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 2016 IRWM Program Guidelines (DWR, 2016).

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 IRWM program has encouraged regional coordination, as well as specific information about the planning studies completed for the 2013 IRWM Plan, and other related plans. Specifically, this chapter includes information about:

- How the 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 2019 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 2019 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 2019 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. It also includes the San Diego Region 2017 Storm Water Resource Plan (SWRP), the 2018 Stormwater Capture and Use Feasibility Study (SWCFS), and the Tri-County FACC's 2019 Water Needs Assessment.

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. Some chapters of this 2019 IRWM Plan were thoroughly updated with current data, while others were not. As indicated in *Chapter 4, Tribal Nations of San Diego County* and *Chapter 5, Watershed Characteristics*, those chapters were not updated because they had been originally developed in close coordination with the tribes and watershed stakeholders, respectively. As the 2019 IRWM Plan is intended to be an update, these chapters were not included in the planned updates as funded by the Proposition 1 Planning Grant. Chapters that received thorough updates included those with sections related to the changes from the 2012 Guidelines to the 2016 Guidelines, as well as those sections with substantial data that no longer reflected Regional conditions at the time this 2019 IRWM Plan Update was being developed. The 2012-2016 drought resulted in substantial shifts in water use, approaches to water supply development, and conservation, while regulatory shifts have also played a role in how the Region approaches water resource management.

In addition to stakeholder input, the 2019 IRWM Plan relied heavily on existing planning documents, including those completed during and for preparation of the 2013 and 2019 IRWM Plans. Of particular importance was the San Diego County Water Authority's 2010 and 2015 Urban Water Management Plans (UWMPs), which formed the base documents of this IRWM Plan because they contain a roll-up of all water supply and recycled water flow projections for all 24 member agencies throughout the San Diego Region. The SWRP and the SWCFS was relied on for regional stormwater management data and information. None of the other water management topics (wastewater, natural resources, flood management, etc.) have a regional resource document that contains regularly updated information compiled for all agencies in the Region managing 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 2019 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, U.S. Forest Service, U.S. Marine Corps, U.S. Indian Health Services, and the San Diego Regional Water Quality Control Board (San Diego Water 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 2019 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	Incorporated per Water Authority UWMP and SWRP
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) – *previously used* Jurisdictional Urban Runoff Management Plans (JURMPs) – *previously used* Jurisdictional Runoff Management Plans (JRMPs) Water Quality Improvement Plans (WQIPs)	Stormwater agencies	As needed	Coordination between cities and agencies within each watershed management area	Incorporated per SWRP
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 of a 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

Types of Local Plans	Jurisdiction	Updates	Coordination During Planning Process	Relation to IRWM Plan
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	San Diego Water Board	Every 3 years	Basin Plan includes water quality objectives; 303(d) list identifies water bodies that are impaired	Incorporated
Storm Water Resource Plan	San Diego MS4 Copermittees	As needed	SWRP is a compilation of planning documents that meet the Storm Water Resource Plan criteria and allow San Diego Copermittees to be eligible for grant funds. The SWRP identifies water quality objectives and opportunities to leverage stormwater as a resource.	Incorporated
Stormwater Capture and Use Feasibility Study	County of San Diego	As needed	Coordinated with SWRP efforts to refine the opportunities for using stormwater as a resource	Incorporated
Water Needs Assessment	DWR	As needed	Coordination among regional NGOs, academics, and other groups to define, identify needs of, and outreach to DACs	Incorporated
Groundwater Sustainability Plan	Groundwater Sustainability Agencies	Every 5 years	GSPs will use existing basin and regional data and studies to develop groundwater basin water budgets and identify management actions	Will be incorporated in future
San Diego Watershed Basin Study	Reclamation	As needed	Basin Study updates are regularly presented to IRWM stakeholders for input. Information included in the Basin Study are being incorporated into the IRWM Plan to align the two efforts.	Will be incorporated in future
4th Climate Change Assessment	California Climate Action Team	Every 3 years	Inter-agency effort to address California-specific policy questions and implement the Climate Change Research Plan	Will be incorporated in future

*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	
San Diego Water Board	The prime water quality regulatory authority within the Region, responsible for protecting beneficial uses and establishing and enforcing water quality standards. The San Diego Water Board is a non-voting 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). These regulations affect water-related resource management decisions and requirements.
Department of Fish and Wildlife	Oversees implementation of the federal Endangered Species Act and regulates activities that may impact endangered species and their habitats. These endangered species and habitats are dependent on well-managed water resources.
California State Parks	Operates a number of state beaches, state parks, and coastal preserves and recreational areas within the Region and sponsors a project funded by San Diego IRWM grant.
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. Watershed health is affected by wildfires and healthy forests can help support healthy headwaters for local supplies.
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.
San Diego River Conservancy	A non-regulatory state agency working to protect, restore, and enhance the San Diego River Area. The Board of Directors includes elected officials from the Region, as well as representatives from state agencies with interest in watershed protection.
Federal Agencies	
U.S. Environmental Protection Agency (EPA)	Through powers delegated to the San Diego Water Board, implements the Clean Water Act and oversees San Diego Water 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. These endangered species and habitats are dependent on well-managed water resources.
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; has served as consultant to several IRWM-funded projects

Agency	Authority and Interest in IRWM Program
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; is a Local Project Partner (LPP) in an IRWM-funded project.
Natural Resources Conservation Service	A division of the U.S. Department of Agriculture that provides technical and financial assistance in a variety of areas related to the conservation of soil, water, and other natural resources.
U.S. Bureau of Reclamation (Reclamation)	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, water rights, and the San Diego Basin Study. Reclamation also administers funding for the Reclamation Wastewater and Groundwater Study and Facilities Act (Title XVI, Public Law 102-575) and for water projects under the WaterSMART program. Reclamation is a non-voting 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 and provides non-voting RAC member representing the San Diego Military Community.
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

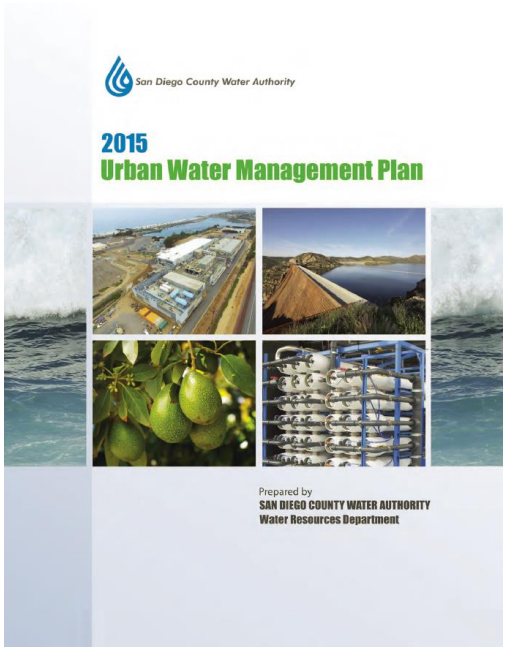
7.3.1 Water Planning Overview

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 San Diego Region, via the Water Authority, with imported water and develops the following regional water plans:

1. The *2015 Urban Water Management Plan* (Metropolitan, 2016a) addresses imported water supply issues and reliability, regional demand reduction efforts, water quality issues, and regional approaches toward the development of local supplies.
2. Metropolitan's *Integrated Water Resources Plan* (Metropolitan, 2016b), serves as Metropolitan's master plan for long-term water reliability for Southern California.



Water Authority's *2015 Urban Water Management Plan*

As the Region's water wholesaler 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 *2015 Urban Water Management Plan* (Water Authority, 2016) 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 *2015 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. the All-American and Coachella canal-lining projects, through which the Water Authority obtained rights to water conserved as a result of the canal linings for 110 years.
    d. coordination with a private enterprise to continue providing a reliable source of local supply from the Carlsbad Seawater Desalination Project,
    e. supporting member agency efforts to optimize production from local groundwater aquifers, including groundwater extraction projects, brackish groundwater recovery projects, and groundwater recharge/recovery projects,
    f. supporting member agency effort to assess and implement alternative supply/conservation options, and
    g. supporting member agency efforts to develop supplies through non-potable recycled water supplies or indirect potable reuse.
2. The *2013 Regional Water Facilities Optimization and Master Plan Update* (Water Authority, 2014) 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 Optimization and Master Plan.
4. A *Water Shortage Contingency Plan* (Water Authority, 2017) that sets forth Water Authority management of water supplies during periods of shortage.

The County of San Diego, in conjunction with the San Diego MS4 Copermittees, developed a regional stormwater resource plan and subsequent stormwater capture and use feasibility study:

1. The *San Diego Region Storm Water Resources Plan* (County of San Diego, 2017) summarizes water quality information and identifies regional opportunities for utilizing stormwater as a resource.
2. The *San Diego Region Stormwater Capture and Use Feasibility Study* (County of San Diego, 2018) continued exploring the feasibility of the stormwater capture opportunities identified in the SWRP, quantified the volume of stormwater that could be captured on public lots, and developed methodologies for evaluating the feasibility of other stormwater capture and use projects.

As discussed above, none of the other water management topics (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 its member 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 2015 and 2016, and each of the local agency UWMPs address the same regional themes presented in the Water Authority's *2015 Urban Water Management Plan.*

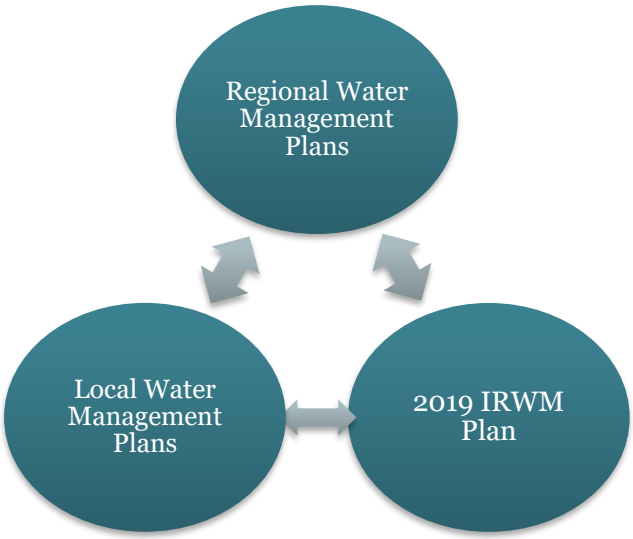
Table 7-3: Summary of San Diego Region Water Supply Plans

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 2015 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.

