10 Data and Technical Analysis

This chapter addresses requirements set forth in the Data Management and Technical Analysis Standards included in the 2012 IRWM Program Guidelines (DWR 2012).

10.1 Overview

The intent of this chapter is to document various aspects of data management and technical analysis that were completed for the 2013 IRWM Plan and will continue for the IRWM Program. Specifically, this chapter includes information regarding:

- The process of data collection, storage, and dissemination of information to IRWM stakeholders, participants, members of the public, and the State.
- The data and technical analyses that were used to develop the 2013 IRWM Plan.

10.2 Data Management

A considerable variety of water and environmental resource data are collected throughout the Region. The overall intent of the Region's IRWM data management strategy is to augment these existing efforts in a way that allows regional leaders, stakeholders, and the public to effectively use data and information to support planning, decision-making, and public education and involvement.

Rather than duplicate existing data management systems in the Region, the 2013 IRWM Plan builds on them through a regional Data Management System (DMS) that is currently being developed through a Proposition 84 Implementation Grant (refer to Section 10.2.3 for more information). The IRWM DMS will focus on building upon existing data and information. In order to understand the framework for the DMS, it is important to understand existing data and information available in the Region. The following sections provide an overview of existing regional data needs and data collection efforts and data sources, which provide the information necessary to develop the DMS.

10.2.1 Data Needs

Despite the extensive ongoing water resources monitoring and data-collection efforts within the Region, opportunities exist for additional data gathering to close data gaps. Monitoring is generally conducted to support specific organizational, regulatory, or research objectives rather than within a regional or integrated framework. As a result, many of the gaps discussed here are related to a general lack of regional, integrated planning and concomitant data support strategies. Since a primary purpose of IRWM planning is to provide that regional focus, it is expected that this assessment of gaps will be updated and refined substantially over the next several years.

Data gaps will continue to be identified through IRWM planning efforts, primarily through the implementation of the planned IRWM DMS. A single, consolidated location for data will make identification of data gaps easier and reduce occurrences of unnecessary overlap or duplication of efforts. The DMS will also make it easier to direct users to a comprehensive source of information, increasing the likelihood of knowledge sharing across groups.

Additional support for addressing data gaps exists in the form of projects included in the 2013 IRWM Plan (refer to *Chapter 9, Project Evaluation and Prioritization* for information about project selection). Projects that have been funded through the IRWM Program seek to address some of the data gaps relating to monitoring. Further, given the adaptable nature of the project selection and evaluation process, it is possible that the RAC and the RWMG will amend project selection criteria to prioritize future projects that address identified data needs. Additional support is provided through the IRWM Plan Objectives, which include Objective C: Effectively obtain, manage, and assess water resource data and information, and Objective D: Further scientific and technical foundation of water management (see *Chapter 2, Vision and Objectives).* These two objectives address the need for increased science-based management as identified by IRWM stakeholders. The project scoring criteria gives preference to projects that address multiple objectives, and together with Objectives C and D, serve to increase the likelihood that projects included in funding proposals will also contribute to addressing data gaps.

The following sections summarize the specific data gaps that have been identified throughout the 2013 IRWM Plan development process, and discussed further in Table 10-1. These data gaps fall into five general categories: communication and collaboration, pollutants and sources, receiving water monitoring, habitat and natural resource monitoring, and monitoring and assessment approaches. Although the 2013 IRWM Plan development process revealed specific data gaps, several stakeholders have also noted that there is a need for data that can be used to facilitate effective decision-making. Stakeholders have noted that general data collection is not always preferable given that more data does not necessarily lead to effective or efficient conclusions. Therefore, the focus of the DMS that will be produced as part of the IRWM Program will focus on collecting specific data that can be efficiently used to improve water management.

Communication and Collaboration

As part of the 2013 IRWM Plan development process, a series of planning studies were conducted to analyze the present state of knowledge, identify opportunities for improvement in water management and strategies, and provide recommendations for changes to incorporate into the Plan (see *Chapter 7, Regional Coordination*). The planning studies identified knowledge-sharing as important to improved integrated water management, but found that knowledge-sharing is often limited to water-oriented organizations and can lack input from other essential parties. Table 10-1 includes details regarding specific communication and collaboration data gaps that were addressed in the 2013 IRWM Plan planning studies.

Addressing issues relating to knowledge-sharing will increase collaboration between agencies or organizations and will enable more efficient use of water management resources. Communication and knowledge sharing will be greatly improved through implementation of the Region's DMS.

Pollutants and Sources

Several data gaps have been identified within the Region's programs to monitor pollutants and sources. These data gaps, which are described in Table 10-1, pertain to: characterization of nonpoint sources, characterization of agricultural runoff and sources, characterization of pathogen impacts and loading, and evaluation of source load reductions.

