholders with one another to identify and enhance synergies among projects, hopefully leading to better integration and stronger partnerships. The online project database will also enhance efforts to inform the general public about "what is IRWM" through concrete project examples.

Table 6-5: Website

Website	
Phase	**Features**
Program Initiation (2005-2007)	IRWM Program utilized the existing Project Clean Water website to provide IRWM-related information to stakeholders
IRWM Plan Implementation (2008 to 2013)	IRWM Program website launched; hosted project submittal database and allowed for meeting materials to be downloaded
Updating the 2007 IRWM Plan (2011-2013)	Revamped website; upgraded project application database; added discussion forum
Future Plan Implementation (2014+)	Add data management capabilities, such as GIS

Stakeholder Email Updates and News Updates: The RWMG maintains an electronic distribution list of stakeholders and interested parties to provide IRWM Program updates, announcements, RAC meeting agendas and summaries, water-related workshops and seminars, and updates from DWR, as well as other grant and funding opportunities that may be of interest to stakeholders. As referenced in Table 6-6, the stakeholder distribution list will continue to be updated and maintained, and email updates will be sent out to provide funding updates, information about grant cycles, RAC updates, project updates, legislative updates, and project profiles.

Table 6-6: Stakeholder Email Updates and News Updates

Stakeholder Email Updates/News Updates	
Phase	**Features**
Program Initiation (2005-2007)	Electronic stakeholder distribution list developed; email updates sent to stakeholders
IRWM Plan Implementation (2008 to 2013)	Stakeholder distribution list updated and maintained; email updates sent to stakeholders
Updating the 2007 IRWM Plan (2011-2013)	Stakeholder distribution list updated and maintained; identified and utilized organizations that were willing to forward email updates to their stakeholder mailing list
Future Plan Implementation (2014+)	Stakeholder distribution list will continue to be updated and maintained; email updates will be sent consistently

Newsletters and Notices: Newsletters are developed and distributed to the stakeholder email list at significant milestones in the IRWM Planning process to ensure stakeholders are being engaged. The newsletters serve as a means of keeping the stakeholders updated on legislative issues, funding opportunities, status of the IRWM Plan, opportunities for involvement, and information about project submittals, a timeline, and RWMG agency contact information. Table 6-7 explains the use of newsletters and notices throughout the phases of the IRWM Program.

In 2013, a newsletter was prepared and distributed to the stakeholder email list to coincide with the initiation of the public review of the Public Draft 2013 IRWM Plan. The purpose was to announce the public review period (held June 20-July 31, 2013), describe the extensive stakeholder outreach conducted during the 2013 IRWM Plan, explain why IRWM planning is important, and solicit comments from the public. Draft 2013 IRWM Plan Update materials were also posted on the IRWM Planning website.

An information flyer will be integrated into the San Diego County Water Authority's existing public outreach materials to provide general information about IRWM, raise the profile of the Program, and acknowledge the benefits of all the agencies cooperating as part of the Program. The flyer will be distributed during community events staffed by the Water Authority.

Table 6-7: Newsletters and Notices

Newsletters and Notices	
Phase	**Features**
Program Initiation (2005-2007)	Newsletters developed and distributed to coincide with initiation of public review of Draft IRWM Plan
IRWM Plan Implementation (2008 to 2011)	None
Updating the 2007 IRWM Plan (2011-2013)	Newsletter prepared and distributed to coincide with initiation of public review of Draft 2013 IRWM Plan
Future Plan Implementation (2014+)	Newsletters will be distributed at significant milestones; an information flyer will be add to the San Diego County Water Authority's public outreach material and distributed during community events

Public Workshops: Public workshops have been held to ensure the involvement of a wide range of public agencies, organizations, and individuals in the IRWM Program. Workshops have also been held to meet the needs of specialized stakeholder groups, including DACs and tribal groups. The various workshops that have been held to support the IRWM Program are described in Table 6-8 and in greater detail below.

Public workshops are generally advertised through the website and the stakeholder email list. Workshops are held in varying locations, spread geographically throughout the Region to facilitate participation by different stakeholders. For workshops associated with planning topics, comments are accepted during each of the workshops and via online comment forms. Comments are reviewed and considered for inclusion within the IRWM Plan, for use in the planning process, or for IRWM Plan implementation. For workshops associated with a "Call for Projects" for the IRWM Plan and grant applications, agendas include the IRWM project evaluation process, the proposed approach to funding application prioritization, and the explanation of project submittal forms. Recently, an additional Strategic Integration Workshop was held to gather

SAN DIEGO
Integrated Regional Water Management

You're invited to the San Diego IRWM Strategic Integration Workshop

IRWM grant funding will be available soon!
Participate in this Workshop to successfully maximize project benefits and position for Prop 84-Round 2 funding.

The San Diego Integrated Regional Water Management (IRWM) Program is looking for integrated solutions to the Region's water management issues. In September-October 2012, we will be accepting applications for $10 million in Prop 84-Round 2 implementation grant funding. In advance of the upcoming Call for Projects, the San Diego IRWM Program is hosting a Strategic Integration Workshop for local project sponsors and potential project partners.

San Diego IRWM Strategic Integration Workshop
Wednesday, September 12, 2012
9:00 a.m. – 12:00 p.m.
SDG&E Energy Innovation Center
4760 Clairemont Mesa Blvd., San Diego, CA 92114

All project sponsors interested in IRWM grant funding are encouraged to complete the Project Concept Form and be prepared to discuss it at this Workshop. Even if you do not have a project in mind, there may be opportunities to participate in other sponsors' projects. We encourage you to complete the Project Partner Form to describe your group's interest and capabilities for partnering in IRWM projects and be prepared to discuss it at this Workshop.

Please complete the attached Project Concept Form or Project Partner Form and return it to rprickett@rmcwater.com by Friday, August 24. The San Diego IRWM Program team will compile the project forms for discussion at this Workshop.

What is Integration?
Developing integrated project solutions ensures a greater level of benefits for the region and makes your project more viable within the IRWM grant program. Integration includes:
- Partnerships between different organizations
- Employing multiple resource management strategies
- Supporting multiple beneficial uses
- Regional- or watershed-scale efforts
- Addressing different components of the hydrologic cycle

For more information regarding the San Diego IRWM Program, please visit http://www.sdirwmp.org or contact IRWM Program Manager Mark Stadler at mstadler@sdcwa.org or (858) 522-6735.

Flyer from the Strategic Integration Workshop

local project sponsors to discuss preliminary project concepts and encourage integration of concepts and development of partnerships for grant funding. This workshop used a "speed networking" format to facilitate the development of relationships between project sponsors and prepare them for the "Call for Projects".

Table 6-8: Public Workshops

Dates	Purpose/ Objectives	How Input Was Received
Program Initiation (2005-2007)		
August 2006	Three workshops held to inform and educate public about background of IRWM planning, and to receive public feedback regarding vision, goals, and objectives of 2007 IRWM Plan	Comments accepted during workshops and via an online comment form; each comment was reviewed and considered for inclusion within the IRWM Plan, for use in the planning process, or for IRWM Plan implementation
April, June, and August 2007	Three workshops held to facilitate a "Call for Projects" for the IRWM Plan and Proposition 50 Grant Application, and provide members of local water supply, wastewater, stormwater, environmental, and community organizations with information about the IRWM Plan prioritization process, the proposed approach to funding application prioritization, and explanation of the Project Application Review form	
IRWM Plan Implementation (2008 to 2013)		
June 2010	Two workshops held to facilitate a "Call for Projects" for the Proposition 84-Round 1 Implementation Grant Application	
Updating the 2007 IRWM Plan (2011-2013)		
August, October, and December 2012; February, April, and June 2013	Six joint Public Workshops/RAC meetings held to receive input and direction on 2013 IRWM Plan chapters	Comments accepted during workshops; each comment was reviewed and considered for inclusion within the IRWM Plan, for use in the planning process, or for IRWM Plan implementation
September 2012	Strategic Integration Workshop held to gather local project sponsors to discuss preliminary project concepts and encourage integration of concepts for Proposition 84-Round 2 funding	Stakeholders submitted project concepts describing preliminary project ideas, and project partners submitted partner forms that described potential services they could provide to support projects; the concept and partner forms were evaluated and discussed by stakeholders to determine potential integration and partnering opportunities
September 2012	Four Watershed Workshops held to solicit information about each watershed for 2013 IRWM Plan, including a characterization of water resources within each watershed, identification of key water management issues and needs, and brainstorming of project concepts to address key issues	Comments accepted during workshops and via feedback forms; each comment was reviewed and considered for inclusion within the IRWM Plan
Future Plan Implementation (2014+)		
2014+	Public workshops will be scheduled to maintain engagement in the ongoing IRWM Program	TBD

Speakers Bureau Presentations: The RWMG actively seeks opportunities to attend meetings hosted by local organizations to present information on the IRWM Program and current activities and to solicit input. The primary focus of the individual group presentations has been to provide attendees with background information about the IRWM planning process, the IRWM Program's purpose, the IRWM Plan objectives, and the project solicitation process. Presentations typically last 15-45 minutes and generally include the use of PowerPoint presentations, maps, informational handouts, and forms for submitting comments and/or projects. Input received during presentations is taken back to the RWMG for consideration, and typically, the participants are added to the stakeholder email list. To continue to expand the Region's understanding and support for the IRWM effort, the RWMG will deliver six to eight presentations annually to groups in the Region. Table 6-9 describes the use of presentations throughout the phases of the IRWM Program.

Table 6-9: Speakers Bureau Presentations

Speakers Bureau Presentations	
Phase	**Features**
Program Initiation (2005-2007)	Frequent presentations to groups in the Region; provided an overview of the IRWM Plan
IRWM Plan Implementation (2008 to 2013)	Increased number of presentations to tribal and DAC representatives
Updating the 2007 IRWM Plan (2011-2013)	Continued presentations to groups in the Region
Future Plan Implementation (2014+)	Plan to deliver six to eight presentation annually about IRWM Program and current activities

Summits: Summits provide an opportunity to raise awareness among the public and stakeholders about the IRWM Plan and allow for questions and public comment. A focal point of early stakeholder participation was the annual Clean Water Summit. The 2006 Clean Water Summit, held on June 30, 2006, was focused entirely around the San Diego IRWM planning effort. The keynote speaker, Jerry Johns of the State Department of Water Resources, presented the background on the IRWM planning process by providing an overview of the California Water Plan Update 2005. Mr. Johns explained how the 2005 Water Plan Update provided a fundamental change in the way we address water throughout the State, and set the stage for a transition in water resource management.

Opening Remarks at the 2012 Summit made by Jerry Sanders, then Mayor of San Diego.

Photo credit: Crystal Mohr, RMC Water and Environment

On February 29, 2012, the RWMG hosted the first San Diego IRWM Program Summit at the outset of the 2013 IRWM Plan to gain input from regional stakeholders on how to enhance water resources management in the San Diego IRWM Region. The Summit was a success, with over 80 diverse attendees, and notable speakers including Jerry Sanders, then Mayor of San Diego, and State Water Resources Control Board Member

Fran Spivy-Weber. Key outcomes from the IRWM Summit included:

- Compiling an overview of various barriers and challenges to water resources management;
- Discussing possible solutions and strategies to overcoming those barriers and challenges; and
- Gathering input on regional planning priorities for San Diego's 2013 IRWM Plan.

As described in Table 6-10, summits will continue to be held as needed in response to major milestones of the IRWM Program, such as the updating or amending of the IRWM Plan.

Table 6-10: Summits

Summits	
Phase	**Features**
Program Initiation (2005-2007)	Clean Water Summit held that was focused entirely around San Diego IRWM planning effort; background on IRWM planning process was presented
IRWM Plan Implementation (2008 to 2013)	No summit held
Updating the 2007 IRWM Plan (2011-2013)	IRWM Summit held at the outset of the 2013 IRWM Plan to gain input from regional stakeholders on how to enhance water resources management in San Diego IRWM Region
Future Plan Implementation (2014+)	Summit(s) will be held as needed in response to major milestones of the IRWM Program

Partnerships and Letters of Support: The San Diego IRWM Program benefits from both formal and informal partnerships, summarized in Table 6-11. As previously described, the RWMG formed a formal partnership through the signing of an MOU in 2005, with several revisions and updates since then, as shown in Table 6-11. Aside from the sharing of ideas and funds, the group has found many other ways to collaborate, such as participating on the Water Conservation Action Committee, getting involved with regional groundwater management planning, developing a regional guidance for low-impact development, and developing and implementing a watershed signage program.

The Tri-County FACC is a formal partnership of the three IRWM planning regions in the San Diego Funding Area (described in *Chapter 3, Region Description*). It was established in April 2009 through joint adoption of an MOU outlining measures for inter-regional coordination. This partnership is a unique opportunity to collaborate with neighboring planning regions to address common objectives, issues, and conflicts.

The RAC, an informal partnership, has realized many benefits including opening the lines of communication between various water-related agencies and organizations and providing opportunities to collaborate, maximize benefits, and realize both a cost savings and improvement in project efficiency. In addition, public participants in the IRWM process have established a regular presence at workshops and RAC meetings, and have provided constructive feedback.

The RAC and interested parties offered letters of support for the IRWM Program and the Region Acceptance Process Application. The RWMG has sent letters of support on behalf of the Upper Santa Margarita Planning Region's grant applications. Partnerships and letters of support help strengthen the basis for the IRWM Plan, support IRWM Plan implementation, and provide a network for the dissemination of information and for the solicitation of region-wide support.

Table 6-11: Partnerships and Letters of Support

Partnerships and Letters of Support	
Phase	**Features**
Program Initiation (2005-2007)	RWMG formed a formal partnership through signing of 2005 MOU
IRWM Plan Implementation (2008 to 2013)	RWMG developed revised 2007 and 2009 MOUs and then signed new 2011 MOU; Tri-County FACC established through joint adoption of 2009 MOU outlining measures for inter-regional coordination
Updating the 2007 IRWM Plan (2011-2013)	RWMG and Tri-County FACC continued to enhance collaboration and coordination of water resources planning
Future Plan Implementation (2014+)	The RWMG will consider extension of its IRWM partnership MOU when it expires in 2016. The three Tri-County FACC members will do the same for its MOU when it expires 2014. The three agencies will support each other as appropriate.

6.4.1 Environmental Justice and Disadvantaged Communities

Environmental justice and DAC concerns in the Region include urbanized areas located near or adjacent to current or past industrial areas, as well as rural backcountry areas. *Chapter 3, Region Description*, provides an overview of the physical location and a description of DACs within the Region. As required by DWR, the following sections provide an overview and background of environmental justice and DAC stakeholders in the Region.

> **"We were very impressed with the San Diego IRWM program's willingness to think 'outside the box'. This creativity allowed rural disadvantaged communities that otherwise would have been left out of process to participate in this essential water resources program."**
>
> ***-Dave Harvey,***
> ***Southern California Regional Environmental Manager,***
> ***Rural Community Assistance Corporation***

Since World War II, the Region has experienced substantial growth, becoming a major port and increasing industrial activities during this time. Such rapid growth and development led to unsustainable land use combinations in portions of the Region. Such areas include those located in the south, southeastern, and border areas of the Region where residential areas and industrial zones were integrated. The location of homes and schools adjacent to industrial facilities has resulted in situations where communities are threatened by the past and present impacts of industrial pollution. Water-related impacts in such areas may include the deposition of airborne industrial and manufacturing contaminants into surface waters and the degradation of groundwater from land contamination. In addition, following World War II, establishment of a major port led to a boom of the shipbuilding and boating industries; these industries have contributed to pollution issues that continue to affect San Diego Bay.

In rural backcountry areas of the Region, communities primarily face groundwater quantity and quality issues. These communities are generally outside of the Water Authority service area and rely on groundwater as their primary if not sole source of water supply. Backcountry groundwater issues are exacerbated by poor economic conditions and lack of local community expertise that can make it difficult to address public health concerns. Rural DACs in the Region have documented issues with water shortages, as well as high contamination levels of uranium, nitrate, and bacteria in available groundwater supplies.

Environmental justice is interpreted in the 2013 IRWM Plan to mean that equal respect and value will be accorded to every individual and community. In developing the 2013 IRWM Plan, attention was given to ensure that DACs are involved in identifying water management issues and solutions. As defined in the *IRWM Grant Program Guidelines (*DWR, 2012*)*, a DAC is a community with an

annual Median Household Income (MHI) that is less than 80% of the statewide annual MHI (DWR, 2012). The guidelines use this definition of DACs with the 2006-2010 American Community Survey to determine the DAC cutoff at $48,706. The San Diego IRWM Region used this number to define disadvantaged areas of concern, and used 2013 MHI projections at a Census block level to identify DACs in the Region. The 2013 cutoff for DACs were those communities with an MHI of $46,979 or less. Section 3.3 in *Chapter 3, Region Description* presents communities within the Region that are classified as economically disadvantaged.

Engaging DACs directly is always a challenge, and many barriers to participation exist for such communities. Such barriers include lack of trust, language and cultural differences, and the time that participation can take away from earning one's livelihood. The IRWM Program has largely relied on working with groups that already have existing relationships with DACs, including those that participate on the RAC. While organizations such as San Diego Coastkeeper, Groundwork San Diego-Chollas Creek, and Rural Community Assistance Corporation have helped the RAC and RWMG to identify DAC concerns and environmental justice issues, it was recognized that additional effort was required to identify and engage urban and rural DACs and identify and address environmental justice concerns. By providing IRWM grant funding to these non-governmental entities, the San Diego IRWM Program has been able to assist disadvantaged communities. The biggest challenge has been the ability to get through the invoicing process in a timely manner to reimburse these organizations for their efforts. This can be a real impediment to providing assistance to disadvantaged communities.

Engaging Disadvantaged Communities

Highlights

- Representation of DACs on the RAC and workgroups
- Targeted outreach meetings with urban and rural DAC stakeholders and advocacy groups
- Strategic Integration Workshop with "speed dating" format to facilitate the development of relationships between community-based organizations and potential project applicants

Lessons Learned / Barriers to Participation

- Financial constraints can restrict ability to participate
- Public meetings were held in disadvantaged areas to the greatest extent feasible to help lessen financial constraints that may prevent DACs from traveling to public meetings
- One-on-one communication between DAC leaders and RWMG or RAC representatives helped ensure that DACs had access to the planning process and helped to build trust

Directed Outreach Program for DACs and EJ Communities

The goal of outreach to disadvantaged and environmental justice communities is to identify and obtain input from groups that, as defined, have historically been disproportionately impacted with respect to the development, implementation or enforcement of environmental laws, regulations and policies due to race, culture or income. Through targeted outreach, the RWMG seeks to learn more about the major water-related concerns facing these groups such that long-term implementation of the 2013 IRWM Plan is responsive to those concerns.

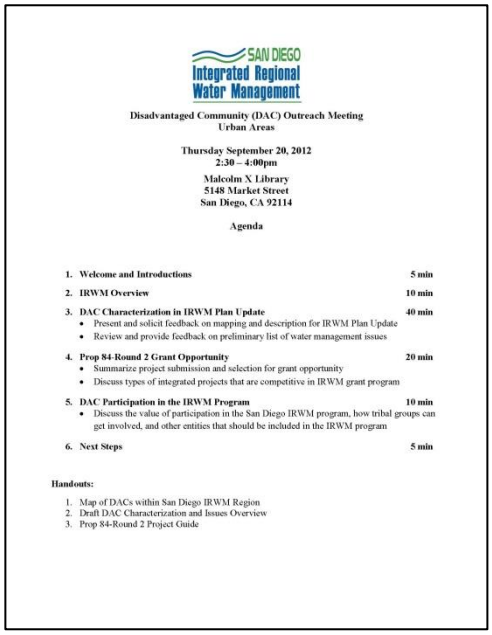
Coordination with Water Management Groups and Water Agencies: If organized water management groups existed within the identified DACs (such as Groundwork San Diego-Chollas Creek in the Pueblo Watershed), the RWMG and RAC members reached out to invite participation in the IRWM Program. If no organized group existed, however, outreach was coordinated through the water agencies and municipalities serving those DACs in order to identity water resources projects that provide DAC benefits.

Coordination with San Diego Association of Governments: San Diego Association of Governments (SANDAG) is the regional planning agency responsible for generating the regional growth projections upon which the Water Authority and member agencies base their Urban Water Management Plan demand calculations. SANDAG has been an active participant in the RAC and other IRWM planning activities. Coordination with SANDAG has assisted the RWMG in surveying the Region's DACs, monitoring changes to these communities, and identifying their needs.

Workgroup Efforts to Engage DACs: The Watershed Planning and Outreach Workgroup was established in 2008 to clarify critical water supply and water quality needs in the Region's watersheds, and to identify outreach strategies that would bring DAC leaders to the table to engage in projects and partnerships that help to solve those critical needs. The Workgroup provided suggestions for helping the Region to understand and address the challenges faced by local DACs.

Disadvantaged Community Representation on the RAC: To ensure consideration of diverse views, RAC membership includes two organizations that identify and address DAC and environmental justice issues. San Diego Coastkeeper and Rural Community Assistance Corporation (RCAC) served on the RAC until the composition of the RAC membership was reorganized under the RAC charter. The RAC charter ensures the RAC will always include both urban and rural DAC representatives. RCAC will continue to serve as the rural DAC representative and Groundwork-San Diego Chollas Creek has recently joined the RAC to represent urban DACs. San Diego Coastkeeper also remains a RAC member, representing non-governmental organizations dealing with water quality issues.

One-on-one Communication between DAC Leaders and RWMG or RAC Representatives: The RWMG and RAC contacted community leaders within the DACs, as well as organizations that support rural water systems, and asked to work with them to identify the current state of their water-related resources. This one-on-one correspondence ensured that DACs had access to the planning process, allowing their input to be incorporated and their interests to be represented early-on, prior to project implementation. Additionally, critical needs of the DACs which were identified through these discussions were translated into long-term targets for the IRWM Plan and potential projects.



SAN DIEGO Integrated Regional Water Management

Disadvantaged Community (DAC) Outreach Meeting
Urban Areas

Thursday September 20, 2012
2:30 – 4:00pm

Malcolm X Library
5148 Market Street
San Diego, CA 92114

Agenda

1. **Welcome and Introductions** — **5 min**
2. **IRWM Overview** — **10 min**
3. **DAC Characterization in IRWM Plan Update** — **40 min**
   - Present and solicit feedback on mapping and description for IRWM Plan Update
   - Review and provide feedback on preliminary list of water management issues
4. **Prop 84-Round 2 Grant Opportunity** — **20 min**
   - Summarize project submission and selection for grant opportunity
   - Discuss types of integrated projects that are competitive in IRWM grant program
5. **DAC Participation in the IRWM Program** — **10 min**
   - Discuss the value of participation in the San Diego IRWM program, how tribal groups can get involved, and other entities that should be included in the IRWM program
6. **Next Steps** — **5 min**

Handouts:

1. Map of DACs within San Diego IRWM Region
2. Draft DAC Characterization and Issues Overview
3. Prop 84-Round 2 Project Guide

Agenda for DAC outreach meeting

For the 2013 IRWM Plan, the approach of working through groups and contacts that have existing relationships with DACs was continued. The Watershed Workshops that were held provided an avenue for reaching out to DACs. Watershed groups that sponsored or participated in those workshops were asked to identify and encourage the participation of individuals who could represent DACs, and the workshops were designed to make it easier for them to participate.

Targeted Outreach Meetings: Between April and June 2010, the San Diego IRWM Program held three outreach meetings with urban and rural DAC stakeholders and advocacy groups. The purpose of these meetings was to introduce DAC stakeholders to the IRWM Program, discuss grant opportunities, and discuss key water management issues facing DACs in the Region. As a result, multiple projects aimed at meeting critical water supply and water quality needs of DACs were submitted for consideration of Proposition 84 grant funding.

Table 6-12: Outreach to Disadvantaged Communities

Outreach to Disadvantaged Communities						
Phase	Coordination with Water Groups	Coordination with SANDAG	Workgroup Efforts to Engage DACs	RAC	One-on-one Communication	DAC Outreach Meetings
Program Initiation (2005-2007)	RWMG and RAC invited organized water management groups and agencies to participate in the IRWM Program	Coordination with SANDAG assisted in surveying the Region's DACs, monitoring changes to these communities, and identifying their needs	None	None	None	None
IRWM Plan Implementation (2008 to 2013)	Continued emphasis on inviting water management groups in DACs to participate in the IRWM program	None	Established to clarify critical water supply and quality needs in the Region's watersheds and to identify outreach strategies to encourage DAC leaders to engage in projects and partnerships that help solve those critical needs	DAC representation on the RAC by San Diego Coastkeeper and Rural Community Assistance Corporation	RWMG contacted DAC community leaders and asked them to identify the current state of their water resources; the critical needs identified through these discussions were translated into long-term targets and potential projects	Outreach meetings to introduce DAC stakeholders to the IRWM Program, discuss grant opportunities, and discuss key water management issues facing DACs in the Region
Updating the 2007 IRWM Plan (2011-2013)	Continued emphasis on inviting water management groups in DACs to participate in the IRWM program	None	None	DAC representation on RAC by Groundwork San Diego-Chollas Creek and Rural Communities Assistance Corporation	Watershed groups that sponsored or participated in watershed workshops identified and encouraged the participation DACs	Targeted outreach meetings to gain better understanding of the water supply and water quality needs of the Region's DACs
Future Plan Implementation (2014+)	Continued emphasis on inviting water management groups in DACs to participate in the IRWM program	TBD	None	Continued DAC representation on RAC	Continued one-on-one communication with DACs to identify major issues and priorities related to water management	Hold outreach meetings to learn more about the major water-related concerns facing DACs so long-term implementation of the Plan is responsive to those concerns

The final Proposition 84-Round 1 Implementation Grant Proposal contained 11 high-priority projects, three of which have direct benefits to local DACs. The Proposition 84 – Round 2 Implementation Grant Proposal (submitted March 2013), contained seven high-priority projects, two of which will have direct benefits to local DACs.

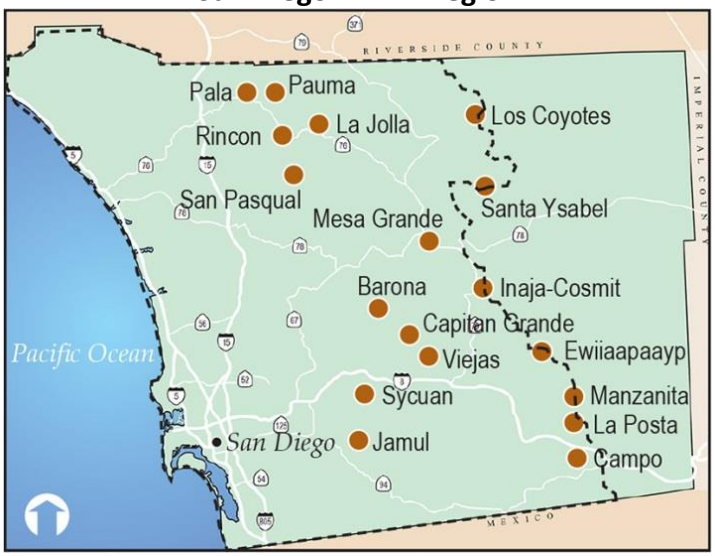
In 2012, targeted outreach meetings were held with representatives of DACs in both urban and rural areas to better understand the critical water supply and water quality needs of the Region's DACs. To overcome financial constraints that may prevent DACs from traveling to public meetings, public meetings related to the planning and implementation of the IRWM Plan were hosted in disadvantaged areas to the greatest extent feasible. This recommendation was included in the *Public Outreach and Disadvantaged and Environmental Justice Community Involvement Plan*. Table 6-12 shows when the various types of outreach to DACs occurred during the four phases of the IRWM Program.

6.4.2 Native American Tribes

San Diego County features the largest number of Tribes and Reservations of any county in the United States. There are 18 federally-recognized Tribal Nation Reservations and 17 Tribal Governments (the Barona and Viejas Bands share joint-trust and administrative responsibility for the Capitan Grande Reservation). Additionally, a 19th reservation in the San Luis Rey Valley was denied to the San Luis Rey Band of Luiseño Indians, though the Band remains active in the San Diego region, while the Mt. Laguna Reservation was deeded to private ownership in 1947. A description of each Tribe is provided in *Chapter 4, Tribal Nations of San Diego County*, along with a detailed map showing Tribal lands. Figure 6-2 provides a summary version.

San Diego County features the largest number of Tribes and Reservations of any county in the United States.

Figure 6-2: Location of Tribal lands in the San Diego IRWM Region



Development of the Tribal Nation Reservations has historically been hampered by their remote location and poor proximity to utility services, complexity of Indian law and politics, and dependence on federal programs. For many tribes, gaming is seen as an opportunity to gain economic independence and provide expanded infrastructure, education, health care, and emergency services for their members. Water and sanitation services have been developed by various tribes – including Barona, Campo, Pala, Pauma, Rincon, Sycuan, and Viejas Bands – to service the casinos and adjacent Reservation lands. Targeted outreach to Native American tribes is necessary to overcome potential barriers to participation in the IRWM Program, such as cultural differences, sovereignty issues, and lack of trust. Increased participation of tribal groups is a goal moving forward in the IRWM Program. Outreach opportunities with tribal groups will continue to be

pursued throughout the IRWM Program to identify major issues and priorities of those communities, as well as to encourage submission of grant applications. One-on-one coordination with tribal groups has helped with gauging their interest in identifying water resource issues that could be addressed through the IRWM program.

As part of the 2013 IRWM Plan development process, the RWMG contacted the 17 federally-recognized Tribal Governments in San Diego County through their respective EPA director, water director, or other environmental liaison. Communication was conducted via telephone, email, fax, and/or mail, when requested. Based on feedback from some tribal representatives, the RWMG provided each tribe with a questionnaire that was to be used to describe each tribe's water management issues. Seven tribes provided completed questionnaires. Tribal representatives were generally cautious with regard to the questionnaire, expressing concern about the purpose of the IRWM program and how the information may be used now and in the future. Some of these concerns were explicitly expressed by tribal representatives during meetings or through written correspondence, and other concerns were expressed verbally during follow-up calls and other informal communications.

For example, past experiences dealing with the County and State over water issues have made some tribal representatives and their respective councils reluctant to trust the stated intention of data collection efforts. Several tribes expressed concern over the possibility that information disclosed via the questionnaire could lead to surplus water supplies on reservations being taken away or diverted to urban areas. One representative expressed concern that the information given through the questionnaire would be shared and included in non-IRWM documents or used outside of the IRWM process for different purposes or motivations. While the questionnaire explicitly directed respondents not to divulge any privately held information, these concerns did prevent some tribal governments from responding.

Another concern explicitly expressed by tribal representatives is whether CEQA documentation would be required for projects funded through the IRWM program. A primary goal of the 2013 IRWM Plan is to document water management issues in the region, establishing a baseline condition to be referenced in State grant applications. All projects funded through State grants must comply with applicable CEQA requirements. However, CEQA is not applicable for projects on reservation lands and any requirement for CEQA compliance would be an unnecessary cost, at best, and an affront to tribal sovereignty, at worst.

Engaging Native American Tribes

Highlights

- Targeted outreach meetings with the Region's tribes and Native American stakeholder groups
- One-on-one communication with tribal representatives helped with gauging their interest in involvement and with identifying issues of concern and priorities for the 2013 IRWM Plan

Lessons Learned / Barriers to Participation

- Reluctance from some tribes to share information about water resources, and concern about the purpose of the IRWM Program and how information would be used now and in the future
- Some tribal governments did not want to participate in the DWR grant program because any CEQA requirement is viewed as incompatible with tribal sovereignty
- Concern about how the IRWM Program is incorporating tribal interests. Specific concerns were raised about a single tribal representative on the RAC given that the tribes are separate sovereign entities
- Tribes are concerned about future water supplies for economic development and sustenance, and plan to use local water supplies based on their tribal rights to water.
- At targeted outreach meetings, tribes provided some suggestions for ways to expand tribal participation in the 2013 IRWM Plan and DWR grant program; some suggestions were incorporated into the stakeholder outreach effort, such as the tribal characterization template

Directed Outreach Program for Native American Tribes

Increased engagement of tribal groups is a goal moving forward in the IRWM program. Outreach opportunities with tribal groups will continue to be pursued throughout the IRWM program to identify major issues and priorities of those communities and to address water resource needs through submission of grant applications.

Tribal Representation on the RAC: To ensure the consideration of diverse views, RAC membership includes one of the Region's tribes. The La Jolla Band of Luiseno Indians served on the RAC until the composition of the RAC membership was reorganized under the RAC charter. The RAC charter ensures the RAC will always reserve a seat for a tribal representative. The Southern California Tribal Chairs Association has been invited to designate a tribal representative to join the RAC, though as of this writing, the seat remains open.

Tribal Outreach Meetings: The RWMG held two outreach meetings for tribal groups in May and June 2010. These meetings provided an overview of the San Diego IRWM Program and discussed grant opportunities and key water management issues facing tribes in the Region.

In August 2012, targeted outreach meetings were held with the Region's tribes and Native American stakeholder groups. Representatives from eight of the 17 tribal governments in San Diego County attended. At the meetings the purpose of the 2013 IRWM Plan was introduced, and it was explained that the 2007 IRWM Plan had limited information on existing conditions for tribal lands and that a priority for the 2013 IRWM Plan was to expand this information. Members of the 2013 IRWM Plan team also explained the process by which Tribal governments could apply for capital project grants from DWR. The individual and collective concerns of the various tribes in the Region regarding water management were gathered at the meetings so they could be included and addressed in the 2013 IRWM Plan. To the extent that tribal representatives were willing, they were also encouraged to participate in the watershed workshops being conducted as part of the 2013 IRWM Plan process.

One-on-one Communication between Tribal Leaders and RWMG or RAC Representatives: One-on-one communication with tribal representatives helped with gauging their interest in being involved in the IRWM effort and identifying issues of concern and priorities to be incorporated into the 2013 IRWM Plan. Tribes' EPA directors, water managers, environmental managers, cultural resource managers, or other liaisons with knowledge of water and/or wastewater issues on reservation lands were contacted for information on how water is managed, distributed, and treated on its reservation. Additionally, any water quality, water infrastructure, or flooding issues on the reservation were solicited for inclusion in the 2013 IRWM Plan.

Tribal Characterization Template: Tribes were given a tribal characterization template that identified the kind of information needed for the 2013 IRWM Plan. The template asked tribes to characterize the water systems, water quality, stormwater and flood management, and natural resources of tribal lands. It was stressed by team members associated with development of the 2013 IRWM Plan that proprietary information was not needed for inclusion in the plan. It was also noted that any information provided would benefit the plan, create a more comprehensive description of how water is managed in the San Diego County, and set a baseline condition that could be referenced by the tribe if it decides to apply for a capital project grant from DWR.

Tribal Water Stories: To capture input from tribal groups in a culturally sensitive manner, tribes were extended the opportunity to share tribal water stories for the Tribal Water Stories Project. Initiated in 2009 at the state level, this Project is a compilation of stories, myths, and legends related to water and water use told by various California tribal groups. The Project also includes

position papers and briefing papers describing the importance of water from a tribal perspective. The original 2009 report did not include perspectives from San Diego tribes, however, so an effort was made during the 2013 IRWM Plan process to collect traditional water-related information from the various local tribes. The intent was to employ trusted contacts to interview tribal representatives to produce a document or recording that captured both historical and contemporary tribal perspectives on water supply and quality issues in the Region. Table 6-13 shows when the various types of outreach occurred during the phases of the IRWM Program.

Table 6-13: Outreach to Native American Tribes

Outreach to Native American Tribes					
Phase	**RAC**	**Tribal Outreach Meetings**	**One-on-one Communication**	**Tribal Characterization Template**	**Tribal Water Stories**
Program Initiation (2005-2007)	Tribal representation on the RAC	None	None	None	None
IRWM Plan Implementation (2008 to 2013)	Tribal representation on the RAC by La Jolla Band of Luiseno Indians	Outreach meetings to provide tribal groups with an overview of IRWM Program and to discuss key water management issues facing tribes in the Region	None	None	None
Updating the 2007 IRWM Plan (2011-2013)	Tribal representation on RAC (*seat is currently open*)	Targeted outreach meetings to provide tribal groups with information about the 2013 IRWM Plan and process for applying for grants from DWR	One-on-one communication with tribal groups helped with gauging their interest in involvement and with identifying issues of concern and priorities that were then incorporated into the 2013 IRWM Plan	Provided to tribes to obtain information to include in 2013 IRWM Plan, such as characterization of water systems, water quality and natural resources of tribal lands	Tribes were provided opportunity to share tribal water stories that would help capture historical and contemporary tribal perspectives on water supply and quality issues
Future Plan Implementation (2014+)	Continued tribal representation on RAC	Consistently hold outreach meetings to encourage tribal involvement in IRWM Program	Continued one-on-one communication with tribal groups to identify major issues and priorities related to water management	None	None

6.5 Updating or Amending the IRWM Plan

San Diego's IRWM Plan is a living document that will continue to evolve with time. IRWM Plan proponents realize that it is important to update the IRWM Plan as appropriate, and to revise plan objectives and goals to address evolving regional needs and concerns. At a minimum, the IRWM Plan will be updated approximately every five years, or whenever a funding opportunity arises. Additionally, it is critical that outreach efforts remain ongoing and continue to expand over time. This will enable the successful maintenance, management, and implementation of the IRWM Plan.

Public Notice Requirements: When proposing to prepare or update an IRWM Plan, the RWMG will publish a notice of intent to prepare the IRWM Plan. The notice of intent to prepare this 2013 IRWM Plan was published in the San Diego Daily Transcript on two consecutive weeks in June 2013. Upon the completion of the IRWM Plan, the RWMG will publish a notice of intent to adopt the IRWM Plan and will adopt the IRWM Plan in a public meeting of the RWMG governing bodies. The notice of intent to adopt this 2013 IRWM Plan was published in the San Diego Daily Transcript on two consecutive weeks in September 2013.

Plan Adoption: The governing bodies of each RWMG agency are responsible for the development and adoption of the IRWM Plan. The Water Authority Board of Directors, City of San Diego City Council, and County of San Diego Board of Supervisors are scheduled to adopt this 2013 IRWM Plan in September and October 2013. Additionally, each project proponent named in an IRWM grant application must also adopt the IRWM Plan. Proof of adoption is provided to DWR, upon request, via resolutions of adoption with signatory blocks for each governing body adopting the IRWM Plan.

Plan Amendments: The governing bodies of each RWMG agency are responsible for determining their formal approval process for IRWM Plan Amendments. Amendments will likely require further approval by the governing bodies; however, the approval process will be dependent upon the nature and extent of each amendment. This Plan (see below) allows for periodic updates to the IRWM project list prior to new funding opportunities without a formal Plan Amendment.

Project Inclusion: As described in *Chapter 9, Project Evaluation and Prioritization*, projects may be added to the IRWM Plan whenever the online project database is opened for submission. Updating the project list will allow additional projects to be added to address changing conditions and needs in the Region. Database submittal does not require RWMG approval; however, a project may be considered included in the IRWM Plan only if it contributes to at least one of the IRWM objectives. The project database is found on the San Diego IRWM Program website (www.sdirwmp.org).

6.6 Potential Plan Implementation Obstacles

The three RWMG agencies have committed to continue financing San Diego's IRWM effort through 2016 per their most recent MOU. The cost to finance the effort is not immaterial, however, and having sufficient financing for the ongoing implementation of the IRWM Plan, including funds to support administrative responsibilities such as grant applications and grant reporting obligations, will remain critical to the successful implementation of the IRWM Plan and associated projects. The RWMG and RAC continue to discuss potential different funding mechanisms for program management and grant administration that do not place undue burdens on any IRWM participant.

Another hurdle in the path of plan implementation is ensuring that all interested stakeholders are able to participate. For example, the grant application process is quite complex and requires a significant amount of information from entities proposing projects for funding. Some potential sponsors, especially those from DACs, many non-profit organizations, and small public agencies,

lack the technical expertise to assemble a proposal that meets all the requirements established by DWR. Moreover, the amount of information required for the actual application can be daunting and quite expensive.

An additional question concerns the future availability of state funding to support IRWM project implementation. The last water bond went before the voters in 2006; new bonds were proposed for 2010 and 2012, but ultimately were not placed on the statewide ballot. Moreover, there is no guarantee that the voters will approve the next water bond to be submitted for their approval. Just as they are discussing potential funding alternatives for program management and grant administration, the RAC and RWMG periodically consider different funding sources to support project implementation.

In order to obtain and maintain regional support for the IRWM Plan, it is critical to continue the ongoing evaluation of regional needs, community issues, and environmental justice issues. This will be achieved through the ongoing education and outreach efforts and regular IRWM Plan updates.

Additional obstacles identified for the Region include water rights concerns, water transfer logistics, international boundary considerations for the Tijuana River Watershed, cross-jurisdictional issues and differing regulations, geographical limitations, and climate change.

Table 6-14: Agencies and Organizations Involved in Water Management in the San Diego IRWM Region

Agency / Organization	Authority (●) or Interest (○)					Watershed(s)	Level of Participation		
	Water	Wastewater	Land Use / Planning	Stormwater / Flood	Natural Resources		RAC or Workgroup	Stakeholder List	Contacted [1]
Agua Hedionda Lagoon Foundation					○	Carlsbad	o	o	o
Alpine Sanitation District		●				San Diego, Sweetwater			E
American Water Company	○					All		o	o
Association of Compost Producers					○	All		o	o
Back Country Land Trust					○	San Diego, Sweetwater			E
Barona Group of Capitan Grande Band of Mission Indians	○	○	○	○	○	San Diego		o	o
Batiquitos Lagoon Foundation					○	Carlsbad			E
Bonsall Conservancy					○	San Luis Rey			E
Buena Sanitation District		●				San Luis Rey, Carlsbad		o	o
Buena Vista Lagoon Foundation					○	Carlsbad	o	o	o
Building Industry Association of San Diego		○	○			All		o	o
Bureau of Indian Affairs	○	○	○	○	○	All		o	o
California Center for Sustainable Energy	○		○	○	○	All		o	o
California Coastal Coalition					○	All	o	o	o
California Coastal Conservancy					○	All			o
California Department of Fish and Wildlife					●	All		o	o
California Department of Water Resources	●					All	o	o	o
California Landscape Contractors Association	○		○	○	○	All	o	o	o
California Rural Water Association	○	○				All		o	o
California Trout					○	All	o	o	o
California Water Resources Control Board	●			●		All		o	o
Campo Band of Diegueno Mission Indians	○	○	○	○	○	Tijuana		o	o
Carlsbad Municipal Water District	●					Carlsbad		o	o
City of Carlsbad		●	●	●		Carlsbad	o	o	o
City of Chula Vista		●	●	●		Sweetwater, Otay	o	o	o
City of Coronado		●	●	●		Otay		o	o
City of Del Mar	●	●	●	●		San Dieguito, Peñasquitos			o
City of El Cajon		●	●	●		San Diego, Sweetwater			o
City of Encinitas			●	●		Carlsbad	o	o	o
City of Escondido	●	●	●	●		San Luis Rey, Carlsbad, San Dieguito	o	o	o
City of Imperial Beach[2]		●	●	●		Otay, Tijuana	o	o	o
City of La Mesa		●	●	●		San Diego, Pueblo, Sweetwater	o	o	o
City of Lemon Grove			●	●		Pueblo, Sweetwater			o
City of National City		●	●	●		Pueblo, Sweetwater, Otay		o	o
City of Oceanside	●	●	●	●		Santa Margarita, San Luis Rey, Carlsbad	o	o	o
City of Poway	●	●	●	●		San Dieguito, Peñasquitos, San Diego	o	o	o
City of San Diego[3]	●	●	●	●		San Dieguito, Peñasquitos, San Diego, Pueblo, Sweetwater, Otay, Tijuana	o	o	o
City of San Marcos			●	●		Carlsbad	o	o	o
City of Santee			●	●		San Diego		o	o
City of Solana Beach			●	●		Carlsbad, San Dieguito		o	o
City of Vista		●	●	●		San Luis Rey, Carlsbad		o	o
Cottonwood Creek Conservancy				●	○	Carlsbad			E

Agency / Organization	Authority (●) or Interest (○)					Watershed(s)	Level of Participation		
	Water	Wastewater	Land Use / Planning	Stormwater / Flood	Natural Resources		RAC or Workgroup	Stakeholder List	Contacted [1]
County of San Diego		●	●	●	●	All	o	o	o
Cuyamaca Water District	●					San Diego			E
Descanso Community Services District	●	●				Sweetwater			E
East Otay Mesa Sewer MD		●				Otay, Tijuana			E
Encina Wastewater Authority[4]		●				Carlsbad		o	o
Environmental Health Coalition	○	○	○	○	○	All	o	o	o
Escondido Creek Conservancy					○	Carlsbad		o	o
Equinox Center	○	○	○	○	○	All		o	o
Fairbanks Ranch Community Services District		●				San Dieguito			E
Fallbrook Land Conservancy					○	Santa Margarita			o
Fallbrook Public Utility District	●	●				San Juan, Santa Margarita, San Luis Rey	o	o	o
Farm Bureau of San Diego County	○					All	o	o	o
Floodplain Management Association				○		All	o	o	o
Friends of Loma Alta Creek					○	Carlsbad		o	o
Friends of Mission Valley Preserve					○	San Diego		o	o
Friends of Rose Canyon					○	Peñasquitos	o	o	o
Friends of Rose Creek					○	Peñasquitos	o	o	o
Friends of Santee's River Park					○	San Diego		o	o
Greater San Diego County Resource Conservation District	○		○		○	All		o	o
Groundwork San Diego-Chollas Creek					○	Pueblo	o	o	o
Helix Water District	●					San Diego, Pueblo, Sweetwater	o	o	o
I Love A Clean San Diego					○	All		o	o
Iipay Nation of Santa Ysabel	○	○	○	○	○	San Luis Rey, San Dieguito		o	o
Inaja Band of Diegueno Mission Indians of the Inaja and Cosmit Reservation	○	○	○	○	○	San Diego		o	o
Industrial Environmental Association	○	○	○	○	○	All	o	o	o
International Boundary and Water Commission	○	○	○	○	○	Tijuana	o	o	o
Iron Mountain Conservancy					○	San Diego, Peñasquitos			o
Jacobs Center for Neighborhood Innovation	○	○	○	○	○	Pueblo	o	o	o
Jamul Indian Village	○	○	○	○	○	Otay	o	o	o
Julian Community Services District	●	●				San Dieguito, San Diego		o	o
Julian Sanitation District		●				San Diego			E
Kumeyaay Diegueno Land Conservancy	○	○	○	○	○	All		o	o
La Jolla Band of Luiseno Indians	○	○	○	○	○	San Luis Rey		o	o
La Posta Band of Diegueno Mission Indians	○	○	○	○	○	Tijuana		o	o
Lakeside River Park Conservancy					○	San Diego		o	o
Lakeside Water District	●					San Diego			o
Lakeside Sanitation District		●				San Diego			E
Leucadia Wastewater District		●				Carlsbad		o	o
Los Coyotes Band of Cahuilla and Cupeno Indians	○	○	○	○	○	San Luis Rey		o	o
Los Peñasquitos Lagoon Foundation					○	Peñasquitos		o	o
Majestic Pines Community Services District	●					San Diego			E
Manzanita Band of Diegueno Mission Indians	○	○	○	○	○	Tijuana		o	o
Mesa Grande Band of Diegueno Mission Indians	○	○	○	○	○	San Dieguito		o	o

Agency / Organization	Authority (●) or Interest (○)					Watershed(s)	Level of Participation		
	Water	Wastewater	Land Use / Planning	Stormwater / Flood	Natural Resources		RAC or Workgroup	Stakeholder List	Contacted [1]
Metropolitan Water District of Southern California	●					All		o	o
Mission Resource Conservation District	○		○		○	Santa Margarita, San Luis Rey	o	o	o
Mission Trails Regional Park Foundation			○		○	San Diego			o
Mootamai Municipal Water District	●					San Luis Rey			E
Morro Hills Community Services District		●				San Luis Rey			E
Oceanside Utilities Commission	●	●				Santa Margarita, San Luis Rey, Carlsbad	o	o	o
Olivenhain Municipal Water District	●					Carlsbad, San Dieguito	o	o	o
Otay Water District	●	●				San Diego, Sweetwater, Otay, Tijuana	o	o	o
Orange County Public Works	●	●				San Juan	o	o	o
Padre Dam Municipal Water District	●	●				San Diego, Sweetwater	o	o	o
Pala Band of Luiseno Mission Indians	○	○	○	○	○	Santa Margarita, San Luis Rey		o	o
Pauma Band of Luiseno Mission Indians	○	○	○	○	○	Santa Margarita, San Luis Rey		o	o
Pauma Valley Community Services District	●	●				San Luis Rey			E
Pine Hills Mutual Water Company	●					San Diego			E
Pine Valley Mutual Water Company	●					Tijuana			E
Pine Valley Sanitation District		●				Tijuana			E
Planning and Engineering for Sustainability	○	○	○	○	○	All	o	o	o
Preserve Calavera					○	Carlsbad			E
Project Wildlife					○	All		o	o
Questhaven Municipal Water District	●					Carlsbad		o	o
Rainbow Municipal Water District	●	●				Santa Margarita, San Luis Rey		o	o
Ramona Municipal Water District	●	●				San Dieguito, San Diego			o
Rancho California Water District	●	●	○	○	○	San Juan, Santa Margarita	o	o	o
Rancho Pauma Mutual Water Company	●					San Luis Rey			E
Rancho Santa Fe Community Services District		●				Carlsbad, San Dieguito			E
Rincon Band of Luiseno Mission Indians	○	○	○	○	○	San Luis Rey		o	o
Rincon Del Diablo Municipal Water District	●					Carlsbad, San Dieguito		o	o
Rincon Ranch Community Services District		●				San Luis Rey			E
River Partners					○	All		o	o
Rose Creek Watershed Alliance					○	Peñasquitos	o	o	o
Rural Community Assistance Corporation	○	○				All	o	o	o
San Carlos Area Council, Mission Trails Park			●		●	San Diego	o	o	o
San Diego Association of Governments (SANDAG)			○			All	o	o	o
San Diego Audubon Society					○	All	o	o	o
San Diego Chamber of Commerce	○	○	○	○	○	All	o	o	o
San Diego CoastKeeper					○	All	o	o	o
San Diego Country Estates			○			San Diego		o	o
San Diego County Air Pollution Control District			●			All		o	o
San Diego County Flood Control District				●		All	o		o
San Diego County Water Authority	●					All	o	o	o
San Diego County Regional Airport Authority				●		All			o
San Diego Earthworks					○	All		o	o
San Diego Gas and Electrict	○		○		○	All		o	o
San Diego Unified Port District			●	●		Pueblo, Sweetwater, Otay	o	o	o

Agency / Organization	Authority (●) or Interest (○)					Watershed(s)	Level of Participation		
	Water	Wastewater	Land Use / Planning	Stormwater / Flood	Natural Resources		RAC or Workgroup	Stakeholder List	Contacted [1]
San Diego Regional Chamber of Commerce			○			All	o	o	o
San Diego Regional Water Quality Control Board	○	●		●	○	All	o	o	o
San Diego River Conservancy					○	San Diego			o
San Diego River Park Foundation					○	San Diego	o	o	o
San Diego Zoological Society			○	○	○	San Dieguito, Pueblo	o	o	o
San Dieguito River Valley Land Conservancy					○	San Dieguito	o	o	o
San Dieguito Water District	●					Carlsbad			E
San Elijo Joint Powers Authority		●				Carlsbad, San Dieguito	o	o	o
San Elijo Lagoon Conservancy					○	Carlsbad	o	o	o
San Luis Rey Watershed Council					○	San Luis Rey	o	o	o
San Pasqual Band of Diegueno Mission Indians	○	○	○	○	○	San Luis Rey, Carlsbad		o	o
Santa Fe Irrigation District	●					Carlsbad, San Dieguito	o	o	o
Sierra Club					○	All		o	o
Solana Center					○	Carlsbad, San Dieguito		o	o
South Bay Irrigation District[2]						Sweetwater, Otay			E
Southern California Tribal Chairmen's Association	○	○	○	○	○	All		o	o
Southern California Wetlands Recovery Project					○	All	o	o	o
Spring Valley Sanitation District		●				San Diego, Sweetwater			E
Surfrider Foundation San Diego					○	All		o	o
Sweetwater Authority	●					Sweetwater, Otay	o	o	o
Sycuan Band of the Kumeyaay Nation	○	○	○	○	○	Sweetwater		o	o
The Nature Conservancy					○	All	o	o	o
Tribal Reservation(s)	●	●	●	●	●	San Luis Rey, San Dieguito, San Diego, Sweetwater, Tijuana	o	o	o
Trust for Public Land					○	All			o
UC Cooperative Extension – San Diego County Farm & Home			○		○	All	o	o	o
Universities (UCSD, SDSU, USD, etc.)			●	●		All	o	o	o
Upper San Luis Rey Resource Conservation District	●		○		○	San Luis Rey			E
U.S. Bureau of Land Management			●			All			E
U.S. Bureau of Reclamation	●	○		●		All	o	o	o
U.S. Fish and Wildlife Service					●	All		o	o
U.S. Forest Service, Cleveland National Forest			●		●	San Juan, Santa Margarita, San Luis Rey, San Dieguito, San Diego, Sweetwater, Tijuana			o
U.S. Geological Survey	○		○			All		o	o
U.S. Marine Corps Camp Pendleton	●	●	●	○		San Juan, Santa Margarita, San Luis Rey	o	o	o
Vallecitos County Water District	●	●				San Luis Rey, Carlsbad		o	o
Valley Center Municipal Water District	●	●				San Luis Rey, Carlsbad, San Dieguito		o	E
Valley Center Parks and Recreation District		●				San Luis Rey			E
Viejas Group of Capitan Grande Band of Mission Indians	○	○	○	○	○	San Diego, Sweetwater			
Vista Irrigation District	●					San Luis Rey, Carlsbad		o	o

Agency / Organization	Authority (●) or Interest (○)					Watershed(s)	Level of Participation		
	Water	Wastewater	Land Use / Planning	Stormwater / Flood	Natural Resources		RAC or Workgroup	Stakeholder List	Contacted [1]
Whispering Palms Community Services District		●				San Dieguito			E
WildCoast					○	All		o	o
Winter Gardens Sewer MD		●				San Diego			E
Wynola Water District	●					San Dieguito			E
Yuima Municipal Water District	●					San Luis Rey			E

1. "E" denotes entities that the RWMG sent an email invitation to participate in the IRWM program, even though some may not have opted to register for the stakeholder email list. The San Diego IRWM program strives to be a collaborative process that involves all interested parties and individuals.
2. City of National City and South Bay Irrigation District together form the Sweetwater Authority, which provides water supply to both service areas.
3. In addition to supplying more than 250,000 metered service connections within its own incorporated boundaries, the City of San Diego conveys and sells potable water the City of Del Mar, the Santa Fe Irrigation District, San Dieguito Water District, and the California American Water Company, which, in turn, serves the Cities of Coronado and Imperial Beach and portions of south San Diego.
4. Encina Wastewater Authority is owned by six public agencies in a unique arrangement called a Joint Powers Agreement. The six owners are: the City of Carlsbad, City of Vista, City of Encinitas, Vallecitos Water District, Buena Sanitation District, and the Leucadia Wastewater District.