Groundwater Sustainability Planning

The Sustainable Groundwater Management Act of 2014 (SGMA) provides a framework for sustainable groundwater management through the formation of Groundwater Sustainability Agencies (GSAs) and development of Groundwater Sustainability Plans (GSPs) for designated high and medium priority groundwater basins or subbasins. GSP development across the state is currently underway, with completion of GSPs anticipated for January 2020 or 2022, depending on groundwater basin designation. Guidelines for GSP development indicate four major topics for inclusion within the plans:



1. *Basin Setting* – A hydrogeologic conceptual model and a description of groundwater conditions will be required in order to develop a water budget for the basin.
2. *Sustainable Management Criteria* – The plan will define sustainable management criteria by identifying sustainability goals and measurable objectives designed to prevent and/or mitigate undesirable results.
3. *Monitoring Networks* – The plans will establish monitoring networks designed to collected groundwater-specific data to evaluate defined groundwater indicators in support of achieving sustainability goals
4. *Projects and Management Actions* – Through the establishment of a basin's water budget and identification of sustainability criteria, a GSA will be able to develop plan to implement projects and management actions to achieve groundwater sustainability.

The following GSPs are underway in the San Diego Region:

- San Luis Rey Valley Groundwater Basin (Medium Priority Basin): The Pauma Valley GSA, led by Yuima MWD in partnership with the County of San Diego, Upper San Luis Rey Resource Conservation District, and Pauma Valley Community Services District, is developing the Pauma Valley GSP in coordination with Mootami MWD, Pauma MWD, and Valley Center MWD. The Pauma Valley GSP is scheduled to be completed by January 31, 2022.
- San Pasqual Valley Groundwater Basin (Medium Priority Basin): The San Pasqual GSA is led by the City of San Diego in partnership with the County of San Diego. The San Pasqual GSP is scheduled to begin development in fall 2019, with the final GSP anticipated to be complete in 2022.

The San Diego River Valley Groundwater Basin may also develop a GSP, as it was originally classified as a Medium Priority Basin and a GSA was formed in 2016. The San Diego River Valley GSA is led by Padre Dam MWD, and includes Padre Dam MWD, County of San Diego, City of San Diego, and Lakeside Water District. However, in 2019, the San Diego River Valley Groundwater Basin was re-classified as a Very-Low Priority Basin and is no longer required to develop a GSP. At the time of the 2019 IRWM Plan's release, the GSA was in the process of determining if it will move forward with the GSP process.

Projects identified in GSPs will be used as examples for the types of groundwater projects the Region may prioritize in future funding opportunities. In addition, basin setting information will help inform

other local water supply planning efforts, as well as help establish a more coordinated network of groundwater monitoring efforts.

7.3.2 IRWM Consistency with Water Management Plans

This 2019 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 2019 IRWM Plan. This collaboration and stakeholder cross-pollination ensure 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 *2015 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 2019 IRWM Plan.

In summary, the 2019 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.

Table 7-4: Consistency of 2019 IRWM Plan with Regional/Local Water Plans

Elements within Regional / Local Water Plans[1]	Consistency with 2019 IRWM Plan
Goals and objectives in water plans and updated UWMPs	Incorporated into goals and objectives of IRWM Plan
Participating stakeholders	Stakeholders reviewed the 2019 IRWM Plan, and applicable stakeholders were 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
Climate change planning	Incorporated into IRWM Plan goals and region description

7.4 Relation to Regulatory Programs

During the course of the IRWM Program, 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 for the 2013 IRWM Plan, and its recommendations implemented as described in *Chapter 11, Framework for Implementation*, as described in this 2019 IRWM Plan.

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 San Diego Water Board in regulating environmental water quality, wastewater treatment, disposal, and reuse.

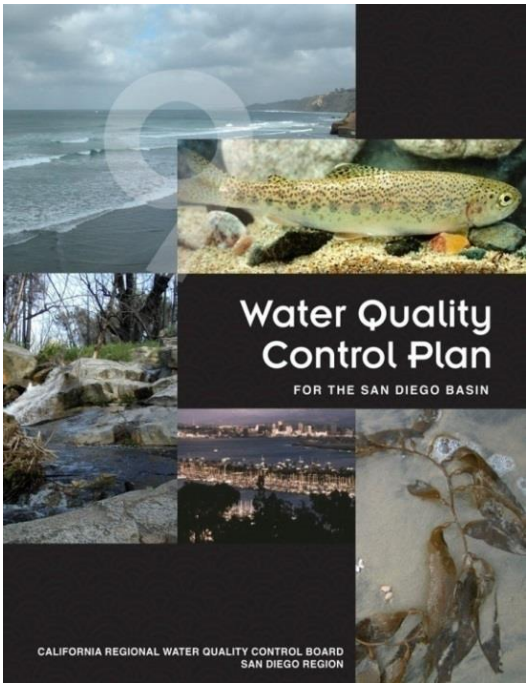
Table 7-5: Summary of Key Regulatory Agencies that Influence IRWM Planning

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 San Diego Water Board, State 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) (San Diego Water Board, 1994, with amendments effective on or before May 17, 2016), 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, 2015), 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.
- *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.



The Basin Plan designates beneficial uses and establishes water quality objectives for the Region.

- *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 San Diego Water Board implements the NPDES program under authority delegated by EPA. NPDES permits are established for five-year periods, but can be renewed.
- The San Diego Water Board regulates discharges from *Municipal Separate Storm Sewer Systems (MS4s)* under a regional permit that jointly regulates stormwater Copermittees. The MS4 NPDES permit establishes prohibitions, effluent limitations, action levels, monitoring and reporting requirements, and required runoff management programs for regulating discharges.
- *Waste Discharge Requirements* are issued by the San Diego Water 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 San Diego Water 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 2014/2016 303(d) impaired water bodies list in April 2018.

7.4.2 Opportunities for Collaboration

Focus on San Diego Water 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 San Diego Water Board purview, on the other hand, extends over a broad range of IRWM planning activities. Additionally, the San Diego Water 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/San Diego Water Board collaboration include:

- the IRWM Program and San Diego Water 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 San Diego Water Board,
- the IRWM Program and San Diego Water Board operate under open processes that encourages public participation and stakeholder input, and
- the San Diego Water 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 San Diego Water Board's regulatory mandates have expanded over the years, resources available to the San Diego Water Board and the regulated Copermittees have not kept pace

with the expansion of these regulatory responsibilities. As a result, the San Diego Water Board and the Copermittees utilize their 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 San Diego Water Board goals and responsibilities are compatible, the potential exists for resources provided through the IRWM Program to assist the San Diego Water Board and Copermittees 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 San Diego Water 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 San Diego Water 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 San Diego Water 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/San Diego Water Board Goals

In 2013, the San Diego Water Board updated its "Practical Vision", which establishes a strategic plan, priorities, and intended future direction (San Diego Water Board, 2013). During development of the Practical Vision, San Diego Water Board staff presented key priority themes of the draft Practical Vision to the Work Group. In presenting the priority themes, San Diego Water Board staff also advised that IRWM and San Diego Water Board collaboration should be directed toward the shared IRWM/San Diego Water Board goals of improving water quality and environmental conditions.

Table 7-6 compares the San Diego Water Board's mission and Practical Vision priority themes with the IRWM Plan mission and objectives. As shown in the table, the IRWM Plan and San Diego Water

Board share considerable common interests; IRWM Plan objectives address each of the priority themes addressed in the San Diego Water Board's Practical Vision.

Table 7-6: Comparison of IRWM Plan and San Diego Water Board Missions and Objectives

San Diego Water 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]** A. Encourage the development of integrated solutions to address water management issues and conflicts B. Maximize stakeholder/community involvement and stewardship of water resources C. Effectively obtain, manage, and assess water resource data and information D. Further the scientific and technical foundation of water management E. Develop and maintain a diverse mix of water resources, encouraging their efficient use and development of local water supplies F. Construct, operate, and maintain a reliable and resilient water management infrastructure system G. Enhance natural hydrologic processes to reduce the effects of hydromodification and encourage integrated flood management H. Effectively reduce sources of pollutants and environmental stressors to protect and enhance human health, safety, and the environment I. Protect, restore and maintain habitat and open space J. Advance water-based enriching experiences

1 Priority themes identified by San Diego Water Board staff as being presented in the *San Diego Water Board Practical Vision, 2013-2019*, which sets forth the San Diego Water Board's proposed strategic plan for the next five years.

2 Objectives identified within the 2019 San Diego Region IRWM Plan.

Identified Collaborative Outcomes

The Workgroup utilized the following process to identify potential IRWM and San Diego Water Board collaborative opportunities to achieve mutual IRWM/San Diego Water Board goals:

1. Identify potential issues of mutual interest to the IRWM Program and San Diego Water Board.
2. Prioritize the potential issues of interest to identify issues with strong and broad Workgroup support and identify desired outcomes for IRWM/San Diego Water 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 San Diego Water Board interest. Through this process, the Workgroup identified the following desired outcomes for IRWM/San Diego Water Board collaboration.

Desired Outcome No. 1: Support Science-Based Basin Plan Objectives

Support the San Diego Water Board's triennial review process and San Diego Water 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 San Diego Water 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 San Diego Water 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 San Diego Water Board staff resources may constrain San Diego Water Board participation in the above desired outcomes. As a result, collaboration between the IRWM Program and the San Diego Water Board may be most useful to the San Diego Water Board in areas where such collaboration:

- assists the San Diego Water 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 San Diego Water Board staff workloads,
- assists the San Diego Water 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/San Diego Water Board Collaborative Opportunities, 2013 IRWM Plan*. The Workgroup report is presented as Appendix 7-A.

The Workgroup recommended that IRWM/San Diego Water 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/San Diego Water 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 San Diego Water Board.

Table 7-7: Summary of Regulatory Work Group "Early Action" Recommendations

Desired Outcome of IRWM/San Diego Water 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 San Diego Water Board Triennial Review process to promote priority San Diego Water 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 San Diego Water Board 303(d) stakeholder review process and promote priority San Diego Water 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 San Diego Water Board	• Assign IRWM liaison to attend San Diego Water Board meetings • Provide San Diego Water Board Executive Officer with periodic IRWM update reports for inclusion in San Diego Water Board agenda packets

Based on the recommendations from the Regulatory Workgroup, increased coordination between the San Diego Water Board and the IRWM Program has been occurring, with San Diego Water Board announcements as a standing agenda item for RAC meetings and regular attendance at one another's meetings.

7.5 Relation to Salinity Planning

As part of the 2013 IRWM Plan, regional stakeholders prepared 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 San Diego Water Board. Five Salt and Nutrient Management Plans (SNMPs) have been developed. One additional SNMP was under way during development of the 2019 IRWM Plan Update – Phase 1. *Section 7.5.3* below provides information on each of the Region's SNMPs. In addition to SNMPs, statewide salinity management efforts are also subject to the State Board's Recycled Water Policy.

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 Water Quality Control 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. An amendment regarding monitoring requirements for constituents of emerging

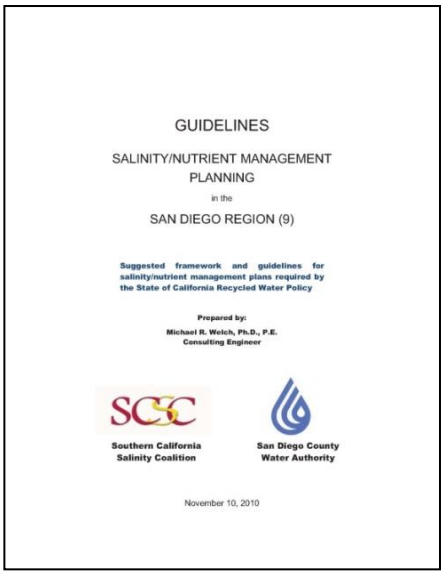
concern (CECs) was adopted in 2013, and another amendment to provide statewide consistency for recycled water project permit requirements is underway.

While California's Porter-Cologne Act charges Regional Water Quality Boards with developing and enforcing Basin Plan groundwater quality objectives, the Regional Water Quality Control 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 required 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 Water 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,


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

- 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.

The San Diego Water 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 San Diego Water Board adopted Resolution No.

R9-2009-0125 which endorsed the SNMP Guidelines (San Diego Water Board, 2010). At its March 2013 meeting, the San Diego Water 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 now that the 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	• Santee/El Monte	• Hodges/San Pasqual	
Tier B Basins			
• San Mateo • San Onofre • Las Flores	• Pala/Pauma • San Marcos • Escondido	• Santa Maria • Middle Sweetwater	
Tier C Basins			
• Valley Center • Keys Creek • Vista	• Miramar • San Vicente/Gower	• National City • Poway	
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 was funded in part through a Proposition 84 IRWM Planning Grant. The five SNMPs developed were in support of the basins that were prioritized by the Region. A sixth SNMP is currently underway and described below.

Lower Santa Margarita River Basin

The Fallbrook Public Utility District (Fallbrook PUD) prepared an appendix in support of the Lower Santa Margarita River Basin SNMP currently being developed by USMC Base Camp Pendleton (USMC, 2012). The Lower Santa Margarita River Basin is a Tier A groundwater basin, and therefore of highest priority for development of an SNMP. This document looked 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 had considered working with Camp Pendleton to implement indirect potable reuse (IPR) by discharging highly treated recycled water into Fallbrook Creek, which would then be diverted for groundwater recharge at Camp Pendleton, however, this was determined to be a less desirable option in the near-term due to costs being comparable or higher than other water management options. IPR may be reconsidered in the future as water management priorities and opportunities change. 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.

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) developed an SNMP for the Santee portion of the basin in 2013 (Padre Dam MWD, 2013). This included 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 San Diego Water Board, and several stakeholder meetings. The stakeholder meetings were advertised as public meetings on both the Padre Dam MWD and San Diego Water 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 completed a SNMP for the San Pasqual portion of the basin in 2014 (City of San Diego, 2014). The City of San Diego also developed a preliminary salt and nutrient loading analytical tool. They conducted a consumptive use analysis, built a soil moisture budget that included groundwater recharge and irrigation pumping analysis, and developed a summary of the basin salt and nutrient budget data. All of this work was rolled up into a summary of preliminary results, which was used for development of the 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

The final SNMP included basin characterization, the identification of salinity/nutrient sources, and identified the need for additional supplemental monitoring of well, surface water, and agricultural run-off.

Escondido Valley Basin

The Escondido Valley Basin is a Tier B groundwater basin and is managed primarily by Rincon del Diablo Municipal Water District (Rincon MWD). Rincon MWD finalized the SNMP in October 2013 (Rincon MWD, 2013). This SNMP included identification of the salt and nutrient sources in the basin, along with basin capacity and loading estimates. It also considered the recycled water use and recharge goals and objectives for the Escondido subarea, and determined what reductions in loading rates are necessary. It proposed feasible mitigation measures, scheduled tasks to identify measures that can be used to reduce or improve the Escondido subarea, and developed a monitoring plan.

San Vicente/Gower Basin

The San Vicente/Gower basin is a Tier C groundwater basin. The Ramona Municipal Water District (Ramona MWD) entered into an agreement with the Water Authority to develop an SNMP for the Gower portion of the basin. The plan was completed in October 2013 (Ramona MWD, 2013). As part of the SNMP, Ramona MWD identified the salt and nutrient sources in the basin, as well as the basin capacity and loading estimates. It considered recycled water use and recharge goals and objectives, and determined necessary reductions to loading rates. Finally, it recommended mitigation measures, scheduled completion tasks to identify measures to reduce or improve the Gower basin, and developed a monitoring plan.

For the Gower SNMP, Ramona MWD compiled and analyzed water quality and other relevant data in GIS, developed a project workplan, and hosted several stakeholder meetings.

Poway Valley Basin

The Poway Valley basin is a Tier C groundwater basin. The City of Poway and the City of San Diego are currently working together to develop a SNMP for the Poway Valley basin. The SNMP will include identification of salt and nutrient sources, basin characterization, 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.

SNMP development will include two workshops for the purpose of presenting information, gathering input from stakeholders, and providing a forum for discussion of salt and nutrient issues.

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 stormwater 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 flood management, which provided an opportunity during development of 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. Floodplain Management Association is an active member of the RAC and provides a flood management perspective and input for the IRWM Program.

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, 2013). 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:

- interconnecting 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 IFM 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.

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

Flash flooding is a flood risk common to all watersheds in the San Diego Region.

Photo credit: Bruce Phillips, PACE

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

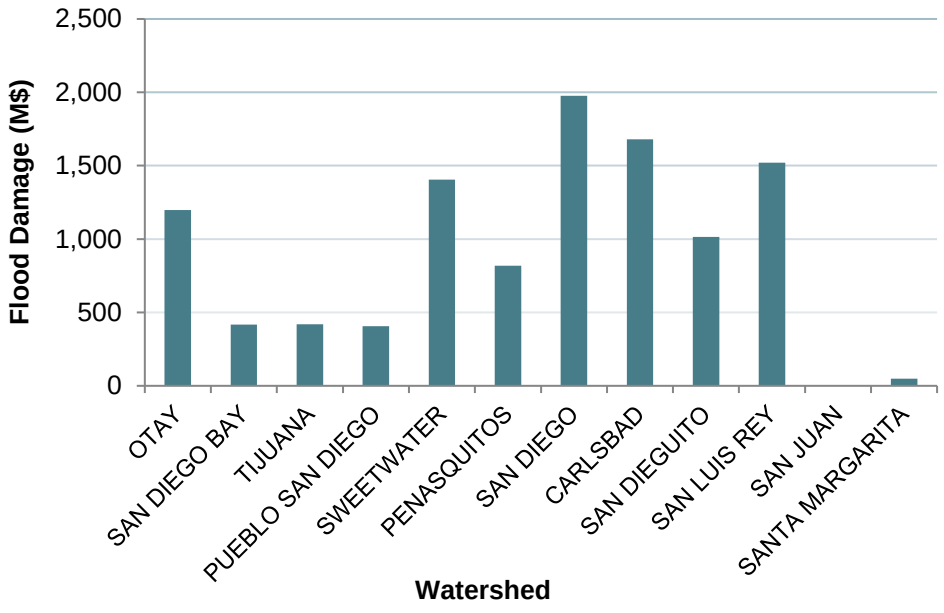
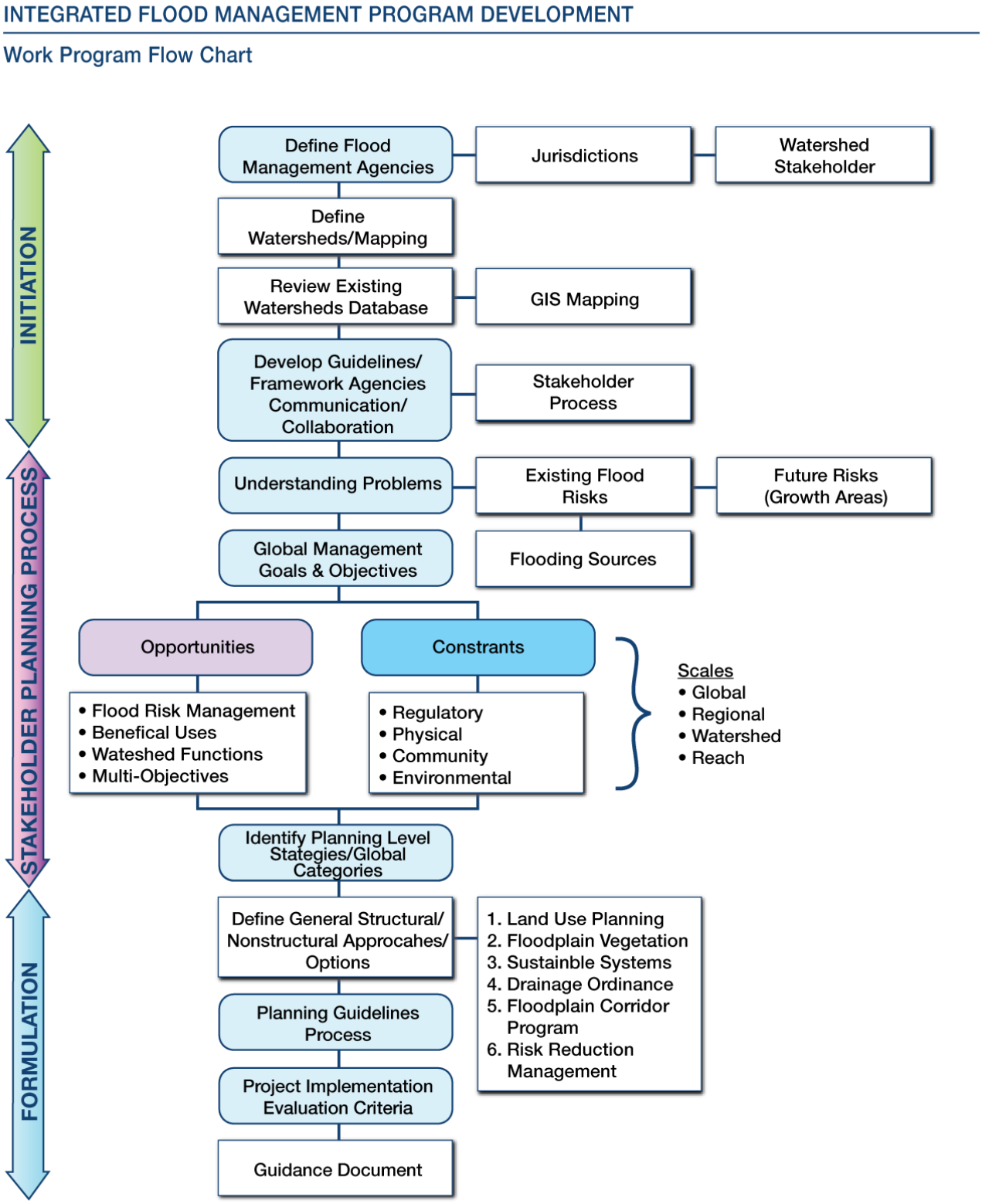


Figure 7-2: Overview of General Work Plan for Integrated Flood Management Study



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 land use and additional manmade encroachments within the floodplain	• Limitations of development and land use 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 IFM 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 IFM Workgroup recommends creation of a Watershed/Floodplain Managers Forum to promote collaboration and coordination to implement IFM strategies.