6.7 References

California Department of Water Resources. *Integrated Regional Water Management Grant Program Guidelines*. 2012.

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7 Regional Coordination

This chapter addresses requirements set forth in the Relation to Local Water Planning, Relation to Local Land Use Planning, and Coordination standards included in the 2012 IRWM Program Guidelines (DWR 2012).

7.1 Overview

The intent of this chapter is to document various aspects of coordination between local, regional, State, and federal agencies related to water resource management in the San Diego IRWM Region. This chapter includes general background information about how the 2013 IRWM Plan process has encouraged regional coordination, as well as specific information about the planning studies completed for the 213 IRWM Plan. Specifically, this chapter includes information about:

- How the 2013 IRWM Plan relates to planning documents and programs established by local water-related agencies.
- The current relationship between land use planning, regional water issues, and the water management goals included in *Chapter 2, Vision and Objectives*.
- The process used to coordinate various stakeholder groups to avoid conflicts and take advantage of efficiencies.
- Information about coordination with other neighboring IRWM efforts.

7.2 Consistency with Local Plans

As described throughout this 2013 IRWM Plan, the San Diego IRWM Program is an "umbrella" planning process that consolidates and synthesizes information from existing processes throughout the IRWM Region. *Chapter 10, Data and Technical Analysis* provides detailed information about the planning documents that were used as the basis of information within the 2013 IRWM Plan. *Chapter 2, Vision and Objectives* demonstrates the detailed stakeholder outreach and engagement process that was used to develop the planning hierarchy included in the 2013 IRWM Plan. The following sections provide detailed information about coordination with various planning activities, including specific planning studies that were completed for the 2013 IRWM Plan pertaining to regulatory programs, flood control planning, land use planning, and climate change.

7.2.1 Coordination of Water Management Planning Activities

The San Diego IRWM Program is a stakeholder-driven planning process. Through the RAC and other public meetings, stakeholders have the opportunity to bring water management issues and priorities into the IRWM Program. When water management issues or priorities are presented to the RAC by stakeholders, they are then vetted by the group to determine which ones should be included as part of the IRWM Plan.

In addition to stakeholder input, the 2013 IRWM Plan relied heavily on existing planning documents. Of particular importance was the San Diego County Water Authority's 2010 Urban Water Management Plan, which formed the base document of this IRWM Plan because it contains a roll-up of all water supply and recycled water flow projections for all 24 member agencies throughout the San Diego Region. None of the other water management topics (stormwater, wastewater, natural resources, flood management, etc.) has a regional resource document that contains regularly updated information compiled for all agencies that manage that resource. For this reason, the IRWM Plan relied upon individual planning and management documents from the various entities that manage other (non-water supply) water resources in the Region. The IRWM Plan goals and objectives (*Chapter 2, Vision and Objectives*) generally incorporate the regional goals of all planning documents in Table 7-1. However, the IRWM Program and this IRWM Plan have no authority over the existing plans and resources that are referenced herein; this IRWM Plan is an umbrella document that attempts to consolidate current planning efforts on a broad variety of water management topics from throughout the Region.

As part of the 2013 IRWM Plan, the RWMG and the RAC created four Workgroups to develop planning studies addressing key water resource issues: Regulatory Coordination, Flood Management, Land Use, and Climate Change. These planning studies were tasked with assessing current plans in the Region for applicability to the 2013 IRWM Plan, to identify opportunities for collaboration between the IRWM Program, water managers, and other planners, and to develop recommendations to incorporation of key issues and goals of these plans (along with priority actions) into the 2013 IRWM Plan. These planning studies are presented in greater detail below.

7.2.2 Coordination with Other State and Federal Agencies

The IRWM Program recognizes the need to include other State and federal agencies in regional water resources planning. Several of these agencies are represented on the RAC – including the U.S. Bureau of Reclamation and the Regional Water Quality Control Board (Regional Board) – and others are included on the stakeholder list as interested parties. Table 7-2 provides an overview of these other agencies and their interest in water management.

7.2.3 Coordinating and Resolving Inconsistencies

The IRWM Program engages stakeholders from throughout the Region, in an effort to increase communication and collaboration that will improve water resources management. Through an open dialogue and stakeholder involvement process, the IRWM Program helps to build relationships between stakeholder groups (including local planning agencies). This reduces conflicts between stakeholder groups, and helps to identify and resolve conflicts and inconsistences in management efforts and plans. By utilizing stakeholder input, the 2013 IRWM Plan ensures that it is addressing the concerns and needs of the Region, and provides opportunities for coordinated planning efforts.

Table 7-1: IRWM Relation to Local Water Management Planning*

Types of Local Plans	Jurisdiction	Updates	Coordination During Planning Process	Relation to IRWM Plan
Urban Water Management Plans (UWMPs) Agricultural Water Management Plans (AWMPs) Groundwater Management Plans (GWMPs)	Water agencies	Every 5 years	Water supply, wastewater, recycled water projections are coordinated with land use/growth projections	Incorporated per Water Authority UWMP
Salt and Nutrient Management Plans (SNMPs)	Wastewater, Water agencies	Unknown – anticipated every 5 years	SNMPs use existing basin and regional studies, and documented issues and instances of noncompliance to develop management strategies	Will be incorporated in future
Recycled Water Master Plans (RWMPs)	Wastewater, Water agencies	As needed	Recycled water projections are coordinated with land use/growth projections	Incorporated per Water Authority UWMP
Wastewater Master Plans (WWMPs)	Wastewater agencies	As needed	Wastewater projections are coordinated with land use/growth projections	Incorporated per Water Authority UWMP
Watershed Urban Runoff Management Plans (WURMPs) Jurisdictional Urban Runoff Management Plans (JURMPs) Water Quality Improvement Plans (WQIPs)	Stormwater agencies	Every 5 years	Coordination between cities and agencies within each watershed management area	Incorporated
Hydromodification Management Plans (HMPs)	Stormwater agencies	As needed	Coordination between cities and agencies to manage hydromodification from new development	Incorporated
Flood Control Plans	Flood agencies or departments	As needed	Flood hazards are coordinated with land use/growth projections	Incorporated
Land Use Plans	Land use agencies, SANDAG	As needed	Land use planners may coordinate with other managers when developing plans. Other plans often incorporate portions General Plan	Incorporated per Water Authority UWMP
Watershed Management Plans	Land use agencies, NGOs	As needed	Watershed goals and strategies generally address surface water/habitat	Incorporated in watershed characterizations
Multiple Species Habitat Conservation Plans (MSHCPs)	Planning agencies	As needed	MSHCP outlines conservation areas; Included activities must comply with MSHCP requirements	Incorporated
Basin Plan/303(d) Listing	Regional Board	Every 3 years	Basin Plan includes water quality objectives; 303(d) list identified water bodies that are not compliant	Incorporated
*Planning documents listed in this table are those that currently exist and are not governed by the IRWM Program. For information about implementation activities that are proposed by the IRWM Program, refer to *Chapter 11, Implementation.*				

Table 7-2: Other State and Federal Agencies with Interest in IRWM

Agency	Authority and Interest in IRWM Program
State of California	
Regional Board	The prime water quality regulatory authority within the Region, responsible for protecting beneficial uses and establishing and enforcing water quality standards. The Regional Board is a RAC member.
Department of Water Resources (DWR)	Establishes a framework for statewide water resources management within the *California Water Plan Update 2009*, and administers the IRWM Grant Program.
California Environmental Protection Agency (Cal/EPA)	Oversees and coordinates public health and environmental regulation within six State of California departments: Air Resources Board, Department of Pesticide Regulation, Department of Toxic Substances Control, Integrated Waste Management Board, Office of Environmental Health Hazard Assessment, and the State Water Resources Control Board (State Board)
Department of Fish and Wildlife	Oversees implementation of the federal Endangered Species Act and regulates activities that may impact endangered species and their habitats
California State Parks	Operates a number of state beaches, state parks, and coastal preserves and recreational areas within the Region
California Department of Forestry	Charged with firefighting, resource management (including administering state and federal forestry assistance programs), and protecting and enhancing California's forest lands
California Coastal Conservancy	Works in partnership with local governments, public agencies, nonprofit organizations, business, and private landowners to coordinate and provide funding to purchase, protect, restore, and enhance coastal resources and access.
Caltrans (California Department of Transportation)	Responsible for planning, maintaining, and constructing surface transportation facilities including highways, roads, bike paths, bridges, and rail transportation facilities. Caltrans addresses land use, air, and water quality impacts of such surface transportation facilities.
California Coastal Commission	In partnership with coastal Cities and the County, plans and regulates the use of land and water in the Region's coastal zone. In this land use planning and regulation role, the Coastal Commission is involved in coastal water quality protection, habitat protection, and public access and recreation.
California State Lands Commission	Oversees lands held in public trust. In this capacity, the Commission manages a variety of public lands, including submerged lands under tidal and navigable waterways. The Commission is also involved in securing and maintaining public access to public lands.
Federal Agencies	
U.S. Environmental Protection Agency (EPA)	Through powers delegated to the Regional Board, implements the Clean Water Act and oversees Regional Board and State Board's implementation of federal NPDES permits, water quality standards, water quality enforcement, and water quality certification programs.
U.S. Fish and Wildlife Service (USFWS)	Oversees implementation of the federal Endangered Species Act and regulates activities that may impact endangered species and their habitats.
National Marine Fisheries Service (NMFS)	Oversees implementation of the Endangered Species Act for marine species and regulates activities that may impact these species.
U.S. Army Corps of Engineers (USACE)	Has regulatory authority over all work within navigable waters, and regulates such projects through the issuance of permits. Additionally, the Corps of Engineers reviews and approves Special Area Management Plans (SAMPs). With this background, USACE can provide valued input to the Region's water management planning process.
U.S. Geological Survey (USGS)	Collects and analyzes regional hydrologic data, and coordinates with local agencies to perform special water resources studies.
U.S. Bureau of Land Management (BLM)	Manages federal lands within the Region, including lands proposed as future Wilderness Areas.
U.S. Forest Service (USFS)	Manages the Cleveland National Forest, which comprises a significant portion of the upstream reaches of the larger watersheds of the Region.
Natural Resources Conservation Service	A division of the U.S. Department of Agriculture provides technical and financial assistance in a variety of areas related to the conservation of soil, water, and other natural resources.

Agency	Authority and Interest in IRWM Program
U.S. Bureau of Reclamation (USBR)	Involved in a variety of water resources management areas central to the IRWM Plan, including water supply, the reclamation of land and water resources, surface water storage, desalination, recreation, agricultural land stewardship, and water rights. USBR also administers funding for the Reclamation Wastewater and Groundwater Study and Facilities Act (Title XVI, Public Law 102-575). USBR is a RAC member.
U.S. Navy	Operates numerous bases and installations within the Region, and plans and implements facilities (via the Naval Facilities Engineering Command) for the U.S. Navy and U.S. Marine Corps within the County.
U.S. Marine Corps	Operates numerous bases and installations within the Region. U.S. Marine Corps Base Camp Pendleton is a Water Authority member agency.
Bureau of Indian Affairs	Administers and manages lands held in trust for the Region's Native American Tribes.

7.3 Relation to Local Water Planning

7.3.1 Water Planning Overview

Numerous water supply plans address Southern California water facilities and water supply, developed by both regional and local agencies.

Regional Water Planning

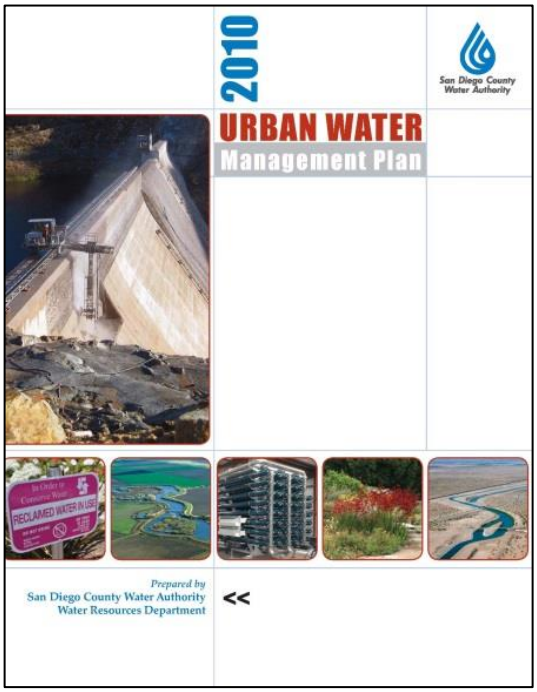
Metropolitan Water District of Southern California (Metropolitan) provides the Water Authority with the Region's imported water supply and develops the following regional water plans:

1. *The Regional Urban Water Management Plan for Southern California* (Metropolitan, 2010a) addresses water supply reliability and demand management from Metropolitan's regional perspective within Southern California.
2. The *2010 Urban Water Management Plan* (Metropolitan 2010) addresses imported water supply issues and reliability, regional demand reduction efforts, water quality issues, and regional approaches toward the development of local supplies.
3. Metropolitan is also in the process of updating their *Integrated Water Resources Plan* (Metropolitan, 2010b), which will serve as Metropolitan's master plan for long-term water reliability for Southern California.

As the Region's primary water supply provider and sole supplier of imported water, the Water Authority serves as the primary regional water planning agency within the Region. All major public water agencies within the Region are either Water Authority members or receive retail supplies from a Water Authority member. Water Authority member agencies collaborate to implement the Water Authority's mission of providing a safe and reliable water supply to its 24 member agencies. Current Water Authority water development plans include the following:

1. The *2010 Urban Water Management Plan* (Water Authority, 2010) continues the Water Authority's long-standing commitment toward improving water supply reliability through diversification of the Region's water supplies and development of local water sources. This plan takes into account data from the most recent growth forecasts developed by the Region's regional land use planning agency (San Diego Association of Governments [SANDAG]). The regional growth projections are used to calculate water demands to ensure adequate supplies are being identified in the planning document to meet future growth within the region. The *2010 Urban Water Management Plan* sets forth the Water Authority's commitment to achieve water supply reliability and diversity through:

a. comprehensive water conservation programs that that support and encourage residential conservation, commercial/industrial/institutional conservation, and agricultural water management and conservation,
b. continued progress in implementing the Water Authority and Imperial Irrigation District agreement for long-term transfer of conserved Colorado River water,
c. coordination with a private enterprise to pursue and develop a new reliable source of local supply from the Carlsbad Seawater Desalination Project,
d. supporting member agency efforts to optimize production from local groundwater aquifers, including groundwater extraction projects, brackish groundwater recovery projects, and groundwater recharge/recovery projects,
e. supporting member agency effort to assess and implement alternative supply/conservation options, and
f. supporting member agency efforts to develop supplies through non-potable recycled water supplies or indirect potable reuse.



Water Authority's *2010 Urban Water Management Plan*

2. A *Regional Water Facilities Master Plan* (Water Authority, 2002) that identifies projects and facilities required to achieve the Regional objective of reducing imported water dependence and ensuring a safe and reliable water supply.
3. A *Capital Improvements Program* to implement the projects and facilities identified in the Regional Water Facilities Master Plan.
4. A *Water Shortage and Drought Response Plan* (Water Authority, 2012) that sets forth Water Authority management of water supplies during periods of shortage.

As discussed above, none of the other water management topics (stormwater, wastewater, natural resources, flood management, etc.) has a regional resource document that compiles information from throughout the Region. This IRWM Plan instead used the individual agency management plans for those resources as described above in Table 7-1.

Local Agency Water Planning

The Water Authority plans are developed in consultation with local water agencies, and reflect local agencies' water planning and projects. Table 7-3 identifies local water agencies that have developed UWMPs, water or recycled water master plans, or watershed sanitary survey assessments. All listed local agency UWMPs were updated in 2010, and each of the local agency UWMPs address the same regional themes presented in the Water Authority's *2010 Urban Water Management Plan.*

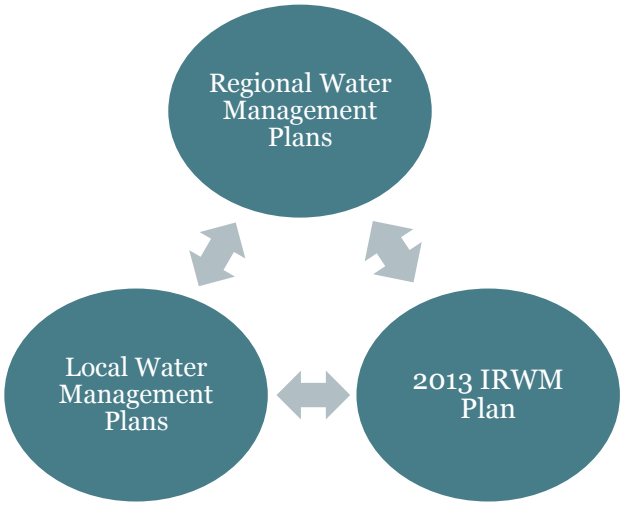
Table 7-3: Summary of San Diego Region Water Supply Plans

Water Agency	Urban Water Management Plan[1]	Water Master Plan[2]	Recycled Water Master Plan[3]	Sanitary Surveys[4]
San Diego County Water Authority	●			
Carlsbad Municipal Water District	●	●	●	
City of Del Mar		●		
City of Escondido	●	●	●	●
Fallbrook Public Utility District	●	●	●	
Helix Water District	●	●		●
City of Oceanside	●	●	●	
Olivenhain Municipal Water District	●	●	●	●
Otay Municipal Water District	●	●	●	
Padre Dam Municipal Water District	●	●	●	
City of Poway	●	●	●	●
Rainbow Municipal Water District	●	●		
Ramona Municipal Water District	●	●	●	●
Rincon Del Diablo MWD	●	●	●	
City of San Diego	●	●	●	●
San Dieguito Water District	●	●		
Santa Fe Irrigation District	●	●	●	
Sweetwater Authority[5]	●	●		●
U.S.M.C. Base Camp Pendleton		●	●	
Vallecitos Water District	●	●	●	
Valley Center MWD	●	●	●	
Vista Irrigation District	●	●	●	●
Yuima Municipal Water District		●		

1 Urban Water Management Plan updated in 2010 and submitted to California Department of Water Resources.
2 Includes adopted water master plans and water facilities plans for conveyance, storage, or treatment facilities. Also includes capital improvements budgets for proposed facilities.
3 Includes plans for the treatment, distribution, marketing, or sale of recycled water. Depending on the agency, the plan may be incorporated within the agency's water master plan or serve as a stand-alone planning document.
4 Includes watershed sanitary surveys that have been updated by the listed agencies within the past five years, as required under the State of California Surface Water Filtration and Disinfection Treatment Regulations (Title 22, Section 64665 of the California Code of Regulations).
5 Sweetwater Authority is comprised of the South Bay Irrigation District and City of National City, both of which are Water Authority members.

7.3.2 IRWM Consistency with Water Management Plans

This 2013 IRWM Plan is consistent with regional and local water plans developed by Metropolitan, the Water Authority, and local agencies, and incorporates goals and elements of these individual plans. Further, the foundation of the IRWM Plan is based on water management issues, goals, and water quality protection needs identified within regional and local water management plans. Local water management planning is often thought of in terms of urban water management planning for water supply; however, the IRWM Plan includes information from all relevant water management topics including stormwater, wastewater, natural resources, flood management, etc.



Stakeholder Coordination

Stakeholder coordination represents a key reason for the consistency between the IRWM Plan, regional water plans, and local agency water plans. Water agencies that comprise the Water Authority also serve as key stakeholders in the IRWM Process. The Water Authority, in addition to coordinating water supply planning with member agencies, serves on the RWMG within the IRWM planning effort.

As a result of this collaboration, stakeholder input from the IRWM process is incorporated into the water planning process, and stakeholder input from the water planning process is incorporated into the 2013 IRWM Plan. This collaboration and stakeholder cross-pollination ensures that both the IRWM Plan and regional/local water plans incorporate and address the same range of water supply and stakeholder-driven issues.

Consistency of Goals

The IRWM Plan goals were developed through a stakeholder-driven process, and address water supply reliability, water quality, natural resources, and integrated water resource management. In establishing these goals, the IRWM Plan goal-development process considered the goals and objectives of regional and local water plans (see *Chapter 2, Vision and Objectives*). Through this process, the IRWM Plan goals embed the Water Authority's "safe and reliable water supply" mission, as well as supporting the goals of individual local agency plans. Coordination and integration opportunities afforded through the IRWM Plan process can, in turn, influence regional and local water plan updates. Through this ongoing process, updated goals and water planning issues from local and regional water plans can be considered and incorporated into the IRWM Program.

Section 8 of the Water Authority's *2010 Urban Water Management Plan* addresses the benefits and opportunities for coordination between regional and local water supply plans and the IRWM Plan process.

Regional/Local Water Plans Incorporated into IRWM Plan

In addition to a shared stakeholder base and common goals, information and issues addressed in the regional and local water plans are incorporated directly into the IRWM Plan. Table 7-4 addresses how key elements within regional and local water plans are reflected within the 2013 IRWM Plan.

Table 7-4: Consistency of 2013 IRWM Plan with Regional/Local Water Plans

Elements within Regional / Local Water Plans[1]	Consistency with 2013 IRWM Plan
Goals and objectives in water plans and updated URWMs	• Incorporated into goals and objectives of IRWM Plan
Participating stakeholders	• Stakeholders reviewed and applicable stakeholders added to IRWM stakeholder list
Institutional issues	• Incorporated into IRWM Plan region description
Water demands projections	• Incorporated into IRWM Plan region description
Description of water storage, treatment, and supply systems	• Incorporated into IRWM Plan region description
Planned water system improvements	• Incorporated into IRWM Plan region description
Implemented or planned local supply development or opportunities	• Incorporated into IRWM Plan region description
Environmental or water quality issues	• Incorporated into IRWM Plan region description
Constraints to supply optimization or development	• Addressed in IRWM Plan region description
Project planning and support needs	• Project scoring process updated to reflect regional priorities expressed by stakeholders

In summary, the 2013 IRWM Plan incorporates current and relevant elements of both regional and local water supply plans. By identifying and addressing management issues common to multiple local water agencies, the intent of the IRWM Process is to foster agency/stakeholder coordination and integration of projects to achieve the IRWM Plan objectives.

7.4 Relation to Regulatory Programs

In scoping development of this 2013 IRWM Plan, the RWMG and RAC determined that improving the working relationships between IRWM stakeholders and regulatory agencies would facilitate better water management in the Region. As such, a planning study specifically geared toward identifying collaborative opportunities was prepared.

7.4.1 Relevant Regulatory Programs

A number of regulatory agencies (see Table 7-5) influence IRWM planning and IRWM-supported projects: resource agencies, health agencies, and water quality agencies. Water quality agencies establish water quality standards or regulate water quality. Resource agencies can influence specific areas of IRWM planning, including stream channel modifications, flood channel maintenance, endangered species review, environmental protection, and land use. Health agencies regulate drinking water source control, treatment, and quality; they also assist the Regional Board in regulating environmental water quality, wastewater treatment, disposal, and reuse.

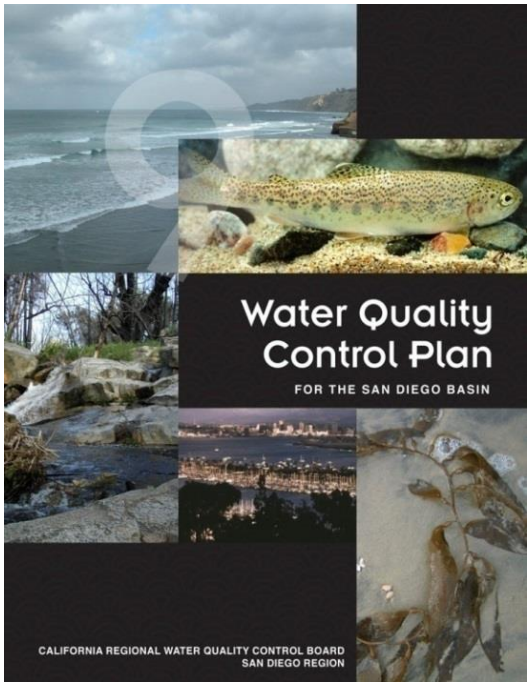
Table 7-5: Summary of Key Regulatory Agencies that Influence IRWM Planning

Category	Agency
Water Quality	• Regional Water Quality Control Board, San Diego Region • State Water Resources Control Board • U.S. Environmental Protection Agency
Resource Agencies	• U.S. Army Corps of Engineers • U.S. Fish and Wildlife Service • U.S. National Oceanographic and Atmospheric Administration Fisheries Service • California Department of Fish and Wildlife • California Coastal Commission
Health Agencies	• California Department of Public Health • County of San Diego Department of Environmental Health

Establishment of Water Quality Plans and Policies

The Regional Board and EPA have broad authority in establishing receiving water standards, regulating discharges, and enforcing compliance with water quality standards, plans, and policies. Water quality plans that establish receiving water standards within the San Diego Region include:

- *Water Quality Control Plan for the San Diego Region (*Basin Plan) (Regional Board, 1994), which designates beneficial uses and establishes ground and surface water quality objectives and implementation policies to protect the beneficial uses.
- *Water Quality Control Plan, Ocean Waters of California* (California Ocean Plan) (State Board, 2009a), which establishes prohibitions, water quality objectives, and implementation policies for discharges to ocean waters.
- *Water Quality Control Plan for Enclosed Bays and Estuaries* (Bays and Estuaries Plan) (State Board, 2009b), which establishes water quality and sediment objectives and implementation policies for discharges to enclosed bays and estuaries.
- *Water Quality Control Plan for Control of Temperatures in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan) (State Board, 1998), which establishes water quality objectives and implementation policies related to thermal discharges.



The Basin Plan designates beneficial uses and establishes water quality objectives for the Region.

- *California Toxics Rule* (Title 40, Section 131.38 of the *Code of Federal Regulations*) (EPA, 1998), which establishes water quality objectives for toxic constituents for inland surface waters and enclosed bays and estuaries.

- *Point-Source National Pollutant Discharge Elimination System (NPDES) Permits* are administered under Section 402 of the Clean Water Act to regulate discharges to federal surface waters from point-source and non-point discharge sources. Point-source NPDES permits are issued to specific entities that discharge to surface waters. The Regional Board implements the NPDES program under authority delegated by EPA. NPDES permits are established for five-year periods, but can be renewed.
- The Regional Board regulates non-point source discharges from *Municipal Separate Storm Sewer Systems (MS4s) Program* that jointly regulate stormwater copermittees. The MS4 NPDES permits establish prohibitions, effluent limitations, action levels, monitoring and reporting requirements, and required runoff management programs for regulating runoff and stormwater discharges. Currently, San Diego County MS4 copermittees are regulated under a single MS4 NPDES permit.
- *Waste Discharge Requirements* are issued by the Regional Board to regulate wastewater discharges (or threatened discharges) to land or to groundwater. Waste discharge requirements specify effluent concentration limits that are based on ensuring compliance with applicable Basin Plan groundwater quality concentration objectives.
- *List of 303(d) Impaired Waters*, prepared by the Regional Board pursuant to CWA Section 303(d), identifies surface waters that are not in compliance with applicable water quality standards. The list is forwarded to the State Board, along with recommended schedules for the preparation of *Total Daily Maximum Loads* (TMDLs) and waste load allocations to attain the standards. EPA approved the State's 2008/2010 303(d) impaired water list in November 2011.

7.4.2 Opportunities for Collaboration

Focus on Regional Board Coordination

While IRWM planning activities can be affected by regulatory actions taken by resource or health agencies (see Section 7.4.1), the flexibility of resource and health agencies to coordinate with the IRWM Program may be limited by a narrow range of regulatory authority or focus, inflexible regulatory requirements or mandates, and decision processes that do not incorporate stakeholder input. The Regional Board purview, on the other hand, extends over a broad range of IRWM planning activities. Additionally, the Regional Board consults with the resource agencies, health agencies, EPA, and the State Board in establishing water quality standards and permits requirements and offers a built-in opportunity for interagency input. Additional reasons for considering opportunities for IRWM/Regional Board collaboration include:

- the IRWM Program and Regional Board each focus on issues specific to the San Diego Region,
- parallels exist in the water quality protection goals of the IRWM Program and the Regional Board,
- the IRWM Program and Regional Board operate under open processes that encourages public participation and stakeholder input, and
- the Regional Board enjoys flexibility in establishing water quality standards that are specific to the water quality and beneficial use protection needs of the San Diego Region.

Additionally, while the Regional Board's regulatory mandates have expanded over the years, resources available to the Regional Board have not kept pace with the expansion of these regulatory

responsibilities. As a result, the Regional Board utilizes its limited resources to address what it deems to represent the highest priority regional water resource protection needs. The IRWM Program is, in essence, a stakeholder-driven resource allocation process. In areas where IRWM and Regional Board goals and responsibilities are compatible, the potential exists for resources provided through the IRWM Program to assist the Regional Board in addressing a greater range of water quality issues and priorities.

IRWM Regulatory Workgroup

Recognizing this potential compatibility, the RWMG and RAC organized a Regulatory Workgroup to support the 2013 IRWM Plan that included Regional Board participation along with a broad range of stakeholders. The Workgroup objectives included:

- serving as an ideas forum or "think tank" to develop suggestions on how the IRWM Program and Regional Board can collaborate to more effectively address regional water issues, and
- providing direction in the preparation of an issues paper (Workgroup Report) that summarizes potential IRWM and Regional Board collaborative opportunities and identifies recommended actions to pursue sensible collaborative opportunities.

Regulatory Workgroup input was provided through a series of workshops. A technical team supported the Workgroup effort by facilitating Workgroup meetings, organizing Workgroup directives, preparing documents to support and focus Workgroup discussion, and preparing a report that summarized Workgroup findings and recommendations.

The purpose of the IRWM Regulatory Workgroup was to determine where regulatory conditions may allow changes to existing regulations to better-achieve regional goals.

Shared IRWM/Regional Board Goals

The Regional Board is in the process of updating its "Practical Vision", which will establish a strategic plan, priorities, and intended future direction. While the Practical Vision is in the developmental draft phase, Regional Board staff presented key priority themes of the draft Practical Vision to the Work Group. In presenting the priority themes, Regional Board staff also advised that IRWM and Regional Board collaboration should be directed toward the shared IRWM/Regional Board goals of improving water quality and environmental conditions.

Table 7-6 compares the Regional Board's mission and Practical Vision priority themes with the IRWM Plan mission and objectives. As shown in the table, the IRWM Plan and Regional Board share considerable common interests; IRWM Plan objectives address each of the priority themes addressed in the draft version of the Regional Board's Practical Vision.

Table 7-6: Comparison of IRWM Plan and Regional Board Missions and Objectives

Regional Board Priorities[1]	IRWM Plan
Mission: Preserve and enhance the quality of California's water resources and to ensure their proper allocation and efficient use for the benefit of present and future generations.	**Mission:** To develop and implement an integrated strategy to guide the San Diego Region toward protecting, managing, and developing reliable and sustainable water resources. Through a stakeholder-driven process and adaptive process, the Region can develop solutions to water-related issues and conflicts that are economically and environmentally preferable, and that provide equitable resource protection for the entire Region.
Priority Themes[1] • Ensure the health of ground and surface waters • Implement effective monitoring and assessment • Support recovery of wetlands and riparian areas • Achieve proactive public outreach and communication • Support sustainable local water supplies	**IRWM Plan Objectives[2]** 1. Encourage the development of integrated solutions to address water management issues and conflicts 2. Maximize stakeholder/community involvement and stewardship of water resources 3. Effectively obtain, manage, and assess water resource data and information 4. Further the scientific and technical foundation of water management 5. Develop and maintain a diverse mix of water resources 6. Construct, operate, and maintain a reliable infrastructure system 7. Enhance natural hydrologic processes to reduce the negative effects of hydromodification and encourage integrated flood management 8. Effectively reduce sources of pollutants and environmental stressors 9. Protect, restore and maintain habitat and open space 10. Optimize water-based recreational opportunities 11. Effectively address climate change

1 Priority themes identified by Regional Board staff as being presented in draft versions of the *San Diego Water Board Practical Vision, 2013-2019*, which sets forth the Regional Board's proposed strategic plan for the next five years. The information presented in this table reflects draft materials provided to the IRWM Program in 2012.

2 Objectives identified within the 2013 San Diego Region IRWM Plan.

Identified Collaborative Outcomes

The Workgroup utilized the following process to identify potential IRWM and Regional Board collaborative opportunities to achieve mutual IRWM/Regional Board goals:

1. Identify potential issues of mutual interest to the IRWM Program and Regional Board.
2. Prioritize the potential issues of interest to identify issues with strong and broad Workgroup support and identify desired outcomes for IRWM/Regional Board collaboration.
3. Identify IRWM Program assets and identifying potential collaborative measures that could be undertaken to achieve the desired outcomes.

The Workgroup utilized five facilitated workshops to identify, assess, and prioritize issues of common IRWM and Regional board interest. Through this process, the Workgroup identified the following desired outcomes for IRWM/Regional Board collaboration.

Desired Outcome No. 1: Support Science-Based Basin Plan Objectives

Support the Regional Board's triennial review process and Regional Board programs and efforts to update science-based assessments of relations between Basin Plan objectives and beneficial use protection.

Desired Outcome No. 2: Support Science-Based Impaired Water Listings and Compliance

Support Regional Board programs and efforts to (1) update impaired water listings that are based on science and robust data and (2) achieve water quality compliance and protect beneficial uses.

Desired Outcome No. 3: Support Prioritization of Habitat Restoration Needs and Opportunities

Support the Regional Board in implementing a process for prioritizing wetlands and riparian habitat restoration needs and opportunities, and coordinate with resource agencies to address regional restoration needs and issues.

Workgroup Recommendations

The Workgroup noted that limited Regional Board staff resources may constrain Regional Board participation in the above desired outcomes. As a result, collaboration between the IRWM Program and the Regional Board may be most useful to the Regional Board in areas where such collaboration:

- assists the Regional Board in executing their statutory responsibilities and in complying with state and federal mandates,
- results in increased regulatory resources or efficiency,
- does not result in increased Regional Board staff workloads,
- assists the Regional Board in stakeholder involvement, and/or
- generates measurable outcomes that demonstrate conformance with applicable water quality standards, requirements and policies.

Recommendations of the Workgroup were presented in *Potential IRWM/Regional Board Collaborative Opportunities, 2013 IRWM Plan*. The Workgroup report is presented as Appendix 7-A.

The Workgroup recommended that IRWM/Regional Board collaboration be centered on benefits that the IRWM Program can provide, which include:

- vision and advocacy,
- technical expertise,
- stakeholder coordination, and
- project funding.

The Workgroup recognized that IRWM/Regional Board collaboration to address the desired outcomes would require an ongoing and evolving process. To initiate progress toward achieving the desired outcomes, the Workgroup identified (1) initial objectives to facilitate progress toward the outcomes, and (2) initial recommended actions (deemed "early action" items) to achieve the initial progress objectives. Table 7-7 presents recommended initial progress objectives and early action items for supporting desired outcomes 1, 2, and 3. To support these desired outcomes, the Workgroup also identified early actions directed toward an overarching goal of improving communication between the IRWM Program and Regional Board.

Table 7-7: Summary of Regulatory Work Group "Early Action" Recommendations

Desired Outcome of IRWM/Regional Board Collaboration	Initial Objective to Facilitate Progress toward Desired Outcome	Early Action Recommendations to Achieve Initial Objective
1. Support science-based Basin Plan objectives	• Identify science-based Basin Plan modifications that may warrant higher priority than provided in 2011 triennial review	• Convene caucus of IRWM stakeholders to (1) identify Basin Plan objectives targeted for review/revision and (2) discuss and review support needs • Organize IRWM stakeholder participation in the Regional Board Triennial Review process to promote priority Regional Board action on the Basin Plan issues targeted by IRWM stakeholders
2. Support science-based 303(d) impaired water listings.	• Identify existing 303(d) listings that may warrant reevaluation or reclassification	• Convene caucus of IRWM stakeholders to (1) identify 303(d) listings requiring modification and (2) and discuss/review support information needs • Organize IRWM stakeholder participation in the Regional Board 303(d) stakeholder review process and promote priority Regional Board action on the listings targeted by IRWM stakeholders
3. Support prioritization of habitat restoration needs and opportunities	• Assess and promote resource agency interest in prioritization of habitat restoration opportunities	• Convene meeting between IRWM stakeholders and resource agencies to discuss means of identifying, coordinating, and prioritizing restoration opportunities
Overarching actions to support Desired Outcomes 1, 2, and 3	• Improve communication between the IRWM Program and Regional Board	• Assign IRWM liaison to attend Regional Board meetings • Provide Regional Board Executive Officer with periodic IRWM update reports for inclusion in Regional Board agenda packets

7.5 Relation to Salinity Planning

As part of the 2013 IRWM Plan, regional stakeholders prepared, or are in the process of preparing, several planning documents related to salinity planning: the *Proposed Guidelines – Salinity/Nutrient Management Planning in the San Diego Region (9)* (Water Authority et al. 2010) were completed in 2010 and accepted by the Regional Board, and five Salt and Nutrient Management Plans are currently under development.

7.5.1 Recycled Water Policy

In February 2009, the State Board adopted Resolution No. 2009-011, which established a statewide Recycled Water Policy. The Recycled Water Policy requires the State Board and the Regional Boards to focus their limited resources on projects that require substantial regulatory review due to unique site-specific conditions, and exercise their authority to the fullest extent possible to encourage the use of recycled water, consistent with state and federal water quality regulations.

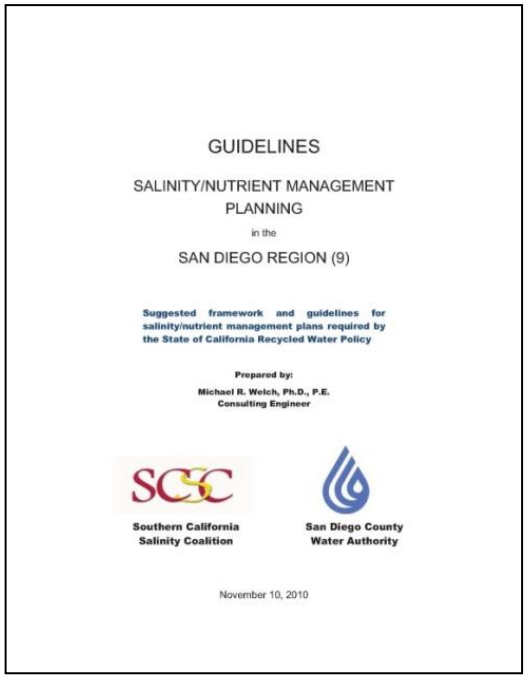
While California's Porter-Cologne Act charges Regional Boards with developing and enforcing Basin Plan groundwater quality objectives, the Regional Boards' permitting and enforcement jurisdiction is limited to the regulation of "discharges of wastes", including wastewater, stormwater and recycled water. The Recycled Water Policy recognizes that wastewater and recycled water projects may represent only a portion of the overall salinity/nutrient loads within a watershed or groundwater basin. To address this, the Recycled Water Policy requires that the management of salinity and nutrient loads be done through the development of regional and sub-regional salt and nutrient management plans. The Policy identifies stakeholder-driven Salt and Nutrient

Management Plans (SNMPs) as the appropriate means for identifying and managing salinity and nutrient loads; per the Policy, those stakeholders with a vested interest in groundwater are responsible for developing SNMP.

The Recycled Water Policy requires that SNMPs be prepared for each California groundwater basin or sub-basin, or have made substantial progress toward completion, by May 2014. While the intent of the SNMP requirements is to promote statewide recycled water use while providing for groundwater quality protection, the San Diego Regional Board essentially met this intent during the 1980s and 1990s through a series of recycled water/groundwater protection studies and associated Basin Plan modification efforts. These prior efforts resulted in the promotion of recycled water use throughout a large portion of the Region.

7.5.2 Salinity/Nutrient Planning Guidelines

1. Establish a framework under which SNMPs may be established by interested agencies and stakeholders,
2. Assess the Region's aquifers and identify aquifers that are suitable for the development of SNMPs and prioritize the Region's groundwater basins for the development of SNMPs,
3. Present "tiered" work scopes for developing SNMPs within the Region in which the level of required assessment is based on the size of the basin, the level of basin complexity, and the potential for conflicts between recycled water use and groundwater quality protection,
4. Identify roles of agencies and identify categories of potential stakeholders,
5. Identify suggested approaches and the expected level of effort for completing the required SNMP tasks for each of the required SNMP phases, including:
   - Step 1: conducting an initial basin characterization.
   - Step 2: identifying and quantifying salinity/nutrient sources,
   - Step 3: identifying supplemental monitoring needs and collecting required data,
   - Step 4: identifying and evaluating potential salinity/nutrient management strategies, selecting appropriate strategies for implementation, and identifying applicable Basin Plan modifications to implement the recommended strategies, and
   - Step 5: identifying assessment metrics for evaluating SNMP effectiveness.
6. Provide guidance on which SNMP constituents should be addressed,
7. Identify strategies to be considered in managing salinity/nutrient sources and loads, and
8. Outline the process for regulatory review and approval of developed SNMPs.


GUIDELINES

SALINITY/NUTRIENT MANAGEMENT PLANNING

in the

SAN DIEGO REGION (9)

Suggested framework and guidelines for salinity/nutrient management plans required by the State of California Recycled Water Policy

Prepared by:

Michael R. Welch, Ph.D., P.E.
Consulting Engineer

Southern California Salinity Coalition

San Diego County Water Authority

November 10, 2010

The SNMP Guidelines were developed to provide local agencies with guidance in developing SNMPs

The Regional Board formally endorsed the SNMP Guidelines on November 10, 2010 with the adoption of Resolution R9-2010-0125.

Recommended Approaches

The SNMP Guidelines identified the salinity and nutrient constituents of concern for the Region based on regional and basin-specific groundwater quality studies and characterizations, groundwater uses, recycled water standards, and compliance issues. Using the Basin Plan constituents of concern as the basis for this exercise, Table 7-8 identifies which of these constituents of concern are applicable to the Region, why they are or are not considered a constituent of concern, and if and how the various SNMPs should approach addressing these constituents.

Basin Prioritization

The SNMP Guidelines organized the Region's groundwater basins into five tiers, ranging from highest priority (Tier A) to lowest (Tier E) regarding the perceived sensitivity of groundwater resources and the related need for salt and nutrient management planning. Table 7-9 provides a listing of the groundwater basin tiers.

- Tier A basins are larger than 60,000 acre-feet, and are significantly used (or proposed for use) for municipal groundwater use. Tier A basins may be contaminated in the downstream portion, and the hydrogeology, groundwater quality, and management alternatives have been well studied. Tier A basins are the highest SNMP priority.
- Tier B basins are those basins which have a capacity of 50,000 acre-feet or less, located in urbanized or agricultural areas. While they have variable groundwater quality, it nevertheless remains useable for agricultural or municipal use. Tier B basins may experience occasional noncompliance with groundwater quality objectives, and have significantly less potential yield than Tier A basins. They are also less well studied than Tier A basins. Tier B basins are a medium SNMP priority.
- Tier C basins are smaller, shallow aquifers with capacities less than 20,000 acre-feet, in unconsolidated sediments. Wastewater and recycled water agencies in Tier C basins may experience occasional noncompliance with water quality objectives, and yields from Tier C basins are modest or small. There are fewer studies that help characterize hydrogeology, groundwater quality, and groundwater transport in Tier C basins than in Tier A or Tier B basins. Tier C basins are a medium SNMP priority.
- Tier D basins are further divided into two categories: Tier D-1 and Tier D-2. Tier D-1 basins are large or moderately sized urbanized coastal groundwater basins. They have higher salinity groundwater quality, with groundwater quality objectives for TDS that exceed 1200 mg/L. Municipal supply is developed or proposed in these basins through demineralization. Tier D-1 basins are a low SNMP priority. Tier D-2 basins are similar to Tier D-1, but are moderate to small-sized, may be coastal or inland, and are not currently developed for public water supplies. On November 10, 2010, the Regional Board adopted Resolution No. R9-2009-0125 which endorsed the SNMP Guidelines (Regional Board, 2010). At its March 2013 meeting, the Regional Board further confirmed that Tier D-2 basins as identified in the salt and nutrient management plan guidelines are small coastal basins that are not currently used for developing water supplies, and in which recycled water compliance with water quality objectives is not generally a high concern. The SNMP Guidelines recommend that Tier D basins do not require an SNMP.