The IFM 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 Stormwater Resource Planning

Storm Water Resource Plan

The County of San Diego, along with its MS4 Copermittees, developed a Storm Water Resource Plan (SWRP) for the San Diego Region that identified the stormwater quality objectives and priorities for each watershed, and the potential for utilization of stormwater as resource. The SWRP was based on the Water Quality Improvement Plans (WQIPs) required under the MS4 permit for the nine watershed management areas in San Diego County, only the San Juan WMA was excluded, and thereby covered ten of the eleven watersheds in the Region – again the San Juan watershed was excluded. The SWRP utilized the IRWM program as a forum for Stormwater entities to collaborate on a regional plan. Outcomes of the SWRP process were presented to stakeholders at RAC meetings, with input solicited on the processes used to develop the SWRP at multiple RAC meetings in 2016 and 2017. The RAC recommended the SWRP be incorporated into the 2013 IRWM Plan via a formal letter notification from the RWMG in April 2017. The 2017 SWRP is available on the San Diego IRWM Program website (http://sdirwmp.org). The 2017 SWRP was intended to provide tools and guidance to support development of multi-benefit stormwater and dry weather runoff projects to achieve watershed and regional planning goals. It was also designed to help project proponents identify potential competitiveness of their projects as well as identify opportunities to adjust their projects to provide additional benefits and strengthen project competitiveness.

The WQIPs that formed the basis of the SWRP were developed in a six-step process:

1. Determination of water quality priorities based on science demonstrating the effects of discharges from the MS4 to water quality.
2. Identification of the source of pollution for highest priority water quality conditions.
3. Develop goals, strategies, and timelines to address highest priority water quality conditions.
4. On-going monitoring and assessment to evaluate progress towards implementing WQIP strategies and meeting WQIP goals.
5. Update the WQIP as needed through an adaptive management process to improve effectiveness of response to priority water quality conditions.
6. Report on the findings of the assessments in Step 5 and any potential changes to the WQIP.

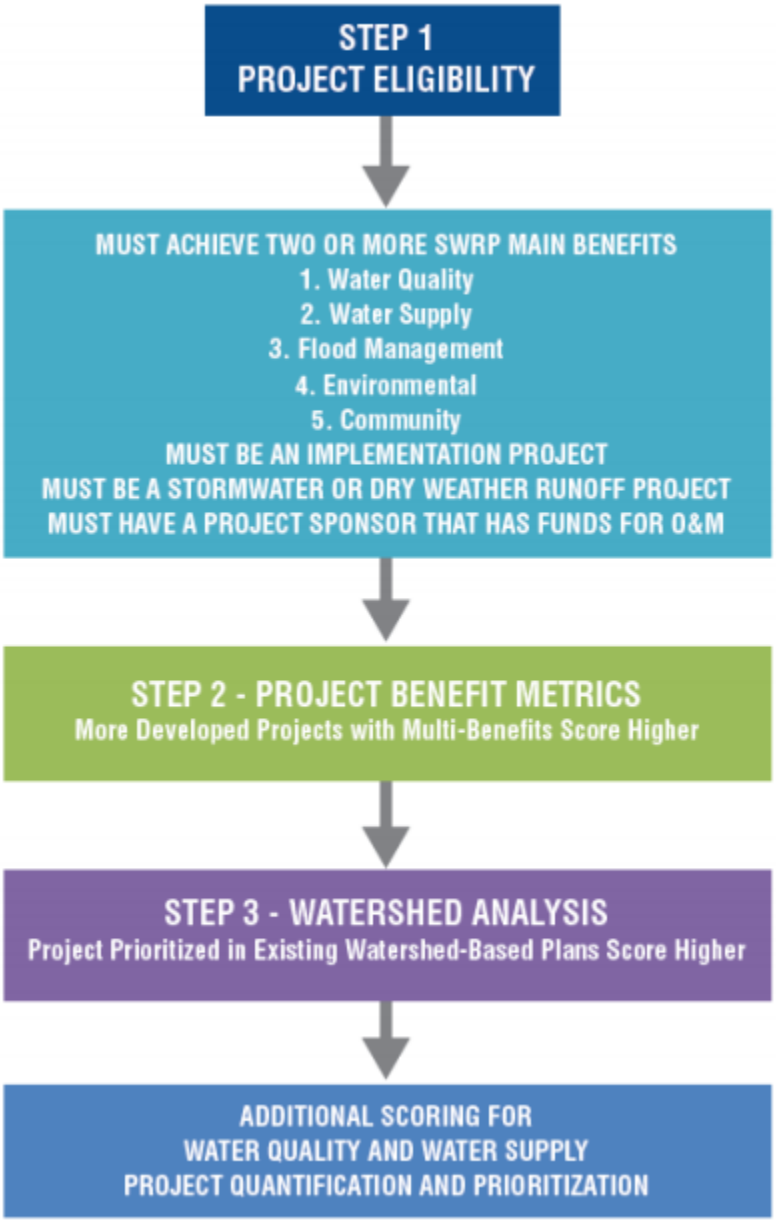
Highest priority water quality conditions identified in the WQIPs and summaries in the SWRP have been incorporated into *Chapter 3, Region Description*.

Per SB 985, all stormwater projects are required to be included in a SWRP, and that the SWRP be incorporated into the regional IRWM Plan. The SWRP includes a process for project scoring, which is intended to help project proponents understand how well their projects meet the priorities for the region. The San Diego IRWM Plan's online project database, OPTI, was updated to incorporate the project prioritization and ranking process from the SWRP. Project proponents are able to add stormwater projects into the SWRP, quantify their projected project benefits, and see how their project compares to others that have been submitted. This provides an opportunity for project proponents to identify areas where their projects could be improved to better meet the priorities of the region or stormwater funding. Integrated, multi-benefit stormwater projects generally score better and as a result, the SWRP encourages projects that also align well with IRWM priorities. The SWRP's project evaluation process is shown in Figure 7-3.

To support project sponsors with submitting projects to the SWRP, guidance was developed to help project sponsors quantify common benefits. This quantification of benefits is an important component in ranking projects in the SWRP. Stormwater project benefits have traditionally been challenging to quantify, especially during the early stages of project development. The SWRP includes appendices and online tools that provide information to help projects develop quantified benefits. The project database is a shared tool among IRWM and SWRP projects – project applying to both projects are submitted to the same database – and includes a link to a spreadsheet that may be used by project sponsors to estimate certain benefits using general information about each watershed and simple, user-friendly fields.

The SWRP is being implemented in coordination with the San Diego IRWM Program, as it utilizes both the IRWM project database system and the IRWM stakeholder list for outreach and notices. The overlap between SWRP and IRWM stakeholders makes this an efficient approach, as well as supportive of an integrated water management. Similar to the IRWM project list, the SWRP project list is a living document, and projects are expected to be added periodically as projects are developed and seek funding through a variety of programs. As stormwater funding opportunities arise, and as appropriate, the online project database and guidance documents are anticipated to be updated to reflect the current conditions and priorities of the funding opportunity.

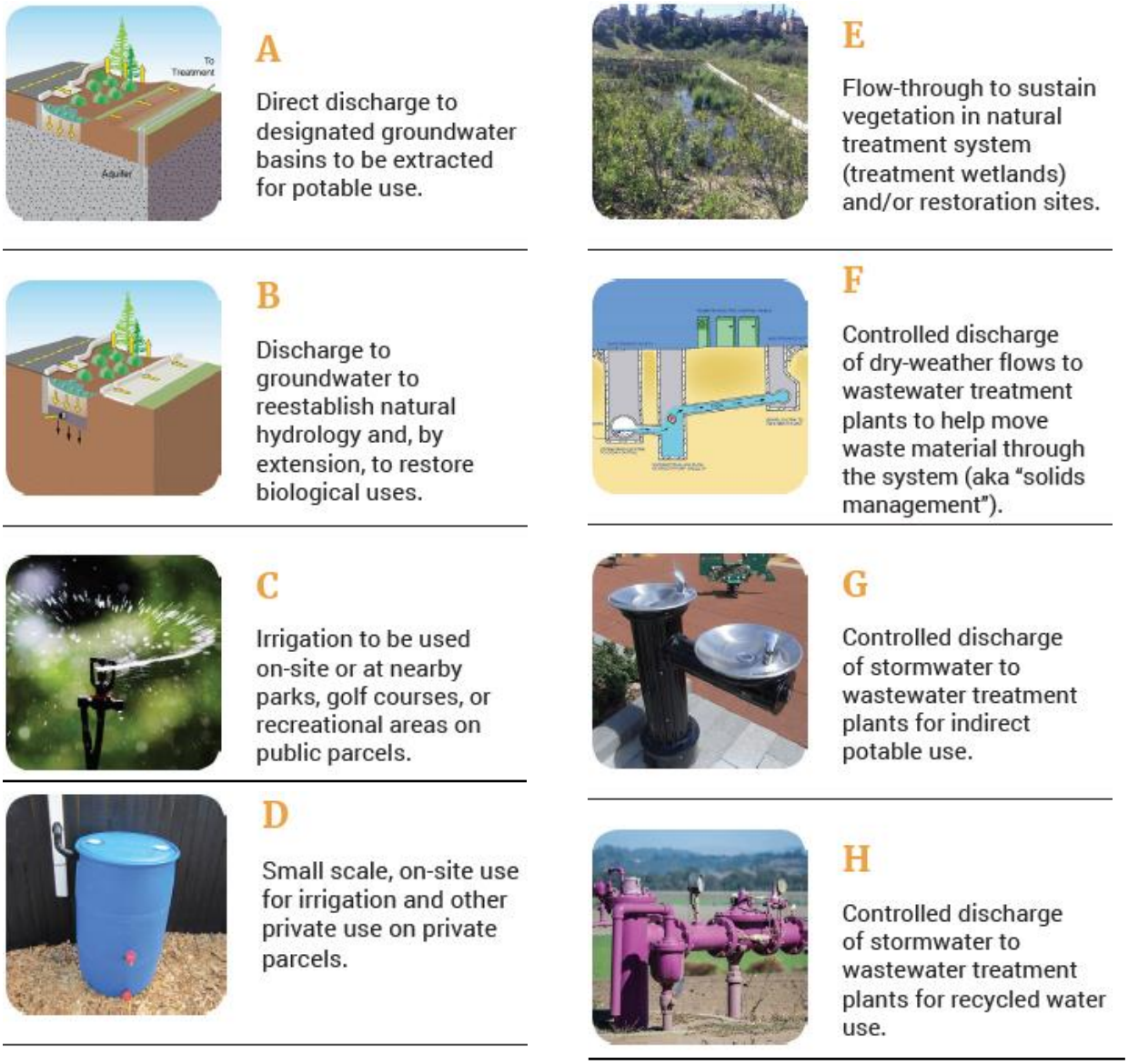
Figure 7-3: SWRP Project Evaluation Process



Stormwater Capture and Use Feasibility Study

Funded through the Proposition 1 Planning Grant, the County developed the SWCFS, which is available on the Project Clean Water website (http://www.projectcleanwater.org/stormwater-capture-and-use-feasibility-study/). The study evaluated the storage potential for public parcels to be used for stormwater capture and use, at a higher level of refinement from that evaluated in the SWRP. The SWCFS quantifies the total volume of stormwater that could reasonably be captured and stored on identified public parcels, and identifies eight stormwater use alternatives, including discharge to groundwater for either potable use or restoration, small and large-scale irrigation, flow through systems for water quality or restoration (treatment wetlands), and diversion to sanitary sewer for solids management, recycled water or indirect potable use. Figure 7-4 shows the eight stormwater use alternatives included in the SWCFS.

Figure 7-4: Stormwater Use Alternatives in the SWCFS



The use alternatives were prioritized for the region based on four criteria: potential volume of stormwater capture on a parcel, cost per acre-foot of water captured for use, additional benefits that may be achieved, and constraints and opportunities to stormwater capture and use (Table 7-14). The rankings of stormwater use alternatives in each of these four criteria were provided to help potential project sponsors choose stormwater use alternatives that may be most appropriate for a particular project, or to identify project changes to help improve their project's stormwater-related benefits.

Table 7-14: Prioritization Criteria and Metrics

Criteria	Metrics	Basis of Assessment
Potential Volume	AFY of stormwater used	• Volume range developed from modeled parcels • Number of parcels identified
Cost	Cost in $/AF	• Total cost including O&M over the project life divided by total stormwater volume used over project life • Cost of providing potable water from desalination as a cost benchmark for comparison • Costs for groundwater extraction, treatment, and distribution not included, consistent with alternatives discharging to a sanitary sewer, which assumes the infrastructure exists
Additional Benefits	Number of additional benefits	• A numerical value is assigned for each of the SWRP benefit categories that can be achieved: Water Quality, Environment, Flood Management, and Community
Constraints and Opportunities	Qualitative assessment of the constraints and opportunities developed by TAC	• Informed by the Constraints and Opportunities identified for each example project • Constraints and Opportunities identified for each alternative

In addition to ranking stormwater use alternatives against the four criteria, the results of the study also provide a timeline for feasibility of implementation for the stormwater alternatives. Alternatives that are generally more feasible for implementation in the near-term are to the left of the timeline, whereas alternatives that have a longer-term feasibility are on the right of the timeline. The order the alternatives appear on the timeline are not for the implementation of specific alternatives but intended to be used as a planning tool to identify and develop stormwater capture and use projects. This tool can also be used to consider adding one or more alternatives to planned projects to attract funding and other benefits.

Figure 7-5 shows the feasibility timeline for the stormwater alternatives and can be used as a management tool to weigh various options. For program level planning, near-term identified alternatives' may have available program resources directed toward their development and implementation. For example, near-term alternatives could be used in implementing a watershed-wide stormwater quality program, in accordance with a WQIP. Whereas, alternatives that need a longer-term period to address constraints may lead managers to focus available program resources on addressing those constraints, such as additional infrastructure, permitting, policy or funding requirements. On a project level, the prioritization process may be used during project development to evaluate a project's constraints and opportunities, and help identify where additional assessment is needed. This process can be used to identify the more feasible alternatives for stormwater capture and use, or a possible hybrid approach using multiple alternatives, and can aid in the assessment of projects to improve overall competitiveness for grant funding.

Figure 7-5: Feasibility Timeline Stormwater Use Alternatives

Alternative A - Injection to Designated Groundwater Basin for Water Supply

- Technology (dry wells for groundwater injection) increases feasible sites and total feasible volumes
- Groundwater injection requires treatment that increases cost
- Inter-agency agreements needed to increase storage and use

Alternative B - Infiltration to Groundwater to Restore Natural Hydrology (Low-Impact Development)

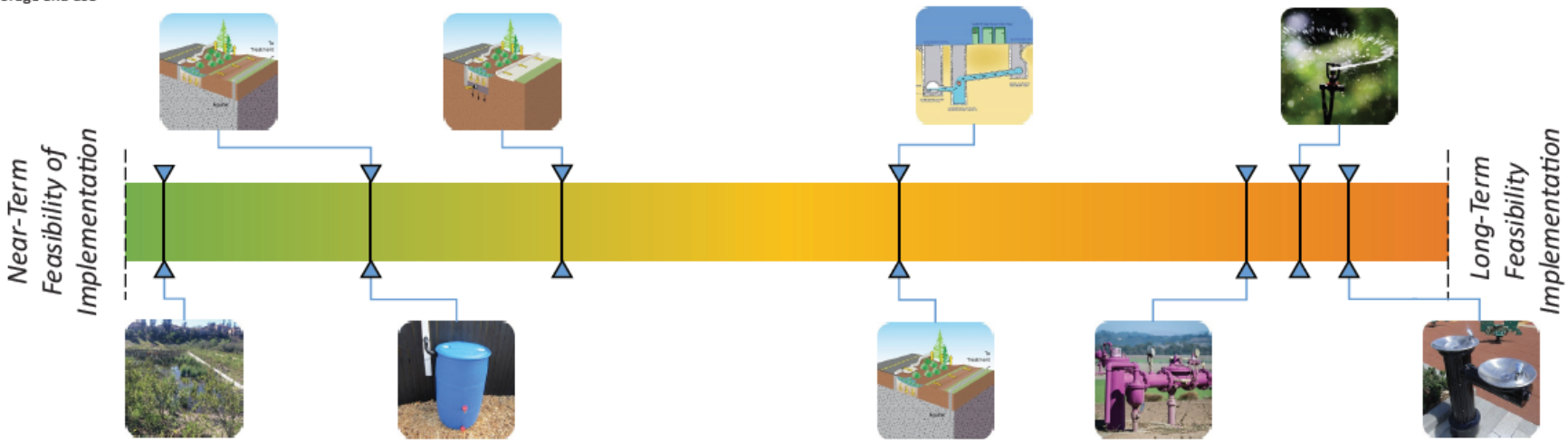
- Number of feasible sites is high
- Addition of dry-weather flows can increase volume and reduce unit costs
- Water quality benefit and potential cost "off-set" for compliance
- Multi-benefit that may attract grant funding
- Local soils limit infiltration and total volumes

Alternative F - Dry-Weather Flow Diversion to WWTP

- Addition of flows can improve solids management
- Flows occur when sewer lines have likely capacity
- Water quality benefit that may provide cost off-set for compliance
- Need for program level inter-agency agreements

Alternative C - Site or Nearby Irrigation Use

- Stormwater generated when demand is low requiring storage
- Greater and costlier storage needed to capture and use multiple storm events
- Pre-treatment required that can increase costs, but treatment costs can be lowered for drip irrigation
- Economies of scale are less viable for these individual site systems



Alternative E - Natural Treatment Systems

- Uses dry-weather flows that increase total annual volumes and lowers unit costs
- Multi-benefit
- Creation of habitat may impact long-term maintenance
- Vector issues need to be addressed

Alternative D - Private On-Site Use

- Rain barrels and downspout disconnects to landscaping are most cost effective alternative
- Larger scale storage and use on private lands provides a much larger potential volume
- Use of Alternative Compliance program provides opportunity for public/private partnerships and funding
- Total regional volume is low due to low storage capacity

Alternative A - Infiltration to Designated Groundwater Basin for Water Supply

- Low cost alternative where surface infiltration is high and site located above groundwater basin
- Regional geologic constraints limit sites and potential volumes

Alternative H - Controlled Discharge to WWTP for Recycled Water Use (H)

- Stormwater flows occur when sewer lines have lower capacity due to infiltration
- Higher unit costs due to greater storage need
- Treatment plant compatibility requires controlled discharge
- Stormwater flows occur when recycled water demand is lower

Alternative G - Controlled Discharge to WWTP for Indirect Potable Use (G)

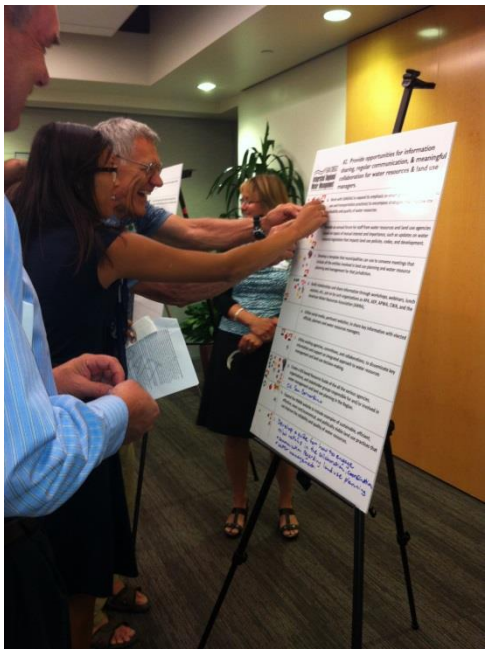
- Stormwater flows occur when sewer lines have lower capacity due to infiltration
- Higher unit costs due to greater storage need
- Treatment plant compatibility requires controlled discharge
- Advanced treatment at existing facilities under development

The SWRP assessed the feasibility of potential capture and storage sites on 12,731 public parcels in the region and found these parcels may provide almost 5% of the total potable water used in the San Diego region. The SWCFS continued the analysis begun in the SWRP, using finer granularity and refined criteria. Of the criteria considered, storage was the key factor in determining feasibility of a parcel. Through this process, the SWCFS determined approximately 1,200 public parcels could be feasible for capture, storage and use. However, the methodology described in the SWCFS may also be used to evaluate potential for stormwater capture and use on private parcels as well, an area of particular interest for the Region's industrial stakeholders. The methodology and steps for project implementation are provided in Figure 7-6 to assist project leaders in adding stormwater capture and use alternatives to planned projects, both private and public.