- Tier E basins are the lowest priority basins for SNMPs. These are located in the rural, eastern portion of the Region, and generally include groundwater dependent communities located outside Metropolitan's service area, the recycled water service area, and the intended scope of the SNMP Guidelines. Tier E basins do not require an SNMP.

Table 7-8: Recommended Salt/Nutrient Management Approaches

Constituent of Concern	Management Issue	Recommended Approach in SNMP
TDS	• Recycled water effluent limits of 1000 mg/L is typical in Region • Groundwater baseline salinity is frequently near or at basin objectives • Compliance with recycled water effluent limits is often challenging	• TDS is likely to be the primary constituent of concern in SNMPs
Chloride	• Compliance is not typically an issue in the Region	• Only need to address chloride if basin-specific needs have been identified
Sulfate	• Compliance is not typically an issue in the Region	• Only need to address sulfate if basin-specific needs have been identified
Sodium	• Compliance is not typically an issue in the Region	• No need to address. May address on a project-by-project basis if necessary
Boron	• Compliance is not typically an issue in the Region • Exceptions are those agencies with industrial discharge sources from boric acid etching operations	• Only need to address Boron if basin-specific needs have been identified, or otherwise locally warranted. • Boron will likely need to be addressed for Carlsbad and Vallecitos areas once Carlsbad Desalination plant is operational
Fluoride	• Compliance is not typically a problem, but may be a problem in the future	• Basin Plan objectives for fluoride are inconsistent with CDPH and EPA recommendations. If the objectives are updated, there is no need to address fluoride
Nitrate	• Occasional noncompliance in areas with wastewater percolation to groundwater • Recycled water effluent limits not currently established, may be regulated in the future • Recycled water use may reduce fertilizer use	• No need to address nitrogen, except on an as-need, project-by-project basis • May prefer a mass-balance approach • If nitrate is addressed, must also address potential cumulative effects
Iron and Manganese	• Recycled water iron and manganese compliance is an increasing concern • Nutrient update by vegetation causes difficulty in determine source loads	• Needs to be addressed in either an SNMP or through project-specific modifications of effluent limits consistent with a regionally coordinated assessment of iron and manganese demands, application, and uptake.
Phosphorus	• No groundwater quality objectives exist for phosphorus in Region • Not easily transported through soil	• No need to address.

Source: Adapted from *Proposed Guidelines – Salinity/Nutrient Management Planning in the San Diego Region (9)* (Water Authority et al. 2010)

Table 7-9: Groundwater Basin Tiers in Region 9*

Tier A Basins		
• Lower Santa Margarita • Hodges/San Pasqual	• Santee/El Monte	
Tier B Basins		
• San Mateo • San Onofre • Las Flores	• Pala/Pauma • San Marcos • Escondido	• Santa Maria • Poway • Middle Sweetwater
Tier C Basins		
• Valley Center • Keys Creek • Vista	• Miramar • San Vicente/Gower • National City	
Tier D Basins		
Tier D-1	**Tier D-2**	
• Oceanside Mission • Mission Valley • Lower Sweetwater	• Bonsall/Moosa • Batiquitos, Buena Vista • Agua Hedionda, Encina	• San Elijo • Lower San Dieguito • El Cajon • Otay • Lower Tijuana
Tier E Basins		
• Santa Ysabel • Warner • Pine Valley	• Descanso • Portrero	• Campo • Cottonwood

*Basin names correspond to the Salinity/Nutrient Management Planning guidance document (Water Authority et al., 2010), see *Chapter 5, Watershed Characterizations* for information on how these basin names correspond to those found in DWR's Bulletin 118 and the 2013 IRWM Plan.

Source: Water Authority et al. 2010

SNMP Process

The statewide Recycled Water Policy acknowledges that the salt and nutrient management needs of groundwater basins will vary across the state, and that the contents of an SNMP will be dependent on site-specific factors. Key components common to all SNMPs are that they be developed in a stakeholder driven process, they assess water quality and salinity/nutrient loads within each basin, and that they identify and evaluate strategies for achieving compliance with Basin Plan water quality objectives and protect beneficial uses.

Using existing knowledge of groundwater basins and uses in the Region, along with stakeholder input through a series of salinity/nutrient management coordination workshops in 2009 and 2010, the SNMP Guidelines identify the key components of SNMPs for the Region, which vary by Tier. However, it should be emphasized that these are meant as guidelines and not required components.

Step 1: Initial Basin Characterization

Identify the basin and define the study area to be evaluated, review existing groundwater studies, identify stakeholders and develop outreach, identify and quantify beneficial uses, characterize existing an historic groundwater quality and distribution, and identify salt/nutrient parameters to be addressed in the SNMP.

Step 2: Identify and Quantify Salinity/Nutrient Sources

Identify and quantify salt/nutrient loads to the basin for constituents identified in Step 1, and develop tools to evaluate the basin's assimilative capacity and fate and transport of salt/nutrient loads. This may include reviewing prior models, determining if a flow/transport model or mass-balance approach is appropriate, and ranking sources by impact on water quality.

Step 3: Supplemental Monitoring

Identify data gaps and develop and implement a plan for addressing them. Supplemental monitoring may be required to better assess hydrogeology or provide complete characterization of groundwater quality. The monitoring plan must be designed to determine water quality in the basin. Monitoring locations shall, where appropriate, target groundwater and surface waters where groundwater has connectivity with adjacent surface waters.

Step 4: Salinity Nutrient Management Strategies

Identify the management goals for the SNMP, develop a list of appropriate management strategies, evaluate the potential effectiveness of the management strategies, evaluate and select alternative management strategies, address Basin Plan modifications that may be associated with the recommended management strategies, and to assess environmental regulatory compliance, such as CEQA and NEPA. Note that different strategies for upstream and downstream portions of basin may be appropriate and special consideration may be required in basins upstream from potable supply reservoirs. Additionally, balancing conflicts between groundwater and recycled water uses may be required using a decision model.

Step 5: Assessment of Plan Effectiveness

The final step in the SNMP process is to assess the effectiveness of the SNMP. This will require identification of metrics, development and implementation of a monitoring program, and establishment of a framework and schedule for auditing and updating the SNMP.

7.5.3 Salt/Nutrient Management Plans in the Region

In March and April 2013, the Water Authority entered into agreements with five agencies to develop SNMPs in the Region. This effort has been funded in part through an IRWM Planning Grant under Proposition 84. The five SNMPs will be developed in support of the basins that have been prioritized by the Region.

Lower Santa Margarita River Basin

The Fallbrook Public Utility District (Fallbrook PUD) is preparing an appendix in support of the Lower Santa Margarita River Basin SNMP currently being developed by USMC Base Camp Pendleton. The Lower Santa Margarita River Basin is a Tier A groundwater basin, and therefore of highest priority for development of an SNMP. This document will look at the use of highly-treated recycled water in the upper basin that may be used to improve water quality in the lower basin. Fallbrook PUD is considering working with Camp Pendleton to implement indirect potable reuse (IPR) by discharging highly treated recycled water into Fallbrook Creek, which will then be diverted for groundwater recharge at Camp Pendleton. Camp Pendleton uses groundwater as its primary water supply source, and is therefore concerned with groundwater quality. Groundwater quality violations may trigger federal investigations due to Camp Pendleton's military operations. This appendix will address the impacts of the proposed IPR project on the salt and nutrient loads in the Lower Santa Margarita River Basin, and will be incorporated into the SNMP for the basin.

Fallbrook PUD has recently kicked off the effort to amend the Lower Santa Margarita River Basin SNMP to include recycled water discharges into Fallbrook Creek. The kickoff included representatives from the Marine Corp Base Naval Weapons Station and adjacent water agencies.

Santee/El Monte Basin

The Santee/El Monte Basin is a Tier A basin, with increasing salinity in the downstream (Santee) portion and lower salinity in the upstream (El Monte) portion of the basin. While the basin currently serves as a water supply for several agencies, the City of San Diego is considering it for potential expanded groundwater use. The Padre Dam Municipal Water District (Padre Dam MWD) is currently developing an SNMP for the Santee portion of the basin. This will include identification of salt and nutrient sources, basin capacity and loading estimates, recycled water use and recharge goals and objectives, determination of any necessary reductions of loading rates, proposed mitigation measures, and development of a monitoring plan.

To date, Padre Dam MWD has completed water quality data collection, development and approval of a project approach plan, coordination with the Regional Board, and several stakeholder meetings. The stakeholder meetings were advertised as public meetings on both the Padre Dam MWD and Regional Board websites.

For further development of the Santee/El Monte Basin, historic water rights issues need to be reconciled with beneficial uses of the basin for municipal agencies contributing return flow from imported and recycled water.

San Pasqual/Hodges Basin

The San Pasqual/Hodges Basin is an agricultural basin owned by the City of San Diego. The downstream portion (Hodges) has increasing groundwater salinity, though the upstream portion

(San Pasqual) remains fairly high quality. The City of San Diego is considering the San Pasqual/Hodges Basin for potential future water supply, making it a Tier A basin. The City of San Diego Public Utilities Department is currently developing a preliminary SNMP for the San Pasqual portion of the basin. This preliminary SNMP will include a detailed outline for review and input from the City. The City of San Diego will also develop a preliminary salt and nutrient loading analytical tool. They will conduct a consumptive use analysis, build a soil moisture budget that will include groundwater recharge and irrigation pumping analysis, and develop a summary of the basin salt and nutrient budget data. All of this work will be rolled up into a summary of preliminary results, which may be used for future development of a final SNMP.

Santa Luz golf course in the San Dieguito Watershed uses recycled water for irrigation and water features.

Source: Jeff Pasek, City of San Diego

To date, the City of San Diego has completed a draft SNMP that includes initial basin characterization, the identification of salinity/nutrient sources, and identified the need for additional supplemental monitoring of well, surface water, and agricultural run-off. Coordination with the Regional Board is ongoing and other area stakeholder meetings will be taking place shortly.

Escondido Valley Basin

The Escondido Valley Basin is a Tier B groundwater basin, and is managed in part by the Rincon del Diablo Municipal Water District (Rincon MWD). The Rincon MWD began development of an SNMP in November 2012. This SNMP will include identification of the salt and nutrient sources in the basin, along with basin capacity and loading estimates. It will also consider the recycled water use and recharge goals and objectives for the Escondido subarea, and determine what, if any, reductions in loading rates will be necessary. It will propose feasible mitigation measures, schedule tasks to identify measures that can be used to reduce or improve the Escondido subarea, and will develop a monitoring plan.

To date, Rincon MWD has begun the initial basin characterization, the identification of salinity/nutrient sources, and coordination with the Regional Board and City of Escondido.

San Vicente/Gower Basin

The San Vicente/Gower basin is a Tier C groundwater basin. The Ramona Municipal Water District (Ramona MWD) has entered into an agreement with the Water Authority to develop an SNMP for the Gower portion of the basin. As part of the SNMP, Ramona MWD will identify the salt and nutrient sources in the basin, as well as the basin capacity and loading estimates. It will consider recycled was use and recharge goals and objectives, and determine any necessary reductions to loading rates. Finally, it will propose mitigation measures, schedule completion tasks to identify measures to reduce or improve the Gower basin, and develop a monitoring plan.

For the Gower SNMP, Ramona MWD has compiled and analyzed water quality and other relevant data in GIS, developed a project workplan, and hosted several stakeholder meetings.

7.5.4 Salt/Nutrient Management Plan for Tier D and E Basins

Although the SNMP Guidelines recommended that no SNMP is necessary for Tier D and E basins, the following presents recommendations for managing salts and nutrients in Tier D and E basins within the San Diego IRWM Region.

As described above, Tier D basins are divided into two categories: Tier D-1 and Tier D-2. Tier D-1 basins are large or moderately sized urbanized coastal groundwater basins. They have higher salinity groundwater quality, with groundwater quality objectives for TDS that exceed 1200 mg/l. Municipal supply is developed or proposed in these basins through demineralization. Tier D-1 basins are a low SNMP priority. Tier D-2 basins are similar to Tier D-1, but are moderate to small-sized, may be coastal or inland, and are not currently developed for public water supplies. Tier E basins are the lowest priority basins for SNMPs. These are located in the rural, eastern portion of the Region, and are outside both Metropolitan's service area and the recycled water service area. Groundwater in many of these basins remains good to excellent. Table 7-10 lists the Tier D and E basins in the Region.

Based on the potential impacts to the basins by salt and nutrient loadings, the existing groundwater quality, or designated beneficial uses, specific basin-wide analysis for the Tier D and E basins is not recommended by the SNMP Guidelines. Typical salt loading in the San Diego Region comes from application of potable water, recycled water, groundwater or other supplies to irrigate landscaping or agriculture. Nutrient loading comes primarily from use of fertilizers. Impacts from nutrients can be minimized by understanding the background nutrient concentration in the water supply and only adding nutrients necessary for proper plant growth. Salt loading can be minimized by avoiding overwatering and planting landscapes that require minimal application of water. Nutrient

loading to use areas from irrigation and fertilizers should not exceed the nutrient demands of the vegetation.

Measures that agencies and stakeholders may implement to minimize nutrient and salt loading include providing information to the public regarding application of irrigation water at agronomic rates, encouraging training for site supervisors or landscapers at large irrigation sites, encourage appropriate use of fertilizers, encourage use of smart controllers, consider adopting water rate structures that encourage water use efficiency, promote landscapes that require minimal watering, and supporting other appropriate measures deemed necessary to lessen nutrient loading. These approaches can be incorporated into existing water conservation, recycled water and storm water programs.

Table 7-10: Tier D and E Groundwater Basins

Basin Tier	Groundwater Basin	Municipal Water Agencies	Municipal Wastewater Agencies
Tier D-1	Oceanside Mission	• City of Oceanside	• City of Oceanside
	Mission Valley	• City of San Diego	• City of San Diego
	Lower Sweetwater	• Sweetwater Authority	• City of National City • City of Chula Vista
Tier D-2	Bonsall/Moosa	• Rainbow MWD	• Rainbow MWD • Valley Center MWD
	Batiquitos, Buena Vista	• Carlsbad MWD	• City of Carlsbad • Carlsbad MWD • Leucadia WWD
	Agua Hedionda, Encina	• Carlsbad MWD	• City of Carlsbad • Carlsbad MWD • Leucadia WWD
	San Elijo	• Olivenhain MWD • San Dieguito Water District	• Olivenhain MWD • San Elijo JPA
	Lower San Dieguito	• Olivenhain MWD • Santa Fe Irrigation District	• Olivenhain MWD • Rancho Santa Fe CSD • Fairbanks Ranch CSD
	El Cajon	• Helix Water District • Otay Water District	• City of El Cajon
	Otay	• City of San Diego • Otay Water District	• City of San Diego • Otay Water District
	Lower Tijuana	• City of San Diego	• City of San Diego
Tier E	Santa Ysabel	• N/A	• N/A
	Warner	• Vista Irrigation District	• N/A
	Pine Valley	• N/A	• N/A
	Descanso	• N/A	• N/A
	Portrero	• N/A	• N/A
Tier E	Campo	• N/A	• N/A
	Cottonwood	• N/A	• N/A

Source: Water Authority et al., 2010

7.6 Relation to Flood Control Planning

Flood management in the Region is dispersed across various agencies, and often grouped within other departments, such as planning departments, emergency response, sanitary districts, and others. The Region lacks a centralized agency to coordinate flooding, providing an opportunity within the 2013 IRWM Plan to compile flood information across the Region and present recommendations for Regional flood management that may be utilized by individual agencies.

7.6.1 Relevant Flood Control Plans

Given the fragmented, and sometimes marginalized, nature of flood management in the Region, flood control plans may be incorporated as part of other plans, such as General Plans, rather than individual Flood Control Plans. Plans with relevant flood information were reviewed for the Integrated Flood Management (IFM) Study, described below. IFM is an integrated, multidisciplinary effort, so other sources of data used in the IFM included flood hazard and flood plain analyses, environmental documentation, biology and wildlife studies, water quality reports, watershed hydrology and hydraulic studies, land use plans, and various GIS layers and existing maps. Appendix 7-B details these plans further.

Flooding can impact multiple jurisdictions or agencies, such as transportation, planning, and sanitation.

Photo credit: Bruce Phillips, PACE

The other significant plan used during development of the IFM study was *California's Flood Future: Recommendations for Management the State's Flood Risk* (Flood Future Report). This report was developed by DWR and the USACE as part of the State Flood Management Planning Program, funded under Proposition 84. The Flood Futures Report documents flood threats and management approaches in California, and recommends strategies for managing flood risks.

7.6.2 Opportunities for Collaboration

The Integrated Flood Management Workgroup was convened in 2012 and 2013 to develop an IFM Study. This IFM Study acts as a guidance document to facilitate integrated water resources approaches to flood management. It identifies a sustainable flood and water management approach as:

- an interconnection of flood risk management actions within broader water resources management, ecosystems, and land use planning,
- providing and recognizing value of coordinating across geographic and agency boundaries,
- evaluating opportunities and potential impacts from a system perspective,
- recognizing the importance of environmental stewardship and sustainability, and

- providing for system flexibility and resiliency in response to changing conditions, such as climate change and population growth

Issues that make integrated flood management in the Region challenging include:

- Projects require extensive stakeholder involvement, which increases project planning costs.
- Flood management responsibility is fragmented.
- Different methodologies and inadequate data make risk assessment complex and costly to complete.
- Land use decisions may not adequately prioritize public safety.
- Delayed permit approvals and complex permit requirements are obstacles to flood risk reduction.
- Flood management projects are not prioritized from a "watershed" system-wide or multi-benefit perspective.
- Flood risk funding as well as long term funding for operations and maintenance.

In order to develop the IFM guidance planning document, the Workgroup underwent a series of six steps: 1) Involving watershed/floodplain managers and stakeholders; 2) Understanding the problems and the flood risks; 3) Defining watershed goals and objectives; 4) Identifying opportunities or constraints; 5) Identifying possible management strategies and approaches; 6) Creating a planning guidance document; and 7) Developing implementation prioritization evaluation criteria. Figure 7-2 shows the process of the IFM Workgroup. Throughout this process, the Workgroup focused on integrating the needs and opportunities of individual watersheds into the Region as a whole, recognizing that each watershed's needs may vary.

Watershed/Floodplain Managers Workgroup

Stakeholder involvement occurred through three workshops during the IFM process. The first workshop, held on June 26, 2012 provided stakeholders with the program objectives and an overview of IFM. The second workshop, on December 4, 2012, defined the opportunities, goals, and strategies for IFM in the Region. The final workshop, on June 5, 2013, provided an opportunity to review the draft version of the document and give feedback.

Flash flooding is a flood risk common to all watersheds in the San Diego Region.

Photo credit: Bruce Phillips, PACE

Understanding the Flood Risks

In order to understand the problems and the flood risks for each watershed, the Workgroup used hydrology information for the Region and FEMA's flood hazard maps. It is noted that the FEMA flood hazard maps are regional, and may not reflect local flood risks. The County of San Diego has also developed flood maps for areas that are known risks, but may not be captured by the FEMA maps. The Workgroup reviewed the flood management plans for each of the 19 entities responsible for flood management within the IRWM Region.

The Workgroup identified flash flooding as a flood risk common to all watersheds in the Region. A flash flood is defined as one when the peak flow travels from one end of the watershed to the other in less than six hours. None of the watersheds in the Region have a response time longer than six hours, making all of them vulnerable to flash flooding, though the greatest risk is in the central and eastern portions of San Diego County. Other flood risks include shallow flooding – due to a lack of channels for water to drain, flooding from inadequate drainage systems (most stormwater systems in the Region are designed for the 10-year flood), and dam failures – typically a result of age, poor design, or disaster. Table 7-11 summarizes flood types in the Region.

Table 7-11: Flood Types and Causes

Flood Hazard	Description Cause
Coastal Flooding	Winter and spring coastal storm, high winds and storm surges
Debris Flow Flooding	Heavy localized rainstorms on hillsides and high sediment producing or unstable areas subject to erosion or post-watershed fires
Slow Rise Flooding	Floodplain with limited hydraulic capacity and heavy precipitation generate runoff greater than capacity
Flash Flooding	High volume rainstorm, thunderstorms, or slow moving storms
Alluvial Fan Flooding	High volume rainstorm and thunderstorm displacing high volume of sediment to alluvial fan geographic features
Urban Drainage Flooding	Large rainstorms which exceed the capacity of the local urban drainage system resulting in flooding

In order to evaluate flood risks, flood hazards were characterized using indicator maps (e.g. spatial distribution of flow velocity, water height, duration) to estimate how these would interfere with human activities in the flood areas. An analysis of the data and sources described above led to an estimate of flood damages within each watershed and flood risks by land use types, per Figure 7-1.

Figure 7-1: Total Estimated 100-Year Approximate Dollar Flood Damage by Watershed

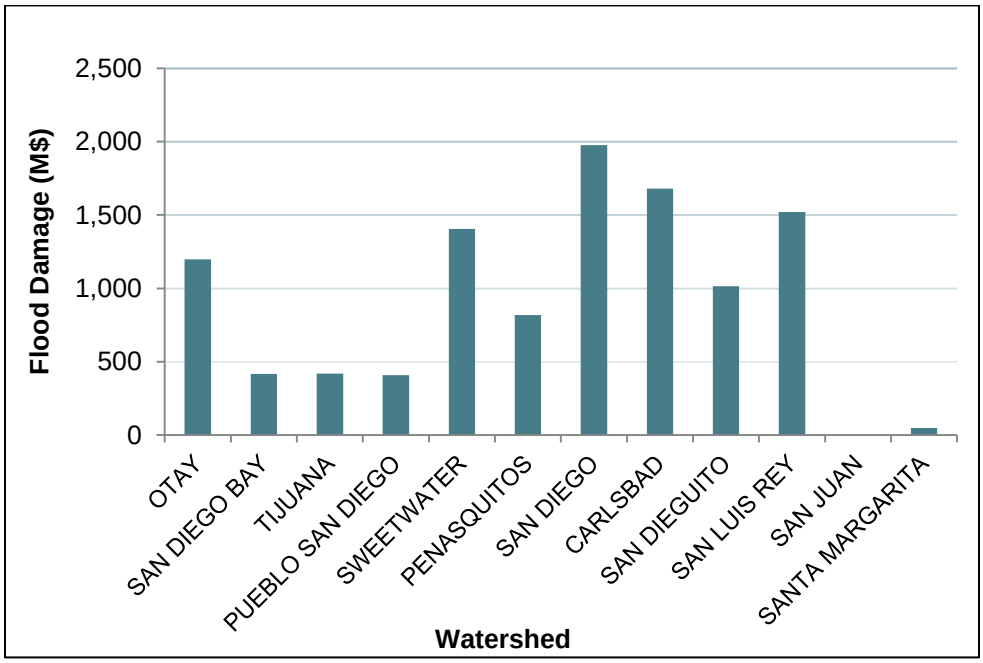
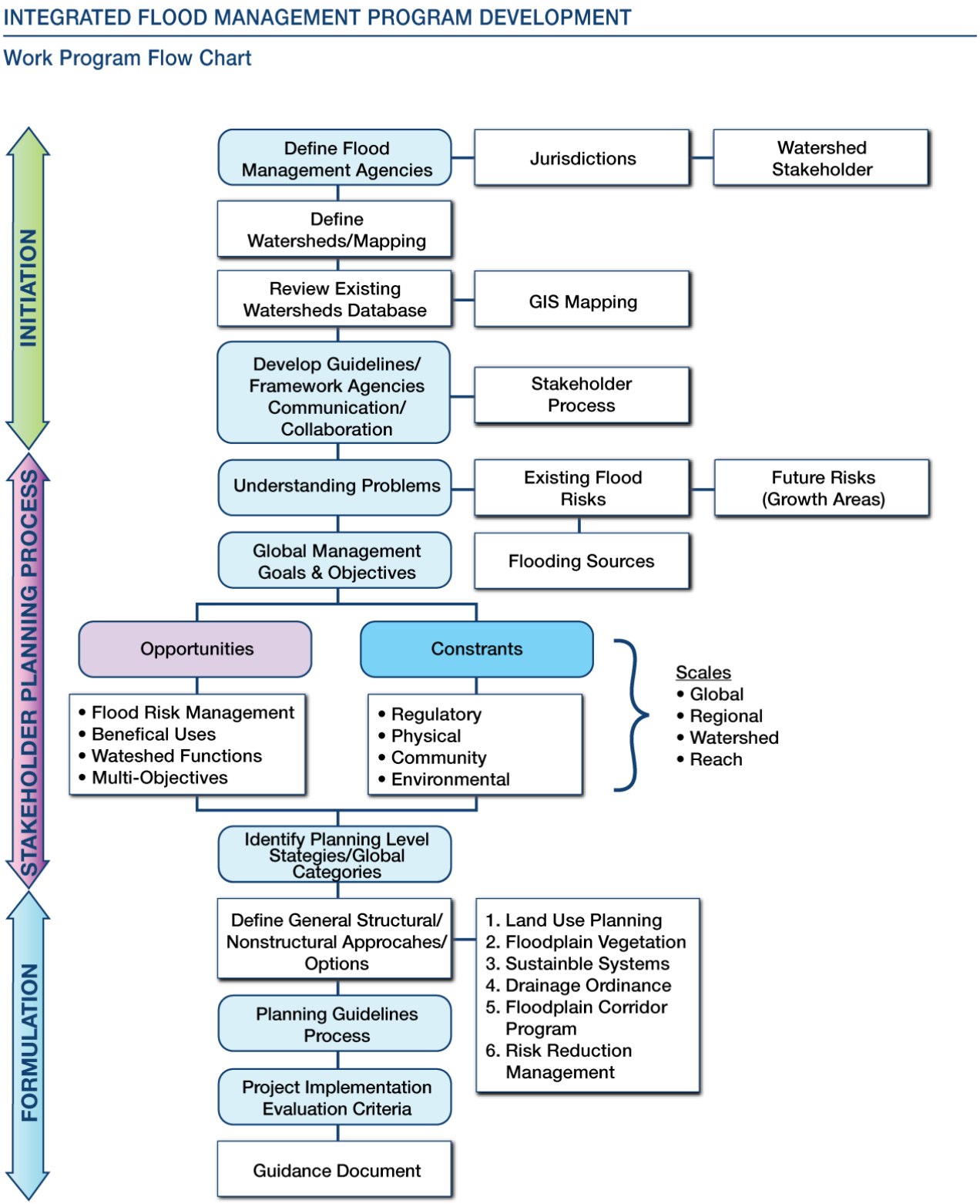


Figure 7-2: Overview of General Work Plan for Integrated Flood Management Study



Defining Watershed Goals and Objectives

IFM uses a different approach to flood management than traditional flood protection strategies. In IFM, structural projects, nonstructural measures, and natural watershed functions are all used to manage flooding. Different strategies may be necessary in individual watersheds, but may include land stewardship, conjunctive water manage, ecosystem restoration, land use planning and management, surface storage, and urban runoff management, among others. IFM requires communication with watershed stakeholders, an integration of land and water management, management of the water cycle as a whole, adoption of a mix of complementary strategies, and adoption of integrated hazard management approaches, and follows these principles:

1. Every flood risk scenario is different: there is no flood management blueprint.
2. Designs for flood management must be able to cope with a changing and uncertain future.
3. Rapid urbanization requires the integration of flood risk management into regular urban planning and governance.
4. An integrated strategy requires the use of both structural and non-structural measures and good metrics for "getting the balance right".
5. Heavily-engineered structural measures can transfer risk upstream and downstream.
6. It is impossible to entirely eliminate the risk from flooding. Hard-engineered measures are designed to defend to a pre-determined level.
7. Many flood management measures have multiple co-benefits over and above their flood management role.
8. It is important to consider the wider social and ecological consequences of flood management spending.
9. Clarity of responsibility for constructing and running flood risk programs is critical.
10. Implementing flood risk management measures requires multi-stakeholder cooperation.
11. Continuous communication to raise awareness and reinforce preparedness is necessary.
12. Planning should target quick recovery, and should use that recovery to build capacity

Identification of Opportunities or Constraints

Flood management in the Region is challenging because of the varied geomorphic conditions within and across watersheds; the presence of urban development in close proximity to steep, rainfall-collecting terrain and coastal flooding; the climate which leads to short but potentially intense rainy seasons; and the risk of sudden flooding as a result of the geographic and meteorological conditions in the Region. This study classified each opportunity or constraint into four categories: 1) physical conditions, 2) regulatory, 3) land use, and 4) environmental/biological. Opportunities and constraints for each of these categories are described in Table 7-12.

Table 7-12: Opportunities/Constraints for Regional Floodplain Management

Opportunity / Constraint	Reference
Physical Features	
Hydraulic conveyance limitations of existing roadway and utility crossings	• Identification of hydraulic limitations as potential target areas for fixes that may reduce areas of flooding and sedimentation
Existing facilities and structures located with the floodplain	• Define existing flood risk from existing facilities/uses within the floodplain
Sediment delivery with flood flows from foothill areas	• Excessive sediment delivery causes deposition and will ultimately be deposited at a downstream location with flatter slope • High sediment yields bulk the flood waters and increase depth of flooding
Limited topographic relief/slope that limits hydraulic conveyance in valley areas	• Facility sizes will increase further downstream within the watershed because of the reduced slope
Soils/geology primarily alluvial deposits that are highly erodible	• Channel migration routinely occurs • Erosion hazards for development adjacent to channels
Specialized geographic/geomorphic features which include alluvial fans and coastal plains	• Hydraulic conditions are unique and conventional flood management solutions are not applicable
Topographic features result in steep slopes in the mountains/foothills and extremely flat slopes on the valley floors	• Changes in hydraulic conveyance and sediment delivery because of the change in slopes
Regulatory	
No centralized regional flood agency for the entire San Diego region. San Diego County Flood Control District is only responsible for the unincorporated County areas and all other municipalities manage floodplains individually	• Flooding problems within the County area are extremely varied and associated with the different individual watersheds • Comprehensive planning required that reflects the current though process for flood management and the environmental considerations for each of the regional watersheds that will cross over political boundaries
FEMA/NFIP requirements for community floodplain regulations	• NFIP requirements have the most influence on floodplain restrictions
Water quality limitations and restrictions based on the Basin Plan and identified TMDLs	• Water quality restrictions should be implemented as part of the regional planning solution
Land Use Features	
Various urban/commercial landuse and additional manmade encroachments within the floodplain	• Limitations of development and landuse restrictions within active flood hazard zones
Environmental/Biological	
Environmental permitting limitations for activities/structures within the floodplain (i.e. endangered species, etc.)	• Additional costs or limitations on the potential solutions available because of environmental regulatory restrictions
Many existing floodplain corridors have special defined ecological preserve or similar designations because of habitat for sensitive species	• Existing floodplains and streams are valuable biological resources for preservation

Identification of Possible Management Strategies and Approaches

Four types of IFM strategies could be used Region-wide: 1) Non-Structural approaches, 2) Restoration of natural floodplain functions, 3) Structural approaches, and 4) Emergency management. These strategies are described in greater detail in Appendix 7-B, and summarized in Table 7-13 below. Appendix 7-B also provides detailed descriptions of how to apply IFM strategies.

Table 7-13: IFM Strategies

Strategy	Actions
Non-Structural Approach	
Land Use Planning	Policies, ordinances, regulations to limit development in floodplain
	Policies, ordinances, regulations to encourage land uses that are compatible with floodplain functions
Floodplain Management	Floodplain mapping and risk assessment
	Land acquisitions and easements
	Building codes and flood-proofing
	Retreat – relocation, abandonment, demolition of buildings
	Flood risk awareness (information and educations)
	Flood insurance
Restoration of Natural Floodplain Functions	
Restoration of function	Promoting natural hydrologic, geomorphic, and ecological processes
	Protecting and restoring quantity, quality, and connectivity of native floodplain habitats
	Invasive species reduction
Structural Approach	
Flood Infrastructure	Levees and floodwalls
	Channels and bypasses
	Retention and Detention Basins
	Culverts and pipes
	Shoreline and streambank stabilization
	Debris mitigation structures
Reservoir and Floodplain Storage and Operations	Storage Operations
	Groundwater Recharge
Operations and Maintenance	Maintenance of flood control structures, especially for those constructed in early to mid-Twentieth Century
Flood Emergency Management	
Emergency Management	Flood preparedness
	Emergency response
	Post-flood recovery

Development of Implementation Prioritization Evaluation Criteria

IFM strategies should be selected that will ensure the maximum number of benefits are achieved, the best location to maximize benefits is selected, that multiple flood hazard issues are addressed, and that different water resources objectives are achieved. The Workgroup used the GIS IFM watershed planning tool to evaluate different IFM opportunities. The criteria for identifying opportunities included floodplain areas, highly permeable soils, groundwater basins, riparian vegetation or sensitive habitat area, and high sediment producing areas. Opportunities were those areas where multiple criteria overlapped. The IFM Planning Study included as Appendix 7-B contains maps of each watershed in the Region showing the various opportunities that were identified.

Recommendations

As described above, flood management in the Region is the responsibility of 19 different agencies, fragmenting flood management efforts. As such, the Workgroup recommends creation of a Watershed/Floodplain Managers Forum to promote collaboration and coordination to implement IFM strategies.

The Workgroup also recommends that flood management projects include numerous alternatives in order to cover a range of available potential solutions. Analysis of these alternatives could then be used as part of any environmental or regulatory requirements, such as CEQA. Design solutions should be developed with an understanding of the underlying hydrologic and hydraulic processes. By using a "toolbox" of design components, innovative solutions may be generated that are more appropriate or effective for a given watershed than a routine alternative.

Other recommendations include:

- Improve understanding and accuracy of regional and local flood risks,
- Develop regional watershed database to assist in flood management planning,
- Develop watershed based planning, including collaboration with stakeholder groups,
- Initiate understanding and awareness of IFM,
- Identify applicable IFM strategies that can be used within the County, and
- Develop watershed planning guidance program implementing IFM through different land planning regulations.

Recommendations and actions that were selected by the RAC and RWMG for inclusion as a priority in this 2013 IRWM Plan are provided in *Chapter 11, Implementation*.

7.7 Relation to Land Use Planning

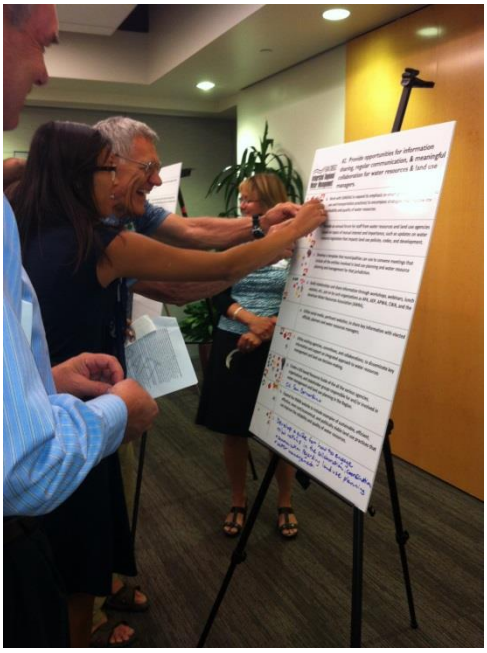
The Land Use and Water Management Study (Land Use Study) was developed by the Land Use Planning Workgroup, and was presented to the RAC and stakeholders at the February 6, 2013 RAC meeting. The Land Use Study examines how integrated land use planning and water resources management occurs in the San Diego IRWM Region, and identifies ways to improve regional collaboration and coordination between water managers and land use planners. The study found a lack of communication between water managers and land use planners in the Region and that efforts to link water management and land use decisions was often challenging. The relationships between water managers and land use planners were often reactive, instead of proactive. Recommendations included in the Land Use Study seek to resolve these issues and improve relationships between these two groups in order to promote orderly growth and development, and economic and environmental well-being of communities, while protecting water resources.

Land Use Workgroup

The Land Use Workgroup used an eight-step process to assess the current relationship between water management and land use planning in the Region: 1) Gap analysis; 2) Assessment of current collaboration and cooperation between water managers and land use planners; 3) Workshop with water managers and land use planners to solicit input on current relationships and identify issues and opportunities for collaboration; 4) Identification of strengths, opportunities, and challenges to create key issues matrix; 5) Development of a Model Water Element for use in general plan updates; 6) Development of preliminary recommendations to improve collaboration and coordination; 7) Workshop with water managers, land use planners, and stakeholders to review and comment on

draft Model Water Element; 8) Incorporation of stakeholder input on Model Water Element and Recommendations and Key Issues Matrix. The RWMG was also involved throughout the Land Use Study process to provide guidance, input, and review of deliverables.

Two workshops were held to develop the Land Use Study: May 2, 2012 and August 21, 2012. The May 2, 2012 workshop provided an opportunity for water managers, land use planners, and other stakeholders to give feedback on the survey results and the general nature of the collaborative relationships. This workshop saw 30 people in attendance. The August 21, 2012 workshop allowed the Workgroup to review and provide feedback on the draft recommendations and Model Water Resources General Plan Policy Guide, described below.



Land Use Planners and Water Managers at the workshop identified opportunities for collaboration.

Photo Credit: Rosalyn Prickett, RMC Water and Environment

7.7.1 Relevant Land Use Planning Documents

As described above, the first step in developing the Land Use Study was to conduct a data gap analysis. The Land Use Workgroup reviewed the 19 General Plans in the Region to identify gaps between water resources management and land use planning. This review sought to determine the extent to which water policy was covered within each General Plan, identify gaps in water policy in the region, and assess the complexity of water resources management as it relates to land use planning. The Regional Comprehensive Plan, produced by SANDAG, was also reviewed because it is the long-term planning framework for greater San Diego County.

In addition to the land use planning documents, the Workgroup reviewed a series of water resources management plans, such as Urban Water Management Plans, Recycled Water Master Plans, Floodplain Master Plans, and Water Supply Assessments. They found that information related to water resources management was typically found throughout the General Plans, rather than in a single, consolidated section. This is due, in part, to the variety of water management topics, including water supply and demand, water quality, wastewater treatment and disposal, watershed features and processes, flood management, and stormwater management. Another significant challenge to coordination and collaboration is the mismatch between land use planning jurisdictions and water management jurisdictions.

The gap analysis found seven major issues that contribute to the challenges of coordinated water resources management and land use planning:

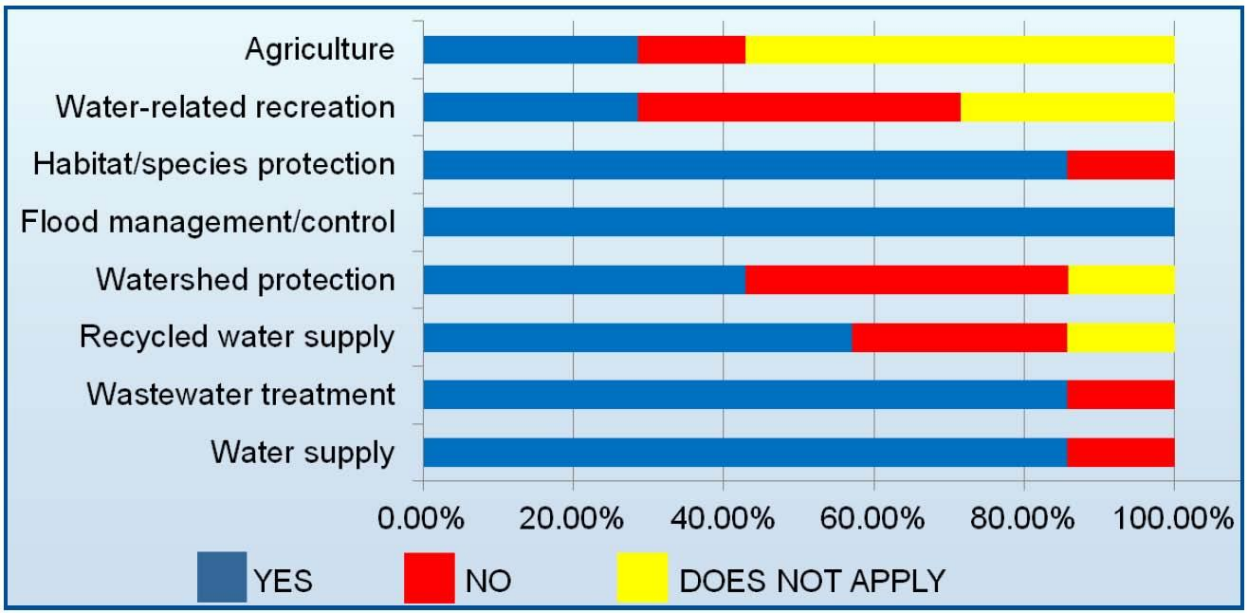
1. Plans varied greatly in time frames and preparation dates
2. General Plans lacked a dedicated Water Element
3. Communities anticipating growth focused on water policies for new development; built-out communities focused on water policies for redevelopment
4. Substantial variation in natural features affects the issues addressed in General Plans

5. Local land use control may be limited by water-related issues under jurisdiction of State and Federal agencies
6. Considerable variation was observed in the strength of long-range water policies, depending on age of General Plan
7. Responsibility for water management tasks within departments varies from agency to agency

7.7.2 Current Relationships between Water Managers and Land Use Planners

To determine the extent of existing collaboration and coordination between water managers and land use planners, and identify issues and opportunities for these relationships, the Land Use Workgroup distributed surveys to a total of 44 people, approximately half of whom were water managers and half land use planners. The Land Use Workgroup received 14 surveys back, again, approximately half from land use planners and half from water managers. The results from the survey were analyzed and presented at the first workshop. As shown in Figures 7-3, land use planners cooperate with water managers to varying degrees.

Figure 7-3: Percentage of Planning/Community Development Departments with Working Relationships with Water Resource Agencies/Staff



7.7.3 Opportunities for Collaboration

The information from the Gap Analysis, Surveys, and Workshop #1 were used to characterize the relationship between land use planners and water managers, and identify the strengths, opportunities, and challenges facing the relationship, and to develop methods to overcoming existing impediments to enable proactive, rather than reactive, relationships. Characterization of the relationship was challenging due to variation in degree of coordination, type of resource involved, and level at which coordination occurs within different agencies. The strengths, opportunities, and challenges are summarized in Table 7-14.

Table 7-14: Strengths, Opportunities, and Challenges Identified by Land Use Workgroup

Strengths	Opportunities	Challenges
• Coordination is already occurring regularly • Most planners consult with water agencies when updating General Plans • One water agency uses General Plans when doing its plan update • Most planning and water agencies work together on joint policy/implementation efforts • Urban Water Management Plans are prepared in coordination with land use projections • Land use planners and water managers from several jurisdictions participated in Land Use Study Workshops	• Beneficial to have: joint training to improve information exchange; cross training and joint activities to explore improved integration • Planners more likely than other departments to be responsible for implementation of water-resource activities • A set of water resources goals, objectives, and policies for Region would be beneficial • Legislation mandates more interaction between land use planners and water managers	• Too many silos exist, reluctance to give up authority • Awareness and understanding of issues and processes is lacking between managers and planners • Plans, policies, projects, and programs must be integrated; framework for integration needed; a universal approach will not be effective • Decision-making often does not consider impacts beyond jurisdictions • Information is extensive but not readily available • Land use planners not aware of IRWM program • General Plans do not address spectrum of water management topics and water policies are not specific enough • Challenge to address water rights with tribes • Staff does not have resources to take on extra work

Conclusion and Outcomes

The final four steps in the process involved drafting a Model Water Resources General Plan Policy Guide (Policy Guide); drafting recommendations for improved collaboration and coordination; hosting a workshop to review the draft Policy Guide and recommendations and solicit public input; and finalizing the Policy Guide, Recommendations, and Key Issues Matrix in the Land Use Study. Each of these three deliverables is available as Attachments 1, 2, and 3, respectively, in the Land Use Study found in Appendix 7-C.

The Policy Guide can assist land use planners in incorporating and addressing water management issues and needs in local land use documents. Workgroup recommendations regarding the relationship between land use planners and water managers focused on two categories:

1. Support or facilitate collaborative preparation of various joint water resources and land use planning efforts and work in the Region
2. Provide opportunities for information sharing, regular communication, and meaningful collaboration for water resources and land use managers

Recommendations that will be implemented as priority actions in the 2013 IRWM Plan are provided in *Chapter 11: Implementation*.

The Key Issues Matrix also provides recommendations to address each issue. These recommendations are broken down by actions that can be implemented by the IRWM Program, Municipalities/Land Use Planners, and Water Agencies/Managers. Details can be found in Attachment 3 of Appendix 7-C.

7.8 Relation to Climate Change Planning

The Climate Change Study, developed by the Climate Change Workgroup and approved by the RAC, serves as an initial guide for the IRWM Region for incorporating climate change adaptation and mitigation measures into IRWM Planning. To develop this guidance, the Climate Change Workgroup reviewed current climate change science, policies, and regulations, and assessed how they related to the IRWM Region.

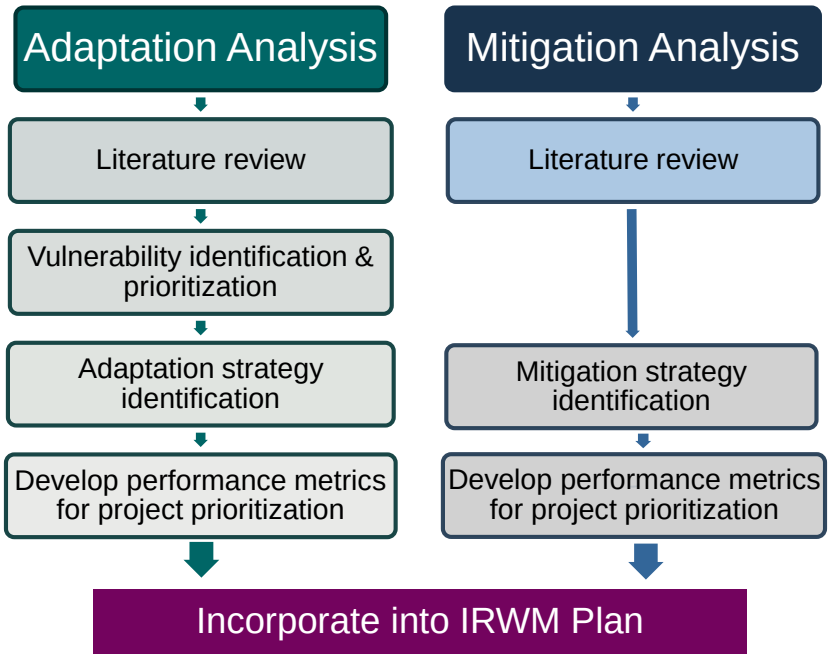
Three major climate change impacts were considered to be closely related to water resource management in the San Diego IRWM Region:

1. Temperature increases
2. Precipitation pattern changes
3. Sea level rise

Climate Change Analysis Process

The Climate Change Workgroup used the following review process, shown in Figure 7-4, to meet DWR's 2012 IRWM Plan Guidelines' Climate Change Standard.

Figure 7-4: Climate Change Analysis Process



7.8.1 Relevant Climate Change Planning Documents

To provide a context for understanding climate change, its potential impacts in the Region, and how to assess adaptation or mitigation strategies, the Climate Change Workgroup reviewed a number of climate change documents and data, including the relationship between water supplies, water infrastructure, and energy use. Water resources and energy use are linked in three primary ways: 1) Water pumping and purification, 2) Wastewater treatment, and 3) Water heating. Because of this linkage, energy use may be reduced both by conserving water and optimizing water operations.

The Climate Change Workgroup also reviewed State legislation and policies related to climate change:

- Executive Order S-3-05
- Assembly Bill 32 (AB32): The California Global Warming Solutions Act of 2006
- Climate Change Scoping Plan
- Senate Bill 97 (SB97)
- Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water
- Executive Order S-13-08
- California Climate Adaptation Strategy
- GHG Reporting Rule

Review of the AB 32-required Scoping Plan identified six GHG emissions reduction measures:

1. Water use efficiency
2. Water recycling
3. Water system energy efficient
4. Reuse of urban runoff
5. Increase renewable energy production
6. Public goods charge

The Workgroup identified The Climate Registry as a useful tool and database for agencies or entities to report GHG emissions. The San Diego County Water Authority, the County of San Diego, and the City of San Diego belong to The Climate Registry, along with a number of other agencies and organizations in the IRWM Region. A number of climate mitigation and adaptation plans for individual cities and agencies in the Region were also identified and reviewed. Finally, the Workgroup reviewed the San Diego Foundation's Climate Initiative, which recommended that every jurisdiction in the County complete a GHG emissions inventory.

The literature review conducted in this step of the process resulted in Table 7-15, a breakdown of the impacts and effects of climate change on the San Diego IRWM Region. This table was presented to and vetted by the Workgroup in June 2012.

Table 7-15: Impacts and Effects of Climate Change on Region

Impact	Effect
Temperature	1.5°F to 4.5°F average temperature increase
Rainfall	Variable projections predict between 35% drier and 17% wetter Increase in variability between years
Supply	Up to 25% decrease in SWP supply Up to 20% decrease in Colorado River supply 164,000 acre-feet per year shortfall in imported supply
Demand	Potential 0.6% to 1.8% increase in demand by 2035
Sea level rise	12 to 18 inch rise in mean sea level rise
Wildfires	40% increase in California Coastal Shrub acreage burned in Southwestern U.S. 54% increase in overall acreage burned in Western U.S.

Vulnerability Identification and Prioritization

Using DWR's *Climate Change Handbook for Regional Water Planning*, the Climate Change Workgroup developed an analysis of the Region's vulnerabilities. This analysis was the primary activity of the Climate Change Workgroup during their June 2012 workshop. Once vulnerabilities were identified, they were ranked and categorized. Vulnerabilities were categorized into five priority levels: Very High, High, Medium, Low, and Very Low. Table 7-16, below, shows the vulnerability issues and their respective rankings. Details regarding processing of vulnerabilities can be found in the Climate Change Study, included in this Plan as Appendix 7-D.

The potential risk that could arise from not addressing the climate change vulnerabilities include: insufficient water supply, inability to meet demand during droughts, poorer water quality, damage from increased flooding, damage to habitats and sensitive species, and coastal flooding and inundation of storm drains and sewer systems.

Adaptation/Mitigation Strategy Identification

Potential adaptation and mitigation strategies were identified using the State of California's *California Water Plan*, and refined through the review of other climate change reports and plans, including regional climate change documents. Strategies were identified and prioritized by determining feasibility and relevancy.

The final list of prioritized strategies is provided in Chapter 5 of Appendix 7-D.

Table 7-16: Prioritized Climate Change Vulnerability Issues

Priority Level	Category and Vulnerability Issue
Very High	Water Supply: Decrease in imported supply
High	Water Supply: Sensitivity due to higher drought potential Water Quality: Increased constituent concentrations Flooding: Increases in flash flooding and inundation (extreme weather) Ecosystem/Habitat: Decrease in available necessary habitat Sea Level Rise: Inundation of storm drains and sewer systems Ecosystem/Habitat: Decrease in ecosystem services
Medium	Water Demand: Crop demand would increase Water Demand: Industrial demand would increase Water Supply: Decrease in groundwater supply Water Quality: Increase in treatment cost Sea Level Rise: Damage to coastal recreation / tourism due to inundation
Low	Water Demand: Limited ability to conserve further Water Supply: Lack of groundwater storage to buffer drought Water Quality: Increased eutrophication Flooding: Increases in inland flooding Ecosystem/Habitat: Increased impacts to coastal species
Very Low	Water Demand: Limited ability to meet summer demand Water Supply: Invasive species can reduce supply available Water Quality: Decrease in recreational opportunity Sea Level Rise: Decrease in land Sea Level Rise: Damage to ecosystem/habitat Ecosystem/habitat: Decrease in environmental flows Hydropower: Decrease in hydropower potential

7.8.2 Opportunities for Collaboration

The Climate Change Study contains a list of recommendations for successful implementation of identified climate change adaptation and mitigation strategies. These recommendations focus on implementation of adaptive management, and prioritization of projects that address climate change impacts.

Adaptive management uses a flexible path of actions in order to implement different measures if key risk triggers or early warning indicators are met. This allows managers to plan for and adjust management strategies to best respond to changes, which can be important when managing issues with high uncertainty, such as climate change. According the Climate Change Handbook, there are five steps in an adaptive management plan:

1. Identify risk triggers associated with important vulnerabilities or uncertainties
2. Quantify impacts and uncertainties
3. Evaluate strategies and define an implementation path that allows for multiple options at specific triggers
4. Monitor performance and critical variables in the system
5. Implement or reevaluate strategies when triggers are reached

In addition to adaptive management, the Climate Change Workgroup recommended prioritizing projects that help to address climate change, which may be done in two ways: 1) Include climate

change adaptation or mitigation in the IRWM Plan Objectives, and 2) Include a weighted climate change scoring category in project selection, based on strategy prioritization described above. Both of these recommendations have been incorporated into this 2013 IRWM Plan (see Objective K, *Chapter 2, Vision and Objectives* and Table 9-2, *Chapter 9, Project Evaluation and Prioritization*).

7.9 Summary of Agency Coordination

As described in *Chapter 6, Governance and Stakeholder Involvement*, the San Diego IRWM program facilitates the RAC and Workgroups to allow for agency coordination and communication. These stakeholder groups enable the various planning entities within the Region to communicate about the water resource issues and challenges they are facing, as well as IRWM-funded projects and programs. Increased knowledge of what other entities are doing allows stakeholders to partner or combine activities and reduce redundancies.

As described in *Chapter 3, Region Description*, the San Diego RWMG cooperates with the two neighboring IRWM regions in the San Diego Funding Area on topics of mutual interest: the Upper Santa Margarita and South Orange County IRWM Regions. The three RWMGs coordinate directly through the Tri-County FACC's period meetings and conference calls. The group addresses water management issues that occur within the two watersheds that overlap Region boundaries: Santa Margarita River and San Juan. The group is specifically tasked through their MOU to identify projects that will address issues within the overlay areas (see *Chapter 3, Region Description*). For example, the Upper Santa Margarita and San Diego IRWM Regions both submitted a joint project in Proposition 84-Rounds 1 and 2 that document and address nutrient loading in the Santa Margarita River Estuary and tributaries. Although the three RWMGs coordinate directly through the Tri-County FACC, they have not consolidated into a single IRWM region because of differences in political boundaries, water management infrastructure, regulatory permitting, and land use authority.

As described above, the IRWM Program coordinates directly with numerous local planning entities on water resource issues and projections. Other State and federal agencies participate in the IRWM Program through the RAC and stakeholder email list (see Table 6-4 in *Chapter 6, Governance and Stakeholder Involvement).*

7.10 References

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8 Resource Management Strategies

This chapter addresses requirements set forth in the Resource Management Strategies (RMS) Standard in the *2012 IRWM Program Guidelines* (DWR, 2012). As such, this chapter considers each RMS listed in the *California Water Plan (CWP) Update 2009* (DWR, 2009), documents which RMS will help achieve the 2013 IRWM Plan objectives, presents all RMS considered for the IRWM Plan Update, and includes an evaluation of the adaptability of water management systems in the San Diego IRWM Region to climate change.

8.1 Overview

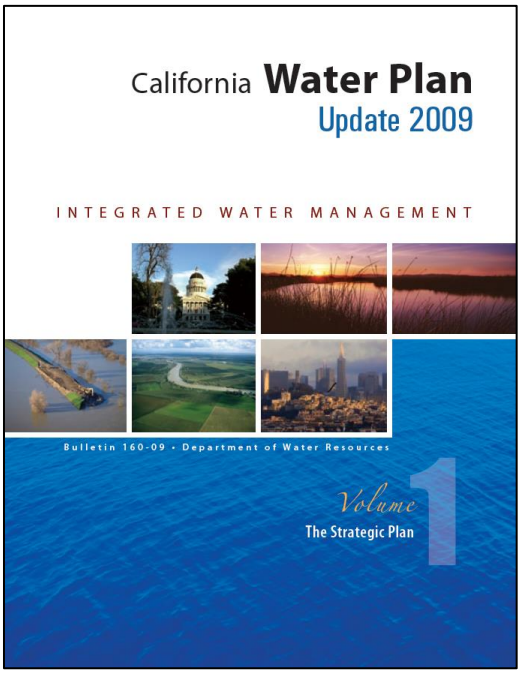
The *2012 IRWM Program Guidelines* require that an IRWM Plan consider each RMS listed in the *CWP Update 2009.* As part of the stakeholder outreach and involvement process conducted for the 2013 IRWM Plan (refer to *Chapter 6, Governance and Stakeholder Involvement*), stakeholders were asked to provide input on other potentially applicable RMS that could be considered in the 2013 IRWM Plan. Those additional RMS are described in Sections 8.2 and 8.4 below.

8.1.1 Resource Management Strategies in *California Water Plan Update 2009*

Division 43, Chapter 2, Section 75206(a) of the California Water Code authorizes funding (pursuant to Proposition 84) for long-term water needs of the state, and requires that eligible projects implement IRWM Plans that address the water management strategies identified within the *CWP Update 2009*:

> *Eligible projects must implement regional water management plans that meet the requirements of this section. Integrated regional water management plans shall identify and address the major water related objectives and conflicts within the region, consider all of the resource management strategies identified in the California Water Plan, and shall use an integrated, multi-benefit approach to project selection and design.*

Table 8-1 below lists RMS included within the *CWP Update 2009*, listed by the categories generated by the California Department of Water Resources (DWR).



California Water Plan Update 2009 contains a wide range of water management strategies.

Table 8-1: Resource Management Strategies Addressed in *California Water Plan Update 2009*

No.	RMS within CWP Update 2009[1]	Strategy Overview	Included in 2013 IRWM Plan
Reduce Water Demand			
1	Agricultural Water Use Efficiency	Increasing water use efficiency and achieving reductions in the amount of water used for agricultural irrigation. Includes incentives, public education, and other efficiency-enhancing programs.	Yes
2	Urban Water Use Efficiency	Increasing water use efficiency by achieving reductions in the amount of water used for municipal, commercial, industrial, irrigation, and aesthetic purposes. Includes incentives, public education, and other efficiency-enhancing programs.	Yes
Improve Operational Efficiency and Transfers			
3	Conveyance - Delta	Maintaining, optimizing use of, and increasing the reliability of conveyance facilities associated with the Bay-Delta. Included within this strategy is Bay-Delta restoration efforts.	Yes
4	Conveyance – Regional/Local	Strategies include improvement conveyance systems, upgrading aging distribution systems, promoting development of more extensive interconnections among water resources systems, establishing performance metrics for quantitative and qualitative indicators (e.g., quantity of deliveries, miles of rehabilitated conveyance facilities, and resiliency of conveyance to earthquakes and fewer regulatory conflicts), and assuring adequate resources to maintain the condition and capacity of existing constructed and natural conveyance facilities.	Yes
5	System Reoperation	Managing surface storage facilities to optimize the availability and quality of stored water supplies and to protect/enhance beneficial uses. Includes balancing supply and delivery forecasts, coordinating and interconnecting reservoir storage, and optimizing depth and timing of withdrawals.	Yes
6	Water Transfers	Contracting to provide additional outside sources of imported water to the Region over and above contracted State Water Project and Colorado River supplies	Yes
Increase Water Supply			
7	Conjunctive Management and Groundwater Storage	Using and managing groundwater supplies to ensure sustainable groundwater yields while maintaining groundwater-dependent beneficial uses, including coordinating management of groundwater and surface water supplies (conjunctive use)	Yes
8	Desalination	Developing potable water supplies through desalination of seawater and brackish groundwater. Includes disposal of waste brine.	Yes
9	Precipitation Enhancement	Strategy involves increasing precipitation yields through cloud seeding or other precipitation enhancing measures.	No
10	Recycled Municipal Water	Developing usable water supplies from treated municipal wastewater. Includes recycled water treatment, distribution, storage, and retrofitting of existing uses.	Yes
11	Surface Storage – CALFED	Strategy involves developing additional CALFED storage capacity or more efficiently using existing CALFED storage capacity.	Yes
12	Surface Storage – Regional/Local	Developing additional yield through construction or modification (enlargement) of local or regional surface reservoirs or developing surface storage capabilities in out-of-region reservoirs.	Yes
Improve Water Quality			
13	Drinking Water Treatment and Distribution	Includes improving the quality of the potable supply delivered to potable water customers by increasing the degree of potable water treatment. Strategy also may include conveyance system improvements that improve the quality of supply delivered to treatment facilities.	Yes

No.	RMS within CWP Update 2009[1]	Strategy Overview	Included in 2013 IRWM Plan
14	Groundwater and Aquifer Remediation	Includes strategies that remove pollutants from contaminated groundwater aquifers through pumping and treatment, in situ treatment, or other means.	Yes
15	Matching Water Quality to Use	Optimizing existing resources by matching the quality of water supplies to the required quality associated with use.	Yes
16	Pollution Prevention	Strategies that prevent pollution, including public education, efforts to identify and control pollutant contributing activities, and regulation of pollution-causing activities. Includes identifying, reducing, controlling, and managing pollutant loads from non-point sources.	Yes
17	Salt and Salinity Management	Recommendations that encourage stakeholders to proactively seek to identify sources, quantify the threat, prioritize necessary mitigation action and work collaboratively with entities with the authority to take appropriate actions.	Yes
18	Urban Runoff Management	Includes strategies for managing or controlling urban runoff, including intercepting, diverting, controlling, or managing stormwater runoff or dry season runoff.	Yes
Practice Resources Stewardship			
19	Agricultural Lands Stewardship	Includes strategies for promoting continued agricultural use of lands (e.g. agricultural preserves), strategies to reduce pollutants from agricultural lands, and strategies to maintain and create wetlands and wildlife habitat within agricultural lands. Stewardship strategies for agricultural lands include wetlands creation, land preserves, erosion reduction measures, invasive species removal, conservation tillage, riparian buffers, and tailwater management.	Yes
20	Economic Incentives	Includes economic incentives (e.g. loans, grants, water pricing) to promote resource preservation or enhancement.	Yes
21	Ecosystem Restoration	Strategies that restore impacted or impaired ecosystems, and may include invasive species removal, land acquisition, water quality protection, re-vegetation, wetlands creation and enhancement, and habitat protection and improvement, habitat management and species monitoring.	Yes
22	Forest Management	Strategies that promote forest management include long-term monitoring, multi-party coordination, improvement in communications between downstream water users and communities and upstream forest managers, residents, and workers, and revisions of water-quality management plans between the State Water Board and forest management agencies to address concerns with impaired water bodies.	No
23	Land Use Planning and Management	Includes land use controls to manage, minimize, or control activities that may negatively affect the quality and availability of groundwater and surface waters, natural resources, or endangered or threatened species.	Yes
24	Recharge Area Protection	Includes land use planning, land conservation, and physical strategies to protect areas that are important sources of groundwater recharge.	Yes
25	Water-Dependent Recreation	Enhancing and protecting water-dependent recreational opportunities and public access to recreational lands.	Yes
26	Watershed Management	Comprehensive management, protection, and enhancement of groundwater and surface waters, natural resources, and habitat	Yes
Improve Flood Management			
27	Flood Risk Management	Strategies that decreasing the potential for flood-related damage to property or life including control or management of floodplain lands or physical projects to control runoff.	Yes

No.	RMS within CWP Update 2009[1]	Strategy Overview	Included in 2013 IRWM Plan
Other			
28	Other Strategies	Other RMS include: • Crop Idling for Water Transfers • Dewvaporation/Atmospheric Pressure Desalination • Fog Collection • Irrigated Land Retirement • Rainfed Agriculture • Waterbag Transport/Storage Technology	No
San Diego IRWM Region RMS (not included in the *CWP Update 2009*)			
N/A	N/A	San Diego IRWM Region-Specific RMS include: • Stakeholder and Community Involvement • Water Resources Data Collection, Management, and Assessment • Scientific and Technical Water Quality Management and Enhancement • Wastewater Management	Yes

Source: DWR, 2009

8.2 Resource Management Strategies Considered and Selected for the 2013 IRWM Plan

8.2.1 California Water Plan Update 2009

As required by DWR in the 2012 IRWM Program Guidelines, this IRWM Plan Update considered each RMS included in the *CWP Update 2009.* Each of these RMS is included in Table 8-1 above, and are analogous to those RMS included within the 2012 IRWM Program Guidelines (DWR, 2012). For purposes of presenting and discussing RMS, the 2013 IRWM Plan utilizes the RMS organizational structure and convention set forth in the *CWP Update 2009*.

8.2.2 Resource Management Strategies Specific to the 2013 IRWM Plan

In addition to the RMS listed within the *CWP Update 2009,* RMS specific to the San Diego IRWM Region were considered for inclusion within the 2013 IRWM Plan. The 2007 IRWM Plan included three Region-specific RMS, which were re-evaluated by stakeholders as part of the 2013 IRWM Plan. Those additional RMS include:

1. *Stakeholder and Community Involvement* – Strategies to involve stakeholders in water resources planning or management activities, including public outreach and education.
2. *Water Resources Data Collection, Management, and Assessment* – Includes collection, analysis, and management of water resources data to support regional water management activities.
3. *Scientific and Technical Water Quality Management Knowledge Enhancement* – Includes technical and scientific analysis to support regulatory compliance issues and options, regional coordination, and compliance.

During the August 1, 2012 workshop in which stakeholders were asked to discuss and vet RMS, San Diego IRWM stakeholders determined that the additional RMS included within the 2007 IRWM Plan were appropriate for the 2013 IRWM Plan. During the public comment period that was held for the Public Draft 2013 IRWM Plan, several comments were received that recommended the addition of another RMS beyond those included in the 2007 IRWM Plan and the *CWP Update 2009*. The additional RMS, *Wastewater Management*, addresses management of wastewater flows as a water resource, for public and environmental health, and for improved efficiency.

RMS exercise conducted at joint Public Workshop/RAC Meeting in August 2012

Photo Credit: Rosalyn Prickett, RMC Water and Environment

8.3 Documenting the Process

One of the priorities of the IRWM Program is to maximize stakeholder involvement and input into the IRWM planning process. As such, members of the Regional Water Management Group (RWMG), Regional Advisory Committee (RAC), and the public were asked to discuss and vet resource management strategies during a public workshop held on August 1, 2012.

IRWM stakeholders were asked to consider all RMS listed within the *CWP Update 2009,* the additional RMS included within the 2007 IRWM Plan, and any additional RMS that may be relevant to the Region. Stakeholders were also asked to consider whether each RMS is being implemented within the Region and if so, to provide an example. Further, as described in detail in Section 7.8 in *Chapter 7, Regional Coordination*, the Climate Change Workgroup also evaluated each RMS in terms of how they could help the Region to address climate change vulnerabilities or mitigate greenhouse gas emissions. The public comment period for the Public Draft 2013 IRWM Plan provided another opportunity for stakeholders to consider the RMS included in the 2013 IRWM Plan.

Section 8.4 includes a compilation of RMS examples that are currently implemented in the Region, the majority of which were provided by IRWM stakeholders.

8.3.1 Selected IRWM Plan Resource Management Strategies

Stakeholder review and consideration of RMS for inclusion within the 2013 IRWM Plan involved considering the potential applicability of each strategy to the Region. Specifically, stakeholders were asked to consider how each RMS could potentially help the Region to meet the San Diego IRWM Objectives in *Chapter 2: Vision and Objectives*. Upon reviewing all RMS listed within the *CWP Update 2009,* as well as the three additional RMS included within the 2007 IRWM Plan, stakeholders determined that two RMS are only partially relevant to the San Diego IRWM Region. Although these two RMS are critical for supply reliability for the Region, they will not be implemented within the Region itself. Because of the importance of these RMS for the Region's imported water supply, they are included in this 2013 IRWM Plan:

1. Conveyance – Delta (#3)
2. Surface Storage – CALFED (#11)

IRWM stakeholders also noted that the following RMS are not applicable to the Region due to the fact that they cannot be realistically implemented or are not directly applicable to the Region. These eight RMS were not selected by the Region's stakeholders for inclusion within the 2013 IRWM Plan:

1. Precipitation Enhancement (#9)
2. Forest Management (#22)
3. Crop Idling for Water Transfers (#28, Other Strategies)
4. Dewvaporation /Atmospheric Pressure Desalination (#28, Other Strategies)
5. Fog Collection (#28, Other Strategies)
6. Irrigated Land Retirement (#28, Other Strategies)
7. Rainfed Agriculture (#28, Other Strategies)
8. Waterbag Transport/Storage (#28, Other Strategies)

As such, 28 strategies were selected for inclusion within the 2013 IRWM Plan, including the four additional RMS identified locally.

8.4 Current Application of Water Management Strategies in Region

Determining the applicability of RMS to the San Diego IRWM Region was done, in part, by assessing how the Region may already implement those RMS listed within the *CWP Update 2009.* The following sections include a description of each RMS and examples of current efforts in the San Diego IRWM Region that involve implementation of the RMS included in Table 8-1.

8.4.1 Agricultural Water Use Efficiency

Agricultural water use efficiency is practiced both by private agricultural businesses and by local water agencies. The San Diego County Water Authority (Water Authority) and local agencies maintain programs to encourage agricultural water conservation and increase efficiency of use. Water costs represent a significant portion of the overall operating costs for many growers within the Region and economic factors have led to significant improvements in agricultural water use efficiency within the Region during the past 30 years. The Water Authority's Agricultural Water Management Program provides free irrigation system evaluations for agricultural operations of one acre or more (Winzler and Kelly et al., 2011). Additional irrigation efficiency expertise, technology, and advice are available to the Region's agricultural businesses through the University of California Agricultural Extension, U.S. Natural Resource Conservation Service, and local growers' organizations.

8.4.2 Urban Water Use Efficiency

The Water Authority and local water agencies currently implement programs to enhance urban water use efficiency within the Region. The Water Authority offers numerous programs to assist customers in using water more efficiently, including residential surveys, retrofits, a landscape efficiency program, voucher programs to encourage flow-efficient toilets and washing machines, and a commercial/industrial/institutional water efficiency program. Local water agencies assist the Water Authority in implementing urban water use efficiency programs, resulting in water conservation savings that are projected to increase by approximately 118,000 AFY to an estimated 174,000 AFY of savings by 2035 (see *Chapter 3, Region Description*) (Water Authority, 2011). Local municipalities encourage conservation through land use regulations, building codes, and incentives.

Urban water use efficiency programs focus on conversion to water wise landscaping.

Photo Credit: Toby Roy, San Diego County Water Authority

Three Water Conservation Summits (2006, 2007, and 2009) were held to bring regional water and land use agencies and urban landscape stakeholders together to shape the future of water conservation in the Region, outline the actions needed to change the conservation ethic, and demonstrate how to implement water conservation programs.

***Urban Water Use Efficiency* RMS in the San Diego IRWM Region**

San Diego County Water Authority - Sustainable Landscapes Program

The Sustainable Landscapes Program is designed to reduce water waste and pollutant infiltration into local waterways through the development and implementation of landscape standards and specifications generally consistent with the California Model Water Efficient Landscape Ordinance and the San Diego Regional Water Quality Control Board Municipal Stormwater Permit. This project is sponsored by the Water Authority and is being developed in partnership with City of San Diego, County of San Diego, California American Water, and non-profit partners such as California Center for Sustainable Energy, Surfrider Foundation, and Association of Compost Producers. The Sustainable Landscapes Program relies on the integration of landscape standards and specifications development, education and training, materials, incentives, outreach, and technical assistance to achieve project goals (water waste and pollution reduction). The project is targeted towards the residential sector, but also includes commercial participants. Project benefits expected to accrue through 2022 include:

- water use reduction
- green waste reduction
- labor reductions associated with maintenance
- carbon dioxide emissions reduction
- water quality improvements

Landscape standards and specifications are underway. Education and training curriculums have been developed by the Water Authority and will be geared towards the residential sector. Technical assistance has been initiated; the Water Authority is in the process of hiring a consultant on a limited basis to provide technical assistance to three pilot sites.

Source: San Diego Integrated Regional Water Management, January 2011

***Urban Water Use Efficiency* RMS in the San Diego IRWM Region**
Biogen Idec – Use of Recycled Water in Cooling Towers Biogen Idec is a biotechnology firm that specializes in the development of therapeutic products for the medical field. Biogen Idec was one of the first companies to use recycled water from the North City Water Reclamation Plant. The company has used recycled water for irrigation of its 42-acre campus in San Diego since 2004 and in its cooling towers since November 2006. The cooling towers at Biogen Idec are the largest users of water in the facility. Conversion to recycled water has allowed Biogen Idec to realize significant cost savings through discounted rates and has provided Biogen Idec with a drought-proof source of water. *Sources: San Diego County Water Authority, NDc; San Diego County Water Authority, 2009a*

8.4.3 Conveyance – Delta

As described in *Chapter 3, Region Description*, the Region receives imported water supply from the State Water Project; therefore, the Region relies upon conveyance facilities associated with the Sacramento-San Joaquin River Delta (Bay-Delta) for water supply.

Although implementation activities that directly improve or enhance the Delta would not be located within the Region, such activities could be financially and politically supported by the Region. For example, the Water Authority's *2010 Urban Water Management Plan* identified advocating for near-term actions and permanent fixes to the Delta as a potential strategy for managing future water uncertainties (Water Authority, 2010). As of this writing, the Water Authority has not endorsed any specific proposal under consideration to restore the Bay-Delta ecosystem and create a more reliable water supply for California.

8.4.4 Conveyance – Regional/Local

The Water Authority aqueduct system delivers both treated and untreated water to the Region. Conveyance facilities for flood flows include lined or armored flood channels, culverts, natural stream courses, and storm drains. Member agency operations for conveying local reservoir supplies include:

- Pipelines (e.g. Hodges, Olivenhain, San Vicente, El Capitan, Sweetwater, and Otay Reservoirs)
- Releases to natural stream channels (e.g. Sutherland, Loveland, Morena, and Cuyamaca Reservoirs)
- Canals, surface channels, and flumes (e.g. Wohlford, Barrett and Henshaw)

Alternative pipeline transmission facilities are located between reservoirs within the Region to provide system flexibility in an earthquake emergency. Provision of such pipelines enhances reliability without augmenting supplies by increasing flexibility to move water between storage locations and points of use.

8.4.5 System Reoperation

All local reservoir-operating agencies (see *Chapter 3, Region Description*) employ some form of system operation and reservoir management. Key reservoir reoperation/management programs within the Region include the following reservoirs that capture local runoff, serve large water treatment facilities, are connected to the imported water system, and are interconnected with other local reservoirs:

- San Vicente Reservoir (City of San Diego),
- Sweetwater Reservoir (Sweetwater Authority),

- Otay Reservoir (City of San Diego), and
- El Capitan Reservoir (City of San Diego).

The Water Authority works with its member agencies through storage agreements and aqueduct operating plans to optimize the use of local storage (Water Authority, 2011). The storage agreements allow for carryover storage in member agency reservoirs and provide increased local storage, which can be used during peak demands on the aqueduct system. The aqueduct operating plans coordinate imported water deliveries and optimize reservoir fill opportunities. The Water Authority will also coordinate with its member agencies to model and evaluate whether other opportunities for storage optimization exist as part of preparing its *2012 Regional Water Facilities Optimization and Master Plan Update*.

The San Vicente Dam Raise will contribute to long-term water supply reliability for the region.

Photo Credit: Toby Roy, San Diego County Water Authority

***System Reoperation* RMS in the San Diego IRWM Region**
City of San Diego, Hypolimnetic Oxygen Demand Investigation - San Vicente Reservoir The City installed hypolimnetic oxygenation systems in several of its reservoirs to study the ability to manage anoxia and sediment nutrient release. These reservoirs include San Vicente, Otay, and El Capitan Reservoirs. Results of the study showed that hypolimnetic oxygenation can improve water quality by decreasing hypolimnetic accumulation of compounds that complicate potable water treatment. Historically, aeration systems have been undersized because designers have not accounted for increases in sediment oxygen demand resulting from the operation of aeration systems. A comprehensive study was performed to estimate the hypolimnetic oxygen demand in San Vicente Reservoir, a eutrophic raw water reservoir in San Diego. Experiments confirmed that maintenance of a well-oxygenated sediment-water interface inhibited the release of certain compounds from sediments. In addition, modeling showed that operation of an oxygenation system would not significantly affect thermal stratification. The results of this investigation will help the City to improve management of its reservoirs by taking actions to increase oxygen within lower layers of the reservoirs to improve water quality and potentially reduce water treatment needs. *Source: Journal of Environmental Engineering (Volume 133, Issue 2), 2007*

8.4.6 Water Transfers

As discussed in *Chapter 3, Region Description*, the Water Authority has implemented water transfer agreements to take delivery of conserved agricultural water from the Imperial Irrigation District and water conserved through lining the All-American and Coachella Canals in Imperial County. Local water agencies have implemented agreements and facilities to allow for transfer of supplies among agencies.

***Water Transfer* RMS in the San Diego IRWM Region**
San Diego County Water Authority – Water Transfer On April 29, 1998, the Water Authority signed an agreement with the Imperial Irrigation District for the long-term transfer of conserved Colorado River water to San Diego County. The Water Authority–Imperial Irrigation District Water Conservation and Transfer Agreement is the largest agriculture-to-urban water transfer in United States history. Colorado River water is being conserved by Imperial Valley farmers who voluntarily participate in the program, and then transferred to the Water Authority for use in San Diego County. Deliveries into San Diego County from the transfer began in 2003 with an initial transfer of 10,000 AF. The Water Authority received increasing amounts of transfer water each year, according to a water delivery schedule contained in the transfer agreement. In 2012, the Water Authority received approximately 90,000 AF. The quantities will increase annually to 200,000 AF by 2021 then remain fixed for the duration of the transfer agreement. The initial term of the Transfer Agreement is 45 years, with a provision that either agency may extend the agreement for an additional 30-year term. During dry years, when water availability is low, the conserved water will be transferred under the Imperial Irrigation District's 's Colorado River rights, which are among the most senior in the Lower Colorado River Basin. Without the protection of these rights, the Water Authority could suffer imported water delivery cutbacks. *Source: San Diego County Water Authority, 2011*

8.4.7 Conjunctive Management and Groundwater Storage

As shown in *Chapter 3, Region Description*, approximately ten of the region's major water agencies incorporate groundwater as part of their water supply portfolio. Groundwater supplies are projected to comprise 28,360 AFY of supply for Water Authority member agencies by 2035 (see Section 3.10 in *Chapter 3, Region Description*). The Region's water agencies have prepared groundwater resources development and management plans for many of the Region's groundwater basins.

Groundwater represents the sole source of supply throughout much of the less developed eastern portion of the Region outside the Water Authority's service area. Groundwater that can be extracted and used as a potable water supply with minimal treatment generally occurs within the upper reaches of the east–west trending watersheds and outside the influence of human activities. Because no backup supply exists in areas outside the Water Authority's service area, management of groundwater is critical to ensuring continued water availability to this portion of the Region's population.

Groundwater that is high in salts and total dissolved solids (TDS) and other contaminants, and requires advanced treatment prior to potable use, is typically found in shallow basins in the downstream portions of watersheds. Brackish groundwater recovery projects use membrane technology, principally reverse osmosis, to treat extracted groundwater to potable water standards. The City of Oceanside's 6.37-million-gallon per day (MGD) capacity Mission Basin Desalter and the Sweetwater Authority's existing 4.0-MGD Richard A. Reynolds Groundwater Desalination Facility are currently the only operating brackish groundwater recovery and treatment facilities within the Water Authority's service area (Water Authority, 2011). Unit costs for brackish groundwater recovery projects are considerably higher than those for simple groundwater extraction and disinfection projects due to the additional treatment requirements and the cost of concentrate (brine) disposal. However, where economical options exist for disposal of brine, this type of groundwater project has proven to be an economically sound water supply option (Water Authority, 2011). Because most of the higher-quality groundwater within the Water Authority's service area is already being fully utilized, the focus for future local groundwater development is brackish groundwater recovery and treatment.

Artificial recharge and recovery projects, also referred to as conjunctive-use projects, can increase groundwater basin yields by supplementing the natural recharge process. Conjunctive use represents an important form of groundwater management, which could be implemented in the

Region to ensure the sustainability of the Region's groundwater supplies. FPUD, Camp Pendleton, Padre Dam MWD, and Helix WD are currently exploring the feasibility of such projects (Water Authority, 2011).

8.4.8 Desalination

The Water Authority's *2010 Urban Water Management Plan* establishes a target of 56,000 AFY of seawater desalination within the Region by 2035 based on the proposed regional seawater desalination project (see *Chapter 3, Region Description*). This desalination capacity would be provided by the Carlsbad Desalination Project, through which the Water Authority would purchase between 48,000 and 56,000 acre-feet per year (AFY) of desalinated seawater. The Carlsbad Desalination Project, which is currently under construction, includes a seawater desalination plant and conveyance pipelines that are being developed by a private, investor-owned company (Poseidon Resources). The Water Authority also is modifying its aqueduct system to incorporate this new water supply. The seawater desalination plant would be located on industrially zoned land adjacent to the Encina Power Station and Agua Hedionda Lagoon, in Carlsbad (Water Authority 2013a). The Water Authority is also engaged in other desalination efforts in the Region, including the Camp Pendleton Seawater Desalination Project and the Rosarito Beach Bi-national Desalination Plant Feasibility Evaluation and Preliminary Design Project.

The Region also participates in several efforts to desalinate brackish groundwater. Currently, there are two projects within the Region being implemented that desalinate brackish groundwater. As described above, the City of Oceanside's 6.37-MGD capacity Mission Basin Desalter and the Sweetwater Authority's existing 4.0-MGD Richard A. Reynolds Groundwater Desalination Facility are the only currently operating brackish groundwater recovery and treatment facilities within the Water Authority's service area (Water Authority, 2011).

***Desalination* RMS in the San Diego IRWM Region**

San Diego County Water Authority – Carlsbad Desalination Project and Camp Pendleton Desalination Project

The Water Authority currently imports approximately 70 percent of its water supply from Metropolitan Water District of Southern California (Metropolitan). Metropolitan's ability to provide reliable water supplies, particularly in dry years, is constrained by the preferential right of each of its member agencies, as well as by uncertainties regarding the continued reliability of the State Water Project and the Colorado River. For these reasons, developing new, local water supplies for the region, such as desalination, is a key component in the Water Authority's water supply diversification efforts. The two projects currently under development within San Diego County are the Carlsbad Desalination Project and the Camp Pendleton Seawater Desalination Project.

The Carlsbad Desalination Project is located at the Encina Power Station in Carlsbad, California. It is being developed by Poseidon Resources. In addition to the treatment facility, the project would involve a new pipeline connection to the Water Authority's existing regional aqueduct system. The Water Authority is participating in the Carlsbad Desalination Project as a potential purchaser of product water from the facility. The Carlsbad Desalination Project has obtained all required permits and environmental clearances and when completed will provide a highly reliable local supply of 48,000 to 56,000 AFY for the Region.

The Water Authority, with participation from U.S. Marine Corps Base Camp Pendleton, is evaluating the cost and feasibility of a desalination plant located at Camp Pendleton. The Camp Pendleton desalination plant would provide between 50 and 150 million gallons per day of desalinated. Following the completion of a feasibility study in 2009, the Water Authority will conduct further technical studies at the proposed facility site. The studies include hydrogeological, geophysical, and ocean and marine life investigations and will also review new power supply facility needs, conveyance, and integration into the existing Water Authority infrastructure.

Source: San Diego Water Authority, 2009b and San Diego County Water Authority, 2013a

8.4.9 Precipitation Enhancement

Regional efforts do not currently focus on precipitation enhancement as an important water management strategy in the Region as a result of (1) the highly seasonal nature of precipitation in the region, (2) the potential for flash flooding, and (3) the virtually nonexistent role of snow pack in storing water within the Region. While precipitation enhancement is not an important strategy for the Region, the City of San Diego has periodically experimented with precipitation enhancement as a means of increasing runoff to local reservoirs. Upon review, stakeholders determined the precipitation enhancement strategy is not an appropriate RMS for the San Diego IRWM Region.

8.4.10 Recycled Municipal Wastewater

Recycled water is currently produced and distributed by many of the Region's water and recycled water agencies. Tertiary treatment capacity within the Region is currently approximately 40 MGD, and the Region's water supply plans propose to increase recycled water use within the Region from 28,000 AFY in year 2010 to 50,000 AFY by year 2035 (see Section 3.5.5 in *Chapter 3, Region Description*) (Water Authority, 2011). Attaining this recycled water use target will involve expanding existing recycled water distribution systems, increasing the number of users, and increasing the variety of recycled water uses.

Recycled water can be used for landscape irrigation, cooling towers, and ornamental ponds.

Photo Credit: Jeff Pasek, City of San Diego

Currently, recycled water (tertiary-treated wastewater) is used exclusively for non-potable purposes, such as irrigation and industrial use. The Region is exploring potable reuse, purifying tertiary treated wastewater with advance treatment technology, as a potential future water supply. The City of San Diego has been conducting a demonstration project for indirect potable reuse, which involves blending purified water with raw water sources in an environmental buffer (in this case, a reservoir) prior to re-treating the water at a drinking water treatment plant. The City of San Diego is also working with the WateReuse Foundation to study various treatment trains for direct potable reuse which would involve the same process as indirect potable reuse without an environmental buffer.

Several agencies – including the City of San Diego, City of Escondido, City of Oceanside, Padre Dam Municipal Water District, and San Elijo Joint Powers Authority – are exploring different technologies that would allow for future potable reuse. While potable reuse is currently in planning and pilot study stages in the Region, full implementation would provide many benefits allowing the Region to expand the use of recycled water supplies, which are currently underutilized.

***Recycled Municipal Wastewater* RMS in the San Diego IRWM Region**
City of San Diego - Water Purification Demonstration Project The City of San Diego has undertaken the Water Purification Demonstration Project to evaluate the feasibility of using advanced treatment technology on tertiary recycled water that can be sent to a local reservoir, blended with other raw water, and then treated and distributed as potable water (also known as indirect potable reuse/reservoir augmentation). The Water Purification Demonstration involves: • Designing, constructing, and operating a 1-MGD Advanced Water Purification Facility at the North City Water Reclamation Plant; • Conducting a study to establish residence time, dilution and water quality parameters of purified water in San Vicente Reservoir; • Defining the State of California State regulatory requirements for a full-scale indirect potable reuse/reservoir augmentation project; • Performing a pipeline alignment study; and • Conducting a public education and outreach program, including tours of the Advanced Water Purification Facility. The Water Purification Demonstration Project puts the City on a path to (1) achieve a more reliable and local source of water and (2) minimize wastewater discharges into the ocean. Although the initial testing phase is complete, operation of the Advanced Water Purification Facility is ongoing. The Public Utilities Department has successfully obtained grant funding for research to help define regulatory criteria for direct potable reuse (a process in which purified water is a raw water supply immediately upstream of a water treatment plant). San Diego's Advanced Water Purification Facility is ideal for these studies because it uses full-scale components already in place. In the case of direct potable reuse, the absence of an environmental barrier (i.e local reservoir) could be compensated through the following: • Additional treatment process or other engineered barriers that increase overall system redundancy and reliability. • Infallible or best available water quality monitoring strategies for each treatment process to achieve real-time control. Real-time monitoring serves to identify treatment breakthroughs and alert the need for immediate system shutdowns to prevent sub-standard water from reaching potable water supplies San Diego IRWM funding has supported research focused on identifying strategies and evaluating their effectiveness pertaining to the above via the Advanced Water Purification Facility Extended Testing Project and the Failsafe Potable Reuse Project. *Source: City of San Diego. 2013. Water Purification Demonstration Project, Project Report, July 2013. 129 pp, plus appendices.*
North San Diego County Regional Recycled Water Project North San Diego County water and wastewater agencies are collaborating to connect the region's recycled water infrastructure – taking inventory of where there are available supplies of wastewater and where there are demands for recycled water for irrigation or industrial uses. The North San Diego Water Reuse Coalition consists of Carlsbad Municipal Water District, City of Escondido, City of Oceanside, Leucadia Wastewater District, Olivenhain Municipal Water District, Rincon del Diablo Municipal Water District, San Elijo Joint Powers Authority, Santa Fe Irrigation District, Vallecitos Water District, Vista Irrigation District, and U.S. Marine Corps Camp Pendleton. The Coalition's project will maximize recycled water use among the agencies, develop interconnections to more efficiently distribute recycled water, and construct new water reclamation facilities to increase the supply of recycled water available to each of these agencies' respective customers. Regional planning, design, environmental compliance, and construction is underway, all supported with San Diego IRWM funding. By working together, these agencies are demonstrating a commitment to provide a reliable, drought-proof source of water for the region and reduce discharge of wastewater to the ocean. *Source: RMC Water and Environment. 2012. North San Diego County Regional Recycled Water Project Facilities Plan.*

8.4.11 Surface Storage - CALFED

CALFED water storage is critical to the reliability of the State Water Project, and in turn to the reliability of Metropolitan's supplies delivered to the Region. Regional efforts do not include constructing or optimizing additional CALFED storage as these storage facilities are not located within the Region. The plans and programs of state agencies and Metropolitan are more likely to incorporate this strategy. Instead, the Region focuses on water resources actions to improve conservation, increase water storage, and increase the diversity of the Region's supplies. For this reason, IRWM stakeholders indicated that this RMS was only applicable to the Region in a limited capacity.

8.4.12 Surface Storage - Regional/Local

Regional surface storage is critical in balancing seasonal and other temporal differences between water supply availability and demand. *Chapter 3, Region Description* summarizes existing regional surface water storage. The Emergency Storage Program (Section 3.5.2 in *Chapter 3, Region Description*) represents an important part of the Region's effort to increase regional water storage.

***Surface Storage – Regional/Local* RMS in the San Diego IRWM Region**
San Diego County Water Authority - San Vicente Dam Raise The San Vicente Dam Raise Project is a component of the Water Authority's Emergency Storage Project, which is a regional project that focuses on water supply reliability. The San Vicente Dam Raise Project will increase the height of the San Vicente Dam from 220 feet to 337 feet and increase storage capacity from 90,000 AF to 242,000 AF. This project will serve two purposes: to use the additional water storage capacity to capture surplus water that is available during wet seasons for use in potential future dry years, and to store water for use in a regional water supply emergency. As such, the project will help to balance seasonal differences between water supply availability and demand, and provide additional storage that may be necessary in the event of a catastrophic emergency such as an earthquake that cuts off imported water supplies to the Region. *Source: San Diego County Water Authority, 2013b*
City of San Diego - Source Water Protection Guidelines for New Development The City of San Diego owns and operates nine drinking water reservoirs. Seven of those reservoirs (Barrett, El Capitan, Hodges, Morena, Otay, San Vicente, and Sutherland), located mainly outside of the City, warrant protection because they are at risk of being polluted as runoff volumes and associated pollutant discharges increase from potential future development. Due to its concern for the water quality of its reservoirs, the City prepared the *Source Water Protection Guidelines for New Developments* (Guidelines). The Guidelines were prepared to assist municipal agencies, designers, land planners, developers, and laypersons in conducting site design planning and select best management practices (BMPs) that protect or improve the quality of runoff draining into the reservoirs. They are not focused on construction activities, but rather site design and source controls that occur over the life of a project. The Guidelines provide a stepwise, simplified BMP selection process to ensure that preferred source water protection BMPs are considered. Although the use of the Guidelines is voluntary, the guidance is consistent with state and local storm water permit requirements, as well as local planning protocols. *Source: City of San Diego Water Department, 2004*
City of San Diego – Watershed Sanitary Survey All public water systems using surface water must conduct a comprehensive sanitary survey of its watersheds every five years. The purpose of the survey is to identify actual or potential sources of contamination, or any other watershed-related factor, which might adversely affect the quality of water used for domestic drinking water. The City of San Diego prepared an update to its Sanitary Survey in 2010. The update identified the potential contaminant sources as well as recommendations to protect the watershed and source water quality. The three categories of recommendations include watershed management and control practices, public education, and inter-jurisdictional coordination. *Source: City of San Diego, 2011*

8.4.13 Drinking Water Treatment and Distribution

Recycled water is used for dust control at construction sites because drinking water quality is unnecessary.

Photo credit: Jeff Pasek, City of San Diego

Water Authority-treated water supplies are derived from two sources: a Metropolitan-operated treatment facility at Lake Skinner in Riverside County, and the Twin Oaks Valley Water Treatment Plant, owned and operated by the Water Authority, which treats untreated water delivered from Metropolitan. In addition, the Region includes additional (non-Water Authority) potable water treatment capacity of 790 MGD (Section 3.5.2, *Chapter 3, Region Description*) that allows for treatment of locally-derived supplies and untreated supplies delivered via the Water Authority's aqueducts. Each water agency maintains its own distribution network, and the agency systems are interconnected to create a potable water delivery system that extends throughout the Water Authority's service area.

Small water systems and community wells are an important source of supply in the portion of Region outside the Water Authority's service area. A lack of backup facilities and interconnections among these small community systems render them vulnerable to supply interruptions or water quality problems. Upgrades in treatment and conveyance to these small water systems would enhance both water quality and system reliability among the Region's rural populations.

8.4.14 Groundwater and Aquifer Remediation

Toxic organic contaminants have been documented in several of the Region's groundwater aquifers. The Regional Board and San Diego County oversee investigation and remediation at more than 100 cleanup/remediation sites throughout the Region. The Regional Board also maintains a program for investigating, monitoring, and enforcing cleanup/remediation of soil and groundwater pollution from (1) Department of Defense sites and (2) pollution sources other than underground storage tanks.

8.4.15 Matching Quality to Use

Many of the Region's water agencies have adopted regulations requiring the use of recycled water in place of potable supplies for certain non-potable irrigation uses. Additional instances where quality is matched to use within the Region include (1) using untreated water for dust control, (2) using poor quality groundwater for non-potable uses such as irrigation, and (3) the use of gray water for toilet flushing and non-potable uses.

***Matching Quality to Use* RMS in the San Diego IRWM Region**
University of California, San Diego The University of California, San Diego (UCSD) is the second-largest user of recycled water in the City. UCSD's recycled water efforts began with irrigation retrofits in 1998, and later recycled water features were designed into the new development within the campus. Currently, recycled water is about five percent of UCSD's total water usage, but UCSD intends to expand recycled water use in the future. *Source: San Diego County Water Authority, NDb*
Lomas Santa Fe Country Club, Solana Beach The Lomas Santa Fe Country Club, located in Solana Beach, receives recycled water from the San Elijo Water Reclamation Facility which is owned by the San Elijo Joint Powers Authority. A total of 100 acres of the country club is irrigated with recycled water; less than 5 acres are irrigated with potable water. The use of recycled water for irrigation decreases the amount of fertilizer needed (due to high nitrogen levels in recycled water) and reduces potable water use. *Source: San Diego County Water Authority et al., NDd*

8.4.16 Pollution Prevention

Approximately 48 inland surface waters and 65 coastal waters or beach segments are listed as 303(d)-impaired water bodies (Section 3.7, *Chapter 3, Region Description*). The Regional Board is currently implementing TMDLs for several of the affected waters and has prioritized TMDLs for remaining impaired waters. The purpose of the TMDLs is to determine pollutant loads and implement activities that can reduce pollutant levels to those required by relevant water quality statutes.

In addition, the County and the Municipal Separate Storm Sewer Systems (MS4) copermittees implement a regional storm runoff program that includes activities to manage runoff discharge and implement programs to prevent, control, and treat sources of pollutants. Ongoing pollution prevention efforts associated with the MS4 program and also implemented by other agencies in the Region include:

- Conducting pollutant monitoring,
- Conducting MS4 discharge and receiving water monitoring,
- Planning and implementing stormwater capture and treatment,
- Developing and implementing non-point source controls including BMPs,
- Planning and implementing dry season diversion of surface flows and storm drain flows to the sewer system,
- Inspections of pollutant-generating activities such as commercial, industrial, residential, and construction,
- Implementing education programs for the general public, school children, and target audiences,
- Implementing wastewater collection system maintenance, rehabilitation, and sewer spill prevention programs, and
- Performing storm drain maintenance and community cleanup events.

8.4.17 Salt and Salinity Management

Several environmental uses can be impacted by excessive salinity. The most urgent need for salt management results from the loss or impending loss of beneficial uses caused by the following: nitrate contamination, seawater intrusion, soil and groundwater salinization, and reduced availability of fresh water flows. The Salt and Salinity Management strategy in the *CWP Update*

2009 identifies recommendations to address urgent needs for salt management. It recommends that stakeholders proactively identify sources, quantify the threat, prioritize necessary mitigation actions and work collaboratively with entities with the authority to take appropriate action to address salt loading.

***Salt and Salinity Management* RMS in the San Diego IRWM Region**
Proposed Guidelines for Salinity/Nutrient Management Planning in the San Diego Region, San Diego County Water Authority and Southern California Salinity Coalition In 2010, the Water Authority and Southern California Salinity Coalition worked together to develop guidelines for implementation of the State's 2009 Recycled Water Policy in the San Diego Region (Regional Board 9). The guidelines are intended to assist agencies and stakeholders to develop salinity/nutrient management plans by establishing a standardized approach and framework that has been reviewed by the Regional Board. The Guidelines assess San Diego Region aquifers and identify aquifers that are suitable for development of salinity/nutrient management plans, and present suggested tasks and procedures to be used in developing those plans. *Source: San Diego County Water Authority and Southern California Salinity Coalition, 2010*

8.4.18 Urban Runoff Management

Urban runoff management within the Region is conducted by multiple entities in the Region, including both public and private parties. Urban runoff management in the form of stormwater runoff management generally occurs through activities related to flood management and runoff management actions implemented by the MS4 copermittees and other relevant agencies, such as the California Department of Transportation and the U.S. Navy. Ongoing urban runoff management strategies implemented by applicable entities within the Region have been directed toward the following:

- Regulatory requirements to implement strategies such as BMPs and public education to limit runoff flows,
- Physical means of control such as flow and pollutant reduction through minimizing impervious areas, capture and retention, diversion to the sewer, or treatment,
- Standards to manage the increase in runoff discharge rates and durations from all Priority Development Projects, to ultimately prevent erosion of channel beds and banks, and
- MS4 discharge and land use monitoring to characterize pollutant loading and BMP monitoring to evaluate effectiveness.

8.4.19 Agricultural Land Stewardship

While agricultural lands represent 3% of San Diego County (*Chapter 3, Region Description*), agricultural activities are an important element affecting the Region's water resources. Land preservation is a key agricultural land stewardship activity implemented within the Region. The County and several municipalities maintain agricultural land preserve programs in which owners agree to set aside lands for agriculture or open space in return for reduced property taxes. Agricultural land stewardship practices implemented by private landowners include erosion control, habitat conservation, and pollution-reduction. Agencies that have programs that assist and advise in agricultural land stewardship practices within the Region include the U.S. Natural Resource Conservation Service, the County of San Diego Department of Agriculture Weights and Measures, and the University of California Agricultural Extension.

The Regional Board is also involved in assisting in agricultural land stewardship through regulation (including issuance of discharge permits or conditional waivers) of animal confinement, agricultural and nursery operations, and silviculture operations.

8.4.20 Economic Incentives

Many water agencies in the Region offer several economic incentive programs to encourage water conservation, including rebate programs for water-conserving washing machines, and outdoor irrigation systems (e.g., smarter controllers, rain barrels, turf replacement)(City of San Diego, NDb and Water Authority, NDd). As detailed in Table 11-5 in *Chapter 11, Implementation*, there are many additional regional financial incentive programs available.