Figure 7-6: Steps for Project Implementation

7.8 Relation to Land Use Planning

The Land Use and Water Management Study (Land Use Study) was developed by the Land Use Planning Workgroup and 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 were 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 Planners and Water Managers at the workshop identified opportunities for collaboration.

Photo Credit: Rosalyn Prickett, Woodard & Curran

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.

7.8.1 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.

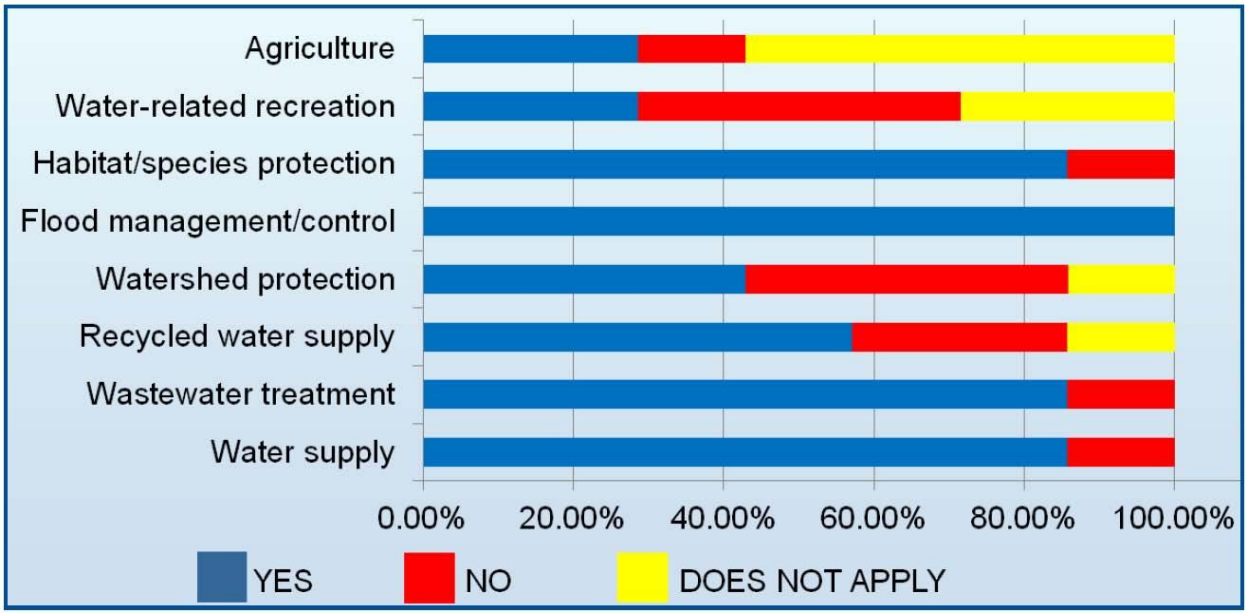
The gap analysis found seven major issues that contribute to the challenges of coordinated water resources management and land use planning:

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 the age of the General Plan
7. Responsibility for water management tasks within departments varies from agency to agency

7.8.2 Existing 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 7-7, land use planners cooperate with water managers to varying degrees.

Figure 7-7: Percentage of Planning/Community Development Departments with Working Relationships with Water Resource Agencies/Staff



7.8.3 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 for 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 7-15.

Table 7-15: 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.

7.9 Relation to Climate Change Planning

The 2013 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.

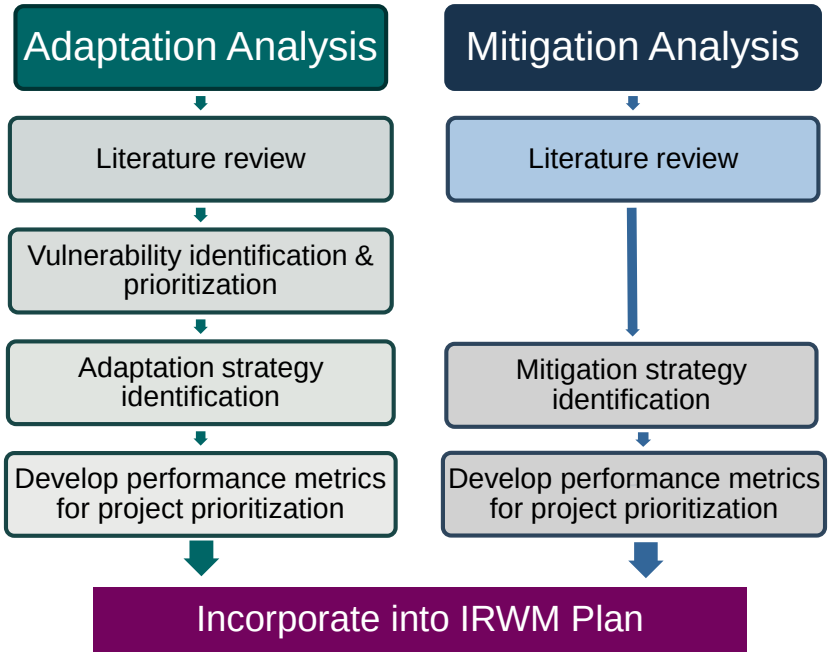
Three major climate change impacts were considered to be closely related to water resource management in the San Diego IRWM Region:

1. Temperature increases
2. Precipitation pattern changes
3. Sea level rise

Climate Change Analysis Process in 2013 Climate Change Study

The Climate Change Workgroup used the following review process, shown in Figure 7-8, to meet DWR's 2012 IRWM Plan Guidelines' Climate Change Standard.

Figure 7-8: Climate Change Analysis Process



7.9.1 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 7-16, 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. See *Chapter 3 Regional Description, Section 3.14* for an updated discussion of anticipated climate change impacts identified for the San Diego Region.

Table 7-16: 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
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 7-17, 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.

Table 7-17: 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 Water Supply: Lack of groundwater and surface water storage* to buffer drought Ecosystem/habitat: Decrease in environmental flows (e.g., stream flows)
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 due to water quality impacts to reservoirs Sea Level Rise: Damage to coastal recreation / tourism due to inundation Water Quality: Increased eutrophication
Low	Water Demand: Limited ability to conserve further Flooding: Increases in inland flooding Ecosystem/Habitat: Increased impacts to coastal species Sea Level Rise: Damage to ecosystem/habitat
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 Hydropower: Decrease in hydropower potential

*The Region's current storage capacity is sufficient; however, it lacks the ability to connect and convey water stored in some regional reservoirs.

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, using the following tiers:

- **Tier 1:** Considered "no regret" strategies, mitigates GHGs or is GHG neutral, or addresses the imported water (very high) vulnerability
- **Tier 2:** Strategies that are included in other local climate change documents, mitigate GHGs or are GHG neutral, or addresses at least three vulnerability areas
- **Tier 3:** Address at least one vulnerability area or mitigates GHGs

The final list of prioritized strategies, along with clarifying descriptions, is provided in Chapter 5 of Appendix 7-D. A list of strategies, by Tier, is presented in Table 7-18.

Table 7-18: Climate Change Management Strategies

Tier 1		
• Urban water use efficiency • Crop idling for water transfers • Education • Gray water use • Rainfed agriculture • Conveyance – Regional/local • System reoperation • Conjunctive management & groundwater storage • Recycled municipal water • Drinking water treatment and distribution	• Groundwater/aquifer remediation • Pollution prevention • Salt and salinity management • Urban runoff management • Flood risk management • Agricultural lands stewardship • Economic incentives • Ecosystem restoration • Land use planning and management • Recharge area protection	• Water-dependent recreation protection • Watershed/soils/forest management • Water-dependent cultural resources and practices preservation • Increase urban forest management • Building water facilities in coordination with land use/sea level rise planning
Tier 2		
• Conduct emissions inventory and target • Increase use of renewable energy courses • Surface storage – Regional/local	• Protective infrastructure • Sediment management • Protect water facilities through the relocation or removal of vulnerable structures	• Protect resources and facilities by constructing seawalls or levees • Protect/restore/create coastal wetlands
Tier 3		
• Water meters installation • Treatment and distribution efficiency • Water transfers	• Localized treatment • Shift water use to off-peak hours • Optimize sewer systems	• Desalination • Indirect potable reuse/Potable reuse

7.9.2 Current Climate Change Study Efforts

Multiple climate change studies have been underway since the completion of the 2013 IRWM Plan. The California Natural Resources Agency (Resources Agency) recently released the *Safeguarding California Plan: 2018 Update* (Resources Agency, 2018). This plan follows the 2014 and 2016 versions, titled *Safeguarding California Plan: Reducing Climate Risk* and *Safeguarding California Plan: Implementation Action Plans*, respectively, which themselves expanded on the 2009 *California Climate Adaptation Strategy*. These earlier plans provided policy guidance for decision makers at the state level, highlighted climate risks, made sector-specific recommendations, and presented implementation plans that could be used to execute the identified actions. The 2018 plan is a roadmap the State will use to respond to climate change. It lays out clear mechanisms for completing over 1,000 ongoing actions and recommendations to achieve the State's goals of addressing the impacts of climate change. Thirty-eight state agencies provided input on the plan, resulting in 76 policy recommendations across 11 policy sectors. Policy sectors include energy, public health, water,

and agriculture. It may be used by stakeholders to evaluate which state agency efforts align with their local or regional climate interests and provides a foundation for coordinating climate adaptation strategies across the state. The plan also serves as a tool for the public to evaluate the State's progress in reaching its climate change goals. It did not update regional climate vulnerability assessments, such as the one completed by the San Diego IRWM Program in 2012 and 2013.

In October 2018, the Resources Agency released its *Fourth Climate Change Assessment* (Assessment). The Assessment consolidated data and findings from 32 State-funded research projects into a single report that highlighted vulnerabilities and solutions to climate change impact across the 11 policy sectors outlined in the *Safeguarding California Plan.* The Assessment builds on the success of the three prior assessments to help understand California-specific policy questions and information needs. The State assessed resources, provided data, and conducted research for climate conditions specifically for individual communities. California still lacks critical information about expected climate impacts, such as extreme weather, and understanding climate risks and management options can help the State prioritize actions and investments to help safeguard California.

The San Diego Region was the subject of one of the studies incorporated into the Assessment, and preliminary findings of climate change impacts related to water resource management was presented to the RAC in June 2018 and April 2019. Anticipated climate change impacts to the San Diego Region's water supplies include wetter winters and drier spring and fall seasons, reduced snowpack, changes to timing of water availability, and increased threat of wildfires, among other impacts. A shift in plant communities is anticipated as droughts are expected to become more frequent and more intense, coupled with potential changes to the fire regime. A summary of the results of this report have been incorporated in *Chapter 3 Regional Description, Section 3.14.*

The American Planning Association (APA) Regional and Intergovernmental Planning Division is in the process of completing a research report, *Regional Water Planning for Climate Resilience,* that explores the connections between regional water planning and climate resilience. The report includes case studies of six distinct regions across the United States, one of which is San Diego County. The study recommended the findings of the *Fourth Climate Change Assessment: San Diego Region Report* be incorporated in the region's planning processes and communicated to a broad audience. This report is anticipated to be finalized in May 2019.

The Region's climate change vulnerabilities developed during the 2013 Climate Change Study have been re-evaluated in light of new climate science understanding, and are presented in Table 7-17. To help project proponents better identify which climate change vulnerabilities their projects address, a crosswalk of the Resource Management Strategies (RMS) (see *Chapter 8, Resource Management Strategies*) and the climate change vulnerabilities are provided in *Chapter 9, Project Evaluation and Prioritization*.

7.9.3 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, the five steps in an adaptive management plan are:

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 IRWM Plan (see *Chapter 2, Vision and Objectives* and Table 9-2, *Chapter 9, Project Evaluation and Prioritization*).

The APA report recommends next steps for climate resilience planning including outreach and community engagement, incorporating findings in local plans, and longer-term actions including "regional greenprint" planning to conduct a "situation analysis" of systems in light of environmental, social, and economical issues relevant to the region (APA, 2019). Additional information on this recommendation will be available in that document once released. Under new requirements for SB 379, the County of San Diego and its 18 cities must review and update the Safety Elements of their General Plans to properly address the effects of climate change on natural hazards, including but not limited to flooding, wildfires, and mudslides. The IRWM Program encourages collaboration between local government planners, engineers, and emergency management planners in the updating process.

7.10 Disadvantaged Community Involvement

The Water Quality, Supply, and Infrastructure Improvement Act of 2014, known as Proposition 1 and administered by DWR, established the Disadvantaged Community Involvement (DACI) Program to support Disadvantaged Communities (DACs), communities in Economically Distressed Areas (EDAs), Underrepresented Communities (URCs), and communities facing Environmental Justice concerns (EJ communities). See *Chapter 3, Regional Description* for more information on how each community is defined.

In 2018, approximately $5.5 million was awarded to the San Diego Funding Area for identifying DACs and their needs, increasing DAC involvement in the three IRWM Regions in the Funding Area, and supporting DACs in preparing for upcoming funding opportunities. Funding was included for development of a joint Water Needs Assessment for the Funding Area, led by the Tri-County FACC and developed by consulting team, Woodard & Curran and two community non-governmental organizations (NGO), the Climate Science Alliance (CSA) and the Rural Community Assistance Corporation (RCAC). The goals of the Water Needs Assessment are to:

1) Identify DACs, EDAs, URCs, and communities facing EJ concerns;
2) Identify and characterize water-related issues and needs of identified communities; and
3) Increase DAC participation in the IRWM planning process.

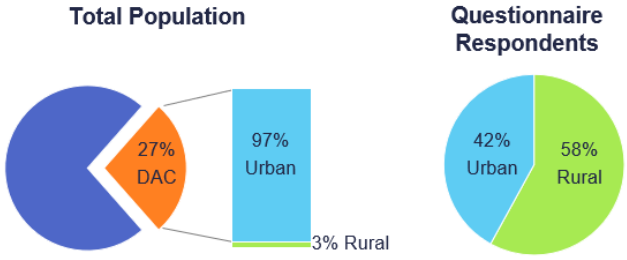
The Water Needs Assessment was designed to help distill the water management needs of DACs in each IRWM Region to provide a better understanding of the needs of the communities to help direct resources and funding where they are needed.

Water Needs Assessment Outreach

Mark Stadler, San Diego County Water Authority, and Jennifer Hazard, RCAC, led the NAWMA meeting presentation and discussion.

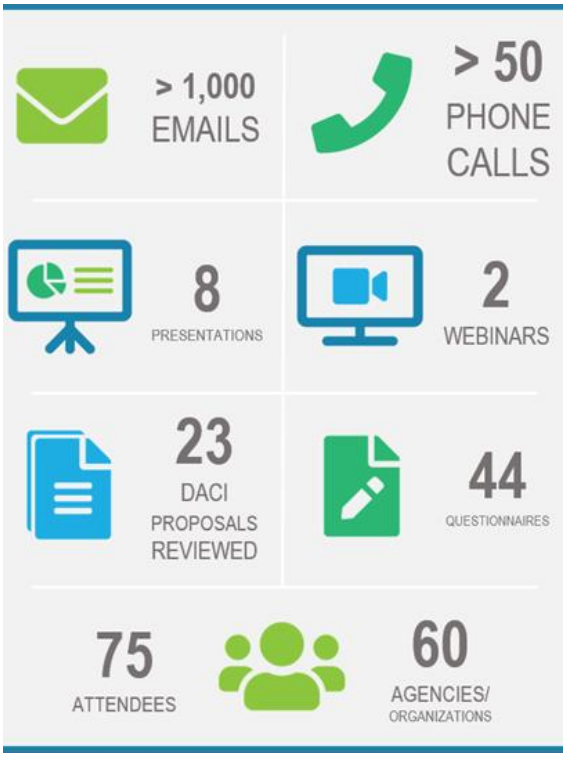
Photo credit: Nicole Poletto, Woodard & Curran

Outreach was conducted between May and November 2018. A short questionnaire was distributed to approximately 400 individuals and 196 organizations via email. The Tri-County FACC hosted informational community meetings in person or via webinar to survey water resource needs across such categories as drinking water accessibility and affordability, wastewater system issues, stormwater and flood management, compliance issues, and water system financing. The community meetings were also used to initiate conversations about how the IRWM Program may better engage with the targeted communities. Each IRWM Region in the San Diego Funding Area held a workshop in April 2019 to provide an opportunity for stakeholders to provide feedback on identified DAC needs. It also provided DACs an additional opportunity to participate and provide feedback if an organization had not already done so. Figure 7-9 illustrates a complete breakdown of outreach activities in the San Diego Funding Area.



Across the SDFA, 83 organizations engaged in the Water Needs Assessment, over 40% of organizations included on the stakeholder list. There are approximately 3.25 million people living in the San Diego IRWM Region, 27% of which reside in a DAC (as seen in the figure to the right). Of these identified DAC communities, 97% of DAC populations are considered urban because they are located within the service area of a water or wastewater agency. It is important to note that all households may not be served by these agencies, and may also have rural characteristics, but are still considered urban in the WNA. In the San Diego IRWM Region, 38 stakeholders attended community meetings and 24 organizations responded to the Water Needs Assessment. These stakeholders represented community-based organizations, cities or counties, water districts, systems, utilities, or companies, and tribes. Of these respondents, 58% of questionnaire respondents were considered rural, while 42% were considered urban.

Figure 7-9: SDFA DAC Outreach in 2018



Identified Water Needs and Challenges

Stakeholders in the San Diego IRWM region generally expressed concerns about water quality and water supply, including issues related to wastewater system failures and the need for infrastructure to ensure water supply in the face of extreme events, such as earthquakes or drought. Stakeholders also affirmed the need identified in the 2019 San Diego IRWM Plan for additional funding for capital infrastructure and O&M. A review of the 22 DACI Program grant proposals from the 2016 DACI Call for Projects and a literature review of available planning documents also pointed toward these communities' overall challenges with water quality and water supply.

Key water challenges identified by stakeholders who engaged in the Water Needs Assessment is presented in Table 7-19. More detail on these challenges as well as other water challenges identified in the SDFA is provided in *Section 6* of Appendix 7-E. Feedback in the San Diego IRWM Region was divided into urban and rural needs. Because urban communities are located within water and wastewater agency service areas, their water resource needs are generally centered on community development and surface water quality issues. While some communities may have rural characteristics, if they are served by a water or wastewater agency, their needs generally align more with urban DACs, and are therefore considered urban DACs under the San Diego IRWM Program. Rural DACs are located outside the jurisdictional boundaries of the region's water and wastewater agencies and may have difficulty meeting drinking water needs with a safe and reliable source due to infrastructure, source water quality, and other issues.