8.4.21 Ecosystem Restoration

The ecosystem restoration strategy identified in the *CWP Update 2009* incorporates a broad range of strategies directed toward conserving, protecting, enhancing, and creating habitat, ecosystems, and wetlands. Ecosystem restoration, environmental and habitat protection and improvement, and wetlands enhancement and creation projects and programs have been implemented by government and non-government organizations within the Region. Ongoing efforts within the Region include multiple species conservation programs, land conservation, invasive species control, land contouring, rehabilitation and re-vegetation, addressing flow hydraulics and preserving natural flow hydrology, and wetlands preservation, conservation and creation. The California Department of Fish and Wildlife and the United States Fish and Wildlife Service are active in several of the Region's restoration programs. As detailed in *Chapter 3, Region Description*, three multiple species conservation and preservation plans are being implemented within the Region. In addition to government ecosystem restoration efforts, private foundations and conservancies have been established within the Region to preserve lands, restore ecosystems, and to provide environmental management of conserved lands.

Habitat restoration can reduce creek pollution, flooding, and soil erosion.

Photo credit: Charles Davis, Jacob Center for Neighborhood Innovation

***Ecosystem Restoration* RMS in the San Diego IRWM Region**
County of San Diego - San Diego River Restoration Project, Edgemoor Property, City of Santee
The County of San Diego is undertaking the San Diego River Restoration Project, a restoration project on the Edgemoor Property in the City of Santee. The San Diego River Restoration Project will enhance riparian habitat which may be used to provide future off-site mitigation for development projects. The project will involve both habitat enhancement and creation. Habitat enhancement will improve riparian scrub/woodland and freshwater marsh by removing invasive species, cleaning up trash, and, if needed, replanting select areas with native plants. In addition, habitat creation will convert nonnative grassland, tamarisk scrub, and disturbed habitat into open water, riparian scrub/woodland, and freshwater marsh.
Sources: HDR Engineering, 2008; P&D Environmental, 2005

8.4.22 Forest Management

Almost all forest management activities can affect water quantity and quality. The Forest Management strategy in the *CWP Update 2009* includes long-term monitoring to understand hydrologic changes resulting from climate change and management actions, multi-party coordination of forest management, improvement in communications between downstream water users and communities and upstream forest managers, residents, and workers, and revisions of water-quality management plans between the State Water Resources Control Board and forest management agencies to address concerns with impaired water bodies.

However, the Region has a Mediterranean climate and does not support extensive forestlands. For this reason, IRWM stakeholders indicated that this RMS was only applicable to the Region in a limited capacity.

8.4.23 (Urban) Land Use Planning and Management

The municipalities across the Region utilize urban land use management as a means of influencing water management through the Region's stormwater runoff program, zoning regulations, building codes, landscape ordinances, septic tanks, and agricultural preserve/land conservation programs. As part of its land use plans, the County limits development in areas dependent on groundwater supply so that water needs do not exceed available supplies. In addition, bills enacted by the State legislature (Senate Bills 610 and 221) require water agencies responsible for water resource planning to work with the local land use agencies to improve the coordination between land use planning and development and available long-term water supplies.

***Land Use Planning and Management* RMS in the San Diego IRWM Region**
San Diego County Water Authority and San Diego Association of Governments – Memorandum of Agreement The Water Authority entered into a Memorandum of Agreement (MOA) with the Region's regional transportation planning authority, the San Diego Association of Governments (SANDAG), in 1992. Per the MOA, the Water Authority agrees to use SANDAG's most recent regional growth forecasts for regional water supply planning purposes, provide updated information on changes in plans or programs, and implement relevant actions contained in the Water Element of the Regional Growth Management Strategy. The MOA ensures that the Water Authority will use land use management information (population projections) as the basis for conducting future water management. Further, the MOA ensures that water supply is considered as a component of the Region's overall growth management strategy. *Source: Appendix 7-C: Land Use Planning Study*

8.4.24 Recharge Area Protection

Land use or land conservation measures to protect important groundwater recharge areas have been addressed in several of the Region's watershed management plans. Local water agencies using groundwater as a source of supply have identified key recharge area issues through sanitary surveys and within groundwater plans. Agencies that own and conserve significant land holdings to protect important groundwater recharge areas within the Region include:

- Camp Pendleton (lower portion of Santa Margarita River Watershed),
- Vista Irrigation District (upper portion of San Luis Rey Watershed), and
- City of San Diego (San Pasqual Valley in the San Dieguito River Watershed).

8.4.25 Water-Dependent Recreation

Chapter 3, Region Description describes water-dependent recreational opportunities within the Region. Recreational uses (either non-contact or contact uses) are supported in virtually all of the Region's inland surface waters, reservoirs, lagoons, estuaries, bays, and coastal waters.

8.4.26 Watershed Management

Watershed management plans have been prepared for the Region's eleven hydrologic units by MS4 Copermittees and other required agencies. The management plans address watershed-specific water management issues outside the limitations of jurisdictional boundaries. The Region's watershed planning efforts also include non-government stakeholders in water management planning decisions. Watershed management includes monitoring, modeling, and assessments to improve understanding of the ambient condition of receiving water bodies, to characterize pollutant loading and management, and to support scientific basis for water quality regulations.

8.4.27 Flood Risk Management

Flood management facilities within the Region include armored and lined channels, levees, natural channels and natural floodplain management, retention basins, culverts, and an extensive regional storm drain system. As described in *Chapter 3, Region Description*, the County of San Diego Flood Control Section coordinates region-wide flood control projects among the County's municipalities to: (1) engineer, maintain, and improve storm conveyance facilities, (2) perform stream restoration and maintenance, (3) update flood mapping, (4) provide for vegetation and debris removal, and (5) maintain stream flow and flood alert systems.

8.4.28 Other Strategies

The Other Strategies chapter of the *CWP Update 2009* discusses a variety of water management strategies that can potentially generate benefits but that are currently limited in their capacity to strategically address long-term regional water planning needs. As described above, all six Other Strategies were considered to be only partially applicable to the Region because they are either not realistic to implement, have already been fully satisfied, or are not directly implemented in the Region.

Rainfed Agriculture

Rainfed agriculture involves meeting all crop consumptive water use demands directly by rainfall on a real-time basis. Due to unpredictability of rainfall frequency, duration, and amount, there is significant uncertainty and risk in relying solely on rainfed agriculture. Currently, improvements in rainfed agricultural production offer limited opportunities to further increase water supply in California. Due to the limited precipitation in San Diego, this RMS can only be implemented in a limited fashion.

Waterbag Transport/Storage Technology

The use of waterbag transport/storage technology involves diverting water in areas that have unallocated freshwater supplies, storing the water in large inflatable bladders, and towing them to an alternate coastal region. This strategy is not currently being used in California, although a proposal was recently considered. The Alaska Water Exports Company proposed to divert up to 30,000 AF of water from the Albion and Gualala Rivers in Northern California and transport the water to the San Diego metropolitan area. The proposal received significant local opposition in Northern California. In 2003, the Albion and Gualala Rivers were added to the California Wild & Scenic Rivers system, and thus ended the plan. No other plans to implement this RMS are currently being considered in the Region.

Crop Idling for Water Transfers

Crop idling is a strategy that removes land from irrigation and makes water available for transfer to other uses. Crop idling could enhance water supply reliability by making water available for other

uses, enhancing water quality, and protecting and restoring fish and wildlife. Agriculture in the Region is already limited, but constitutes an important part of the local economy. For these reasons, this RMS was considered to be unrealistic to implement in the Region.

Dewvaporation or Atmospheric Pressure Desalination

Dewvaporation is a specific process of humidification-dehumidification desalination. Brackish water is evaporated by heated air, which deposits fresh water as dew on the opposite side of a heat transfer wall. The energy needed for evaporation is supplied by the energy released from dew formation. Dewvaporation can provide small amounts of water in remote locations. The technology of dewvaporation is still being developed and therefore is not considered realistic to implement in the Region.

Fog Collection

Precipitation enhancement in the form of fog collection has not been used in California as a management technique, but experimental projects have been built or considered internationally. There has been some interest in fog collection for domestic water supply in some of the dry areas of the world near the ocean where fog is frequent. Because of its relatively small production, fog collection is limited to producing domestic water where few other viable water sources are available, and is not considered realistic to implement in the Region.

Irrigated Land Retirement

Irrigated land retirement is the removal of farmland from irrigated agriculture. Land retirement could enhance water supply reliability by making water available for redistribution, enhancing water quality, and protecting and restoring fish and wildlife resources, but it results in the loss of agricultural lands. Agriculture in the Region is already limited, but constitutes an important part of the local economy. For these reasons, this RMS was considered to be unrealistic to implement in the Region.

8.4.29 Stakeholder/Community Involvement

Stakeholder/community involvement was added as a RMS by IRWM stakeholders during development of the 2007 IRWM Plan to address previous Objective A (now Objective B): Maximize stakeholder/community involvement and stewardship. Stakeholder and community involvement continues to be an important component of IRWM planning in the Region. There are many examples of how this RMS is being implemented in the Region:

Stakeholder outreach and education builds a sense of creek stewardship in local residents.

Photo credit: Charles Davis, Jacob Center for Neighborhood Innovation

- In 2008, the San Diego IRWM Program launched a publically-accessible website, which continues to be updated and maintained to reflect current information (www.sdirwmp.org).
- Selection of IRWM projects continues to focus on stakeholder and community involvement; many of the IRWM projects funded to-date include outreach components.
- IRWM stakeholders played an important role in providing input and information to update the IRWM Plan. This effort is discussed in detail in *Chapter 6, Governance and Stakeholder Involvement.*

8.4.30 Water Resources Data Collection, Management, and Assessment

Water Resources Data Collection, Management, and Assessment was added as a RMS by IRWM stakeholders during development of the 2007 IRWM Plan to address previous Objective B (now Objective C): Effectively obtain, manage, and assess water resource data and information. This objective continues to be an important tenet of IRWM planning in the Region. There are many examples of how this RMS is being implemented in the Region:

- In 2010, the San Diego IRWM Program launched a publically-accessible online project database, which contains information regarding all IRWM projects submitted for inclusion in the IRWM Plan.
- The successful 2011 Proposition 84-Round 1 Implementation Grant included the *Regional Water Data Management Program,* which will provide the first step in creating a comprehensive data management system for the IRWM Region.

8.4.31 Scientific and Technical Water Quality Management Knowledge Enhancement

Scientific and Technical Water Quality Management Knowledge Enhancement was added as a RMS by IRWM stakeholders during development of the 2007 IRWM Plan to address previous Objective C (now Objective D): Further scientific and technical foundation of water quality management. This objective continues to be an important tenet of IRWM planning in the Region. There are many examples of how this RMS is being implemented in the Region:

- The San Diego IRWM Program's RWMG participated in the Regional Board's 2011 Triennial Review Advisory Committee to provide feedback on amendments to the *Water Quality Control Plan for the San Diego Basin* from an IRWM perspective.
- The Regulatory Workgroup Report was completed in 2012 to evaluate potential opportunities for the IRWM Program to collaborate with regulatory agencies (specifically the Regional Board) to achieve mutual water quality protection and management goals, particularly regarding enhancing the scientific and technical basis behind water quality regulations. Please refer to *Chapter 7, Regional Coordination* for more information.

8.4.32 Wastewater Management

Wastewater Management was added as a RMS by IRWM stakeholders during the development of the 2013 IRWM Plan. Wastewater Management includes those activities that consider wastewater flows as a water resource, and therefore involves active and comprehensive management of wastewater as part of the Region's water supply. Specific actions that fall under this RMS include: improving wastewater treatment, maximizing wastewater reuse by managing wastewater as a regional resource, managing discharges, improving the collection system, improving efficiency, and any other aspect of wastewater management that would provide benefits or reduce costs to the

Region. The Wastewater Management RMS can contributes to Objective A (integrated solutions), Objective E (diverse mix of water resources), Objective F (reliable water infrastructure), and Objective H (pollution reduction).

***Wastewater Management* RMS in the San Diego IRWM Region**
South Bay International Wastewater Treatment Plant (SBIWTP) The International Boundary and Water Commission, a partnership between the U.S. and Mexican governments, built the South Bay International Wastewater Treatment Plant in San Ysidro, CA to treat wastewater from the City of Tijuana in Mexico that would otherwise be discharged to the Tijuana River and impact the quality of this waterbody. Wastewater at the plant is treated to secondary standards prior to discharge through the South Bay Ocean Outfall. The facility treats an average of 25 MGD, but has the potential to expand to 100 MGD. The SBIWTP has reduced the amount of sewage entering the Tijuana River, and reduced the impacts to residents in the Region, and the City of Imperial Beach in particular. *Source: International Boundary & Water Commission (http://www.ibwc.state.gov/mission_operations/sbiwtp.html); RWQCB, Tijuana River Valley Recovery Strategy: Living with the Water.*

8.5 Objectives Assessment

Table 8-2 presents the RMS and how they contribute to meeting each of the IRWM Plan objectives, including the three additional San Diego IRWM Plan-specific RMS identified by the stakeholder group (listed in Section 8.2.2). The selected RMS for inclusion in the 2013 IRWM Plan indirectly or directly supports attainment of one or more IRWM Plan objectives. When selecting RMS, the effects of climate change on the Region and how each RMS will help address these effects was taken into consideration (Section 3.14, *Chapter 3, Region Description*).

8.6 Applicability to the Region's Watersheds

As described in *Chapter 5, Watershed Characterization*, the Region's eleven watersheds share many region-wide water quality management problems and needs. Key water management similarities among the Region's watersheds include:

- Water quality impairment associated with bacteriological, nutrient, and sediment loads,
- Ecosystem protection and restoration needs and the need for invasive species control,
- Water supply diversity and water infrastructure reliability needs,
- Hydromodification and flood control issues, and
- Climate change impacts and need for adaptive or mitigation water resource management.

Table 8-2: IRWM Plan Objectives Supported by Resource Management Strategies

Resource Management Strategies	IRWM Plan Objectives Supported by Resource Management Strategies										
	A. Encourage the Development of Integrated Solutions to Address Water Management Issues and Conflicts	B. Maximize Stakeholder/ Community Involvement and Stewardship	C. Effectively Obtain, Manage and Assess Water Resources Data	D. Further Technical and Scientific Foundation for Water Management	E. Develop, Operate, and Maintain a Diverse Mix of Water Resources	F. Construct, Operate, and Maintain Reliable Infrastructure System	G. Enhance Natural Hydrologic Processes to Reduce the Effects of Hydromodification and Encourage Integrated Flood Management	H. Reduce Pollutant Sources and Environmental Stressors	I. Protect, Restore and Maintain Habitat and Open Space	J. Optimize Recreational Opportunities	K. Effectively Address Climate Change through Adaptation or Mitigation in water Resource Management
Agricultural Water Use Efficiency	○	○		○	●	○		○			○
Urban Water Use Efficiency	○	○		○	●	○		○			○
Conveyance – Delta					○	○					○
Conveyance – Regional/Local					○	●					○
System Reoperation	○				○	○					○
Water Transfers					●						●
Conjunctive Management & Groundwater	○		○	○	●	○			●		○
Desalination			○	○	●	○					●
Precipitation Enhancement			○	○	○						
Recycled Municipal Water	●		○	○	●	○					○
Surface Storage – CALFED		○	○	○	○	○			○		○
Surface Storage – Regional/Local		○	○	○	○	○			○		○
Drinking Water Treatment and Distribution		○	○	○	●	○					
Groundwater and Aquifer Remediation		○	○	○	●						
Matching Quality to Use			○	○	○						
Pollution Prevention		○	○	○				●	○	●	
Salt and Salinity Management	○	○	○	○				●	○	○	
Urban Runoff Management		○					○	○	○	○	
Agricultural Lands Stewardship				○				●	●	●	
Economic Incentives (Loans, Grants, and Water Pricing)	○	○		○	○	○	○	○	●	○	○
Ecosystem Restoration		○	○	○				○	●	○	
Land Use Planning and Management	○	○		○					●	●	
Recharge Areas Protection					○	○		○			
Water-dependent Recreation		○	○	○				○	○	●	
Watershed Management	○	●	●	●	○		●	●	○	○	○
Flood Risk Management	○	○	○	○			●		○	○	○
Stakeholder/Community Involvement		●									
Water Resources Data Collection, Management, and Assessment			●	○							○
Scientific and Technical Water Quality Management Knowledge Enhancement			●	●	○	○	○				○
Wastewater Management	●		○	○	●	●		●			○

● Water management strategy primarily and directly supports attainment of the IRWM Plan objective
○ Water management strategy helps achieve the IRWM Plan objective

While the Region's watersheds face many similar water management needs, not all of the water management strategies are applicable to each of them:

- Agricultural Water Use Efficiency and Agricultural Land Stewardship RMS are not applicable within the Pueblo HU, as that watershed does not support any significant commercial agriculture.
- The San Juan and Pueblo HUs do not feature any existing or planned surface storage reservoirs. System Reoperation and Surface Storage – Regional/Local are thus not applicable within these watersheds.
- While the Pueblo HU may possess significant manageable deep-aquifer groundwater resources (San Diego Formation), no usable near-surface groundwater exists within the hydrologic unit. As a result, Groundwater and Aquifer Remediation and Recharge Area Protection are not applicable within the watershed.
- Groundwater resources exist in the upper reaches of the Peñasquitos HU (private wells in the Poway area), but aquifer storage capacities and yields are not sufficient to warrant implementation of Groundwater and Aquifer Management and Recharge Area Protection within the Peñasquitos HU.
- Only one seawater desalination site (within the Carlsbad HU) has been identified within the Region's water plans. Seawater desalination may be feasible in other locations, but a lack of availability of facility sites and brine disposal issues may prevent this strategy from being implemented in all but a few select locations within the Region.

8.7 Adapting Resource Management Strategies to Climate Change

Climate change is expected to directly impact a number of areas related to water resources, in particular temperature, precipitation, and sea level rise. As global temperature increases, seasonal precipitation patterns including the timing, intensity and form of precipitation, are projected to change. These changes could present some uncertainty to the availability of future imported water delivery capabilities, cause changes to local water quality, cause sea level rise, increase flooding, and impact the frequency and intensity of wildfires. See Section 7.8 in *Chapter 7, Regional Coordination*, and Appendix 7-D for a detailed assessment of the Region's potential climate change vulnerabilities.

RMS that are implemented to manage water resources can also address climate change adaptation and mitigation. Table 8-3 was extracted from the *CWP Update 2009*; it categorizes RMS and identifies greenhouse gas (GHG) reduction opportunities associated with each RMS. The GHG reduction opportunities were considered when determining which RMS to incorporate into the 2013 IRWM Plan.

Table 8-3: Resource Management Strategies and GHG Reduction Opportunities

Management Objectives	Resource Management Strategy	GHG Reduction Opportunities
Reduce Water Demand	Agricultural Water Use Efficiency Urban Water Use Efficiency	Reduce dependency on energy to transport water resources
Improve Operational Efficiency and Transfers	Conveyance – Delta Conveyance – Regional/local System Reoperation Water Transfers	Decrease emissions by reducing operational efficiency/ transfer vehicle use and energy required for operations/transfers
Increase Water Supply	Conjunctive Management & Groundwater Desalination Precipitation Enhancement Recycled Municipal Water Surface Storage – CALFED Surface Storage – Regional/local	Localize water use, reduce imported water use, which requires additional energy and increases GHG emissions.
Improve Water Quality	Drinking Water Treatment and Distribution Groundwater Remediation/Aquifer Remediation Matching Quality to Use Pollution Prevention Salt and Salinity Management Urban Runoff Management	Stabilize water cycles by restoring water systems to their natural state. Matching quality to use could also reduce the need for water treatment, which requires energy and results in greenhouse gas emissions.
Improve Flood Management	Flood Risk Management	Control flooding so recharge can be redirected efficiently. Redirecting to reservoirs and groundwater recharge can prevent droughts and reduce the Region's dependence on energy-intensive water importation, and improve water supply reliability in dry seasons.
Practice Resources Stewardship	Agricultural Lands Stewardship Economic Incentives (Loans, Grants and Water Pricing) Ecosystem Restoration Forest Management Land Use Planning and Management Recharge Area Protection Water-Dependent Recreation Watershed Management	Provide opportunities for carbon sequestration, reforestation, and restoration/maintenance of urban land surfaces.
Other	Crop Idling for Water Transfers Dewvaporation or Atmospheric Pressure Fog Collection Irrigated Land Retirement Rainfed Agriculture Waterbag Transport/Storage Technology	Reduce energy requirements and GHG emissions through decreased demand on imported water.
Strategies Identified by Stakeholders	Stakeholder/Community Involvement Water Resources Data Collection, Management, and Assessment Scientific and Technical Water Quality Management Knowledge Enhancement Wastewater Management	Collaboration among stakeholders will help to strengthen water resources (including climate change-related) data, which will help to strengthen the scientific and technical basis of water management. Wastewater management includes increased efficiencies and comprehensive management of wastewater supplies. Collectively, these actions will help the Region reduce GHG emissions by increasing collaboration and efficiency in all realms of water planning, which will in turn enhance operational efficiency and reduce energy required in water planning and implementation processes.

Source: DWR, 2009

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9 Project Evaluation and Prioritization

This chapter addresses requirements set forth in the Integration Standard and the Project Review Process Standard in the *2012 IRWM Program Guidelines* (DWR 2012). As such, this chapter includes information regarding the structures and processes that provide opportunities to develop and foster integration as well as the processes used to select projects for inclusion in the 2013 IRWM Plan.

9.1 Overview

The intent of this chapter is to document both the integration and project evaluation and prioritization processes associated with the San Diego IRWM Program for the purposes of IRWM grant funding. Specifically, this chapter includes information regarding:

- The system that was intentionally developed to promote and encourage integration.
- The process used for submitting, reviewing, and selecting projects for inclusion in the 2013 IRWM Plan and subsequent grant applications.

9.2 Integration

According to DWR, integration generally means combining separate pieces into an efficiently functioning unit (DWR 2012). During development of the 2013 IRWM Plan, the Priorities and Metrics Workgroup defined integration as it pertains to the IRWM Program (refer to *Chapter 6, Governance and Stakeholder Involvement* for more information on the Priorities and Metrics Workgroup). IRWM Program Objective A encourages the development of integrated solutions to address water management issues and conflicts. With respect to the San Diego IRWM Program, integration refers to the five following aspects: partnerships, resource management, beneficial uses, geography, and hydrology. Each integration component defined by the IRWM Program is explained in the following sections. Further, Section 9.2.6 describes actions taken by the IRWM Program to promote and encourage integration.

The North San Diego County Regional Recycled Water Project – funded by Proposition 84-Round 1 – features multiple partnerships, watersheds, and beneficial uses.

Photo Credit: Kim Thorner, Olivenhain Municipal Water District

Due to the importance of integration, projects must meet Objective A, Objective B, and at least one additional IRWM objective to be considered for IRWM-related grant funding (refer to Section 9.3 for more information). The following sections also explain the manner in which projects are assessed to determine if they meet each definition of integration.

9.2.1 Partnership Integration

Definition: Establishing partnerships between different organizations that are cost effective through sharing of data, resources and infrastructure. Please refer to *Chapter 6, Governance and Stakeholder Involvement* for details on IRWM Program efforts to help establish partnerships.

As described in Section 9.4, the method by which this integration criterion is assessed for IRWM projects is based upon the number of entities involved in implementing the project. In order to be considered involved in implementation, partners (entities) must be responsible for completing work associated with the project. Partnerships between different departments in a single organization may also be considered as partnership integration; however, in order to garner points in the project evaluation process, a project must include partnerships with outside entities.

Example: Rural Disadvantaged Communities Partnership Program

The *Rural Disadvantaged Communities (DAC) Partnership Program* was selected for inclusion in the Proposition 84 Implementation Grant – Round 2 Proposal. This program proposes to fund projects that serve the needs of rural DACs and Tribes, through the Rural Community Assistance Corporation (RCAC).

RCAC has extensive experience helping to fund infrastructure and capacity-building projects in rural communities. By utilizing their resources and experience, RCAC can assist implementation of projects conceptualized by Tribes or rural DACs, and will serve as the local project sponsor for the program. Because RCAC has extensive experience working with funding agencies, Tribes, and rural communities, it is well-suited to serve as the local project sponsor for Proposition 84 funding. In addition, RCAC understands the specific requirements of the IRWM grant program, and is therefore able to address common issues that might impede project implementation. Utilizing the resources of RCAC can fill gaps in Tribal or rural DAC skill sets, helping to ensure the success of projects and overcome potential barriers. The partnership between RCAC and rural communities allows for a more cost-effective and comprehensive approach to addressing critical issues in rural DACs and tribal communities than if the groups worked separately.

9.2.2 Resource Management Integration

Definition: Employing multiple resource management strategies within a single project to effectively address a variety of issues. For more information about resource management strategies as they relate to the San Diego IRWM Program, please refer to *Chapter 8, Resource Management Strategies.*

As described in Section 9.4, the method by which this integration criterion is assessed for IRWM projects is based upon the number of IRWM objectives addressed by the project. Due to the comprehensive nature of the IRWM objectives, these objectives cumulatively cover the resource management strategies pertinent to the Region.

Example: Sustaining Healthy Tributaries to the Upper San Diego River

The *Sustaining Healthy Tributaries to the Upper San Diego River* project included in the Proposition 84 Implementation Grant – Round 2 Proposal represents an example of resource management integration. The project proposes to restore habitat along a stream and monitor water quality and aquatic life before and after the restoration work. These data will provide insight into the success of the project and the impact restoration work has on water quality and aquatic life. Data collected as part of this project will also be used to provide baseline stream data, which is anticipated to help inform management of other streams in the San Diego River system, and provide information about source water protection as the primary creek being monitored for this project (Boulder Creek) is tributary to one of the Region's most important water supply reservoirs, El Capitan Reservoir. Integrating monitoring with habitat restoration and water quality data will provide a more complete understanding of stream health and help to address issues in similar streams in the future.

9.2.3 Beneficial Use Integration

Definition: Project solutions can be implemented to support several different beneficial uses. For more information about beneficial uses as defined in the *Water Quality Control Plan for the San Diego Basin*, please refer to *Chapter 3, Region Description.*

As described in Section 9.4, the method by which this integration criterion is assessed for IRWM projects is based upon the number of beneficial uses that are addressed by the project. Beneficial uses are defined in the *Water Quality Control Plan for the San Diego Basin*, which is discussed in *Chapter 3, Region Description* and available online:

http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/

Example: North San Diego County Recycled Water Project

The *North San Diego County Regional Recycled Water Project* included in the Region's Proposition 84 Implementation Grant – Round 2 Proposal is an example of a project that uses beneficial use integration, because its implementation will support several beneficial uses. The project will integrate urban and agricultural-based recycled water systems of ten partner water agencies located in the North County region to maximize the use of recycled water in the area. By integrating recycled water systems across a variety of agency service areas, the project will maximize the beneficial uses served by the project by providing recycled water for industrial, municipal, and agricultural beneficial uses. As this project involves the integration of many agencies across the North County region, the project will increase economic efficiencies, which will facilitate the support of more beneficial uses than could be supported by each agency's recycled water system on an individual basis.

9.2.4 Geographical Integration

Definition: Implementing watershed-or regional-scale projects that may benefit from economies of scale. For more information on the IRWM region and watersheds within the region, please refer to *Chapter 3, Region Description* and *Chapter 5, Watershed Characterizations*.

As described in Section 9.4, the method by which this integration criterion is assessed for IRWM projects is based upon the level of integration that the project achieves between multiple watersheds.

Example: Implementing Nutrient Management in the Santa Margarita River Watershed

The *Implementing Nutrient Management in the Santa Margarita River Watershed* project, included in the Proposition 84 Implementation Grant – Round 2 Proposal, is an example of a project that uses geographical integration. This project is a watershed-scale project that is being jointly implemented by San Diego County on behalf of the San Diego IRWM Region in coordination with the Upper Santa Margarita Watershed IRWM Region. In addition to increasing inter-regional communication, the partnership that resulted from this project enables the regions to share financial, technical, and knowledge resources and ensure the project's success. This will also serve to reduce conflict over resources and ideology. By using a watershed-scale approach, this project benefits from economies of scale and will provide greater benefits than if each individual IRWM Region were to attempt to address issues within the Santa Margarita River Watershed on an individual basis.

9.2.5 Hydrological Integration

Definition: Addressing multiple watershed functions within the hydrologic cycle. *Chapter 5, Watershed Characterizations,* contains information on the watersheds within the IRWM region.

As described in Section 9.4, the method by which this integration criterion is assessed for IRWM projects is based upon whether or not a project provides watershed services. For purposes of the 2013 IRWM Plan, watershed services are considered based upon the Watershed Management Area

Analysis described in Provision B.3.b.(4) of the San Diego Municipal Separate Storm Sewer Systems Permit (Order No. R9-2013-0001).

As such, IRWM projects meet this integration criterion if they:

- Address dominant hydrologic processes, such as infiltration
- Address existing streams in a watershed, including those that are perennial or ephemeral
- Address current or anticipated future land uses that may impact the hydrologic cycle
- Address sedimentation or sediment yield areas
- Address existing flood control structures or channel structures and associated hydromodification

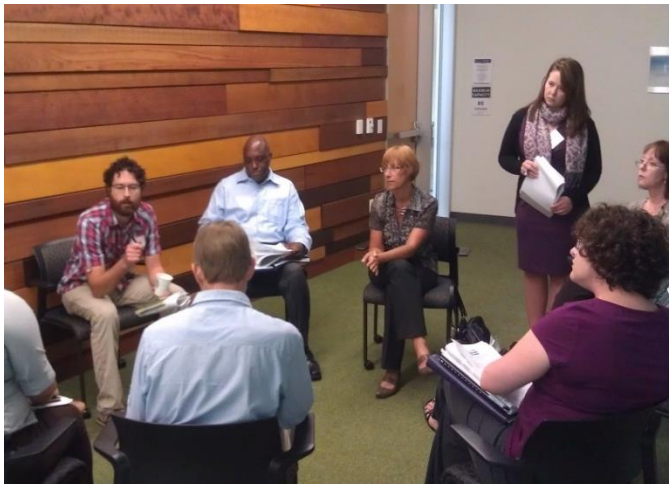
Example: Chollas Creek Integration Project

The *Chollas Creek Integration Project* included in the Proposition 84 Implementation Grant – Round 2 Proposal represents an example of hydrological integration. The project proposes to address flooding and water quality issues through creek realignment, physical flood control, and habitat restoration. Flood control efforts like reducing impervious surfaces or bank stabilization, will help to improve water quality, while water quality improvements and habitat restoration efforts, such as removal of invasive species and planting native species, will help reduce flooding. By simultaneously addressing different components of the hydrologic cycle, this project provides multiple benefits from a single activity.

9.2.6 Methods Used to Promote and Encourage Integration

A Strategic Integration Workshop was held on September 12, 2012 to encourage and improve integration in and among projects submitted to the IRWM project database. The Strategic Integration Workshop was conceptualized by the Priorities and Metrics Workgroup, which was tasked with several items including providing recommendations on how to increase project integration and promote development of projects that are aptly suited for IRWM funding due to their integrated components (as defined in Sections 9.2.1 - 9.2.5 above).

As suggested by the Priorities and Metrics Workgroup, prior to the Strategic Integration Workshop, the IRWM Program released a Call for Project Concepts and a Call for Project Partners. These items were released via the IRWM e-mail list, the IRWM website, and were also discussed at the August 3, 2012 RAC meeting. Project proponents submitted project concepts describing preliminary project ideas, and potential project partners submitted project partner forms describing potential services that could be provided to support other projects. Prior to the Strategic Integration Workshop, the Priorities and Metrics Workgroup reviewed the project concept forms and project partner forms for potential integration and partnering opportunities that could be suggested to stakeholders during the Strategic Integration Workshop. During the Strategic Integration Workshop, local project sponsors and potential project partners



Stakeholders discussing projects at the Strategic Integration Workshop

Photo Credit: Rosalyn Prickett, RMC Water and Environment

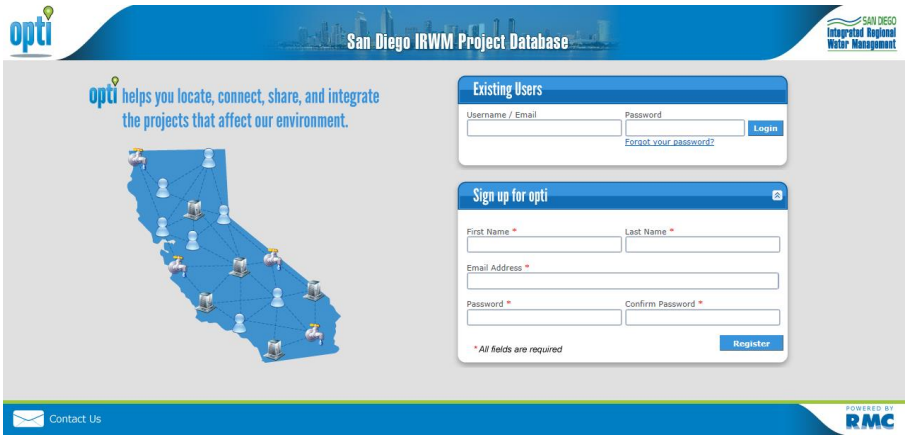
discussed the preliminary project concepts and partnering opportunities. The purpose of this workshop was to bring stakeholders together to provide information about projects being considered within the region and to encourage sponsors and project partners to discuss ways in which their project concepts could be elaborated upon or potentially combined to increase integration. Through this process, many of the projects ultimately included in the Proposition 84 – Round 2 funding proposal were conceived or improved.

Based on discussion with the RAC on April 3, 2013, the Strategic Integration Workshop was considered a success. Stakeholders appreciated the opportunity to learn about other projects being considered and to integrate their projects with similar or complementary projects. Strategic Integration Workshops or similar integration-based forums will be held in advance of future IRWM funding opportunities, to further understanding of integration and improve project integration throughout the Region.

In addition to activities such as the Strategic Integration Workshop, the San Diego IRWM Program encourages integration through its project selection process as integrated projects are scored higher, making them more likely to be included in funding proposals, than non-integrated projects (refer to Section 9.4.2 for more information on the project scoring process). Further, watershed coordination groups, such as watershed council or coalitions are an effective means by which to promote community dialogue on water issues, and can provide a basis for coordinating IRWM project development, integration, and implementation.

9.3 Including Projects in the IRWM Plan

Projects that meet at least one Plan Objective are eligible for inclusion in the San Diego IRWM Plan as soon as they are entered into the San Diego IRWM Project Database, which is hosted through the San Diego IRWM Website (www.sdirwmp.org). The San Diego IRWM Program updated the online project database in 2012 when comprehensively updating the San Diego IRWM Program Website (refer to *Chapter 10, Data and Technical Analysis* for more information).



Screenshot of the San Diego IRWM Project Database

The project database was updated to expand its functionality and use, and in particular to allow the database to function as a means for data and information-sharing. For example, the database now includes a mapping feature that allows users to view all projects included in the database on a map (to view their location in the Region), and also allows users to sort projects by functional area (i.e. natural resources projects vs. water supply projects, etc.). The inclusive nature of this process was established to encourage stakeholders to enter projects into the database even in times when there

are not active grant cycles occurring, so as to provide a comprehensive list of water resources projects across the Region. During grant cycles, a call for projects is put out through the stakeholder outreach channels in place for the San Diego IRWM Program (RAC meetings, stakeholder e-mail list, outreach meetings, etc.).

The expanded nature of the online project database allows stakeholders to enter projects into the online project database at any time; however, these projects are not automatically included in the IRWM Plan. As described in *Chapter 2, Vision and Objectives*, in order to be included in the IRWM Plan, a project must meet at least one objective, but to be considered for inclusion in IRWM-funding grants, projects must meet Objective A and Objective B, as well as at least one of the other IRWM objectives (C through K).

9.4 IRWM Project Review

IRWM projects are a fundamental component of the 2013 IRWM Plan, and are considered the primary venue through which to implement IRWM Objectives. Project review and prioritization for the 2013 IRWM Plan has two fundamental components: the project review process and project scoring content. The project review process refers to the specific actions taken to review and prioritize projects, while the project scoring content refers to the quantitative and qualitative criteria that are applied to the projects in order to complete scoring and ranking. The IRWM Plan is a living document, and the projects included in the IRWM Plan may be updated as necessary. Because of this, the addition or removal of a project from the IRWM Plan's online list of projects does not require the IRWM Plan to be amended or re-adopted. For inclusion in the Plan, a project must first be submitted to the online IRWM Project Database, available at: http://irwm.rmcwater.com/sd/login.php. Once submitted to the database, projects may be included in the IRWM Plan if they meet at least IRWM Plan Objective (see *Chapter 2, Vision and Objectives*).

As described in *Chapter 6, Governance and Stakeholder Involvement,* the Priorities and Metrics Workgroup, which was convened for the 2013 IRWM Plan was tasked with developing recommendations for the project prioritization process and project scoring content for IRWM funding opportunities. In Fall 2012 while the 2013 IRWM Plan was being prepared, the Region convened a Project Selection Workgroup to review and select projects for recommended funding via the upcoming Proposition 84-Round 2 Implementation Grant process. In December 2012 the RWMG convened a joint meeting of the Priorities and Metrics Workgroup and the Proposition 84-Round 2 Project Selection Workgroup to discuss the project prioritization process and project scoring content, and to provide recommendations for how the process and scoring may be amended for future rounds of IRWM funding. Further, a joint RAC meeting and public workshop was held on April 3, 2013, to provide additional input regarding the IRWM project review process and project scoring content.

The following sections describe how the IRWM project review and selection process and project scoring content for IRWM funding opportunities will be conducted and structured for future rounds of IRWM funding.

9.4.1 IRWM Project Review and Selection Process

During consideration of projects for IRWM funding programs, the San Diego IRWM Program uses a multi-step process for project review that relies heavily on stakeholder input. Note that a project must be included in the IRWM Plan to be eligible for IRWM funding, and submitted prior to the Call for Projects deadline. As outlined in the steps below, project selection is initially done through an

objective, automatic scoring system, with scores confirmed by a third party. These scores are used to develop a ranked and tiered list of projects that are numerically scored based upon their ability to meet pre-defined criteria such as the ability to address multiple IRWM Plan objectives. Detailed information on scoring criteria is provided in Section 9.4.2.

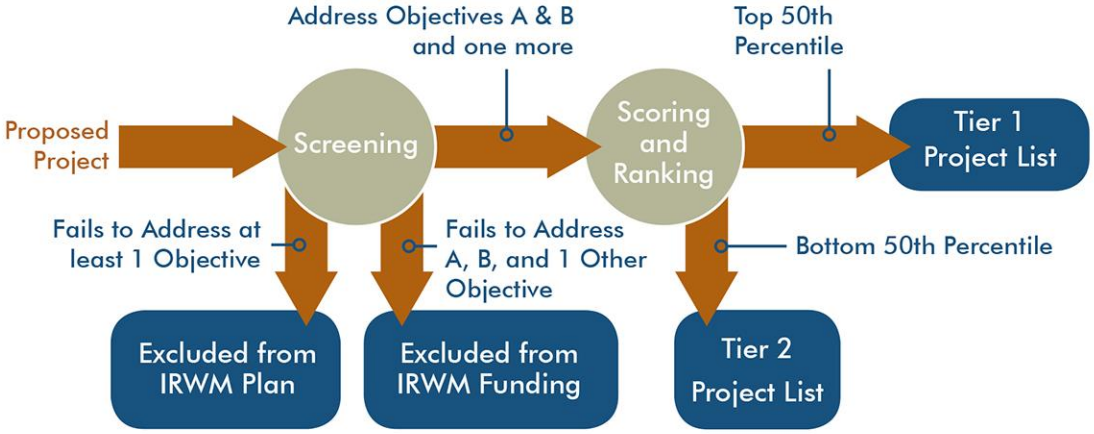
Stakeholder input is solicited following the scoring process, which allows stakeholders to elevate projects to the Tier 1 list (funding-eligible) based on merit, importance to IRWM Program, and other factors. During a grant proposal solicitation phase, only projects in Tier 1 are considered for funding. A Project Selection Workgroup, selected by the RAC, is convened to review database submittals and recommend projects to include in the San Diego IRWM Region's proposal package. The RAC considers the package of projects for inclusion in a funding proposal and votes whether to recommend the package to the RWMG governing bodies. Those governing bodies – the San Diego County Board of Supervisors, San Diego City Council and San Diego County Water Authority Board of Directors – must vote to approve the grant application, including the package of projects, before it may be submitted to DWR. The ultimate approval of the application and projects submitted for funding lies with the Board of Directors of the San Diego County Water Authority, the agency authorized to submit grant applications on behalf of the RWMG.

The Strategic Integration Workshop was an effective way to allow project sponsors to connect prior to opening of the Call for Projects.

Photo credit: Rosalyn Prickett, RMC Water and Environment

The recommended process to be implemented by the San Diego IRWM program from project submittal through compilation of a grant proposal package is outlined in the following steps. Figure 9-1 shows an overview of IRWM project selection, while Figure 9-2 provides a step-by-step account of the project review and selection process.

Figure 9-1: Overview of IRWM Project Selection



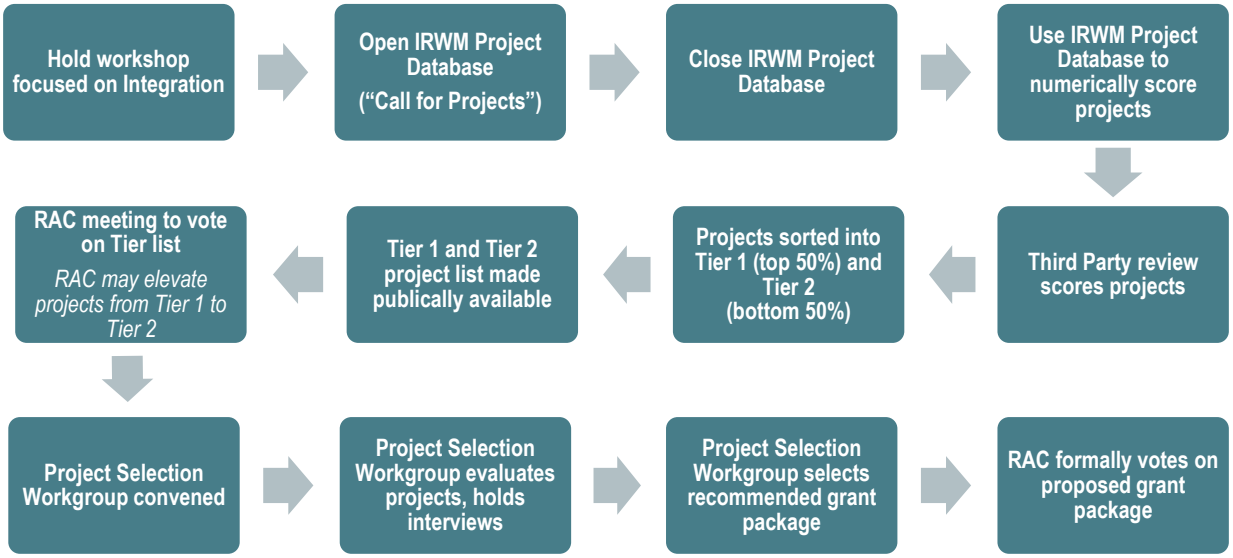
Please note that the following steps are recommendations regarding the project selection process, and therefore may be amended as appropriate by the RWMG or the RAC:

1. Hold an outreach meeting such as a Strategic Integration Workshop or a Watershed Workshop before the formal Call for Projects to allow stakeholders to interact and potentially integrate projects and project concepts. The scoring process and criteria will be explained, and tutorial given on how to use the online Project Database.
2. Issue a Call for Projects that is long enough to reasonably allow project sponsors to ask questions regarding the database, complete database forms, and revise previously submitted projects.
3. Use the IRWM Project Database to score and rank projects according to the numeric scoring described in Section 9.4.2.
4. Partial credit may be applied if projects only result in indirect benefits. Table 9-3 (located at the end of this chapter) provides an overview of how partial scoring may be applied to projects with respect to the IRWM Plan Objectives.
5. Have a third party review the project database scoring and ranking, and review each project to consistently apply scoring across all projects ("ground-truthing").
6. Sort projects into Tier 1 and Tier 2 lists – approximately the top 50% and bottom 50%, respectively.
7. Make the Tier 1/Tier 2 scored project list available to all IRWM stakeholders and allow IRWM stakeholders to contest any scoring changes based on the ground-truthing exercise.
8. Present the Tier 1/Tier 2 scored project list to the RAC, and allow the RAC to vote on the list. The RAC may vote to recommend elevating projects from the Tier 2 list to the Tier 1 list.
9. Convene a Project Selection Workgroup, which consists of RAC members from each caucus.
10. Have the Project Selection Workgroup review all projects (Tier 1 and Tier 2). The workgroup is provided the tiered list that includes recommendations from the RAC for elevating projects from Tier 2 to Tier 1.
11. Allow Project Selection Workgroup members to nominate elevation of projects from the Tier 2 list to the Tier 1 list. Decisions to elevate projects from the Tier 2 list to the Tier 1 list must be done by a 2/3 super-majority vote.
12. Have the Project Selection Workgroup discuss the overall project budget, and determine the appropriate process through which to split available funds among projects during one of the initial Project Selection Workgroup meetings.
13. Funnel any questions about projects posed by the Project Selection Workgroup members through a third party, who will report back to the Workgroup.
14. Have the Project Selection Workgroup discuss and evaluate projects based on the project and proposal-level criteria, using the criteria to eliminate projects from consideration. As appropriate, the Workgroup may hold private votes to conduct the post-scoring evaluation.
15. When the Project Selection Workgroup is applying the project-level and proposal-level criteria, they may break up by caucus and rate each project on how they meet the criteria.
16. Have the Project Selection Workgroup select projects for interviews and provide proponents with presentation guidelines, template, and standard format.
17. Have the Project Selection Workgroup conduct interviews of selected projects. Ask all proponents the same questions and give the same amount of time to present.

Do not allow Project Selection Workgroup members to participate as interviewees if their projects are included for consideration in the grant proposal.

18. Re-convene the Project Selection Workgroup after interviews to further eliminate/evaluate projects. Ultimately, the Workgroup will evaluate projects and budgets to reach consensus on a grant proposal.
19. Discuss final Project Selection Workgroup recommendation with the RAC. A formal vote of the RAC is required to recommend the package of proposed projects for inclusion in an IRWM grant application to the RWMG governing bodies.
20. RWMG governing bodies vote to approve the grant application, including the package of projects.

Figure 9-2: Step-by-Step Project Review and Selection Process



9.4.2 IRWM Project Scoring Content

As described in Section 9.4.1, projects undergo a scoring process in order to be classified as Tier 1 or Tier 2. This section provides an overview of the scoring criteria that are used in determining which projects will be considered for funding opportunities. In order to increase transparency in the project selection process, these scoring criteria are also made available to IRWM stakeholders before the Call for Projects so that they may use the criteria to decide if their projects may be appropriate for funding through the IRWM Program, or to enhance their projects to better meet the program objectives.

Table 9-1 shows the numeric project scoring criteria that are used to rank projects and sort them into the Tier 1 and Tier 2 project lists (refer to Section 9.4.1). Please note that each category in which a project is scored will be weighted to reflect the preferences of a given grant opportunity. This weighting will vary depending on the opportunity and will be determined by the RAC in coordination with the RWMG. Following project tiering, the Project Selection Workgroup evaluates projects on a project-level and on a proposal-level to consider the difficult-to-quantify merits of the projects, and determine how well the projects fit together into a strong proposal that meets the

preferences and requirements of the DWR grant solicitation (the grant guidelines, or Proposal Solicitation Package). Those criteria to be evaluated by the Project Selection Workgroup are included in Table 9-2.

In addition to the scoring criteria listed in Table 9-1 and Table 9-2, the following steps pertaining to project scoring for future IRWM grant opportunities were recommended and approved of by the RAC and RWMG. Although included in the 2013 IRWM Plan, the following steps remain as recommendations only as to provide flexibility to adapt as needed to grant cycles. As with the project review process recommended in Section 9.4.1, the scoring steps and criteria presented below are recommendations that may be amended as appropriate.

1. Recommended edits to the project database:
    a. The project database should be limited to only include information necessary to score the projects into Tier 1 and Tier 2 lists.
    b. All projects will be asked to submit a formal project abstract that includes a complete summary of the project in a consistent (pre-determined) format.
2. Recommended edits to the scoring criteria:
    a. RWMG will create draft scoring criteria for each round of funding, and will bring the criteria to the RAC for review and approval. As indicated in Table 9-1, weighting for all scoring criteria are not established in this IRWM Plan. Weighting for any of the criteria may be changed to 0%, which would indicate that the given criterion is not applicable to a future round of project selection. Conversely, given the open nature of the criteria, any number of additional criteria may be added to reflect regional funding priorities.
    b. RWMG will create materials that explain how points will be assigned in the ground-truthing process. These materials will be made available to stakeholders prior to or during the Call for Projects.
3. Recommended edits to the project- and proposal-level criteria:
    a. When the Project Selection Workgroup is applying the project-level and proposal-level criteria, they will break up by caucus, and rate each project on how they meet the criteria.
    b. RAC to determine a guideline for the approximate number of projects to be included in each proposal.