Table 7-19: Summary of Key Water Challenges Identified by Stakeholders in the San Diego IRWM Region

Identified Water Challenge	San Diego IRWM Region	
	Urban	Rural
Water Quality	• Small percent of cross-border water quality contamination causes public health and ecosystem problems • Desired upstream control of stormwater runoff to protect water quality.	• Aging infrastructure affects quality of water supply • Issues with nitrate and uranium in specific areas, in some cases leading to a reliance on bottled water for supply • Infrastructure failure or distrust in infrastructure leads to a reliance on bottled water for emergency drinking supply
Water Supply	• Cost is unaffordable in some cases • Some lack of confidence about the quality of imported supply	• Expectation that drought and other climate change factors will affect localized supply • Concern that larger urban areas will tap into supply • Old reservoir tanks for drinking water causing contamination issues • Pollutants from runoff affect supply in some cases • "Silver tide" of retiring operators and lack of knowledge where system pipelines are located.
Flooding	• Some issues with flooding, especially in canyons • Major flooding in streets caused by water main breaks	• Lack of infrastructure leads to flash flooding
Wastewater	• Water conservation measures cause declining flows in the wastewater system. Less flows results in higher concentration of waste in the wastewater system and subsequent O&M issues • Infrastructure failure due to drought, and flooding; lack of funding for improvements	• Challenges to increasing economic development and land use and a lack of adequate septic infrastructure • Tribal need for wastewater management infrastructure

In the San Diego IRWM region's urban communities, concern was expressed about the public health and ecosystem implications of stormwater runoff in specific locations – notably, issues related to transboundary flows in the Tijuana River Watershed and coastal waters near the U.S.-Mexico border,

and downstream of homeless encampments. A few stakeholders expressed an interest in green infrastructure and community outreach that emphasizes holistic stormwater solutions to provide multiple capture and filtration benefits for communities. Although flooding was mentioned several times as a major concern, it was generally not elaborated upon, with the exception of a few comments about its impact on public safety and infrastructure in urban areas, mostly near the international border. In some specific urban areas, there was concern about the affordability of water, as well as concern that water conservation measures were contributing to higher pollutant concentrations in wastewater treatment infrastructure, which is causing a need for additional funding to address associated water quality and pollution issues.

The largest stakeholder concern in the San Diego IRWM region's rural communities was continued access to safe drinking water, which most respondents cited as coming from local sources of groundwater. Stakeholders indicated that groundwater quality is being impacted by specific contaminants such as uranium, nitrates and sulfur. Stakeholders also expressed apprehension about the availability of supply given threats from climate change, population growth, and potential demand from urban areas. Some rural communities stated that actual infrastructure failure or distrust in infrastructure has resulted in a reliance on bottled water as an emergency drinking supply. Infrastructure-related needs included the need for consolidated water systems to support growing communities, the need to maintain and repair wells, and the need to maintain and repair septic systems.

Other rural issues identified in the Results Workshops in April 2019 include the "silver tide" of retiring operators for drinking water and wastewater systems. When operators retire, they often take their knowledge of water systems with them. Many rural communities don't know exactly where their pipelines are and do not have access to As-Builts or GIS for their systems. This is also an issue experienced in older urban communities. Another issue experienced in rural communities and older urban communities includes deteriorating water and wastewater infrastructure. Some stakeholders also noted the rising cost of water and the need to keep water affordable in DACs, as well as the need for small noncompliant water systems to receive technical, managerial, and financial assistance. With the need for all local water supplies to meet maximum contaminant levels, the cost of water is projected to rise, no matter the source.

Lessons Learned

The outcomes of this Water Needs Assessment reflect the responses of participants, and while it is representative of some of the needs facing DACs, additional needs may be experienced by DACs in the Region, and the needs identified in the Water Needs Assessment should not be considered exhaustive. The water challenges described by DACs in the SDFA are generally consistent with the known water needs identified in *Chapter 3 Regional Description, Section 3.3.4*, although stakeholders placed different emphasis or priority on identified needs, which may be due to the organizations who participated in the Water Needs Assessment. The scope of the Water Needs Assessment did not include a process to verify identified needs, recognizing that communities themselves have direct knowledge and experience that enables them to identify their needs best. As a result, data considered in this assessment necessarily reflects the perceptions and biases of its participants.

The Water Needs Assessment consisted of a strategic effort aimed at identifying and reaching out to DACs that have either not been engaged with IRWM in the past or were previously unidentified. Many of these communities face capacity barriers and, in some cases, lacked access to the internet, making follow-up to initial outreach efforts difficult. Several outreach strategies, such as email, webinars, and in-person meetings, were experimented with to evaluate the success of each strategy in terms of effectively engaging DAC stakeholders and representatives. The questionnaire was valuable as a tool

for prompting discussion at the community meetings, as well as an effective tool for collecting input across a broader geographic area for this assessment. The online version of the questionnaire reached more stakeholders than any of the other strategies and received an approximately 21% response rate to the questionnaire from organizations, a response rate that is higher than the average external survey response rate.

Community meetings were effective in soliciting strong qualitative feedback from specific individuals, as discussions tended towards specific topics of interest to the participants such as the need for stormwater runoff education or an interest in water recycling projects. Factors such as capacity and drive time were likely barriers to attendance by a wider audience, making community workshops more valuable for focusing on a specific community's water needs.

Although the webinars were broadly advertised throughout the SDFA, with at least two weeks advanced notice to participants, webinar participation remained low and it was concluded that the webinar format was not a successful way of engaging with participants.

Barriers to DAC Involvement

The Water Needs Assessment facilitated discussion to understand how IRWM regions can better engage with its DACs, EDAs, URCs, and EJs. Input provided helped identify opportunities to expand existing DAC engagement efforts and learn how to best communicate IRWM activities and opportunities to DAC stakeholders. Barriers to engagement and involvement in the IRWM Program were divided into barriers that may exist for a DAC participant and barriers that may exist to the IRWM program.

Participant Barriers

1. Lack of representation
2. Limited capacity to pursue project funding
3. Difficulty with funding cash flow and processes

Institutional Barriers

1. Cost and capacity to reach rural areas
2. Inability to fund planning and design, and
3. Programmatic and regulatory barriers

These barriers are described in more detail in *Section 7* of Appendix 7-E.

7.10.1 Opportunities for Collaboration

Based on the results and experience of conducting the Water Needs Assessment, the Tri-County FACC has identified a number of opportunities to learn more about DACs, expand their engagement with IRWM, and overcome some of the barriers described above. Opportunities described here may apply to either or both the statewide IRWM Program and local efforts. Some of these opportunities may require additional funding from the State to implement:

1. **Leverage the updated list of DAC stakeholders** and identify ways for the three planning Regions in the Tri-County FACC to continue and expand ongoing DAC involvement and engagement. For example, the three RWMGs may send email invitations to IRWM meetings and activities and conduct targeted follow-up as appropriate.

2. **Use targeted outreach** to notify communities with self-identified needs when funding is available to help them.
3. **Follow up with stakeholders on challenges and pressing needs** in specific communities and communicate these pressing needs to DWR as priorities. Additional funding from the State may be required to address identified needs.
4. Continue to **implement technical support training** for the IRWM grant process.
5. Continue to **support changes at the State level** that will encourage more DAC participation in funding opportunities, including adjustments to how advanced payment is administered, increasing flexibility in work plans, extending CEQA compliance timelines, and contracting changes to address tribal and DAC needs. This may include composing comment letters to DWR or advocating for change in the Roundtable of Regions' Grant Administration Workgroup.
6. Continue to look for **opportunities to partner with organizations,** such as the Regional Water Quality Control Board to leverage existing relationships and conduct outreach through new avenues such as advertising the IRWM Program at community fairs, festivals, and farmers markets or reaching out to Facebook community groups and DAC census municipality staff.
7. **Explore alternative outreach methods** to reach and support communities that have limited access to web-based resources through assistance from the State, which may include advertising the success of the IRWM Program through human interest stories in local newspapers.
8. Encourage the State to create **additional outreach** materials such as videos on "What is IRWM?" that can be easily shared on YouTube or displayed at neighborhood meetings to give more information about the program.
9. **Encourage future IRWM project applications** that follow up on project ideas from community meetings.
10. Continue to **actively seek DAC representation** on the leading committees of each IRWM program's stakeholder group.
11. Continue to outreach to and encourage **engagement by tribal communities** in IRWM stakeholder groups.
12. Continue to serve as a **forum for communication** within the SDFA. Advertise technical trainings and support provided by NGO partners.
13. Encourage the State to create a "**one-stop shop" for technical assistance** and funding opportunities. This would include not only opportunities through DWR, but opportunities from other State and Federal agencies. This may include Metropolitan Water District of Southern California's new regional DAC pilot program to promote water conservation in DACs.

Ultimately, the Water Needs Assessment will be used by DWR to develop funding priorities that align with the needs of DACs. The Assessment will inform DWR in future rounds of IRWM funding, as well as the San Diego IRWM Program.

7.11 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 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).*

7.12 References

American Planning Association (APA), *Regional Water Planning for Climate Resilience.* 2019.

California Department of Water Resources (DWR). *20x2020 Water Conservation Plan.* 2010.

California Department of Water Resources (DWR). *2016 Integrated Regional Water Management Program Guidelines.* 2016.

California Regional Water Quality Control Board, San Diego Region. *Water Quality Control Plan for the San Diego Region*. 1994, with amendments effective on or before May 17, 2016.

California Regional Water Quality Control Board, San Diego Region. *San Diego Water Board Practical Vision, 2013-2019*. 2013.

California Regional Water Quality Control Board, San Diego Region. *Minutes of Meeting.* November 10, 2010.

California Natural Resources Agency (Resources Agency). *Safeguarding California Plan: 2018 Update.* 2018.

California, State of. *Urban Water Management Act.* Division 6, Part 2.6, California Water Code, Sections 10610 through 10656. 1983.

California State Water Resources Control Board. *Water Quality Control Plan, Ocean Waters of California (California Ocean Plan)*. 2015.

California State Water Resources Control Board. *Water Quality Control Plan for Enclosed Bays and Estuaries.* 2009b.

California State Water Resources Control Board. *Water Quality Control Plan for Control of Temperatures in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California.* 1998.

City of San Diego. *San Pasqual Valley Groundwater Basin Salt and Nutrient Management Plan*. 2014.

Metropolitan Water District of Southern California. *The Regional Urban Water Management Plan for Southern California.* 2010.

Metropolitan Water District of Southern California. *2015 Urban Water Management Plan.* 2016a.

Metropolitan Water District of Southern California. *Integrated Water Resources Plan.* 2016b.

Padre Dam Municipal Water District. *Santee Basin Salt/Nutrient Management Plan.* 2013.

Rincon del Diablo Municipal Water District. *Salinity/Nutrient Management Plan Escondido Valley Groundwater Basin.* 2013.

Ramona Municipal Water District. S*alt and Nutrient Management Plan for the Gower Hydrologic Subarea.* 2013.

San Diego County Water Authority. *2013 Regional Water Facilities Optimization Master Plan Update.* 2014.

San Diego County Water Authority. *2015 Urban Water Management Plan.* 2016.

San Diego County Water Authority. *Water Shortage Contingency Plan.* 2017.

U.S. Environmental Protection Agency. *California Toxics Rule (Title 40, Section 131.38, Code of Federal Regulations)*. 1998.

U.S. Marine Corps Base Camp Pendleton. 2012. *Salt and Nutrient Management Plan Southern MCB Camp Pendleton.*

This page intentionally left blank