Table 9-1: Scoring Criteria for IRWM Grant Opportunities

Criterion	Scoring Procedure	Points Assigned	Percent of Total Score[2]
Addresses Multiple Objectives[1]	Score is based on # of objectives addressed[3]	6+ objectives = 4 pts 5 objectives = 3 pts 4 objectives = 2 pts 3 objectives = 1 pt	TBD
Spans Multiple Watersheds	Score is based on the level of integration between watersheds	Multiple Watersheds = 4 pts Integration within a single Watershed = 2 pts Only site-specific = 0 pts	TBD
Addresses Multiple Beneficial Uses (BUs)	Score is based on # of beneficial uses addressed	4+ BUs = 4 pts 3 BUs = 3 pts 2 BUs = 2 pts 1 BUs = 1 pt	TBD
Addresses Multiple Watershed Services within the Hydrologic Cycle	Score is based on the number of watershed services[4] within the hydrologic cycle	Includes 2+ watershed services = 2 pts Includes 1-2 watershed services = 1 pts Includes no watershed functions = 0 pts	TBD
Creates New Applied Water or Offsets Potable Demand[2]	Score is based on Yes/No response	Yes = 4 pt No = 0 pts	TBD
Linked to Other Water Management Projects	Score is based on Yes/No response	Yes = 4 pt No = 0 pts	TBD
Involves More than One Entity	Score is based on Yes/No response	Yes = 4 pt No = 0 pts	TBD
Implements IRWM Plan Recommendation or Addresses an IRWM Issue[5], IRWM Workgroup Recommendation, or a Recommendation in an Adopted Water Management Plan	Score is based on the kind of planning document that suggests implementing benefits or components of the project	IRWM Plan Recommendation or Issue = 4 pts Workgroup Recommendation = 2 pts Other Adopted Water Management Plan Recommendation = 1 pt	TBD
Directly Benefits Disadvantaged / Environmental Justice Communities	Score is based on the degree of benefit (direct vs. indirect)	Direct Benefits = 4 pts Indirect Benefit = 2 pts No Benefits = 0 pts	TBD
Other[6]	TBD	TBD	TBD

1. ½ points may be applied if the project indirectly meets this criterion (see Table 9-3 example for 2007 Objectives).
2. Prior to each round of funding, percentages will be applied as appropriate to determine applicable weighting of each criterion in accordance with direction provided by the RAC and the RWMG. Please note that percentages may be set at 0 for any given criteria, indicating that any of these criteria may be removed from consideration for a specific funding opportunity. Conversely, the "Other" category provided in this table indicates that any number of new criteria may be added by the RAC and the RWMG to reflect new or modified funding priorities.
3. Note that to be considered for IRWM funding, Objectives A and B and one other must be addressed. RAC may be asked to prioritize the IRWM Plan Objectives prior to each grant cycle.
4. Watershed services are defined in Section 9.2.5
5. IRWM Issues are identified in Table 1-2 of the IRWM Plan Update
6. "Other" scoring shall consider contribution of project to reducing greenhouse gas emissions, how the project will reduce dependence on Delta Supply, and how the project is related to resource management strategies (see Chapter 8).

Table 9-2: Framework for Scoring Guidelines for IRWM Grant Opportunities

Criteria	Suggested Workgroup Guidelines
PROJECT-LEVEL CRITERIA	
IRWM Plan Objectives	Select projects that contribute to the attainment of IRWM Plan objectives.
Legal, Scientific, and Technical Feasibility	Select projects that are well supported from a technical standpoint based on supporting studies and data.
Budget	Select projects that have well-developed budgets and exhibit reasonable costs. Note that DAC projects are exempt from the 25% funding match requirement.
Readiness to Proceed	Select projects that will be ready to proceed by December 2014.
Cost-Effectiveness – Water Supply, Water Quality, Flood Damage Reduction	Select projects that are cost-effective on both the short- and long-term, and provide quantifiable benefits to the region.
Benefits Tribes	Select projects that address the water resources needs of San Diego area tribes.
Integration	Review integration potential using pre-defined types of integration – Partnerships, Management strategies, Beneficial uses, Geographic, Hydrologic
Climate Change	Contributes to climate change adaptation or mitigation
PROPOSAL-LEVEL CRITERIA	
IRWM Plan Objectives	Proposal to include a suite of projects that addresses all IRWM Plan objectives.
Linkages to Other Projects	Proposal to include projects with synergies and linkages among them.
Funding Match	Proposal to achieve an overall 30% funding match.
Schedule	Proposal must include at least one project that will begin implementation by May 2014.
Economic Analysis – Water Supply, Water Quality and Other Expected Benefits, and Flood Damage Reduction	Proposal to include projects that realize quantifiable water supply benefits.
	Proposal to include projects that realize quantifiable water quality and other expected benefits.
	Proposal to include projects that realize quantifiable flood damage reduction benefits.
Geographic Parity	Proposal to include a suite of projects that will benefit watersheds across the Region.
Benefits Disadvantaged Communities	Proposal to include at least one project that addresses the critical water supply or water supply quality needs of disadvantaged communities.
Implementing Agency	Proposal to include a balance of projects sponsored by non-governmental organizations and agencies.
Cost Effectiveness	Compare cost effectiveness of projects within each functional area ($/level of benefit)
IRWM Integration	Compare integrated aspects of each project in accordance with the definition of integration established by the San Diego IRWM Program
Cutting-Edge Technology	Proposal to highly consider projects that implement cutting-edge or next-generation technologies that can effectively address water management issues

Table 9-3: Potential Partial Credit for 2007 IRWM Plan Objectives

Objective	1 point *Direct; active*	0.5 points *Indirect; passive*	0 points *Not applicable*
Objective A| Maximize stakeholder and community involvement and stewardship.	Workshops/educational meetings; interpretive signage w/IRWM principles; Hands-on events such as cleanups or water quality monitoring; Fliers/mailers; Surveys; Community events; School-based educational programs	CEQA meetings; Customer meetings	No specific activities in work plan
Objective B| Effectively obtain, manage, and assess water resources data and information.	Collect, manage, assess and share data (online, database, plan); Data must inform decision-making	Used for project-purposes only; Not shared beyond project team	No specific activities in work plan
Objective C| Further scientific and technical foundation of water management.	Research and development; pilot projects with shared results; Scientific analysis must inform decision-making; Regulation development/revisions with regulatory agencies	Used for project-purposes only; Not shared beyond project team; Standard permitting with regulatory agencies	No specific activities in work plan
Objective D| Develop and maintain a diverse mix of water resources.	Produces and uses recycled water, seawater desalination, local surface water, or groundwater; Water transfers; Water conservation; Stormwater capture if beneficially reused; Habitat preservation or treatment to protect supplies	Produces water but not uses; Stormwater capture not reused; Incidental recharge; Incidental reduction in environmental demands (invasive removal); Upland preservation	No specific activities in work plan
Objective E| Construct, operate, and maintain a reliable infrastructure system.	Construction, rehabilitation, or replacement of aging/ inadequate infrastructure; Emergency/redundant facilities; Natural systems (creeks) if offloads constructed system	Energy efficiency for conveyance/treatment systems; Infrastructure built but not connected to customers; Pilot project infrastructure; Mitigation for infrastructure	No specific activities in work plan
Objective F| Reduce the negative effects on waterways and watershed health caused by hydromodification and flooding.	Hydromodification BMPs and LID; Retention basins in floodplain; Structural flood improvements; Floodplain widening or realignment; Managed habitat restoration for flood purposes (needs technical doc); Reduced flood risk; Acquisition and protection of floodplain	Incidental flood benefits from habitat restoration; Retention basins with other primary purpose (recharge or water quality); Monitoring only; Pilot project only	No specific activities in work plan; Data collection only
Objective G| Effectively reduce sources of pollutants and environmental stressors.	Salinity management; Stormwater BMPs and LID; Point-source treatment; Reduces wastewater discharges to ocean outfalls; Water and wastewater treatment; Erosion/ sedimentation control; Contaminant uptake via habitat restoration if changing from impermeable to permeable; Retention basins for water quality treatment	Incidental water quality benefits from habitat restoration (currently permeable); Monitoring only; Pilot project only	No specific activities in work plan; Data collection only
Objective H| Protect, restore and maintain habitat and open space.	Habitat acquisition or restoration w/nexus to water resources; Removal of aquatic/riparian barriers (check dams); Invasive species management; Habitat creation	Agricultural land protection (as wildlife corridors); Monitoring only; Incidental habitat protection due to sediment control	No specific activities in work plan; Data collection only
Objective I| Optimize water-based recreational opportunities.	Access points to water-based recreation; Trails; Fishing/boat launches; Picnic areas; Overlooks; Bacteria reduction that directly reduces beach closures; Water quality improvements at reservoirs ; Quagga control at reservoirs	Incidental water quality benefits from habitat restoration; Acquiring land for future trails	No specific activities in work plan

9.5 References

California Department of Water Resources (DWR). 2012. *Guidelines: Integrated Regional Water Management, Proposition 84 and 1E*. November 2012. Available: http://www.water.ca.gov/irwm/grants/docs/Guidelines/GL_2012_FINAL.pdf

10 Data and Technical Analysis

This chapter addresses requirements set forth in the Data Management and Technical Analysis Standards included in the 2012 IRWM Program Guidelines (DWR 2012).

10.1 Overview

The intent of this chapter is to document various aspects of data management and technical analysis that were completed for the 2013 IRWM Plan and will continue for the IRWM Program. Specifically, this chapter includes information regarding:

- The process of data collection, storage, and dissemination of information to IRWM stakeholders, participants, members of the public, and the State.
- The data and technical analyses that were used to develop the 2013 IRWM Plan.

10.2 Data Management

A considerable variety of water and environmental resource data are collected throughout the Region. The overall intent of the Region's IRWM data management strategy is to augment these existing efforts in a way that allows regional leaders, stakeholders, and the public to effectively use data and information to support planning, decision-making, and public education and involvement.

Rather than duplicate existing data management systems in the Region, the 2013 IRWM Plan builds on them through a regional Data Management System (DMS) that is currently being developed through a Proposition 84 Implementation Grant (refer to Section 10.2.3 for more information). The IRWM DMS will focus on building upon existing data and information. In order to understand the framework for the DMS, it is important to understand existing data and information available in the Region. The following sections provide an overview of existing regional data needs and data collection efforts and data sources, which provide the information necessary to develop the DMS.

10.2.1 Data Needs

Despite the extensive ongoing water resources monitoring and data-collection efforts within the Region, opportunities exist for additional data gathering to close data gaps. Monitoring is generally conducted to support specific organizational, regulatory, or research objectives rather than within a regional or integrated framework. As a result, many of the gaps discussed here are related to a general lack of regional, integrated planning and concomitant data support strategies. Since a primary purpose of IRWM planning is to provide that regional focus, it is expected that this assessment of gaps will be updated and refined substantially over the next several years.

Data gaps will continue to be identified through IRWM planning efforts, primarily through the implementation of the planned IRWM DMS. A single, consolidated location for data will make identification of data gaps easier and reduce occurrences of unnecessary overlap or duplication of efforts. The DMS will also make it easier to direct users to a comprehensive source of information, increasing the likelihood of knowledge sharing across groups.

Additional support for addressing data gaps exists in the form of projects included in the 2013 IRWM Plan (refer to *Chapter 9, Project Evaluation and Prioritization* for information about project selection). Projects that have been funded through the IRWM Program seek to address some of the data gaps relating to monitoring. Further, given the adaptable nature of the project selection and evaluation process, it is possible that the RAC and the RWMG will amend project selection criteria to prioritize future projects that address identified data needs. Additional support is provided through the IRWM Plan Objectives, which include Objective C: Effectively obtain, manage, and assess water resource data and information, and Objective D: Further scientific and technical foundation of water management (see *Chapter 2, Vision and Objectives).* These two objectives address the need for increased science-based management as identified by IRWM stakeholders. The project scoring criteria gives preference to projects that address multiple objectives, and together with Objectives C and D, serve to increase the likelihood that projects included in funding proposals will also contribute to addressing data gaps.

The following sections summarize the specific data gaps that have been identified throughout the 2013 IRWM Plan development process, and discussed further in Table 10-1. These data gaps fall into five general categories: communication and collaboration, pollutants and sources, receiving water monitoring, habitat and natural resource monitoring, and monitoring and assessment approaches. Although the 2013 IRWM Plan development process revealed specific data gaps, several stakeholders have also noted that there is a need for data that can be used to facilitate effective decision-making. Stakeholders have noted that general data collection is not always preferable given that more data does not necessarily lead to effective or efficient conclusions. Therefore, the focus of the DMS that will be produced as part of the IRWM Program will focus on collecting specific data that can be efficiently used to improve water management.

Communication and Collaboration

As part of the 2013 IRWM Plan development process, a series of planning studies were conducted to analyze the present state of knowledge, identify opportunities for improvement in water management and strategies, and provide recommendations for changes to incorporate into the Plan (see *Chapter 7, Regional Coordination*). The planning studies identified knowledge-sharing as important to improved integrated water management, but found that knowledge-sharing is often limited to water-oriented organizations and can lack input from other essential parties. Table 10-1 includes details regarding specific communication and collaboration data gaps that were addressed in the 2013 IRWM Plan planning studies.

Addressing issues relating to knowledge-sharing will increase collaboration between agencies or organizations and will enable more efficient use of water management resources. Communication and knowledge sharing will be greatly improved through implementation of the Region's DMS.

Pollutants and Sources

Several data gaps have been identified within the Region's programs to monitor pollutants and sources. These data gaps, which are described in Table 10-1, pertain to: characterization of nonpoint sources, characterization of agricultural runoff and sources, characterization of pathogen impacts and loading, and evaluation of source load reductions.

Receiving Water Monitoring

Data gaps also exist within the Region pertaining to receiving water bodies. Specific data gaps associated with receiving water bodies are described in Table 10-1 and pertain to watershed sampling, streamflow monitoring, and groundwater monitoring programs.

Habitat and Natural Resource Monitoring

Habitat mapping efforts within the Region are reasonably complete, but significant additional data collection is needed to better address habitat health and viability and to update habitat maps. Additional habitat health, species composition, and invasive species data are required in all watersheds to provide for a greater understanding of geographic-, temporal-, and water quality-related trends. Although several federal, state and local agencies collect data related to the quantity and quality of habitat, currently no single entity in the Region provides a comprehensive assessment of such data.

Monitoring and Assessment Approaches

In some instances, data gaps could be addressed through modifications to existing monitoring and assessment approaches. For instance, monitoring approaches that better focus on water quality or environmental "risk," rather than static regulatory benchmarks such as chemical concentrations, could more effectively and cost-efficiently focus management efforts toward solutions. Likewise, considerable benefit, including cost-savings, could be achieved through data gathering approaches that are designed to assess cumulative impacts rather than those of a single source or project.

Water quality monitoring is conducted by citizens through San Diego CoastKeeper's Water Pollution Source Tracking Program.

Photo credit: Travis Prichard, San Diego CoastKeeper

Another key issue associated with monitoring approaches is that of linkages between media. Although the cycling of constituents between water supply systems, surface waters, groundwater, and potentially biota is well understood from a theoretical perspective, little real world data exist to support the development of effect management approaches. For instance, high total dissolved solids concentrations have been documented in supplied water, surface waters, and groundwater throughout the Region. Future data collection should focus on characterizing and managing this issue.

Finally, an increased understanding of the dynamics between existing monitoring systems would be beneficial. For example, although the 2006 update of the Region's list of impaired water bodies (303(d) list) generated several new listings for drinking water reservoirs (e.g., for color, pH, manganese, nitrogen, and phosphorous), a better understanding of the limnology of these water bodies would help to interpret the results on which the listings are based. In this example, data on the cycling of dissolved oxygen and nutrients would help to provide a framework for interpreting results.

Table 10-1: Further Details on Existing Data Gaps

Data Gap Topical Area	Information about Data Gaps
Communication and Collaboration	***Land Use Planning Study Findings***: The *Land Use Planning Study* found that there is an opportunity for increased communication and collaboration between water managers and land planners. Specifically, this study found that there is a general lack of understanding between water managers and land use planners that may hinder their ability to consider or incorporate each other's planning efforts. Challenges to bridging this gap include: different agency missions and interests, limited resources, and different jurisdictional areas.
	Regulatory Workgroup Report Findings: The *Regulatory Workgroup Report* also identified knowledge-sharing as a key opportunity for improved water management. This report recommends increased collaboration with the Regional Water Quality Control Board (Regional Board) and identified common themes of interest, including effective data management and assessment. Within this theme, the Regulatory Workgroup identified four issues of mutual interest: 1) Improve standardization of data collection and assessment, 2) Eliminate disincentives for data collection and transfer, 3) Eliminate duplicative data collection, management, and assessment efforts, and 4) Ensure that collected data are useful and effectively analyzed, and focus on question-driven issues.
	Integrated Flood Management Planning Study Findings: The *Integrated Flood Management Planning Study* made a number of recommendations related to increased or improved communication between agencies and organizations. This study also highlighted the opportunity for integrated management and planning through improved knowledge-sharing.
Pollutants and Sources	***Characterization of Nonpoint Sources***: Nonpoint source (NPS) pollution is considered to be the major contributor of pollution to impacted streams, lakes, wetlands, estuaries, marine waters, and groundwater basins, and the leading cause of water quality impairments in California. Despite the existence of a myriad of programs focused on various aspects of NPS management, ongoing efforts are hampered by a lack of specific knowledge about the individual sources within the Region's watersheds that collectively constitute NPS pollution. For instance, the Municipal Stormwater Permit requires that local jurisdictions implement programs to address impacts from more than 40 commercial and industrial business types; these sources are present by the tens of thousands throughout the Region. In the long-term, effective management will require that data collection be focused on better characterizing the specific sources of priority pollutants in the Region's watersheds. Not only must specific activities and processes occurring on-site be better understood, but our knowledge of how threat-to-water-quality varies within broad categories of regulated sources (e.g., residences, restaurants, etc.) must also be increased.
	Characterization of Agricultural Runoff and Sources: Water quality monitoring of agricultural runoff has been identified as an additional data gap. San Diego agriculture is a $1.7 billion industry (as of 2011), ranking as the fourth largest industry in the Region. The County's unique topography creates a wide variety of microclimates resulting in nearly 30 different climate types of vegetation communities. This diversity allows for a multitude of different agricultural commodities to be produced in the County – from strawberries and tomatoes along the coast, to apples in the mountain areas. Chemicals applied during operations (e.g., pesticides and fertilizers) may be carried into the ground, and to surface waters or groundwater. The extent of potential contamination resulting from agricultural practices is currently unknown, and should be addressed in future data collection efforts.
	Characterization of Pathogen Impacts and Loading: In recent years, impaired water bodies formally listed under Section 303(d) of the Clean Water Act for bacterial indicators have become increasingly common. The listings for bacterial indicators present a problem, because the indicators themselves are not thought to present a threat to humans, i.e., their presence is merely an indicator of the potential presence of disease organisms. Future monitoring would benefit from the development of measures that provide a better indication of actual risk, as well as a basis for the identification and assessment of specific management measures. Likewise, site-specific epidemiological studies and source investigations (e.g., DNA source tracking) may also be useful to increase appropriate management of indicator bacteria.

Data Gap Topical Area	Information about Data Gaps
	Evaluation of Source Load Reductions: While considerable data collection has focused on identifying water quality problems and impairments throughout the Region, comparatively little is known about the effectiveness of specific management measures targeted to remedy these problems. The current Municipal Stormwater Permit requires that source load reductions be determined for a variety of sources regulated under the program. However, the current state-of-the-art for conducting load reduction estimates, especially at a broad programmatic level, is poorly evolved. Considerable effort is currently being invested in the development of new methods, but data are generally not available to support estimation either of non-structural BMP effectiveness or implementation frequency. This data gap must be addressed to improve the effectiveness and cost-efficiency of pollution management programs.
Receiving Water Monitoring	***Representative Watershed Sampling***: Water quality monitoring that does not include the upper portions of many of the Region's watersheds presents a spatial data gap. Stormwater programs have conducted mass loading monitoring at the base of the Region's watersheds since 1993-94. MS4 Copermittees in the Region have used this monitoring data and other information to determine watershed priorities, which have been well-established in management plans formalized by the Copermittees and their stakeholder groups. Moving forward, receiving water monitoring should be focused to update Basin Plan priorities such as beneficial use designations and water quality objectives; this will help to determine appropriate management actions and move away from water quality monitoring that is not necessary given the amount of water quality data that is available throughout the Region.
	Streamflow Monitoring: Ongoing streamflow monitoring provides a basic statistical understanding of surface water flows within major streams and rivers in the Region. A larger number and greater geographical distribution of streamflow gaging stations, however, is required to assess streamflow recharge of groundwater, to provide a better understanding of streamflow within smaller watersheds and lesser tributaries, and to provide streamflow data needed to develop TMDLs.
	Groundwater Monitoring: While groundwater data are collected in many watersheds within the Region, data are insufficient to adequately characterize groundwater quality, groundwater availability, and aquifer characteristics throughout much of the Region. This is particularly evident in areas exclusively dependent on groundwater supplies. Groundwater data are sufficient to characterize groundwater quality and availability only within some of the Region's major aquifers. Within groundwater-dependent communities in the inland portions of the County (outside the Region's major alluvial aquifers), water quality data are too scarce to effectively characterize and manage water quality problems. Spatial and temporal understanding of groundwater quality in these areas is therefore lacking. A centralized, coordinated groundwater data collection effort would be required to allow for more complete characterization of groundwater availability and quality within the Region.
	Monitored Constituents: Because monitoring strategies are often driven by regulatory mandates, the selection of monitored constituents tends to be broad, inclusive (e.g., all EPA Priority Pollutants), and static. In the past several years, watershed and water quality management in the Region has evolved to become increasingly focused on specific issues and problems. Likewise, watershed sources of pollution are in continual flux. For instance, it is estimated that there are currently more than 85,000 chemicals in commerce in the U.S., with more than 2,000 new chemicals being added to this mix annually (a rate of seven per day). Although the nature of water and environmental pollution generally remains the same over time, the details do not. Monitoring and data collection must therefore become increasingly focused on newly identified priorities, as well as "emerging chemicals of concern" (e.g., pyrethroid pesticides, brominated flame retardants, nanoparticles, and pharmaceutical wastes).

10.2.2 Data Collection and Sources

Many of the Region's monitoring programs and activities provide data that are useful to IRWM planning and management in the Region. Data collected to support the 2013 IRWM Plan will facilitate the development of local water management programs in a manner that ensures consistency with the standards established through statewide data management systems. Table 10-2 provides an overview and description of efforts thought to be of particular importance to IRWM planning, but is not intended as a comprehensive survey of all programs and activities.

In addition, a substantial amount of data is collected pertaining to stormwater for purposes of the Municipal Separate Storm Sewer System (MS4) permit. Specific stormwater-related monitoring efforts, which provide the basis for stormwater and water quality monitoring in the Region are detailed in Table 10-3.

The IRWM Program will support statewide data activities by potentially serving as a repository for regional compilation of water resources data and information, and by requiring that data collected to support project performance assessment is collected in a manner consistent with continuing statewide data collection programs. Consistency with Statewide monitoring programs is critical to ensuring that regional projects contribute to efficient, uniform, and comprehensive study design and data collection. Data collected as part of Plan implementation will be required to be comparable with applicable statewide data collection programs such as the Surface Water Ambient Monitoring Program (SWAMP) and Groundwater Ambient Monitoring and Assessment (GAMA) Program. Upon completion of the IRWM Program performance assessment, the project-specific data collected, along with its associated quality assurance/quality control information, would be provided to the state in a format that can be easily integrated into statewide data collection and tracking programs. All projects implemented with IRWM funding must follow state mandated protocols for data collection and reporting, and must also send regular reports to DWR. Through IRWM funding, the IRWM Program will facilitate data collection in accordance with statewide standards, and can also help to encourage project proponents and other stakeholders to contribute data to statewide databases.

Water quality monitoring data collection site at the Biofiltration Wetlands (San Diego Zoo Safari Park), partially funded through the IRWM Program.

Photo credit: Rosalyn Prickett, RMC Water and Environment

10.2.2.1 Typical Collection Techniques

Data are collected using common, standard techniques appropriate to the type of data collected, collection site conditions, resource availability, and how the data will be analyzed. Data collection techniques are typically described in reports associated with each dataset. Scientifically sound data will be considered for inclusion in the DMS, but methodology will be the responsibility of the individual organizations. Substantial concerns relating to appropriateness of methodology may be addressed through removal from DMS, at the discretion of the RAC and the RWMG.

Table 10-2: List of Potential Data Sources for IRWM Planning

Monitoring	Collected by	Reported to	Notes
Various GIS datasets	San Diego Association of Governments (SANDAG)	San Diego Geographic Information Source (SanGIS)	SanGIS, a joint project of the County of San Diego and SANDAG, is a publicly-available regional geographic information system (GIS) data warehouse. The data provided by SanGIS includes a variety of sources of information from local, statewide, and federal databases, and ranging from landbase information (lots, parcels, roads, etc.) to demographic data, and specific water resources data such as impaired water bodies, groundwater basin locations, floodplains and flood zones, and more. SanGIS: http://www.sangis.org/
Real-time or recent surface-water, groundwater, or water-quality data	U.S. Geological Survey (USGS)	National Water Information System (NWIS)	The NWIS is a comprehensive and distributed application that supports the acquisition, processing, and long-term storage of water data. NWIS: http://waterdata.usgs.gov/nwis
Routine monitoring of public water systems	Operators of public water systems	California Department of Public Health (CDPH)	Sampling is conducted at treatment plants, within distribution systems, and at the tap, and monitoring results are evaluated to ensure that applicable drinking water quality standards are met. For regulated constituents, results are compared to Primary and Secondary MCLs, and unregulated contaminants are evaluated against CDPH Detection Limits for Purposes of Reporting (e.g., color, corrosivity, and odor). For more information on CDPH's Drinking Water Program, visit http://www.cdph.ca.gov/programs/Pages/DWP.aspx
Routine monitoring of small water systems (i.e., community water systems that serve 199 connections or less from groundwater supply wells)	There are over 150 small water systems within the Region.	San Diego County Department of Environmental Health (DEH)	DEH Land Use Program staff inspects small water systems and monitors the reporting of water samples to ensure that they comply with Safe Drinking Water Act and EPA requirements for supplying potable water. Monitoring results are reported monthly to CDPH. Monitoring for the constituents described above for all water suppliers is conducted every three years, and more frequent monitoring is conducted for bacteria and nitrates. For more information on DEH's Small Drinking Water Systems program, visit http://www.sdcounty.ca.gov/deh/water/lu_sws.html
Chemical contaminants in oysters and mussels and in sediments	National Oceanic and Atmospheric Administration (NOAA)	National Oceanic and Atmospheric Organization (NOAA) Status and Trends Program, Mussel Watch Project	NOAA collects and analyzes samples of bivalve tissue biennially and sediments every decade to track long-term trends in organic and inorganic contaminants along the coast. These data are used to assess changes in water quality and provide context for local regulators. Tissue banks are maintained from all sampling efforts to allow retrospective analyses for new or emerging contaminants of concern. For more information on the Mussel Watch program, visit http://ccma.nos.noaa.gov/about/coast/nsandt/musselwatch.aspx
Streamflow data at 94 stations in the County; Depth to groundwater at 20 stations in the County	United States Geological Survey (USGS) monitoring stations	United States Geological Survey (USGS) National Water Information System	USGS collects streamflow data across the nation, as well as monitors water quality. USGS also partners with local agencies to produce studies and reports on the status of surface and groundwater. For more information about the National Water Information System or to access data, visit http://waterdata.usgs.gov/nwis

Monitoring	Collected by	Reported to	Notes
"Ambient" surface water monitoring in all County watersheds	Regional Board and organizations collecting water surface water quality data using funding from Propositions 13,40,50, and 84	State Water Resources Control Board (State Board) Surface Water Ambient Monitoring Program (SWAMP)	The main functions of SWAMP are to accept, manage and store SWAMP data and to share this data within SWAMP and among stakeholders. The database is designed to transfer data into larger data exchange networks. Water quality, toxicity, sediment chemistry, microbiological, habitat, biological, fish and shellfish tissue data and metadata are managed within a central database that is fed from peripheral databases. SWAMP is designed to support and expand water quality assessments, to determine 303(d) listings and de-listings, and help prioritize or support site-specific actions. SWAMP works closely with the California Water Quality Monitoring Council (CWQMC). For more information on SWAMP, visit http://www.waterboards.ca.gov/water_issues/programs/swamp/
Water quality monitoring to assess receiving water conditions (surface and groundwater) and verify that targeted load reductions are occurring	Dischargers as named in permits, the Water Quality Control Plan for the San Diego Basin (Basin Plan), and Regional Board Orders	Total Maximum Daily Loads (TMDLs), Waste Discharge Requirements (WDRs), and Investigation Orders	Water quality monitoring is conducted as part of TMDL assessments. Additional monitoring by dischargers is at the discretion of the Regional Board, and is often required in support of TMDLs or possible future TMDLs. For more information on the Regional Board's TMDL program, visit http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/tmdls/index.shtml
Water quality monitoring to verify compliance with permit conditions	Permitted parties	Regional Board Point-Source Discharge Permit Compliance Monitoring	Regional Board regulates point-source discharges through WDR or NPDES permits. Both of these permits require monitoring to verify compliance with standards associated with applicable conditions. Data in this category also includes permitting required for ocean dischargers (outfalls). For more information the point-source discharge monitoring via WDR permits visit: http://www.swrcb.ca.gov/sandiego/water_issues/programs/ground_water_basin/recycled_subsurface/recycledwater_subsurfacedisposal_programs.shtml For more information on monitoring through NPDES permits visit: http://www.waterboards.ca.gov/water_issues/programs/npdes/
Extensive monitoring of urban runoff discharges and receiving waters	Permitted parties	Regional BoardMS4 Program	As part of the MS4 permit issued by the Regional Board, the Copermittees have implemented runoff monitoring programs. Monitoring has been conducted since the 1993-94 wet season, but evolved to address monitoring goals and management questions. Program components are described in Table 10-3. For more information about the MS4 permit, visit: http://www.swrcb.ca.gov/sandiego/water_issues/programs/stormwater/sd_stormwater.shtml For information regarding stormwater management in the IRWM Region, visit: http://www.projectcleanwater.org/html/copermittees.html
Beach water quality at 110 locations as part of AB411 requirements	Cities, wastewater agencies, DEH	DEH Ocean and Bay Recreational Water Program and individual city/wastewater agency programs	Water quality samples are collected at 78 beaches (110 locations) weekly from April through October every year. Samples are collected from a smaller number of beaches from November through March commensurate with beach use and budget. For more information, visit http://www.sdcounty.ca.gov/deh/water/beach_bay.html

Monitoring	Collected by	Reported to	Notes
Watershed sanitary surveys of public water systems	Water agencies with surface reservoirs	CDPH	Per Title 22, § 64665 of the California Code of Regulations, CDPH requires watershed sanitary surveys be conducted every 5 years to identify sources of contamination or other factors which might adversely affect quality of water used for domestic drinking water. These surveys are conducted by individual water agencies using surface water reservoirs. More information can be found on agency and city websites. An example from the City of San Diego can be found here: http://www.sandiego.gov/water/quality/environment/sanitarysurvey.shtml
Marine environmental research	Member agencies	Southern California Coastal Water Research Project (SCCWRP)	SCCWRP is a joint powers agency for marine environmental research on the Southern California Bight. Its mission is to gather data so that agencies can effectively protect the Southern California marine environment. It focuses on Publicly Owned Treatment Works (POTWs), urban runoff, and surface water quality monitoring. For more information, visit: www.sccwrp.org
Areas of Special Biological Significance (ASBS) information management	Scripps Institution of Oceanography (SIO), City of San Diego, San Diego Coastkeeper	SIO Coastal Observing Research and Development Center (CORDC)	CORDC is the lead for ASBS information management. The CORDC system includes automatic data transfer and ingestion, data archiving and backup, public display of data and historical data download. It uses a modified SWAMP template, and allows for users to query and view data. The goal is to establish infrastructure needs and generate conceptual design required for long-term assessment of ASBS performance and management decisions. For more information, visit: https://cordc.ucsd.edu/projects/asbs/
Characteristics of Southern California Bight	Research organizations, such as SIO	Southern California Coastal Ocean Observing System (SCCOOS)	SCCOOS maintains databases of surface currents, satellite imagery, wave condition and forecasts, meteorological conditions and forecasts, water quality, ocean temperature, salinity, chlorophyll, and density. It also presents and manages data in various data interfaces and products, utilizing web-based mapping to provide localized interactive data displays. For more information on SCCOOS or to access data, visit: http://www.sccoos.org/index.html
Citizen-based volunteer surface water quality monitoring	Citizen scientists working under the supervision of various non-governmental organizations(NGOs)	San Diego Stream Team; San Diego CoastKeeper Water Quality Monitoring Program; San Diego River Park Foundation's RiverWatch Team; Carlsbad Watershed Network's Watershed Stewards Training Program	Citizen science provides significant, important data sets. Most of these efforts are supervised by local NGOs. More information on citizen monitoring efforts can be found on these organizations' websites: San Diego CoastKeeper has a data portal that contains field screening data collected by volunteers. The data portal contains field screening data collected by volunteers that were trained in accordance with State Water Resources Control Board and EPA field methods. CoastKeeper: http://www.sdwatersheds.org/wiki/Main_Page The Common Grounds Project is conducted by the City of San Diego, San Diego State University and San Diego CoastKeeper to incorporate data from regional water quality monitoring programs and integrate the data on a watershed level using a web-based interactive application. Common Grounds: www.sdbay.sdsu.edu The San Diego River Watershed Data Portal is an online resource for citizen-based monitoring programs. Currently the Data Portal has compiled data for the San Diego River Park Foundation's RiverWatch program. These data have been collected at 15 sites on a monthly basis since 2004. San Diego River Watershed Data Portal: http://www.ecolayers.biz/sdrpf-riverwatch/ Carlsbad Watershed: http://www.carlsbadwatershednetwork.net/stewards_training.php

Monitoring	Collected by	Reported to	Notes
Groundwater monitoring as part of compliance with underground storage tank regulations	County of San Diego	DEH and Regional Board	Groundwater monitoring is required as part of regulating compliance with underground tank regulations, and is normally limited to near underground tanks to check for leaks. Where leaks have been detected, more extensive monitoring is required. More information can be found on the Regional Board's Underground Storage Tank (UST) Program Website, at http://www.waterboards.ca.gov/sandiego/water_issues/programs/ground_water_basin/ust_program.shtml Or at the County of San Diego's UST Program site at http://www.sdcounty.ca.gov/deh/hazmat/ust.html
Biological resource/habitat surveys and biological monitoring programs	Wildlife agencies	Multiple Species Conservation Program (MSCP) Databases	The programs developed as part of the MSCP typically include general habitat monitoring, species specific monitoring and surveys, and other tools such rapid assessment protocol surveys, vernal pool inventories, photo monitoring, and post-fire recovery surveys. The County of San Diego is developing a comprehensive database to track and more efficiently manage monitoring activities. When complete, the database will provide information such as past monitoring activities, future monitoring requirements, locations of preserved lands within the County's MSCP Subarea, and locations of monitoring sites. For more information on the MSCP, visit: http://www.sdcounty.ca.gov/pds/mscp/ The City of San Diego (www.sandiego.gov) has also developed an integrated Management and Monitoring Database that tracks their MSCP biological monitoring and management activities. It includes a GIS component, field data collection using a pocket personal computer, and field and office demonstration to other agencies. Future phases may include a web-based internet application made available to the public for education and information.
Status and distribution of bird populations	Local birders	San Diego Audubon Society's Christmas Bird Counts	The annual Christmas Bird Count, conducted by the Audubon Society through its local chapters, monitors the status and distribution of bird populations in the Western Hemisphere. The results are compiled into the longest running database in ornithology. Trends seen in these data can indicate habitat fragmentation or signal an environmental threat. More information about the Christmas Bird Count can be found at http://birds.audubon.org/christmas-bird-count
Outdoor research and education activities	Field Station Program staff, visiting researchers	San Diego State University (SDSU) Biological Field Stations	The SDSU Field Stations Program supports outdoor research and education activities. Three of the Program's sites are located within the IRWM Region. The field stations are established as reserves, totaling over 5,000 acres, and provide visitor access, education and outreach, and sites for scientific research. More information can be found at http://fs.sdsu.edu
Natural resources data	Varies	California Environmental Resources Evaluation System (CERES)	CERES is an information system to facilitate access to natural resource data. CERES' goal is to improve environmental analysis and planning by integrated natural and cultural resource information from multiple contributes and making it available and useful to a variety of users. CERES: http://ceres.ca.gov/
Variety of water data	Varies	Water Data Library (WDL)	The WDL contains data from monitoring stations across state. Allows users to easily query areas of interest. Includes groundwater levels, water quality, surface water flow, rainfall/climate and well logs. Links to other data resources. WDL: http://www.water.ca.gov/waterdatalibrary/

Monitoring	Collected by	Reported to	Notes
Groundwater elevation data	Local water suppliers overlying groundwater basins	California Statewide Groundwater Elevation Monitoring Program (CASGEM)	CASGEM is a collaboration between local organizations and DWR to collect groundwater elevations statewide. Tracks seasonal and long-term trends in groundwater elevations. Data available on the CASGEM Online System. CASGEM: http://www.water.ca.gov/groundwater/casgem/
Variety of data	California Natural Resources Agency	California Environmental Information Catalog (CEIC)	CEIC is a library of existing data and where to find it. CEIC facilitates identification and access to data and improves efficient use of data. CEIC: http://ceic.resources.ca.gov/
Variety of data	Various entities, compiled by State Board	California Environmental Data Exchange Network (CEDEN)	CEDEN is a cooperative data exchange program for organizations involved in water and environmental resources in California. Scores of programs have been connected into CEDEN. Projects are underwater to extend data exchange to additional standards. CEDEN: http://www.ceden.org/
Variety of data	Various entities, compiled by State Board	Surface Water Ambient Monitoring Program (SWAMP)	SWAMP is a statewide monitoring effort to assess the conditions of surface waters throughout California. Some state funding sources require reporting to SWAMP if projects involve surface water monitoring. SWAMP: http://www.waterboards.ca.gov/water_issues/programs/swamp/
Variety of data	Various entities, compiled by State Board	Groundwater Ambient Monitoring and Assessment program (GAMA)	GAMA was created to improve statewide ambient groundwater quality monitoring and assessment and increase the availability of groundwater quality information to the public. It consists of the California Aquifer Susceptibility (CAS) assessment and the Voluntary Domestic Well Assessment Project. GAMA: http://www.waterboards.ca.gov/water_issues/programs/gama/
Variety of data	Various entities, compiled by DWR	Integrated Water Resources Information System (IWRIS)	IWRIS is a data management tool for water resources data. It utilizes databases such as WDL, CDEC, USGS Streamflow, Local Groundwater Assistance Grants, and local agency data to allow users to access and visualize multiple sets of data simultaneously. It was designed to support IRWM efforts. IWRIS: http://www.water.ca.gov/iwris/
Variety of data	Various entities, compiled by The Climate Registry (TCR)	TCR	The California Climate Action Registry has been integrated into TCR, which collects GHG emissions data from members. Data are verified by third-party organizations before being submitted. All three RWMG member agencies and the Metropolitan Water District of Southern California (Metropolitan) are TCR members. TCR: http://www.theclimateregistry.org/
Variety of data	Various entities, compiled by California Department of Fish and Wildlife	California Bio-Geographic Information and Observation System (BIOS)	BIOS is a statewide data management system that allows DFG and partner organizations to manage, exchange, and geographically visualize a variety of environmental/biological data BIOS: http://bios.dfg.ca.gov/
Variety of data	Various entities, compiled by California Department of Fish and Wildlife	California Natural Diversity Data Base (CNDDB)	CNDDB is a database of rare species and communities. It is maintained and updated by the California Department of Fish and Wildlife, and data can be accessed either directly or through BIOS. CNDDB: http://www.dfg.ca.gov/biogeodata/cnddb/

Table 10-3: Stormwater Monitoring Program Components from the 2007 MS4 Permit

Monitoring Element	Description	Frequency
A. Receiving Waters Monitoring Program		
Mass Loading Station Monitoring	11 stations located in downstream segments of major watersheds, upstream of tidal influence	Samples collected during three storm events per year
Temporary Watershed Assessment Station (TWAS) Monitoring	Same as mass loading stations, but stations are located in upstream reaches	Twice during wet weather and twice during dry weather
Bioassessment Monitoring	Conducted at 20 sites (two reaches within each of the 10 watershed management areas) and 3 reference sites	Samples collected twice per year, annually
Toxicity Identification Evaluations (TIEs)	Conducted to evaluate the extent and causes of pollution in receiving waters and prioritize and implement management actions	When monitoring results indicate degradation
Ambient Bay and Lagoon Monitoring (ABLM)	Sediment testing as well as chemistry, toxicity, and benthic community testing	Annual
Coastal Storm Drain Monitoring	Bacterial sampling conducted in sewer outfalls and receiving waters (coastal and lagoon) during dry- and wet-weather periods	Samples collected twice monthly
Pyrethroids Monitoring	Monitoring program to measure and assess the presence of pyrethroids in receiving waters	Water quality samples collected during storm events twice per year, sediment samples collected following first-flush rainfall event
B. Urban Runoff Monitoring		
MS4 Outfall Monitoring	To characterize pollutant discharges from MS4 outfalls in each watershed	Wet and dry weather
Source Identification Monitoring	To identify sources of discharges of pollutants causing the priority water quality problems within each watershed	As practicable
Dry Weather Field Screening and Analytical Monitoring	Consists of (1) field observations; (2) field screening monitoring; and (3) analytical monitoring at selected stations	April - October
C. Regional Monitoring		
Southern California Bight '08	Optional participation in the Bight '08 study, data collected from 2007 to 2012	Offshore Water Quality: monthly; Coastal Wetlands and Estuaries: continuously for water quality parameters, bimonthly for primary producer biomass

10.2.3 IRWM Data Management System

Rather than duplicate existing data management systems in the Region, the 2013 IRWM Plan proposes to build on them through the augmentation of the San Diego IRWM website (http://www.sdirwmp.org). As part of the 2013 IRWM Plan development process, the San Diego IRWM website was comprehensively updated such that it contains up-to-date information about workgroups, workshops, and other meetings held in relation to the planning process. The website also contains work products from the various planning studies and technical efforts undertaken for the 2013 IRWM Plan, as well as information about project selection and solicitation associated with IRWM grant opportunities (Proposition 84 and Proposition 1E). Finally, the website also contains updated information about projects that have been funded through the IRWM Program (Proposition 50 and Proposition 84), including project overviews, budgets, and major project amendments. The San Diego IRWM website provides a venue through which stakeholders can learn about IRWM Plan implementation and progress. In 2011, a Report Card was created to assess progress on implementation of the 2007 IRWM Plan. As discussed in *Chapter 11, Implementation,* it is anticipated that the 2013 IRWM Plan will be assessed in a similar fashion, and results of this

assessment (the comprehensive Report Card) will continue to be posted on the San Diego IRWM website for review by stakeholders and other interested parties.

Future IRWM Program activities will include further updates to the San Diego IRWM website such that the website will include a Data Management System (DMS) that will be publicly-accessible through the website. The DMS is intended to address three primary data and information management goals, which are described in the following sections.

10.2.4 Data Management Objectives and Goals

Data and information management is an essential element of the IRWM planning and management process. An effective data management strategy must address several key objectives:

- *Support for IRWM Planning* – Data and information must support ongoing IRWM planning and decision-making processes. Through the planning process, a basis can be established for evaluating the performance of individual projects, programs, the2013 IRWM Plan, and the IRWM Program as a whole, as well as for supporting statewide data needs and integration with regional and statewide programs.
- *Evaluation of Project, Program, and Plan Performance* – Projects and programs must be periodically evaluated according to established criteria to monitor their progress and evaluate their success. Collective 2013 IRWM Plan progress and performance must also be evaluated, and the results of these evaluations used to provide feedback into the ongoing planning process.
- *Facilitation of Public Participation* – Dissemination of data and information to stakeholders and the public is critical to ensuring their ongoing participation in IRWM planning and implementation activities.

In support of these objectives, three data management goals have been developed for the IRWM Program. These goals and details regarding how these goals will be implemented are discussed in below.

<u>Goal 1 – Provide Simplified Access to Existing Sources of Data and Information</u>

A considerable amount of water management data and information is provided through numerous existing monitoring and research efforts. Although many agencies and organizations have developed useful web-based resources for disseminating data and information, users often lack the specific knowledge necessary to find and effectively use this information. A key component of the DMS will be to establish a centralized point for interested parties to find and explore these existing resources, and to more easily obtain the specific data they need. This will likely include web links and contact information for agencies and organizations collecting or managing water management data.

It is important to recognize that many existing efforts provide a considerable degree of data centralization and access to data sources and databases. In some cases, there may be opportunities for integration or consolidation of efforts over time. In other cases, the goal will simply be to ensure that monitoring and data management efforts are not duplicated between programs, or that data are collected and disseminated in a consistent manner such that various data sets may be reasonably compared and analyzed in a similar fashion.

Written and electronic work products will also continue to be a key part of the data and information dissemination process. In addition to providing contact information for obtaining these products, documents and reports will be posted or linked through the DMS. Examples of such documents and

reports include Urban Water Management Plans (UWMPs), Metropolitan's Integrated Resources Plan updates, Consumer Confidence Reports, Annual Multiple Species Conservation Program (MSCP) management and monitoring reports, plant and wildlife surveys reports, and area-specific management plans.

Goal 2 – Provide Direct Access to IRWM-Generated Data and Information

As described in *Chapter 11, Implementation*, performance data will be tracked to allow the RWMG to assess the progress of implementation and the success of individual IRWM projects and programs, as well as the 2013 IRWM Plan and IRWM Program as a whole. Through the San Diego IRWM website, stakeholders can directly access data and information on all IRWM initiatives. As noted above, the San Diego IRWM website was recently updated to include detailed information about the IRWM planning process such as meeting dates, agendas, and notes for workshops, workgroup meetings, Regional Advisory Committee (RAC) meetings, and other public/outreach meetings. The website will also continue to provide information on the 2013 IRWM Plan development process and relevant documents such as the triennial Report Card that will be produced to comprehensively assess IRWM Program implementation and progress.

Plan stakeholders and the general public will continue to be informed of the IRWM planning process and online data availability through email announcements and in-person announcements made during regular RAC and other stakeholder meetings. Local press will also continue to be informed as future work is completed and data become available online. Specifically, newspaper announcements will continue to be made, as necessary, in accordance with requirements set forth in California Water Code §10541.

In addition, it is anticipated that future work will continue to build upon the extensive public outreach that was conducted for the 2013 IRWM Plan. For additional information on existing and anticipated future stakeholder outreach and involvement activities, please refer to *Chapter 6, Governance and Stakeholder Involvement*.

Goal 3 – Provide User-Defined Interactive Access to Key Data Sets

Selected data sets will be incorporated into a centralized GIS database of key parameters that can be queried by the user. This feature, which is not a current feature of the San Diego IRWM website, is intended to increase the overall access and utility of water management data for the Region. Building on the example of SanGIS (see Table 10-2), the following types of functionality are anticipated: (1) user-based and pre-defined interactive outputs that may be tailored to specific user categories; (2) access to raw data, analyzed data, reports, maps, and other documents; (3) map building via queries, which can be used in conjunction with more advanced functions. The specific format and content of the GIS database is not known at this time, as it will be designed in accordance with substantial stakeholder input and specifically tailored to meet regional data needs. Database design is underway and content and functionality will address the needs identified by stakeholders during the design process.

The IRWM DMS will provide a central repository for data related to water management. Such data may include water quality, flow, rainfall, watershed and stream mapping, and water agency jurisdictional boundaries, among others. The DMS has been envisioned as a comprehensive, water-oriented, publicly available source of information and data. However, given that DMS design is not yet finalized, the aforementioned vision for the DMS may change as necessary to fit the needs identified by stakeholders (refer to Section 10.2.4.2 for more information on the DMS development process).

Entity Responsible for Maintaining DMS

The San Diego IRWM Program, with leadership from the County of San Diego, will be responsible for implementing and maintaining the DMS. The County's Watershed Protection Program in the Department of Public Works, has initiated DMS design by issuing a Request for Proposals (RFP) for DMS design recommendations. Despite the County's current lead on initiating DMS design, with limited exception, ownership and responsibility for the management of data resides with the parties that collect them (i.e., permitted dischargers, NGOs, research institutions) and/or that require their collection (i.e., permitting agencies).

DMS Development and Vision

The DMS will provide a central location for interested qualified parties to submit and access data related to water management in the San Diego IRWM Region. It will be populated with data from partner organizations, including members of the RWMG, the RAC, and projects receiving funding through IRWM grants. Other organizations will be encouraged, but not required, to participate. Protections will be implemented for sensitive data and proprietary information.

Data Availability – Near Term

Water-related data are currently publicly available on the San Diego IRWM Program website (www.sdirwmp.org), through the WaterGIS page. This page allows for direct download of Regional water data, including watershed data, agency boundaries, water quality data, water infrastructure, various jurisdictional and land use data, and other data used in the development of this Plan. , Information related to IRWM Plan projects can be accessed through the Project Database, also available on the San Diego IRWM Program website. Data available on this website will be updated as necessary, and remain available until they can be incorporated into the complete DMS. WaterGIS will contribute to DWR's efficient use of data and stakeholder access to data standards while the DMS is being developed.

DMS Development – Long Term

The DMS is expected to reach final design within two years of adoption of the2013 IRWM Plan. As mentioned above, the County has issued an RFP for the DMS design. This RFP details the expectation of the design process. In accordance with DWR and the RWMG's preference for stakeholder involvement, DMS design will be guided through stakeholder meetings. The design phase of the DMS may include the following steps:

1. A program for NGOs designed to build capacity participation in stakeholder meetings and enable NGOs to participate by providing funding to assist in covering participation expenses. Enabling NGO participation allows for a broader range of stakeholder participation in the design process.
2. Management of the DMS Advisory Workgroup to provide guidance on DMS needs and functionality through development of assessment approaches and methodologies, development of a vision for the DMS design recommendations document, drafting the DMS design recommendations, and providing input throughout the design process.
3. Needs assessment of stakeholder groups to solicit input from stakeholder groups on their existing and past data management efforts and their planned data management needs.
4. Input on draft DMS design recommendations to provide feedback on DMS design recommendations, which will help ensure that all stakeholder needs are considered, and provide for a more transparent process..

Table 10-4: Data Layers Available on WaterGIS (www.sdirwmp.org)

Data Layer	Original Data Source
Integrated Flood Management Data	Potential flood hazard zones developed for the 2013 IRWM Plan (refer to *Chapter 7, Regional Coordination* for more information)
Watershed boundaries	Tierra Data Systems, Interagency California Watershed Mapping Committee via SanGIS Data Warehouse: www.sangis.org
Water agency boundaries	Compiled by IRWM Program
Sanitation district boundaries	Compiled by IRWM Program
Municipal boundaries	SanGIS Data Warehouse: www.sangis.org
Groundwater basins	DWR via SanGIS Data Warehouse: www.sangis.org
Impaired water bodies	State Board 303(d) List: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml
Disadvantaged communities	U.S. Census data, processed by IRWM Program and Nielson-Claritas; Community Planning Areas from County of San Diego and City of San Diego, via SanGIS Data Warehouse: www.sangis.org
Community Planning Areas	City of San Diego, County of San Diego; via SanGIS Data Warehouse: www.sangis.org
Land uses in Region	SANDAG, County of San Diego, Cleveland National Forest, Bureau of Land Management, State Parks, compiled by SANDAG; via SanGIS Data Warehouse: www.sangis.org; U.S. Fish and Wildlife Service: http://www.fws.gov/gis/data/national/index.html#NWRS BOUNDARY ; BLM: http://www.geocommunicator.gov/ARCGIS/REST/services/SMA/MapServer ; California State Parks: http://projects.atlas.ca.gov/projects/calstprksbndys. Land uses consolidated by IRWM Program
Precipitation in Region	SanGIS Data Warehouse: www.sangis.org
Water infrastructure	Compiled by IRWM Program; County Assessor via SanGIS Data Warehouse: www.sangis.org
Tribal Nations	SanGIS Data Warehouse: www.sangis.org
Natural Resources	U.S. Fish and Wildlife Service: http://criticalhabitat.fws.gov/; State Board: http://www.swrcb.ca.gov/water_issues/programs/oceans/asba_areas.shtml

It is anticipated that final DMS design will be the result of these efforts, and once funding is secured, that this design will be implemented. Given the early stage of DMS design at the time of this writing, it is anticipated that changes may be made to the preliminary DMS development and implementation process. Upon completion, the DMS will be made publicly available, with links provided to the DMS online portal on each RWMG member's website, the San Diego IRWM Program website, and RAC member organization websites. Other relevant organizations will also be encouraged to post a link or direct visitors to the DMS. Additionally, a press release will be written and distributed to further notify the public when the DMS is available.

Stakeholder Contribution to DMS

As described above, stakeholders will guide DMS design through workshops, work groups, and public meetings. It is expected that the DMS will be designed to allow stakeholders to submit data for inclusion in the database. Though DMS design is not yet complete, it is likely that the process by which stakeholders contribute data to the DMS will involve an automated submittal process through the DMS website, coordination with a staff member tasked with managing the DMS, or some combination of the two. The exact mechanism for stakeholder contribution to the DMS beyond the forums required in the RFP will be determined through the design process.

QA/QC Measures

Quality Assurance/Quality Control (QA/QC) measures will primarily be the responsibility of the party that collects the data or requires the collection of data. The system is likely to include some form of standardization for data (such as a format compatible with relevant statewide databases), which may act as a cursory QA/QC safeguard. It is also anticipated that DMS users who identify problems with data will be able to report these problems to the DMS manager. It is also anticipated that significant QA/QC problems will be addressed through removal of erroneous data from the system, and suppliers of said data notified of the problem in order to allow for corrections to future data submissions. It is not anticipated that any of the likely data suppliers will present QA/QC problems, given their long history of data collection and analysis, their frequent need to report data to various regulatory agencies, and the use of standard sampling methodologies.

Sharing Data

The purpose of the DMS is to provide a central clearinghouse for regionally-relevant water data to facilitate data sharing and increased integration of data collection and analysis. The DMS will be advertised through the San Diego IRWM website, as well as the websites of RWMG and RAC member organizations. The DMS will be designed for public access, and is anticipated to be user-friendly, with clear instructions for use readily available. Included in the DMS will be data collected through IRWM funded projects. This is a requirement for all projects included in IRWM funding packages, as legally appropriate. Sensitive data are anticipated to be protected through a restricted area of the DMS, though will remain available for DMS users who meet the requirements for access to this data. These requirements will depend on the type of data whose access will need to be restricted, and is anticipated to be determined during the planning or implementation phase of the DMS. All legal requirements relating to data access will be met.

Data will be transferred and shared with stakeholders through downloadable GIS-based data layers. The purpose of WaterGIS and the future full-scale DMS is to provide public access to water resources datasets and to support the RWMG's efforts to share collected data with all interested stakeholders.

Benefits of DMS

Development of the DMS will provide transparent access to water resources data sets and will help support robust water management decision-making. Table 10-5 provides a summary of the benefits of the DMS.

Table 10-5: Benefits of San Diego IRWM DMS

Need	How IRWM Plan Supports Need
Increased Data Availability	The primary objective of the IRWM Plan is to support existing statewide priorities and preferences. Projects and programs funded through IRWM Program will provide data and information consistent with and supportive of these priorities and make them more available to the state and public.
Statewide Water Supply Assessment and Management	Data will assist in updating the California Water Plan.
Evaluation of Regulatory Compliance	Data will assist regulators in evaluating compliance with various permits, regulations, and laws.
Non-point source (NPS) and Watershed Management Initiatives	Data will support NPS Management Plan goal of providing single, coordinated statewide approach to dealing with NPS pollution. Data will also directly support priorities in the Regional and State Boards' Watershed Management Initiatives.
Regional and Watershed Assessments	Data will directly support programs to assess regional and watershed water quality, such as SWAMP and 303(d) listings. Data will also assist in updating various regional and local watershed management plans. As the DMS is developed and implemented, data collected as part of the IRWM program will be easier to access and provide more support for local, regional, and statewide assessments.
Groundwater Assessment and Management	Data will comply with and support objectives of GAMA, including improvement of statewide ambient groundwater quality monitoring and assessment, and increasing groundwater information availability. Groundwater projects funded through the IRWM Program will meet applicable GAMA data standards.
Natural Resource Assessment and Management	Habitat and natural resource data will comply with and support applicable objectives and standards of statewide natural resource conservation and management programs, including MSCP. Project partners will be encouraged to submit data to applicable statewide databases.
Regional Planning Focus/Increased Coordination of Efforts	Bringing together all parties necessary to achieve integrated regional water management will provide an unprecedented level of focus on, and analysis of, existing and new data and information. This will lead to increased insight and stakeholder and public participation. The IRWM Program also encourages integrated thinking, planning, and project design/implementation. Increased coordination should improve the quality and usefulness of data collection efforts in the Region.

10.3 Technical Analysis

The 2013 IRWM Plan is based on sound technical information reviewed by the RWMG, members of the RAC, and other interested SDIRWM stakeholders. Published documents such as regional plans, studies, and technical reports were reviewed, experts were consulted, and meetings with various interest groups were held to understand the short-term and long-range needs of the Region. Stakeholder outreach efforts are detailed in *Chapter 6, Governance and Stakeholder Involvement*, and include soliciting input on the water needs of the Region. Descriptions of the technical information reviewed during development of the 2013 IRWM Plan are provided in the following sections.

10.3.1 Technical Information

The needs identified in the 2013 IRWM Plan were developed through an extensive review of literature and consultation with experts and interest groups. Examples of literature reviewed for IRWM Plan development and updates include regional plans such as urban water management plans, groundwater management plans, and land use plans. Many of the sources are themselves reviews of literature or studies, such as the *California Water Plan Update 2009*, or the 2004-2005 Regional Urban Runoff Monitoring Program Update. Wherever possible, the source of data analyzed in relevant portions of these plans, reports, or studies are noted in Table 10-6.

Whenever possible, regional data, reports, or studies were used to build the foundation for the needs and management direction in the 2013 IRWM Plan. This improves the ability of the IRWM Plan Update to identify and address the unique water needs of the Region, and provides for a more accurate and thorough analysis of the Region. Primary sources of data are the Regional Board, the Water Authority, the County of San Diego, the City of San Diego, the CDFW (previously the California Department of Fish and Game), and other local agencies. Utilizing data from these sources ensures reliable, consistent, and complete information that has been collected and analyzed following accepted standards. Data were also frequently provided by SANDAG, the regional transportation planning agency in San Diego, which is led by a Board of Directors comprised of representatives from the eighteen cities that lie within the Region, and the County of San Diego. This emphasis on local and regional data supports the ability of the IRWM Plan Update to address region-specific needs.

Data gaps identified during IRWM Plan Update development and update are described in Section 10.2.1, above. Section 10.2.3 details how the IRWM Program activities will work towards bridging the identified data gaps.

10.3.2 Technical Analysis and Methods

A description of the studies, models, and other technical methodologies performed in the analyses or literature reviewed used in developing the IRWM Plan Update are provided in Table 10-6. Table 10-6 represents a selection of the primary technical sources used during the writing of the IRWM Plan Update, though as provided on page 58 of the 2012 Guidelines, Table 10-6 may not include every study used. In addition to detailing the type of data used, Table 10-6 also describes how the data were analyzed, the relevant results from the analysis, how the data were used in the IRWM Plan Update, and the source of the data. Much of the technical information used in the creation of the 2013 IRWM Plan stems from UWMPs and other similar planning documents. These documents are updated frequently (every five years), and undergo extensive public review. This process, along with the local and regional focus of these documents, helps to ensure an accurate source of information for local and regional planning. While it is not always possible to identify how data were analyzed in order to write these planning documents, an effort has been made to further define the data that were used in preparation of the documents that form the basis for the planning decisions made in this IRWM Plan Update.

Table 10-6: Technical Analysis and Methods Used in the 2013 IRWM Plan

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
Region Description – Boundaries, Jurisdictions, etc.				
2050 Regional Growth Forecast	SANDAG	Existing demographic and economic trends; local land use plans; forecast model utilizing existing development, future land use plans, proximity to existing job centers, past development patterns, travel times to project location of future growth; consultation with local land use planners	Future land use; future population	Used to determine existing and projected land use, also used to discuss water use and demand
Western U.S. Climate Summaries	Western Regional Climate Center	NOAA coop stations –average annual total rainfall	Rainfall pattern in Region over 150+ years	Used to describe climate, local water source from precipitation
2010 Urban Water Management Plan	Water Authority	SANDAG 2050 Regional Growth Forecast vetted through the Water Authority and the Water Authority's member agencies	Future population within Water Authority service area	Used to determine how many people are served by Water Authority, and in discussion of future water demand
San Diego IRWM Region Acceptance Process (RAP)	RWMG in association with the RAC	Analysis of the Region's unique water management issues to determine an appropriate boundary	Water agency jurisdictional boundaries; Wastewater agency service areas; County boundaries; Physical/hydrologic characteristics	Used to describe appropriate Region boundaries as approved of by DWR in the RAP
San Diego Regional Municipal Separate Storm Sewer System Stormwater Permit (2007)	Regional Board	Permit terms	Duties of Copermittees and principal Copermittee required by MS4 permit	Description of stormwater and urban runoff management responsibilities – this guides how the plan addresses urban runoff and stormwater, and affects project selection, 2013 IRWM Plan objectives, and the Resource Management Strategies Used to determine appropriate Region boundaries
Region Description – Water Supply				
2011 Annual Report	Water Authority	Review of existing records	Water supply volumes or purchases	Used to describe source of water supplied to or by Water Authority member agencies
Bulletin 118	DWR	Review of all Bulletin 118 documents for the Region's groundwater basins	Groundwater yield data, and groundwater balance data (as applicable)	Used to determine groundwater basin locations, limitations of groundwater availability outside Water Authority service area, and establish potential need for protection of groundwater supplies through groundwater management or project selection

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
2010 Urban Water Management Plan	Water Authority	IWR-MAIN computer model modified to meet Region's parameters and renamed CWA-MAIN	Uses SANDAG 2050 Regional Growth Forecast for input data; Water demand related to income, water prices, and weather	Used to discuss water demand in Region in the context of use type and volume. Also used to link population growth/development with increased water demand.
	Water Authority	Review of information presented in the UWMP	Location of groundwater resources for municipal supply, demineralization treatment capacity for groundwater	Used to discuss groundwater resources used for municipal supply
	Water Authority	Review of information presented in the UWMP	Reservoir capacity	Used to discuss capacity of water storage in reservoirs
	Water Authority, City of San Diego	Review of information presented in the UWMP for the Water Authority and the City of San Diego	Water treatment capacity	Used to discuss potable water production capacity, as well as identify source of raw water for treatment facilities
	Water Authority	Review of projected water supply information	Projected surface water supply, reservoir capacity	Projected Water Supply Table: used to determine water supply reliability in various weather years, provides information in order to develop plan to minimize impacts of drought-related water shortages. Used to produce the California Water Plan Update 2009
2003 Colorado River Quantification Settlement Agreement (QSA)	Water Authority	Terms of the QSA agreement	Volume of water transferred from the Imperial Irrigation District	Used to describe source of imported water in Region
Streamflow monitoring	United States Geological Survey (USGS)	Streamflow gauges	Streamflow information	Used to calculate streamflow volume annually, monthly, to demonstrate availability and timing of surface water from streams, as well as influence of urbanization on streamflow
California Water Plan Update 2009	DWR, Water Authority	Review of Resource Management Strategies (RMS) and information pertaining to water supply availability	Identifies short-term and long-term issues that may impact water supply availability	Used to inform *Strategic Plan* that emphasizes diversification of Region's water portfolio. This priority is used in project selection, BMPs, RMS and other parts of the 2013 IRWM Plan

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
Region Description – Recycled Water				
2010 Urban Water Management Plan	Water Authority and member agencies	Review of recycled water supply and demand information Water use records; permits	Projected recycled water supply and demand Volume of recycled water use; capacity of recycled water facilities	Used to describe recycled water demand and projected future demand in the Region. Also used to describe the recycled water capacity in the Region
Tertiary treatment capacity permits	Regional Board	Permit language	Permitted recycled water capacity in million gallons per day	Used to locate existing recycled water capacity
Recycled water discharge permits	Regional Board	Permit language	Permitted discharge flows	Used to discuss discharge of recycled water through existing outfalls
Region Description – Water Quality				
California Toxics Rule	Regional Board	US EPA methodologies to protect human health and aquatic life (as referenced in US EPA 40 CFR Part 131, Derivation of Criteria)	Water quality criteria for cyanide, metals, toxic organics	Used to establish water quality standards
Water Quality Control Plan for Ocean Waters of California	State Board	Review of established objectives for ocean waters	Water quality objectives for ocean waters	Used as reference for information on receiving water standards
303(d)-Listed Waters	Regional Board, State Board	Review of 303(d)-listed water bodies in the Region	List of 42 impaired inland waters in Region, 40 impaired coastal waters	Used to discuss water impairment, provide context for priorities, opportunities for improvements, etc. Used to establish constituents of concern for the Region
TMDL studies	Regional Board	Review of TMDLs in the Region	Adopted and initiated studies	Used to discuss progress on establishing TMDLs for impaired waters in the Region.
2004-2005 Regional Urban Runoff Monitoring Program Update	San Diego County Municipal Stormwater Copermittees	Core monitoring, baseline long-term effectiveness assessments	Constituents of concern in the Region	Used to describe constituents of concern for Region, by watershed
1997 San Diego County Groundwater Report	Water Authority	Review of information presented on the Region's groundwater basins	Water quality issues within groundwater aquifers	Used to establish constituents of concern in the Region's principal groundwater aquifer

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
Region Description – Beneficial Use Protection				
Water Quality Control Plan for the San Diego Basin	Regional Board	Review of Areas of Special Biological Significance	ASBS designation and impact	Determination of 2 ASBSs in Region, which must be protected from change due to human activity
Water Quality Control Plan for the San Diego Basin	Regional Board	Review of Beneficial Uses	Beneficial Use designation	Used to explain the designated beneficial uses for water in the Region
Water Quality Control Plan for the San Diego Basin	Regional Board	Review of water quality objectives	Water quality objectives (surface and groundwater)	The water quality objectives from the Basin Plan are designed to protect beneficial uses. Used to describe surface water quality standards.
Region Description – Flood Management				
Multi-Hazard Mitigation Plan	County of San Diego, Rancho Santa Fe Fire District, all incorporated cities in the Region, FEMA, California Emergency Management Agency	Federal Emergency Management Agency (FEMA)Flood Insurance Rate Map (FIRM) data, Base flood elevations in the HAZUS-MH model	Location and extent of flood hazard areas	Used to discuss areas at risk from flooding in the Region.
Region Description – Stormwater Management				
San Diego Regional Municipal Separate Storm Sewer System Stormwater (MS4) Permit (2007)	Regional Board	Permit terms	Duties of Copermittees and principal Copermittee required by MS4 permit	Description of stormwater and urban runoff management responsibilities – this guides how the plan addresses urban runoff and stormwater, and affects project selection, 2013IRWM Plan objectives, and RMS
Tentative San Diego Regional Municipal Separate Storm Sewer System Stormwater Permit (2013)	Regional Board	Permit terms	Changes to the 2007 MS4 permit, requirement of the Water Quality Implementation Plans	Used to discuss potential changes in stormwater management that will occur during the life of the 2013 IRWM Plan.

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
Region Description – Climate Change				
Climate Change Planning Study	Climate Change Workgroup, San Diego IRWM RAC.	Review of scientific literature. A selection of key sources used in this study is provided below.	Study provides climate change data analysis relevant to the Region, describes relevant policies and legislation, provides a vulnerability analysis for the Region, describes the effects of climate change on the Region, and provides management strategies and recommendation for addressing climate change and its likely impacts.	Used to develop recommendations for the Plan to include regarding climate change mitigation and adaptation.
Regional Focus 2050 Study	San Diego Foundation	Review of scientific literature, consultation with climate change experts and local scientists	Effects of climate change on San Diego region. Key impacts: Climate hotter and drier, sea level rises 12-18 inches, water shortage in County, more frequent and intense wildfires, increased public health risks, loss of native species, inability to meet energy needs.	Used in Climate Change Planning Study as a primary source of information on local impacts of climate change as well as local efforts to address climate change.
Focus 2050 White Paper	Coastal Data Information Program	LIDAR for elevation mapping, and projected sea level rise	Maps of projected inundation levels for mean sea level in 2050.	Used to show the impact of sea level rise on beaches and low-lying coastal communities, as well as the risks they face from inundation levels.
Climate Change Handbook for Regional Planning	DWR	Review of scientific literature	Summary of climate change impacts, methods for assessing climate change in individual regions	Used to describe the threats to local and regional water resources from climate change in the Climate Change Planning Study. Methodologies used to assess climate change vulnerabilities in Region.
Energy Aware Planning Guide	California Energy Commission	Review of scientific literature	Links between energy and water use, strategies to reduce energy use in the water sector	Used in the Climate Change Planning Study to discuss the role water use in the Region plays in GHG emissions. It provides the basis for claims of emissions reductions from Plan actions.
California Water Plan Update 2005; Progress on Incorporating Climate Change into Management of California's Water Resources	DWR	Review of scientific literature	Summary of probable climate change impacts	Used to identify which changes may impact the Region and how these impacts may be felt. This provides a selection of needs that the plan addresses through its objectives, project selection, and management plans.

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
Region Description – DACs				
Median Household Income	American Community Survey, US Census Bureau	Review of census tracts within the Region	Median Household Income (MHI)	Used to determine location of DACs in the Region
Region Description – Wildlife and Habitat				
Multiple Habitat Conservation Program (MHCP) and Multiple Species Conservation Program (MSCP)	County of San Diego	Review of location of sensitive resources in the Region, particularly those within relation to water resources	1,075 square miles covered, additional 2,907 square miles to be covered in MSCPs being developed	Conservation plans to protect sensitive resources Habitat linkages
San Diego County Multiple Species Conservation Plan EIR/EIS	United States Fish and Wildlife Service , California Department of Fish and Wildlife(DFW)	Review of vegetation communities within the Region	Information about vegetation communities in the Region, particularly those associated with water resources	Used to describe Vegetation communities in the Region
San Diego County Multiple Species Conservation Plan EIR/EIS	USFWS, DFW	Review of wildlife and threatened species within the Region	Information about wildlife and threatened species in the Region, particularly those associated with water resources	Wildlife and threatened species

10.4 References

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11 Implementation

This chapter addresses requirements set forth in the Impact and Benefit Standard, the Plan Performance and Monitoring Standard, and the Finance Standard in the 2012 IRWM Program Guidelines (DWR 2012).

11.1 Overview

The intent of this chapter is to document various aspects associated with implementation of the 2013 San Diego IRWM Plan. Specifically, this chapter includes information regarding:

- Actions that can be taken to implement priorities established in the planning studies associated with the 2013 IRWM Plan.
- Potential impacts and benefits that may result from implementation of the 2013 IRWM Plan, including impacts and benefits within the Region, between regions (inter-regional), and those directly affecting disadvantaged communities (DACs), environmental justice-related concerns, and Native American Tribal communities.
- Performance measures and monitoring that will document progress that is being made towards meeting the objectives set forth in the 2013 IRWM Plan.
- Actions that will be taken to ensure that the projects listed in the 2013 IRWM Plan are being implemented.
- Necessary monitoring to ensure that the projects included in the 2013 IRWM Plan comply with applicable rules, laws, and permit requirements.
- Financing information that demonstrates how the 2013 IRWM Plan will be adequately funded, and therefore implemented.

11.2 Implementation Action Plan

The following section provides detailed information regarding implementation actions that may be taken for various priorities identified in the 2013 IRWM Plan. Implementation of these priorities will serve as a benchmark against which to assess how well the 2013 IRWM Plan has been implemented. As discussed in detail in Section 11.5, the implementation status of these priorities will be considered in the triennial review completed for the IRWM Program.

11.2.1 Implementation Action Plans for Regional Priorities

As described in detail in *Chapter 2, Vision and Objectives*, the workgroup that was convened to evaluate the vision, mission, goals, and objectives for the 2013 IRWM Plan (the Priorities and Metrics Workgroup) did not establish short-term and long-term priorities for the 2013 IRWM Plan. Instead, updated priorities were established based on technical work (planning studies) completed for the 2013 IRWM Plan. Each planning study conducted as part of the 2013 IRWM Plan (refer to *Chapter 7, Regional Coordination*) – the Regulatory Workgroup Report, the Land Use and Water

Management Planning Study, the Climate Change Planning Study, and the Integrated Flood Management Planning Study – include specific recommendations that were determined by and vetted through the stakeholder groups convened for each planning study.

The planning study recommendations, while aimed at addressing priority action items specific to each study, can also be considered priorities for the IRWM Program itself because they can be implemented through the IRWM Program. The recommendations may also be implemented through the IRWM projects included in and potentially financed through the IRWM Program. A complete list of the recommendations from the planning studies was presented to the Regional Advisory Committee (RAC) at a joint RAC Meeting/Public Workshop held on April 3, 2013. During this meeting, RAC members and members of the public were asked to review the list of planning study recommendations and take one month (April 10 to May 10, 2013) to identify which actions they would be willing to either 1) take responsibility as lead organization for accomplishing the task or 2) provide support and involvement. RAC members and members of the public were also asked to obtain and confirm their commitment to work towards accomplishing the selected tasks. For each action, RAC members or members of the public are expected to meet the following commitments:

1. Actions should be completed in approximately three years and a final presentation will be made to the RAC;
2. Actions will require development of a work plan and quarterly reporting, using forms that will be made available on the San Diego IRWM website; and
3. A report will be made to the RAC on the status of each action approximately 12-16 months after commitments have been finalized through adoption of the 2013 IRWM Plan.

A final list of recommendations to include in the 2013 IRWM Plan was presented to the RAC at the June 5, 2013 meeting. Table 11-1 provides an overview of the recommendations for the planning studies, the party or parties that have committed to implementing the recommendation(s), and the specific action that will be implemented (specific party commitment). Please note, that as indicated in Table 11-1, some of the commitments made by interested parties are not the same as the full recommendation action included in the planning studies. The specific party commitments have been included as the short-term priorities for the 2013 IRWM Plan, and are expected to be completed or implemented prior to a future update to the IRWM Plan or to have made substantial progress towards completion or implementation. Further, Table 11-2 includes a list of the planning study recommendations that have not yet received implementation commitments. While the recommendations without commitments are not included in the 2013 IRWM Plan as short-term priorities, they are considered regional priorities, and the IRWM project selection process encourages stakeholders and other interested parties to implement these items in the future (refer to *Chapter 9, Project Evaluation and Prioritization*).

Implementation Actions for Short-Term Priorities Included in the 2007 IRWM Plan	
The 2007 IRWM Plan identified seven short-term priorities to address immediate implementation needs. Due to the substantial progress made toward meeting each of these priorities, as well as priority shifts that have occurred since 2007, these priorities are being replaced with those outlined below in Table 11-1.	
Short-Term Priority	**Progress Toward Meeting Each Priority**
1. Implement priority projects and programs that support the Region's IRWM goals and objectives.	• Project and program selection for IRWM-related funding programs (Proposition 50 and Proposition 84) has emphasized support for San Diego's IRWM goals and objectives. Each IRWM grant proposal submitted to DWR has included projects that meet multiple IRWM Plan objectives.
2. Formally establish a long-term institutional structure to guide the ongoing development and implementation of the San Diego IRWM Plan.	• The RWMG agencies adopted a revised MOU in 2011 that clarified their roles and responsibilities through 2016. • In 2009 the RAC indicated support for the existing institutional structure, which had been in place since before adoption of the 2007 IRWM Plan. • In 2012 a workgroup of the RAC (the Governance and Financing Workgroup) was convened to discuss long-term governance of the IRWM Program. As discussed in *Chapter 6, Governance and Stakeholder Involvement,* the workgroup and the RAC re-indicated their support for the existing institutional structure.
3. Implement and update (as needed) a Public Outreach Plan that ensures key stakeholders and affected parties are informed and engaged in IRWM planning and implementation.	• The 2007 IRWM Plan included a Public Outreach and Disadvantaged & Environmental Justice Community Involvement Plan designed to ensure key stakeholders and others are involved in IRWM activities. The plan was updated in 2009, and again in 2012. • Since 2007, the RWMG and RAC have continued to identify stakeholders as necessary additions to the IRWM planning process. Original RAC members were selected to represent a variety of water-related interests in the region. New RAC members invited to participate in 2013 represent water-related interests across the Region as defined by the Governance and Financing Workgroup.
4. Establish a regional, web-based system for sharing, disseminating, and supporting the analysis of water management data and information.	• The RWMG has developed a website dedicated to IRWM planning for the San Diego region (www.sdirwmp.org). The website contains detailed information about how one may get involved with the San Diego IRWM planning process. • The Region's Proposition 84-Round 1 IRWM Implementation Grant award included funding for a Regional Data Management Program, and the County is moving forward with implementing this project.
5. Complete a needs assessment and develop recommendations for addressing existing deficiencies in the technical and scientific foundation of San Diego Basin Plan beneficial uses and water quality objectives.	• A workgroup (the Regulatory Workgroup) was convened as part of the 2013 IRWM Plan process to develop a report on collaboration with the San Diego Regional Board (refer to *Chapter 7, Regional Coordination* for more information). The workgroup explored possibilities for furthering collaboration with the Regional Board, including collaborative efforts that could increase the technical and scientific foundation of regulatory requirements.
6. Complete an updated assessment of local water management plans to ensure effective and upfront input from these plans during all phases of IRWM planning and implementation. Where planning deficiencies are identified, address these deficiencies as part of the 2013 IRWM Plan process.	• A planning study of water management and land use planning was conducted in 2012 as part of the 2013 IRWM Plan (refer to *Chapter 7, Regional Coordination* for more information). This planning study included an updated assessment of water management plans in the Region, as well as acknowledgement and resolution of any inconsistencies with the IRWM Plan and local land use plans.
7. Revise the IRWM Plan and publish the Second Edition of the San Diego IRWM Plan.	• The 2007 IRWM Plan is currently being updated, and this priority will be considered complete once the 2013 IRWM Plan has been adopted (anticipated in Fall of 2013).

Table 11-1: Implementation Commitments from Planning Study Recommendations

Planning Study	Objective	#	Recommendation Action from Planning Study	Responsible Party	Party Commitment
Regulatory Workgroup Report[1]	Improve communication between IRWM Program and the San Diego Regional Water Quality Control Board (Regional Board)	R-1	Assign IRWM liaison to Regional Board	City Public Utilities	City will assign Senior Staff to be IRWM liaison to Regional Board
		R-2	Provide periodic IRWM progress reports to Regional Board	City Public Utilities	City's commitment will involve assigning existing staff to: 1) attend monthly meetings of the Water Board, 2) review agendas and proposed Board Actions ahead of each meeting, 3) report out at RAC meetings on Water Board actions, and 4) once or twice per year make a presentation to the Water Board about the status of the San Diego IRWM Program.
	Ensure consistency between IRWM Plan and Regional Board Practical Vision	R-3	Monitor development of Regional Board Practical Vision[2]	RWMG	Same as Recommendation Action
		R-4	Incorporate priority themes from Regional Board Practical Vision into IRWM Plan	RWMG	Same as Recommendation Action
		R-5	Coordinate with Regional Board for consistency in IRWM Plan and Practical Vision	RWMG	Same as Recommendation Action
	Identify science-based Basin Plan modifications that may warrant higher priority than provided in 2011 triennial review	R-6	Convene IRWM stakeholders to (1) review Basin Plan review priorities, resources, and schedules, (2) identify additional priorities of interest to IRWM stakeholders, (3) determine IRWM stakeholder interest in supporting Regional Board to address additional priorities	RWMG IEA- Support[3]	RWMG will obtain input from IRWM Stakeholders regarding the three actions identified in the Recommendation Action
		R-7	Convene workshop with Regional Board and IRWM stakeholders to discuss priorities identified by IRWM stakeholders	RWMG	Same as Recommendation Action
	Identify research, data collection, data management, data assessment, and resources required to support Regional Board's process for science-based evaluation of the prioritized Basin Plan objectives	R-8	Convene workshop with Regional Board and IRWM stakeholders to discuss research, data collection, management and assessment, and resources required to address objectives that warrant scientific update or development of site-specific objectives	RWMG IEA- Support	RWMG will provide a forum for the Regional Board and IRWM stakeholders to convene, and will share outcomes with the RAC

[1] Recommendations not prioritized
[2] The Regional Water Quality Control Board Draft Practical Vision is described in *Chapter 7, Regional Coordination*
[3] IEA is an abbreviation for the Industrial Environmental Association, a non-governmental organization

Table 11-1: Implementation Commitments from Planning Study Recommendations

Planning Study	Objective	#	Recommendation Action from Planning Study	Responsible Party	Party Commitment
Regulatory Workgroup Report[4]	Identify existing 303(d) listings that may warrant reevaluation or reclassification	R-9	Convene IRWM stakeholders to (1) review 303(d) listings of the Region's reservoirs, (2) identify 303(d) listings of reservoirs that may warrant reevaluation or reclassification, (3) determine IRWM interest in supporting Regional Board reassessment or reclassification of 303(d) reservoir listings of concern	Water Authority IEA- Support[5]	Water Authority will obtain input from IRWM Stakeholders regarding the three actions identified in the Recommendation Action
		R-10	Convene workshop with Regional Board and IRWM stakeholders to discuss 303(d) waters that may warrant reevaluation or reclassification to better support IRWM goals and Practical Vision priorities	RWMG	RWMG will provide a forum for the Regional Board and IRWM stakeholders to convene, and will share outcomes with the RAC
	Identify projects or actions that could improve water quality of 303(d) listed waters and attain water quality objectives	R-11	Convene workshop with Regional Board and IRWM stakeholders to identify (1) projects that could improve water quality of 303(d) waters and (2) alternate means to traditional TMDLS to achieve water quality objectives	RWMG City Stormwater - Support	RWMG will provide a forum for the Regional Board and IRWM stakeholders to convene, and will share outcomes with the RAC
	Identify research, data collection, data management, data assessment, and resources required to support the Regional Board's process for science-based evaluation of the prioritized 303(d) listings	R-12	Convene workshop with Regional Board and IRWM stakeholders to discuss data collection, management, and assessment, and required resources to reevaluate or reclassify 303(d) listings	RWMG City Stormwater - Support	If needed, the RWMG will convene a workshop to discuss actions included in the Recommendation Action, and will share outcomes with the RAC
	Develop and maintain a list of wetlands and riparian habitat restoration needs and opportunities	R-13	Convene regulators and IRWM stakeholders to discuss (1) means of identifying, coordinating, and prioritizing restoration needs and opportunities and (2) potential action plan for developing and maintaining habitat restoration needs and opportunities priorities list	RWMG	RWMG will assist regulators and IRWM stakeholders in discussing the actions included in the Recommendation Action
	Evaluate potential opportunities for coordination of Regional Board SEP process and other compensatory mitigation programs to support and promote habitat restoration and recovery	R-14	Convene meeting with Regional Board to assess means for coordinating IRWM Program support with Regional Board SEP process and other mitigation programs	RWMG	Same as Recommendation Action

[4] Recommendations not prioritized
[5] IEA is an abbreviation for the Industrial Environmental Association, a non-governmental organization

Table 11-1: Implementation Commitments from Planning Study Recommendations

Planning Study	Objective	#	Recommendation Action from Planning Study	Responsible Party	Party Commitment
Land Use Planning Study[6]	Support or facilitate collaborative preparation of various joint water resources and land use planning efforts and work in the Region	L-2	Prepare model grey water ordinance	Zoo[7]	Same as Recommendation Action
		L-3	Prepare guidelines for distribution outside agencies to encourage "watershed friendly" design, construction, and maintenance of development	City Public Utilities	City's commitment will involve: 1) updating the Source Water Protection (SWP) Guidelines for New Development that the Water Department published in 2004, and 2) embarking on an outreach effort to have land use agencies put the SWP Guidelines to use, which would include informational documents.
		L-4	Prepare information sheets on potential water resource impacts of various land uses for land use planners to refer when evaluating proposals	City Public Utilities	Same as commitment for Recommendation Action L-3
		L-5	Prepare model sustainable landscape guidelines	Water Authority	Same as Recommendation Action
	Support or facilitate collaborative preparation of various joint water resources and land use planning efforts and work in the Region	L-6	Incorporate broader range of water resources goals which support IRWM Plan into SANDAG's Regional Comprehensive Plan	Water Authority	Same as Recommendation Action
		L-7	Prepare model stormwater management ordinance	City Stormwater	Same as Recommendation Action
		L-9	Prepare conservation or resource management plans/guidelines for community and backyard gardens	Water Authority	Same as Recommendation Action
	Provide opportunities for information sharing, regular communication, and meaningful collaboration for water resources and land use managers	L-15	Build relationships and share information through workshops, webinars, lunch sessions, etc. hosted by various professional associations (AEP, APA, APWA, etc.) Informal "meet & greet" preceding each event.	Zoo	Same as Recommendation Action
		L-16	Provide annual forum on topics of mutual interest and importance to water resources and land use agencies	Zoo Water Authority	Same as Recommendation Action
Climate Change Planning Study[8]	Include recommended objectives and targets in the Plan	C-2	Objective: Effectively address climate change through adaptation and mitigation in water resource management	Incorporated in 2013 IRWM Plan	Same as Recommendation Action

[6] Recommendations prioritized within each objective
[7] Zoo is an abbreviation for the Zoological Society of San Diego, a non-governmental organization
[8] Recommendations not prioritized

Table 11-1: Implementation Commitments from Planning Study Recommendations

Planning Study	Objective	#	Recommendation Action from Planning Study	Responsible Party	Party Commitment
Climate Change Planning Study[9]	Include recommended objectives and targets in the Plan	C-3	Target 1: Encourage development of cost-effective carbon-efficient strategies for water management projects	Incorporated in 2013 IRWM Plan	Same as Recommendation Action
		C-4	Target 2: Incorporate adaptation strategies to respond to sea-level rise, rainfall variability, and temperature variability in planning for water and wastewater management	Incorporated in 2013 IRWM Plan IEA- support	Same as Recommendation Action
		C-5	Target 3: Reduce or neutralize GHG emissions in all areas of water resource management	Incorporated in 2013 IRWM Plan	Same as Recommendation Action
Integrated Flood Management Planning Study[10]	Increase regional floodplain manager and agency collaboration	F-1	Develop framework and process for different level of communication for floodplain managers	County	Same as Recommendation Action
		F-2	Engage watershed stakeholders in workshop forum which brings together the regulators and floodplain managers to discuss different competing watershed issues (1) roadblocks to flood management, (2) regulatory constraints	FMA[11]	Same as Recommendation Action
		F-3	Provide basis for regional working forum of floodplain managers that allows increased collaboration and future regular meetings	County FMA	Same as Recommendation Action
	Increase regional floodplain manager and agency collaboration	F-4	Promote communication across jurisdictional boundaries and within watershed	County FMA	Same as Recommendation Action
	Improve understanding of regional flood risks	F-5	Develop understanding of the different types of flooding from both regional level, watershed level, and local level included specific flood problems for the different areas.	City Stormwater–Support FMA	Same as Recommendation Action

[9] Recommendations not prioritized
[10] Recommendations not prioritized
[11] FMA is an abbreviation for the Floodplain Management Association, a non-governmental organization

Table 11-1: Implementation Commitments from Planning Study Recommendations

Planning Study	Objective	#	Recommendation Action from Planning Study	Responsible Party	Party Commitment
Integrated Flood Management Planning Study[12]	Improve understanding of regional flood risks	F-6	Provide methodology to define the magnitude of flood risks in order to better prioritize the level of flood risk which integrates potential flood damage	City Stormwater– Support FMA- Support	Same as Recommendation Action
	Improve understanding of regional flood risks	F-7	Review common recurring flood damage losses	City Stormwater - Support	Same as Recommendation Action
	Develop watershed database to assist in flood management planning	F-8	Collect and compile watershed mapping information related to flood hazards and watershed information in a GIS format, as well as developing a schema for managing the data to benefit future watershed planning	City Stormwater - Support	Same as Recommendation Action
	Identify common agency flood management issues and constraints	F-9	Develop background from stakeholder information on the common problems implementing flood hazard mitigation projects and the different constraints.	City Stormwater - Support	Same as Recommendation Action
	Define different watershed flood management goals	F-10	Develop understanding of the different priority goals of the watershed stakeholders based on the common recurring flooding issues/problems/hazards	City Stormwater - Support	Same as Recommendation Action
	Initiate understanding and awareness of “integrated flood management” (IFM)	F-11	Prepare educational material and information on background of IFM to encourage better understanding of the required thought process	City Stormwater - Support FMA- Support	Same as Recommendation Action
	Initiate understanding and awareness of “integrated flood management” (IFM)	F-12	Provide examples of IFM projects to assist in understanding how to apply and the basis of the key planning principles which are different from conventional watershed planning	City Stormwater - Support	Same as Recommendation Action
	Identify applicable IFM strategies on global and watershed basis	F-13	Define common types of IFM strategies which integrate different planning principles through different scales (1) watershed level, (2) city level, and (3) neighborhood/local level	IEA- Support[13]	Same as Recommendation Action

[12] Recommendations not prioritized
[13] IEA is an abbreviation for the Industrial Environmental Association, a non-governmental organization

Table 11-2: Planning Study Recommendations without Commitments

Planning Study	Objective	#	Recommendation Action from Planning Study	Responsible Party	Party Commitment
Land Use Planning Study[14]	Support or facilitate collaborative preparation of various joint water resources and land use planning efforts and work in the Region	L-1	Distribute model water resources policies for use by municipalities	No responsible parties or commitments have been identified.	
		L-8	Prepare model guidelines for green infrastructure for public agencies and for private development		
		L-10	Coordinate BMPS in municipal codes when water agency is not the municipality		
		L-11	Prepare conservation or resource management plans/guidelines for agricultural operations		
		L-12	Prepare model green building standards		
	Provide opportunities for information sharing, regular communication, and meaningful collaboration for water resources and land use managers	L-13	Create GIS-based Resource Guide of all agencies, organizations, and stakeholders responsible for or involved in water management and land use planning for region. Host Guide on IRWM website. See study for details on what Guide would contain.		
		L-14	Expand SANDAG's emphasis on smart growth to encompass strategies that improve reliability and quality of water resources		
		L-17	Develop meeting template that includes all entities involved in land use planning and water resource planning and management for each jurisdiction.		
	Provide opportunities for information sharing, regular communication, and meaningful collaboration for water resources and land use managers	L-18	Utilize existing groups to disseminate key information and support integrated approach to water resources management and land use decision making		
		L-19	Include examples of viable land use practices that can improve reliability and quality of water resources on IRWM website		
		L-20	Develop a guide for engaging tribal nations in land use planning and water management		
		L-21	Utilize social media, pertinent websites, etc. to share key information with officials, planners, and water resources managers		
Climate Change Planning Study[15]	Use of adaptive management[16]	C-1	Encourage consideration of DWR's *Climate Change Handbook* recommendations on developing adaptive management plans: 1) Identify risk triggers 2) Quantify impacts and uncertainties 3) Evaluate strategies and define flexible implementation paths 4) Monitor performance and critical variables 5) Implement or reevaluate strategies when triggers are reached	No responsible parties or commitments have been identified.	

[14] Recommendations prioritized within each objective
[15] Recommendations not prioritized
[16] The process of adaptive management includes: 1) data gathering and analysis of vulnerabilities when determining triggers and 2) evaluating if triggers have been met. It is further anticipated that climate change vulnerabilities will be reassessed during future IRWM Plan updates.

Table 11-2: Planning Study Recommendations without Commitments

Planning Study	Objective	#	Recommendation Action from Planning Study	Responsible Party	Party Commitment
Integrated Flood Management Planning Study[17]	Identify applicable IFM strategies on global and watershed basis	F-14	Develop background on specific types of "opportunities" within the watershed that facilitate the application of IFM	No responsible parties or commitments have been identified.	
		F-15	Develop regional mapping of both opportunities and constraints related to flood management		
	Develop watershed planning guidance program implementing IFM	F-16	Develop watershed planning process framework with key planning principles for implementing IFM that focuses on linking sustainability, water resource management, and land use planning to flood management and the entire hydrologic cycle.		
		F-17	Prepare guidance on integrating "land use planning" as central element of IFM and define how it can be utilized for different type of floodplain hazards issues		
		F-18	Develop overall guidance document that provides stakeholders the basis for watershed planning with IFM		
	Create watershed planning tools to facilitate IFM project development	F-19	Develop a specialized GIS based tool which assists in the defining locations of IFM projects at a regional scale and can provide maximum multiple benefits and provides method for prioritizing flood management projects		

[17] Recommendations not prioritized

11.2.2 Implementation Issues for Priority Projects

Action items listed in Table 11-1 above will likely be implemented through projects that are designed to address regional priorities established for the Region in the planning studies conducted for the 2013 IRWM Plan. These projects may be implemented through the IRWM Program and subsequently funded through IRWM-related funding mechanisms, or may be implemented independently of the IRWM Program through other programs and funding mechanisms.

If the programs are implemented independently of the IRWM Program, implementation issues may occur as a result of funding priorities. In other words, given that independent implementation would occur at the discretion of the entities listed in Table 11-1, those entities may experience prioritization shifts, budget changes, and other unforeseen funding issues that could delay or stall implementation.

If projects that are implemented to address the action items listed Table 11-1 are funded by the IRWM Program, there could be potential implementation issues associated with IRWM Program funding. Potential IRWM Program-related implementation issues that have been experienced to date, and are anticipated to continue given the current status of the statewide IRWM Program include: 1) the ability to fund pilot projects and studies and 2) the amount of technical information required by IRWM grant applications. Those issues are described further below.

Funding Pilot Projects and Studies

Proposition 84 Implementation Grants administered through the California Department of Water Resources (DWR) emphasize the construction/implementation phase of projects, and therefore are best-suited to fund projects that are shovel-ready. This emphasis on implementation means that the IRWM Program provides limited funding for other types of projects, such as pilot projects and studies. While funding may be limited for pilot projects and studies, these types of projects are often necessary in order to assess alternatives and develop projects that can be successfully implemented to achieve desired benefits. Without pilot projects and studies, projects may be shelved, or money may be wasted implementing projects that encounter unexpected obstacles that could have been revealed and avoided through implementation of a pilot project or study.

As demonstrated in Table 11-1, several of the short-term priorities for the San Diego IRWM Program could be addressed through the implementation of pilot projects or studies. Given the current status of Proposition 84 Implementation Grant funding, it is possible that these pilot projects and studies will not be funded through the IRWM Program (Proposition 84) unless future Proposition 84 Implementation Grant solicitations are altered to provide flexibility for funding projects that are not in the implementation phase.

Technical Requirements

Proposition 84 Implementation Grant applications require a substantial amount of technical information to complete, particularly with respect to economic cost/benefit analyses. The technical information required for the Proposition 84 Implementation Grant applications is often so involved that it is beyond the ability of project partners (local project sponsors) to provide in sufficient detail at the time of the proposal solicitation. This is especially true for small non-profit organizations, disadvantaged communities, and tribes, which may not have the resources necessary to gather this information. The technical requirements of IRWM-related grant opportunities have been noted by San Diego IRWM stakeholders as a barrier that prevents some stakeholders from seeking out IRWM

funding; therefore the technical requirements of IRWM-related grant opportunities may also be a potential barrier to implementation of the priorities included in Table 11-1.

Regulatory Requirements

Proposition 84 Implementation Grants currently require grantees to comply with all applicable California regulations in order to be eligible for funding. Tribal nations in the Region have expressed concern that DWR may inappropriately apply California Environmental Quality Act (CEQA) requirements to tribal projects submitted to the IRWM Program. Tribal reservations are not subject to CEQA. However, this perception is a significant barrier to tribal participation in the IRWM Program since it would require tribes to give up their tribal sovereignty in order to use State funding for a project on tribal land.

11.3 Benefits and Impacts

The purpose of this section of the 2013 IRWM Plan is to document potential impacts and benefits associated with implementation of the Plan, and to clearly communicate those potential impacts and benefits to IRWM stakeholders. Implementation of the 2013 IRWM Plan involves both implementation of the IRWM Program itself and implementation of water management projects. As such, the following sections contain information regarding potential impacts and benefits of IRWM Plan implementation within the Region, between IRWM regions (inter-regional), and those that may directly affect DACs, environmental justice-related concerns, and Native American Tribal communities. Table 11-3 includes a synthesis of this information, and also includes examples of potential projects that could be implemented to address each objective.

One of the central features of the 2013 IRWM Plan is the San Diego IRWM Objectives that were revised by stakeholders as part of the 2013 IRWM Plan development process (refer to *Chapter 2, Vision and Objectives* for more information). Due to the importance of the IRWM Objectives, the objectives were used to determine potential impacts and benefits associated with implementation of the 2013 IRWM Plan.

For the San Diego Region, pilot testing at the Advanced Water Purification Facility will lead to future supply reliability.

Photo credit: Marsi Steirer, City of San Diego

Projects that are implemented through the IRWM Program undergo an impact/benefit analysis during the project selection and vetting process as the project selection workgroup determines and weighs the benefits and impacts of each project. This benefit/impact evaluation process, including the numeric scoring criteria assigned to each project, is described in *Chapter 9, Project Evaluation and Prioritization.* Further, a robust economic benefit/cost analysis is currently required by the Proposition 84 Implementation Grant Proposal Solicitation Package. Assuming that DWR will continue to require the economic benefit/cost analyses for future grant solicitations, it is assumed that each

project funded through the IRWM Program will undergo a formal impact/benefit (cost/benefit) analysis during the grant proposal preparation process.

11.3.1 Potential Benefits and Impacts

Regional Benefits and Impacts

Implementation of the 2013 IRWM Plan (and achievement of the San Diego IRWM Objectives) is expected to result in substantial benefits to the Region. Due to the wide-ranging nature of the San Diego IRWM Objectives, potential water resources benefits are anticipated to be diverse and extensive. Collectively, the San Diego IRWM Objectives would result in the regional benefits described in Table 11-3 below. The benefits associated with the IRWM Program and IRWM Projects are anticipated to address issues and concerns of stakeholders and interested parties within the Region and within the San Diego Funding Area.

Implementation of the 2013 IRWM Plan could also potentially result in impacts to the Region. Potential impacts associated with the IRWM Program generally include time and costs associated with implementing the program. Potential impacts associated with IRWM projects would be similar to those impacts associated with any other water resources-related planning, design, or construction projects. Impacts may include short-term, site-specific impacts related to construction, and long-term impacts associated with project operation. Table 11-3 below provides a summary of potential impacts that could occur due to implementation of the 2013 IRWM Plan.

Inter-Regional Benefits and Impacts

Implementation of the San Diego IRWM Objectives is expected to result in benefits and impacts that extend beyond the IRWM Region. Collectively, the San Diego IRWM Objectives will result in the inter-regional benefits and impacts described in Table 11-3 below.

Benefits and Impacts to Disadvantaged Communities, Environmental Justice Concerns, and Native American Tribal Communities

Due to the diverse nature of benefits associated with the IRWM Program and with IRWM Projects, benefits are anticipated to span throughout the IRWM Region, and even potentially beyond the IRWM Region. As described in detail in *Chapter 3, Region Description,* disadvantaged communities (DACs) and communities impacted by environmental justice issues are dispersed throughout the Region. Further, Native American tribal communities are also located in various areas throughout the Region, albeit more heavily concentrated in the eastern portion of the Region. Due to both the dispersed nature of potential benefits from the IRWM Program and IRWM projects and the dispersed nature of DACs, Environmental Justice communities, and Native American Tribal communities, benefits provided to the aforementioned communities as a result of IRWM Program or IRWM project implementation are likely to be similar to those that would occur throughout the Region as a whole. Table 11-3 highlights in italics how implementation of the IRWM Program and IRWM projects may specifically and directly benefit DACs and Tribal communities, and address Environmental Justice-related concerns.

Due to both the dispersed nature of the potential IRWM Program and IRWM Project impacts and the dispersed nature of DACs, EJ communities, and Native American Tribal communities, impacts that would occur to the aforementioned communities as a result of IRWM Program or IRWM project implementation are not anticipated to be acute, and are likely to be similar to those that would occur throughout the Region as a whole.

Table 11-3: Summary of Potential Impacts and Benefits

San Diego IRWM Objectives		IRWM Program	IRWM Projects - Regional	IRWM Projects - Interregional	Project Examples
A. Encourage the development of integrated solutions to address water management issues and conflicts	**Benefits**	• Encourages development of integrated projects • Communication and trust-building among IRWM stakeholders enables partnerships for addressing water management issues	• Integrated solutions can be more cost-effective, saving the Region time and money • Integration can reduce conflicts, which can result in faster implementation and therefore faster accrual of project-related benefits • Integration may include a variety of sponsors, who can add expertise to a project and increase the overall benefits provided by the project • *Integration can potentially partner DACs, EJ, and Tribal communities with other partners that can facilitate project implementation. This is especially true of Tribal communities that may find contracting with DWR difficult without a non-Tribal partner*	• Integration can result in more benefits than single-purpose projects. Such benefits could extend beyond the IRWM Region and directly benefit other IRWM regions • Provide guidance to the priorities and issues facing each sub-region	Any IRWM project that includes partnership integration (multiple partners), resource management integration, beneficial use integration, geographic integration, or hydrologic integration. Due to the importance of integration, projects are required to include a form of integration to be considered for IRWM Program funding (refer to *Chapter 9, Project Evaluation and Prioritization*)
	Impacts	• Will require an expenditure of public funds and/or staff time to accomplish	• Integration can require additional time and effort to implement as compared to single-agency, single-use projects • Integration may be difficult for projects that are shovel-ready	• Integrated projects within the San Diego IRWM Region could potentially detract from implementation of inter-regional projects	
B. Maximize stakeholder/ community involvement and stewardship of water resources, emphasizing education and outreach	**Benefits**	• Enhance stakeholder participation • *May benefit DACs, EJ, and Tribesby connecting these groups with other IRWM stakeholders that they would generally not engage or partner with*	• Target resources to projects meeting urgent needs from different communities. Streamline prioritizing process with regional stakeholder meetings	• Address interregional water resource management issues with stakeholders, optimize resource allocation	Any IRWM project that directly involves stakeholder or community involvement could result in the benefits or impacts associated with this objective. Due to the importance of stakeholder involvement, projects are

San Diego IRWM Objectives		IRWM Program	IRWM Projects - Regional	IRWM Projects - Interregional	Project Examples
	Impacts	• Increased coordination among the region's water resource managers could increase competition for limited State and federal grant funding • Increased stakeholder involvement could result in conflicting missions between stakeholders leading to increased difficulty in decision making	• Increased stakeholder involvement could lead to more projects requesting funding, making project selection more difficult, expensive, and time consuming	• Increased stakeholder participation could make interregional efforts more challenging	
C. Effectively obtain, manage, and assess water resource data and information	**Benefits**	• Collect and assess water resource management data for decision making and future resource management activities	• Active sharing of most current understanding on water management issues and alternative solutions	• Contributes accessible data for improved resource management within the San Diego Funding Area and throughout California	Any IRWM project that works to provide centralized public access to water management data or involves the collection and evaluation of water resources data to support decision-making or problem-solving
	Impacts	• Data requirements may reduce willingness to participate in IRWM efforts	• *Could increase costs to collect and manage data*	• Could contribute to interregional decisions based on regional data that may not apply to other regions	
D. Further scientific and technical foundation of water management	**Benefits**	• Obtain valid and empirical knowledge of water resource management • Active sharing of most current understanding on water management issues and alternative solutions	• Would help projects identify effective or efficient solutions • Increase project ability to receive funding by providing scientific support and justification	• Develop water management techniques and strategies applicable to other regions for improved resource management in California	Any IRWM project that works to collaborate with regulatory agencies to resolve water management issues; projects may include pilot projects or studies
	Impacts	• Could lead to stakeholder conflict if perceived as only addressing a few	• Science may not support the methods or goals of projects that stakeholders wish to pursue	• May result in conflicts between regional management.	

San Diego IRWM Objectives		IRWM Program	IRWM Projects - Regional	IRWM Projects - Interregional	Project Examples
		management goals, rather than all management goals			
E. Develop and maintain a diverse mix of water resources, encouraging their efficient use and development of local water supplies	**Benefits**	• Can help water suppliers to coordinate management activities related to supply diversification	• Can help to increase water supply reliability for the region • Improve irrigation and landscaping efficiency • Development of local projects provides more local control over implementation and management of resource • Potential for improved water quality from local seawater and groundwater demineralization projects • *Could potentially increase the reliability of water pricing, which would directly benefit all water customers, but would specifically benefit DACs that are more heavily impacted by steep water rate increases*	• Could reduce dependence on imported water supplies that are ultimately sourced from outside the Region, therefore making those imported water supplies available for other users outside of the IRWM Region	Any IRWM project that increases local water supplies within the region. These projects may include recycled water supply projects (non-potable or potential potable projects) or projects that provide additional groundwater supplies
E. Develop and maintain a diverse mix of water resources, encouraging their efficient use and development of local water supplies	**Impacts**	• Potential issues may arise between water suppliers if there are conflicts or disagreement regarding how water supplies should be diversified	• Some local water supply sources may be of lower water quality than existing sources, which could exacerbate water quality issues • Construction related impacts including dust, noise, and traffic generation associated with large-scale water supply projects • Alternative water supplies may be more expensive than existing water supplies from the perspective of end-users (water rate payers)	• Local water supply development in the San Diego Region may differ from water supply provisions and planning efforts in other regions, therefore creating conflicts with other IRWM Regions	

San Diego IRWM Objectives		IRWM Program	IRWM Projects - Regional	IRWM Projects - Interregional	Project Examples
F. Construct, operate, and maintain a reliable infrastructure system	**Benefits**	• Provide awareness and support for regional water-related infrastructure needs, and provide a forum for stakeholders to discuss infrastructure issues	• Provide infrastructure for water and wastewater treatment and conveyance to maintain supply reliability and improve water quality. • Provide infrastructure for storm water treatment and conveyance to protect and restore water quality • *Will help address critical water supply and water quality needs of DACs and Tribes, which may suffer from unreliable or unsafe water infrastructure due to lack of funds or technical capacity*	• Improve interregional water supply reliability and water quality • Reduce risk to water supply and water delivery from natural or man-made disaster	Any IRWM project that directly or indirectly involves water-related infrastructure. These projects may include regional construction-related infrastructure projects that attempt to address emergency and carry-over water deliveries or site-specific habitat-related projects that attempt to maintain natural water resources functions
F. Construct, operate, and maintain a reliable infrastructure system	**Impacts**	• Support for certain infrastructure projects and improvements may be controversial, therefore potentially hampering stakeholder relations and outreach efforts	• Construction related impacts including dust, noise, mitigation, and traffic generation associated with large-scale infrastructure projects • Large-scale infrastructure projects can be costly to implement and could potentially cause rate increases.	• Local infrastructure development in the San Diego Region may detract from interregional infrastructure investments, such as those associated with imported water supplies. Such projects could potentially create conflicts with other IRWM Regions	
G. Enhance natural hydrologic processes to reduce the effects of hydromodification and encourage integrated flood management	**Benefits**	• Provide a forum for coordination of flood management efforts across various jurisdictions, and increase coordination between flood managers and other functional areas such as water quality and stormwater	• Protect and improve regional water quality downstream of areas with significant erosion • Alleviate flood protection requirements in downstream watersheds	• Promote collaboration on integrated flood management with adjacent regions • Enhancing flood protection in upstream regions is more cost-effective	Any IRWM project that addresses hydromodification, either directly by enhancing or restoring natural hydrologic processes, or indirectly by promoting planning efforts to reduce hydromodification and related impacts

San Diego IRWM Objectives		IRWM Program	IRWM Projects - Regional	IRWM Projects - Interregional	Project Examples
	Impacts	• Increasing coordination between functional areas could result in increased conflict or time to resolve flood-related issues	• Can be costly to implement • Hydromodification may have altered the stream in such a way that removal may not result in the expected or desired outcome	• May lead to conflict between flood management goals for different regions	
H. Effectively reduce sources of pollutants and environmental stressors to protect and enhance human health, safety, and the environment	**Benefits**	• Provide a forum to increase awareness for impacts associated with pollutants and environmental stressors	• Protect and improve regional water quality downstream of discharge locations • Reduce human health threats and environmental stressors in downstream water bodies. • Reduce run-off and pollutant discharge • Improve water quality • *Protect EJs, which suffer from disproportionately poor water quality and will benefit more from reduction in pollutants than non-EJs.*	• Promote collaboration on water quality issues with adjacent regions, such as large groundwater basins and water bodies that encompass multiple regions	Any IRWM project that directly addresses/reduces pollution by removing pollutant sources, or those projects that indirectly address water quality and environmental stressors through mitigation activities
	Impacts	• Could be conflict over true source of pollutants or stressors or what constitutes a "safe" level of these constituents	• There may be trade-offs between other project benefits and potential pollutants/environmental stressors	• There may be interregional conflicts between the sources of pollutants/environmental stressors and those who are impacted by impacts associated with these constituents	
I. Protect, restore, and maintain habitat and open space	**Benefits**	• Can provide an opportunity for agencies and parties that manage habitat and open space to coordinate and collaborate with water managers and other parties that can both impact and benefit habitat and open space	• Maintain habitat for natural riparian and aquatic species, improve water quality and flood control in natural channels • Could contribute to improved public health through reduced pollution and increased recreation opportunities	• Promoting habitat integrity across regions will increase habitat for natural species and enhance resource stewardship • Habitat restoration could improve air quality and contribute to statewide air quality goals	Any IRWM project that directly protects and restores habitat and open space, or indirectly contributes to habitat and open space via water quality protection, flood management, etc.

San Diego IRWM Objectives		IRWM Program	IRWM Projects - Regional	IRWM Projects - Interregional	Project Examples
	Impacts	• Increasing coordination between different groups could result in increased conflict or time to resolve issues, including regulatory issues across federal, state, and local jurisdictions.	• Implementing habitat restoration and open space projects may conflict with other land uses and be inconsistent with flood management goals and objectives to maintain flood conveyance capacity.	• Integrated projects within the San Diego IRWM Region could potentially detract from implementation of inter-regional projects	
J. Optimize water-based recreational opportunities	**Benefits**	• Provide awareness and support for water-based recreational opportunities, including recreational beneficial uses established in the Basin Plan	• Maximize beneficial use of available water resources within the Region for recreational purposes • Protect and enhance the serviceability of existing recreational sites and create additional resources for recreational purposes • Could increase recreation-based tourism	• Water-based recreational opportunities in the San Diego Region may be utilized by residents of other IRWM Regions, or may reduce demands for water-based recreation opportunities in other IRWM regions	Any IRWM project that directly or indirectly supports water-based recreational opportunities, such as those projects involving habitat restoration, flood control, and watershed protection
	Impacts	• Support for recreational beneficial uses could conflict with support for other beneficial uses	• Could lead to increased impacts associated with pollution, traffic, etc. that may result from recreation or tourism • Increased competition for limited water resources in the region for other potential beneficial uses	• Support for recreational beneficial uses in the San Diego IRWM Region may conflict with other beneficial uses in upstream water bodies, including those located within other IRWM regions	
K. Effectively address climate change through adaptation or mitigation in water resource management	**Benefits**	• Provide integrated adaptation and mitigation measures towards potential climate change impacts on regional water resources	• Reduce energy intensity and carbon footprint related to various water resources • Adaptation projects increase certainty and reliability of resource mix • Provide additional flood and fire protection to local communities	• Contribute to achieving statewide climate change goals such as those established by Assembly Bill 32	Any IRWM project that addresses climate change either directly or indirectly via the implementation of adaptation or mitigation strategies, including the implementation of resource management strategies that may contribute to climate

San Diego IRWM Objectives		IRWM Program	IRWM Projects - Regional	IRWM Projects - Interregional	Project Examples
	Impacts	• Uncertainty related to climate change could lead to stakeholder conflict or to increased difficulty in decision-making regarding how to best address climate change	• Uncertainty in climate change impacts or timing can make project planning difficult • Climate change-related goals could potentially conflict with other goals • *Protect EJs, which suffer from disproportionately poor air quality and will benefit more from reduction in pollutants than non-EJs. Will help mitigate DACs that may be impacted to a greater degree by climate change than non-DACs.*	• IRWM regions may not agree on the certainty or magnitude of climate change impacts, or how to address such impacts	change adaptation (refer to *Chapter 6, Resource Management Strategies*)

11.4 Finance

This section of the 2013 IRWM Plan documents a plan for implementation and financing of the IRWM Program and IRWM projects included in this plan. As per requirements established by DWR, this section includes the following items:

- Known and potential funding sources, programs, and grant opportunities for the development and ongoing funding of the IRWM Plan.
- Potential funding mechanisms for projects that implement the IRWM Plan.
- An explanation of the certainty and longevity of potential funding sources.
- An explanation of how operation and maintenance costs for IRWM projects could potentially be funded.

As explained in *Chapter 6, Governance and Stakeholder Involvement,* the Governance and Financing Workgroup that was convened for the 2013 IRWM Plan provided input regarding potential funding mechanisms for the IRWM Program and IRWM projects. As such, the sections below contain information provided by the IRWM stakeholders that comprised the Governance and Financing Workgroup.

11.4.1 Plan Financing

The Governance and Financing Workgroup discussed a variety of potential financing options for the IRWM Program. Information provided by the workgroup and elaborated upon through development of the 2013 IRWM Plan is summarized in Table 11-4.

The Governance and Financing Workgroup discussed four potential funding sources for the IRWM Program, including:

- Business as usual: the IRWM Program is funded by the RWMG (San Diego County Water Authority, City of San Diego, and County of San Diego). This option is abbreviated at "business as usual" in the following table.
- 501(c)(3): The IRWM Program officially becomes a 501(c)(3) non-profit organization, and raises funds accordingly. This option is abbreviated as "501(c)(3)" in the following table.
- Regional sales tax: The Region could impose a regional sales tax to fund the IRWM Program. This option is abbreviated as "tax" in the following table.
- Participation fee: Each participating agency (potentially RAC members or all stakeholders) could pay a small fee to participate in the IRWM Program. This option is abbreviated as "fee" in the following table.
- Joint Powers Authority (JPA): Formation of a JPA with participating agencies paying a fee for inclusion in the JPA.

The Workgroup also discussed potential barriers that may exist to financing for the IRWM Program, including:

- It may be difficult to raise funds for the IRWM Program, because program management items do not necessarily result in tangible results. Tangible results are often required or desired for various funding sources, especially from public funding sources.

- Precedent has currently been set by the RWMG to fund the IRWM Program. It may be difficult for regional stakeholders to understand the need for IRWM Program funding given this precedent.

Table 11-4 provides an overview of the costs associated with each of the existing program elements that are undertaken to manage the IRWM Program, as well as costs required to prepare and manage the IRWM grant (Proposition 50 and Proposition 84) process. The table also outlines the certainty and longevity of each potential funding source that was identified by the Governance and Financing Workgroup, and describes the potential responsible entity associated with each funding source. Please note that as operations and maintenance costs are not applicable to the IRWM Program efforts, those costs are not elaborated upon in the following table.

Table 11-4: Potential IRWM Plan Financing Components

Program Element	Likely Annual Project Cost	Likely RWMG Staff Commitment	Possible Responsible Entity	Potential Funding Source	Certainty/Longevity of Funding Source
IRWM Program Management					
RWMG Meetings[1]	$38,000	8 hrs pp/month	RWMG agencies	Business as usual	RWMG MOU funds the IRWM Program through 2016. After 2016 there is no certainty of funding.
RAC Meetings[1]	$33,000	8 hrs pp/quarter	501(c)(3) Executive Director and/or Staff	501(c)(3)	Very uncertain. Region would need to determine who would form the non-profit, and this process could take years to establish. This funding source could potentially be sustainable in perpetuity once established.
Tri-County FACC Meetings[1]	$4,000	2 hrs pp/quarter			
DAC Outreach[1]	$20,000	4 hrs pp/quarter	Stakeholders - unknown	Fee	Very uncertain. Governance and Finance Workgroup noted that imposing a fee would potentially reduce involvement in the IRWM Program. The potential longevity of this fee would need to be determined by the implementing entity.
Tribal Outreach[1]	$20,000	4 hrs pp/quarter			
Public Outreach[1]	$34,000	8 hrs pp/quarter			
SDIRWM Report Card[2]	$6,500	8 hrs pp	Stakeholders - unknown	JPA	Very uncertain. Governance and Finance Workgroup noted that a JPA would require interested agencies that would not only participate in the IRWM Program, but would also be willing and able to provide funding. The certainty and longevity of the funding source would, therefore, be dependent upon the status of each agency willing to participate in the JPA.
Data Management System Administration	TBD	96 hrs/ quarter			
Future Update of the IRWM Plan					
Future IRWM Plan Update, including Highlights[1]	$120,000	8 hrs pp/quarter	RWMG agencies	Business as usual	Very uncertain. The next IRWM Plan Update is anticipated in 2018 (in five years). There is no RWMG MOU in place for 2018, so there is no certainty of funding for a future IRWM Plan Update/Highlights document.

Program Element	Likely Annual Project Cost	Likely RWMG Staff Commitment		Possible Responsible Entity	Potential Funding Source	Certainty/Longevity of Funding Source
				501(c)(3) Executive Director and/or Staff	501(c)(3)	Very uncertain. The Region would need to determine who would form the non-profit, and this process could take years to establish. Funding sustainability is also dependent upon the funding stream(s) used by the non-profit.
				Stakeholders - unknown	Fee	Very uncertain. It is highly unlikely that the Region could levy a fee to pay for a future planning document.
				Stakeholders - unknown	JPA	Very uncertain. The certainty and longevity of the funding source would, therefore, be dependent upon the status of each individual agency willing to participate in the JPA.
Grants						
Grant administration – currently covered through Implementation Grant funding				RWMG agencies	Grants	Uncertain until grants are awarded. If proposals are only partially funded, cost may be difficult to fund.
Grant applications[3]	$108,000	16 hrs/mo during grant preparation		RWMG agencies	Business as usual	RWMG MOU funds development of grant applications through 2016. After 2016 there is no certainty of funding.
				501(c)(3) Executive Director and/or Staff	501(c)(3)	Very uncertain. The Region would need to determine who would form the non-profit, and this process could take years to establish. This funding source could potentially be sustainable in perpetuity once established.
				Stakeholders - unknown	Fee	Very uncertain. Governance and Finance Workgroup noted that imposing a fee for project proponents would potentially reduce involvement in the IRWM Program. The potential longevity of this fee would need to be determined by the implementing entity.
				Stakeholders - unknown	JPA	Very uncertain. Governance and Finance Workgroup noted that a JPA would require interested agencies that would not only participate in the IRWM Program, but would also be willing and able to provide funding. The certainty and longevity of the funding source would, therefore, be dependent upon the status of each agency willing to participate in the JPA.
TOTAL	**$380,000**					

1 Costs are estimated based on cost estimates in the 2010 Planning Grant contract, with amendments, divided by two years
2 Costs are estimated based on costs required to produce the first Report Card in 2011, divided by three years.
3 Costs are estimated based on total fee assigned to existing consultant for 2 grant cycles, divided by five years.

11.4.2 Project Funding

IRWM planning provides an important first step in positioning the Region to secure the outside funding critical to allow the Region to implement much-needed water management projects and programs. An approved IRWM Plan is necessary for regions to be eligible for funding from the State of California under Propositions 50, 84, and 1E. Future funding opportunities are likely to also require an approved IRWM Plan, as the importance and value of integrated planning and management gains recognition.

The Proposition 50 Chapter 8 IRWM Grant Program is a joint program between DWR and the State Board, which provides funding for projects that protect communities from drought, protect and improve water quality, and reduce dependence on imported water. The IRWM Grant Program includes two separate grant types - Planning Grants and Implementation Grants. The San Diego IRWM Region has received $25 million under Proposition 50, to fund 19 projects.

Proposition 84, consisting of three rounds of funding, began in the summer of 2008, and is expected to provide approximately $91 million in funding for IRWM projects in the San Diego Region. To date, the San Diego Region has received $8 million under Proposition 84 – Round 1, to fund 11 projects, and applied for an additional $10.5 million through Round 2, to fund 7 projects.

Proposition 1E is expected to provide $300 million statewide for grants for stormwater and flood management projects. These funds are applied for by individual project sponsors, rather than the IRWM Program. Within the San Diego IRWM Region, the City of Escondido has received $15 million of Proposition 1E funds.

Projects funded through inclusion in the IRWM Plan range from pilot projects for innovative water treatment technology, recycled water systems, water quality and supply for DACs, flood control and stormwater management, and water supply and reliability.

Beyond Propositions 50, 84, and 1E, a variety of future state and federal funding opportunities for water-related projects are expected. Those additional funding opportunities are elaborated upon in the following section.

11.4.3 Project Financing Options

The Governance and Financing Workgroup also discussed potential financing options for projects included in the 2013 IRWM Plan. Information provided by the workgroup and elaborated upon through development of the 2013 IRWM Plan is summarized in Table 11-5.

The Governance and Financing Workgroup discussed multiple potential funding sources for IRWM projects, including those at the local/regional, state, and federal levels. Further, due to the diverse nature of projects included in the 2013 IRWM Plan, the Workgroup discussed projects by functional area (water supply, wastewater, recycled water, groundwater, stormwater, flood control, and habitat/open space). Information regarding potential funding sources for projects within each of the aforementioned functional areas is provided in Table 11-5.

Table 11-5: Potential IRWM Project Financing Options

Potential Funding Source	Description of Funding Source and Potential Certainty/Longevity	Functional Area							Funding Includes O&M?
		Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat/Open Space	
Local / Regional									
Capital Improvement Programs	A majority of the large infrastructure IRWM projects are included in Capital Improvement Program (CIP) budgets prepared and adopted by implementing agencies. The CIPs address project costs, project implementation schedules, and funding sources for implementing budgeted projects. Large-scale CIP projects are typically funded through debt (revenue bonds or general obligation bonds) serviced by water and sewer rates, capacity charges, standby charges, or agency shares of property taxes or assessments. Smaller scale CIP projects may be funded by the agencies with cash on hand, short-term lines of credit, or directly from water or sewer rates. Flood control CIPs may be funded through debt service (bonds) backed by agency general funds. CIP projects may also be funded, in part, by outside grants or financial assistance. Due to the varied nature of CIP budgets, the longevity and certainty of this funding source is highly variable.	x	x	x	x	x	x	x	No
Special Property Assessments	Special property assessments can provide funding for both capital projects and operations and maintenance. For example, monitoring Special Drainage Area fee is charged to development projects to fund new facilities or upsizing of old ones. Some districts pay special fees to maintain specific facilities, or a tax that contributes to flood control O&M. Note that a special property assessment would be subject to California Proposition 218 requirements.					x	x		Poten tially
Water user rates	Water rates could be used to fund or partially fund IRWM Projects. These funds would likely be reserved for water supply, water supply quality, or wastewater projects, or those projects which have the potential to reduce future water rate inflation (e.g. projects that reduce dependence on imported water). These funds could potentially be used to fund operations and maintenance; however, the certainty and longevity of the funding source is dependent upon individual water users' willingness to pay.	X	X	X	X				Poten tially
Local Water Supply Development (LWSD) Program	The Water Authority's LWSD program provides member agencies with financial incentives of up to $200 per acre-foot for the development of recycled water and groundwater projects capable of relieving imported demands on Water Authority facilities. This incentive contribution offsets projects costs, especially in the early years of project start-up. In order to continue to qualify for these incentives, project expenses must exceed project revenues. Incentives are available for up to 25 years based on continued financial need. As cost of imported water goes up, the need for financial incentives will diminish and this program will phase out.			x	x				No

Potential Funding Source	Description of Funding Source and Potential Certainty/Longevity	Functional Area							Funding Includes O&M?
		Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat/Open Space	
Local Resources Program (LRP)	The LRP program features financial incentives from the Metropolitan Water District of Southern California (Metropolitan) for recycled water and groundwater development projects that offset demands for imported water. The LRP is designed to ensure the financial feasibility of local projects during the initial years of operation. The LRP provides incentives of up to $250 per acre-foot for up to 25 years for qualifying recycled water and groundwater projects. This funding source is not currently available to the San Diego Region, but could potentially become available again in the future.			x	x				Yes
Quality of Life Funding Strategy	Led by SANDAG, the Quality of Life Funding Strategy has been exploring potential funding mechanisms for four identified infrastructure needs: habitat conservation, shoreline preservation, water quality enhancement, and public transit. The group has considered a sales tax, user fees, bond measures, special assessments, and impact fees, but no policy decision has been made yet. As such, the certainty and longevity of this funding source are uncertain at this time.					x			Poten tially
NGO Funding or Endowments	Non-government organization (NGO) funds may be derived from endowments, contributions, fundraisers, membership dues, or other similar sources. Many NGO-sponsored projects include some funding from these sources. Additionally, if the San Diego IRWM Program were to establish itself as a 501(c)(3) organization, additional funding for IRWM projects could be garnered directly by the IRWM Program. Due to the diverse and uncertain nature of this funding source, its use and longevity are also highly uncertain at this time.	x	x	x	x	x	x	x	Poten tially
Private Grants	Hundreds of foundations or businesses provide support for environmental projects through private grants. If the San Diego IRWM Program were to establish itself as a 501(c)(3) organization, private grant funding for IRWM projects could be garnered from multiple sources. Due to the diverse and uncertain nature of this funding source, its use and longevity are also highly uncertain at this time.	x	x	x	x	x	x	x	Poten tially
State									
Proposition 50 – Water Use Efficiency Program	Proposition 50 established a funding program for agricultural water use efficiency projects, including research and development, feasibility studies and pilot/demonstration projects, public information and education, and technical assistance. Approximately $15,000,000 is available in the 2012 funding cycle. (http://www.water.ca.gov/wateruseefficiency/finance/)	x							No

Potential Funding Source	Description of Funding Source and Potential Certainty/Longevity	Functional Area							Funding Includes O&M?
		Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat/Open Space	
Proposition 50 – Chapter 6(b) and (c)	Proposition 50 Chapter 6(b) and (c) provide funding for public water systems. Section (b) funds new technologies to clean drinking water. Section (c) funds improvements to systems with MCL compliance violations, surface water treatment microbial requirements, and mandatory disinfection required by CDPH. Grant funding up to $50,000,000 is provided, with 50% matching funds required. No match is required for projects serving disadvantaged communities (DACs). (http://www.cdph.ca.gov/certlic/drinkingwater/Documents/Funding/DWRfundingnotice-06-2010.pdf)	x							No
Proposition 84 – IRWM Grant Program	Proposition 84, approved by California voters in November 2006, provides funding for planning and projects that assist local agencies to meet long-term State water needs, including delivery of safe drinking water, flood risk reduction, and protection of water quality and the environment. A maximum of $1,000,000 is available per region for a one-time Plan Update to be completed by 2013. San Diego received this grant award; however, it does not provide long-term program financing. A total of $1,000,000,000 is available statewide (with $71,000,000 available to the San Diego IRWM region) for project implementation, with funding allocated through periodic application processes. A 25% minimum cost share is required. Projects must be part of an IRWM plan. The California Department of Water Resources (DWR) administers the IRWM grant program under Proposition 84. (http://www.water.ca.gov/irwm/)	x	x	x	x	x	x	x	No
Proposition 84 – Storm Water Grant Program (SWGP)	The SWGP, funded through Proposition 84, provides grant funding for the reduction and prevention of storm water pollution of rivers, lakes, and streams. Approximately $82,000,000 is available for planning and implementation of eligible projects. The Round 1 solicitation is currently underway. The State Water Resources Control Board (State Board) is administering the SWGP. (http://www.waterboards.ca.gov/water_issues/programs/grants_loans/prop84/index.shtml)					x			No
Proposition 1E – Stormwater Flood Management Grant Program	Proposition 1E, also approved by California voters in November 2006, provides funding for stormwater and flood management projects that can demonstrate reduction in flood damage. Proposition 1E provides grant funding of up to $30,000,000 per eligible project. A 50% minimum cost share is required. Projects must be part of an IRWM plan. DWR administers the Proposition 1E funding program. (http://www.water.ca.gov/irwm/integregio_stormwaterflood.cfm)					x	x		No
Flood Protection Corridor Program (FPCP)	The FPCP program, funded by both Proposition 84 and Proposition 1E, to provide grant funding for nonstructural flood management projects. Eligible projects seek to acquire, restore, enhance and protect real property for the purposes of flood control protection, together with agricultural land preservation and/or wildlife habitat protection. The program provides grant funding of up to $5,000,000 per project. DWR administers the FPCP program. (http://www.water.ca.gov/floodmgmt/fpo/sgb/fpcp/)						x	x	No

Potential Funding Source	Description of Funding Source and Potential Certainty/Longevity	Functional Area							Funding Includes O&M?
		Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat/Open Space	
Urban Streams Restoration Program	The Urban Streams Restoration Program, administered by DWR, seeks to reduce property damage caused by flooding or erosion, restore or protect the natural ecological values of streams, and promote community involvement and stewardship. Eligible projects include creek cleanups, invasive removal, revegetation, channel reconfiguration, flood protection, and community involvement. Grant funding up to $1,000,000 is available to local agencies and NGOs (working together). (http://www.water.ca.gov/urbanstreams/)						x	x	No
Local Groundwater Assistance (LGA) Program	The LGA program, administered by DWR, provides funding for groundwater studies, management, and monitoring. The program provides grant funding of up to $250,000 per applicant. (http://www.water.ca.gov/lgagrant/)				x				No
Infrastructure State Revolving Fund (ISRF) Program	The Infrastructure State Revolving Fund (ISRF) program, through the California Infrastructure and Economic Development Bank, provides low-cost financing to public agencies for qualifying infrastructure projects. The ISRF program funding is available in amounts ranging from $250,000 to $10,000,000, with loan terms of up to 30 years. Interest rates are set on a monthly basis. Eligible project categories include drainage, water supply and flood control, environmental mitigation measures, parks and recreational facilities, sewage collection and treatment, and water treatment and distribution. (http://www.ibank.ca.gov/infrastructure_loans.htm)	x	x	x	x	x	x	x	Yes
Safe Drinking Water State Revolving Fund (SDWSRF)	The SDWSRF, through the California Department of Public Health (CDPH), provides agencies with low interest loans for projects that upgrade public drinking water infrastructure, including wells, pumps, storage tanks, treatment, surface water intakes, pipes, and other components. Prioritization is based on risk to public health. For construction, funding is available in amounts up to $20,000,000 per year per project and $30,000,000 per year per entity, with loan terms of up to 20 years. For planning, funding is available in amounts up to $500,000 per project, with loan terms of up to 5 years. These loans carry an interest rate equal to half of the State's general obligation bond interest rate. This below market interest rate can result in substantial savings on debt service. Further, a 0% interest rate and up to 80% grant (up to $3,000,000) is possible for projects serving DACs. (http://www.cdph.ca.gov/services/funding/Pages/SRF.aspx)	x			x				Yes

Potential Funding Source	Description of Funding Source and Potential Certainty/Longevity	Functional Area							Funding Includes O&M?
		Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat/Open Space	
Clean Water State Revolving Fund (CWSRF)	The CWSRF, through the State Board, provides agencies with low interest construction loans for wastewater, water recycling, and nonpoint source projects. The CWSRF funding is available in amounts up to $50,000,000 per agency, with loan terms of up to 20 years. These loans carry an interest rate equal to half of the State's general obligation bond interest rate. This below market interest rate can result in substantial savings on debt service. Principal forgiveness may be made available to projects serving DACs. Applications are accepted continuously. (http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/index.shtml)			x	x	x			Yes
Water Recycling Funding Program	The Water Recycling Funding Program, through the State Board, provides agencies with low interest construction loans for water recycling projects, including treatment, distribution, and groundwater recharge. These loans carry an interest rate equal to half of the State's general obligation bond interest rate. This below market interest rate can result in substantial savings on debt service. Planning grants are also available to reimburse up to 50% of eligible costs, to a maximum of $75,000. Applications are accepted continuously. (http://www.waterboards.ca.gov/water_issues/programs/grants_loans/water_recycling/index.shtml)			x					Yes
Nonpoint Source Grant Program	The Nonpoint Source (NPS) Grant Program, through the State Board, annually allocates Clean Water Act Section 319(h) funding from the U.S. Environmental Protection agency to projects that address water quality problems in surface and ground water resulting from NPS pollution. The goal of these projects is to ultimately lead to restoring the impacted beneficial uses in these water bodies. Projects are required to be located in a watershed that has an adopted/nearly adopted Total Maximum Daily Load (TMDL) for the constituent of concern and has been identified in the NPS Program Preferences. A 25% funding match is required. (http://www.waterboards.ca.gov/water_issues/programs/nps/grant_program.shtml)					x			No
Groundwater Management Program Assessments	In areas where a Groundwater Management Program is established per requirements of the State of California Groundwater Management Act (AB 3030), the implementing agency may fund groundwater improvement projects through assessments levied against groundwater users (provided that voter approval of such assessments is granted).				x				Yes
California State Coastal Conservancy	The Coastal Conservancy provides funding for protection, public access, and restoration, and enhancement of coastal resources. There are no established minimum or maximum grant amounts; however, projects must be consistent with the purposes of available funding sources (e.g., Proposition 84). Applications are accepted continuously. (http://scc.ca.gov/category/grants/)							x	Poten tially

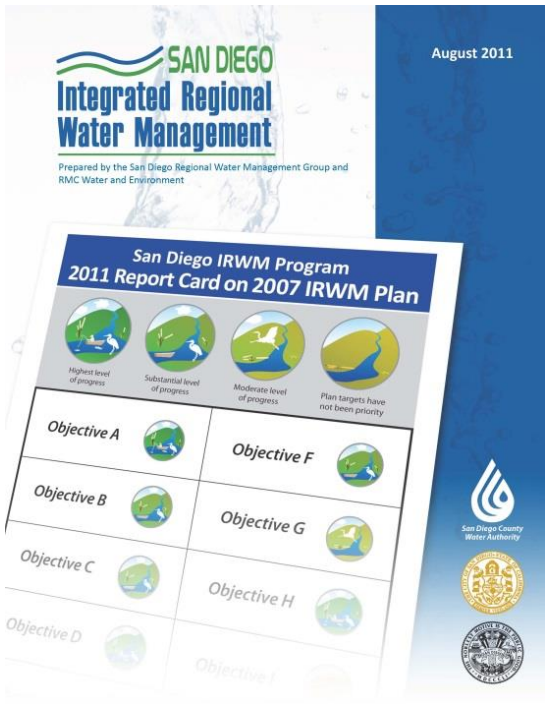
Potential Funding Source	Description of Funding Source and Potential Certainty/Longevity	Functional Area							Funding Includes O&M?
		Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat/Open Space	
Federal									
Title XVI Water Reclamation and Reuse – Construction	The Reclamation Wastewater and Groundwater Study and Facilities Act (Title XVI, Public Law 102-575) authorizes the federal government, via U.S. Bureau of Reclamation (USBR), to fund up to 25% of the capital cost of congressionally authorized recycling projects. Funding for construction is available in accordance to each project's authorization and the funding opportunity announcement (FOA). (http://www.usbr.gov/WaterSMART/title/)			x					No
Title XVI Water Reclamation and Reuse – Feasibility Study	USBR also releases FOAs for development of new feasibility studies for congressionally authorized recycling projects. Grant funding is available up to $150,000 per applicant with a 50% cost share. Studies must be completed by March 2014. (http://www.usbr.gov/WaterSMART/title/)			x					No
WaterSMART Water & Energy Efficiency Grants	Through the WaterSMART, USBR provides 50% cost share funding to irrigation and water districts, Tribes, States and other entities with water or power delivery authority. Projects should seek to conserve and use water more efficiently, increase the use of renewable energy, protect endangered species, or facilitate water markets. Projects must be completed within 24 months that will help sustainable water supplies in the western United States. (http://www.usbr.gov/WaterSMART/weeg/index.html)	x		x				x	No
WaterSMART System Optimization Review Grants	USBR provides grant funding for System Optimization Reviews, which are a broad look at system-wide efficiency focused on improving efficiency and operations of a water delivery system, water district, or water basin. The System Optimization Review results in a plan of action that focuses on improving efficiency and operations on a regional and basin perspective. This grant program provides 50% cost share, up to $300,000. Agencies must be able to complete the System Optimization Review within 24 months. (http://www.usbr.gov/WaterSMART/sor/index.html)	x							No
WaterSMART Advanced Water Treatment and Pilot and Demonstration Project Grants	USBR provides grant funding for pilot and demonstration projects that address the technical, economic, and environmental viability of treating and using brackish groundwater, seawater, impaired waters, or otherwise creating new water supplies within a specific locale. (http://www.usbr.gov/WaterSMART/awtg/index.html)			x	x				No

Potential Funding Source	Description of Funding Source and Potential Certainty/Longevity	Functional Area							Funding Includes O&M?
		Water Supply	Wastewater	Recycled Water	Groundwater	Stormwater	Flood Control	Habitat/Open Space	
WaterSMART Grants to Develop Climate Analysis Tools	This program, through the USBR, is for research projects focused on the information gaps detailed in the joint USBR and United Stated Army Corps of Engineers (USACE) Report titled "Addressing Climate Change in Long-Term Water Resources Planning and Management: User Needs for Improving Tools and Information" (Section 3). This grant program provides 50% cost share. (http://www.usbr.gov/WaterSMART/cat/index.html)	x							No
WaterSMART Program for Basin Studies	This program, through the USBR, is for basin studies that complete work to evaluate and address climate change impacts. (http://www.usbr.gov/WaterSMART/bsp/)	x	x	x	x	x			No
Cooperative Watershed Management Program (CWMP)	The purpose of the CWMP, through the USBR, is to improve water quality and ecological resilience and to reduce conflicts over water through collaborative conservation efforts in the management of local watersheds. The CWMP will provide financial assistance to form new watershed groups, to expand existing watershed groups, and/or to conduct one or more projects in accordance with the goals of watershed groups. Establishment or expansion of a watershed group may be funded $100,000 for up to 3 years. Planning and implementation of a watershed projects may be 50% cost share. (http://www.usbr.gov/WaterSMART/cwmp/index.html)					x		x	No
Water and Waste Revolving Fund Grants	The U.S. Department of Agriculture (USDA) Rural Development assists communities with a population less than 10,000 with water and wastewater systems. The grant recipients will use the grant funds to establish a revolving loan fund. The loans will be made to eligible entities to finance pre-development costs of water and wastewater projects or short-term small capital improvement projects not part of the regular O&M of current water and wastewater systems. The amount of financing to an eligible entity shall not exceed $100,000 and shall be repaid in a term not to exceed 10 years. (http://www.rurdev.usda.gov/UWP-revolvingfund.html)	x	x		x				No
Water and Waste Disposal Grants and/or Guaranteed Loans	USDA Rural Development assists communities with a population less than 10,000 with water and wastewater systems. To qualify, applicants must be unable to obtain the financing from other sources at rates and terms they can afford and/or their own resources. Funds can be used for design, construction, land acquisition, legal fees, equipment, and initial operations and maintenance. Projects must be primarily for the benefit of rural users. The rates that are used to calculate these loans are subject to change quarterly. Loans are made based on the applicant's authority and the life expectancy of the system's project, which may be up to the maximum of 40 years. (http://www.rurdev.usda.gov/UWEP_HomePage.html)	x	x		x				Yes

11.5 Plan Performance and Monitoring

11.5.1 Methods to Evaluate Plan Performance

The San Diego IRWM Program uses a Report Card to evaluate IRWM Plan performance. This Report Card was last produced in August 2011, and is anticipated to be produced approximately every three years. Assessing the IRWM Plan every three years will allow enough time to pass after the IRWM Plan has been finalized to provide an opportunity assess what progress has been made towards achieving IRWM Plan goals, objectives, and priorities, and implement changes to improve performance. The Report Card provides an overview of the progress that has been made toward obtaining the IRWM Plan goals and objectives (see *Chapter 2, Vision and Objectives*), the IRWM priorities (established in Section 11.2 of this chapter), and anticipated benefits associated with projects funded through the IRWM Program (Proposition 50 and Proposition 84). During this evaluation, the Impacts and Benefits section of the Plan will be revisited and updated, if necessary. The Report Card only assesses activities specific to the IRWM Program, and does not evaluate other, non-IRWM activities in the Region.



The IRWM Report Card assesses both Plan and Project performance for the San Diego IRWM Program.

For the first Report Card, data used to assess progress related to the IRWM Plan were compiled to provide quantitative assessments when appropriate and possible. Because achievements were found to be difficult to quantify, a qualitative assessment of progress using graphic designations for four degrees of progress was developed. These degrees of progress are as follows:

- Highest level of progress has been made towards achieving IRWM Plan targets
- Substantial progress has been made towards achieving IRWM Plan targets but modest additional progress is needed to fully meet the goals
- Moderate progress has been made toward achieving IRWM Plan targets but moderate additional progress is needed to fully meet the goals
- Plan Targets have not been a priority for IRWM Plan implementation

Given that the IRWM Plan Targets have been substantially updated to ensure the measurability of the IRWM Objectives, future iterations of the Report Card should contain more quantitative assessments than past versions of the Report Card.

In addition, for the first Report Card, IRWM Plan performance was measured, in part, by the progress made towards achieving the short-term priorities described in this chapter. Short-term priorities were assessed using the same qualitative degrees of progress used to assess the objectives. As described above, each of the short-term priorities in the 2013 IRWM Plan has the

support of the RAC, and at least one RAC member organization has been assigned the lead on each of these priorities. Each of these lead priorities partners will complete a work plan, submit quarterly reporting, and report on the status of their respective priority actions within one year of finalization of the 2013 IRWM Plan. It is anticipated that these reporting actions will result in information for the Report Card that is more quantified and compiled, therefore also resulting in more quantitative assessments of short-term priorities compared to the first version of the Report Card.

Information pertaining to how plan performance and monitoring will be tracked with a Data Management System, including who will be responsible for maintaining the Data Management System, is included in *Chapter 10, Data and Technical Analysis.*

11.5.2 Methods to Evaluate Project Performance

The Report Card also assesses the performance of projects funded through the IRWM Program (through Proposition 50 and Proposition 84). Assessment of projects is done in two ways: contribution to IRWM Plan objectives, and individual project targets and metrics. Table 11-6 shows projects that have been funded through the IRWM Program, and how they contribute to IRWM Plan objectives. Note that some projects included in the table were funded under Proposition 50 and Proposition 84-Round 1, and are therefore consistent with the 2007 IRWM Plan Objectives. In contrast, the Proposition 84-Round 2 projects were evaluated using the objectives in the 2013 IRWM Plan.

The Report Card will provide a discussion of project progress, as well as project achievements. Further, it will evaluate projects by the individual targets and metrics described for each project in the grant applications and contracts. These targets and metrics are increasingly designed to correspond with appropriate objectives, targets and metrics in the IRWM Plan. Though there may not always be an exact correlation between project targets established for the grant application and contracting process and IRWM Plan targets, the project targets generally support IRWM Plan objectives. Therefore, as projects achieve their individual targets and objectives, they will also contribute towards attainment of the IRWM Plan objectives. As the IRWM Program evolves, closer correlation between project targets and IRWM Plan targets is expected.

Project targets and metrics will be used to measure future project performance and included in the performance measures in future grant applications. Additionally, a Project Assessment and Evaluation Plan will be developed after contract execution for each project selected for funding through the IRWM Program. This Project Assessment and Evaluation Plan will define how projects will be assessed, evaluated, and reported.

11.5.3 Adaptive Management

The San Diego IRWM Plan is a living document. As such, it is expected that periodic updates will occur. The 2013 IRWM Plan is one such update to the original 2007 IRWM Plan, and reflects changes that have occurred in the IRWM Region since the development of the 2007 IRWM Plan. In order to remain relevant, and to ensure that the water management needs of the Region are identified and the structure exists to address these needs, it is anticipated that this Plan will be updated every 5 years through the life of the IRWM Program. It is expected that this will provide sufficient time to implement projects and actions to achieve IRWM Plan goals, while still having the flexibility to address any changes to water management needs that arise through changes in the Region. It should be noted that the RWMG MOU currently extends through 2016. As this MOU

provides the basis for managing and funding the IRWM Program, future updates to the IRWM Plan are contingent upon either a renewal/extension of the RWMG MOU or the development of an alternative governance structure and funding mechanism to implement the IRWM Program.

In addition to the planned updates to the San Diego IRWM Plan designed to provide opportunities for adaptive management, the IRWM Plan incorporates adaptive management through its project selection process. As described in *Chapter 9: Project Evaluation and Prioritization*, projects submitted to the IRWM Program are initially scored using the Project Selection Criteria. These criteria reflect a way to assess how projects address the objectives and purpose of the IRWM Program. The Project Selection Workgroup weights each of these criteria to emphasize which criteria are most important to the IRWM Region at the time of project selection. This allows projects that address the most critical needs of the IRWM Region to be given priority, even as these needs change as they are addressed or as other changes affect the Region.

11.6 References

California Department of Water Resources (DWR). 2012. *Guidelines: Integrated Regional Water Management, Proposition 84 and 1E*. November 2012. Available: http://www.water.ca.gov/irwm/grants/docs/Guidelines/GL_2012_FINAL.pdf

Table 11-6: Consistency of IRWM-Funded Projects with IRWM Plan Objectives

IRWM-Funded Projects	IRWM Plan Objectives Addressed										
	A*	B	C	D	E	F	G	H	I	J	K*
Proposition 50 Projects											
Implementation of Integrated Landscape and Agricultural Efficiency Program		✓	✓	✓	✓						
Irrigation Hardware Giveaway and Dry Weather Runoff Reduction Demonstration		✓	✓	✓	✓						
Over-Irrigation/Bacteria Reduction		✓	✓	✓	✓			✓			
Santee Water Reclamation Facility Expansion Project		✓		✓	✓	✓				✓	
Recycled Water Retrofit Assistance Program		✓		✓	✓						
City of San Diego Recycled Water Distribution System Expansion, Parklands Retrofit, and Indirect Potable Reuse/ Reservoir Augmentation Project		✓		✓	✓	✓		✓		✓	
San Vicente Reservoir Source Water Protection through Watershed Property Acquisition and Restoration					✓	✓	✓	✓	✓	✓	
El Capitan Reservoir Watershed Acquisition and Restoration Program					✓		✓	✓	✓	✓	
Northern San Diego County Invasive Non-Native Species Control Program			✓		✓		✓		✓		
Santa Margarita Conjunctive Use Project					✓						
Carlsbad Desalination Project Local Conveyance		✓		✓	✓	✓			✓	✓	
San Diego Region Four Reservoir Intertie Project Conceptual Design		✓		✓	✓	✓				✓	
South County Water Supply Strategy		✓	✓	✓	✓						
El Monte Valley Groundwater Recharge and River Restoration Project - Phases 1 and 2		✓		✓	✓	✓	✓	✓	✓	✓	
San Diego Regional Pollution Prevention		✓	✓	✓				✓		✓	
Biofiltration Wetland Creation and Education Program		✓		✓			✓	✓		✓	
San Dieguito Watershed Management Plan Implementation		✓		✓				✓	✓	✓	
City of San Diego Green Mall Porous Paving and Infiltration - Phase 1		✓	✓	✓				✓✓		✓	
County of San Diego Chollas Creek Runoff Reduction and Groundwater Recharge			✓	✓			✓	✓		✓	
Proposition 84 – Round 1 Projects											
Sustainable Landscapes Program		✓	✓	✓	✓		✓	✓			
North San Diego County Regional Recycled Water Project - Phase I		✓	✓		✓	✓					
North San Diego County Cooperative Demineralization Project		✓			✓	✓		✓			
Rural Disadvantaged Community (DAC) Partnership Project - Phase I		✓			✓	✓		✓			

Table 11-6: Consistency of IRWM-Funded Projects with IRWM Plan Objectives

IRWM-Funded Projects	IRWM Plan Objectives Addressed										
	A*	B	C	D	E	F	G	H	I	J	K*
Lake Hodges Water Quality and Quagga Mitigation Measures			✓	✓	✓	✓		✓			
Implementing Nutrient Management in the Santa Margarita River Watershed - Phase I		✓	✓	✓				✓			
Bannock Avenue Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection		✓	✓	✓	✓					✓	
Pilot Concrete Channel Infiltration Project		✓	✓	✓	✓						
San Diego Regional Water Quality Assessment and Outreach Project		✓	✓	✓	✓			✓	✓		
Chollas Creek Integration Project - Phase I		✓	✓				✓	✓	✓		
Regional Water Data Management Program		✓	✓	✓							
Proposition 84 – Round 2 Projects											
North San Diego County Regional Recycled Water Project (NSDCRRWP) - Phase II	✓	✓	✓		✓	✓		✓			✓
Turf Replacement and Agricultural Irrigation Efficiency Program	✓	✓	✓		✓			✓			✓
Rural Disadvantaged Community (DAC) Partnership Project - Phase II	✓	✓	✓	✓	✓	✓		✓			✓
Failsafe Potable Reuse at the Advanced Water Purification Demonstration Facility	✓	✓	✓	✓	✓			✓			✓
Sustaining Healthy Tributaries to the Upper San Diego River and Protecting Local Water Supplies	✓	✓	✓	✓	✓		✓	✓	✓	✓	
Chollas Creek Integration Project - Phase II	✓	✓	✓				✓	✓	✓		
Implementing Nutrient Management in the Santa Margarita River Watershed - Phase II	✓	✓	✓	✓							

* New IRWM Objectives that were not established at the time of the Proposition 50 or Proposition 84-Round 1 grant applications.

Download the complete 2013 San Diego IRWM Plan at:
www.sdirwmp.org

Photo credit to:

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