Receiving Water Monitoring

Data gaps also exist within the Region pertaining to receiving water bodies. Specific data gaps associated with receiving water bodies are described in Table 10-1 and pertain to watershed sampling, streamflow monitoring, and groundwater monitoring programs.

Habitat and Natural Resource Monitoring

Habitat mapping efforts within the Region are reasonably complete, but significant additional data collection is needed to better address habitat health and viability and to update habitat maps. Additional habitat health, species composition, and invasive species data are required in all watersheds to provide for a greater understanding of geographic-, temporal-, and water quality-related trends. Although several federal, state and local agencies collect data related to the quantity and quality of habitat, currently no single entity in the Region provides a comprehensive assessment of such data.

Monitoring and Assessment Approaches

In some instances, data gaps could be addressed through modifications to existing monitoring and assessment approaches. For instance, monitoring approaches that better focus on water quality or environmental "risk," rather than static regulatory benchmarks such as chemical concentrations, could more effectively and cost-efficiently focus management efforts toward solutions. Likewise, considerable benefit, including cost-savings, could be achieved through data gathering approaches that are designed to assess cumulative impacts rather than those of a single source or project.

Water quality monitoring is conducted by citizens through San Diego CoastKeeper's Water Pollution Source Tracking Program.

Photo credit: Travis Prichard, San Diego CoastKeeper

Another key issue associated with monitoring approaches is that of linkages between media. Although the cycling of constituents between water supply systems, surface waters, groundwater, and potentially biota is well understood from a theoretical perspective, little real world data exist to support the development of effect management approaches. For instance, high total dissolved solids concentrations have been documented in supplied water, surface waters, and groundwater throughout the Region. Future data collection should focus on characterizing and managing this issue.

Finally, an increased understanding of the dynamics between existing monitoring systems would be beneficial. For example, although the 2006 update of the Region's list of impaired water bodies (303(d) list) generated several new listings for drinking water reservoirs (e.g., for color, pH, manganese, nitrogen, and phosphorous), a better understanding of the limnology of these water bodies would help to interpret the results on which the listings are based. In this example, data on the cycling of dissolved oxygen and nutrients would help to provide a framework for interpreting results.

Table 10-1: Further Details on Existing Data Gaps

Data Gap Topical Area	Information about Data Gaps
Communication and Collaboration	***Land Use Planning Study Findings***: The *Land Use Planning Study* found that there is an opportunity for increased communication and collaboration between water managers and land planners. Specifically, this study found that there is a general lack of understanding between water managers and land use planners that may hinder their ability to consider or incorporate each other's planning efforts. Challenges to bridging this gap include: different agency missions and interests, limited resources, and different jurisdictional areas.
	Regulatory Workgroup Report Findings: The *Regulatory Workgroup Report* also identified knowledge-sharing as a key opportunity for improved water management. This report recommends increased collaboration with the Regional Water Quality Control Board (Regional Board) and identified common themes of interest, including effective data management and assessment. Within this theme, the Regulatory Workgroup identified four issues of mutual interest: 1) Improve standardization of data collection and assessment, 2) Eliminate disincentives for data collection and transfer, 3) Eliminate duplicative data collection, management, and assessment efforts, and 4) Ensure that collected data are useful and effectively analyzed, and focus on question-driven issues.
	Integrated Flood Management Planning Study Findings: The *Integrated Flood Management Planning Study* made a number of recommendations related to increased or improved communication between agencies and organizations. This study also highlighted the opportunity for integrated management and planning through improved knowledge-sharing.
Pollutants and Sources	***Characterization of Nonpoint Sources***: Nonpoint source (NPS) pollution is considered to be the major contributor of pollution to impacted streams, lakes, wetlands, estuaries, marine waters, and groundwater basins, and the leading cause of water quality impairments in California. Despite the existence of a myriad of programs focused on various aspects of NPS management, ongoing efforts are hampered by a lack of specific knowledge about the individual sources within the Region's watersheds that collectively constitute NPS pollution. For instance, the Municipal Stormwater Permit requires that local jurisdictions implement programs to address impacts from more than 40 commercial and industrial business types; these sources are present by the tens of thousands throughout the Region. In the long-term, effective management will require that data collection be focused on better characterizing the specific sources of priority pollutants in the Region's watersheds. Not only must specific activities and processes occurring on-site be better understood, but our knowledge of how threat-to-water-quality varies within broad categories of regulated sources (e.g., residences, restaurants, etc.) must also be increased.
	Characterization of Agricultural Runoff and Sources: Water quality monitoring of agricultural runoff has been identified as an additional data gap. San Diego agriculture is a $1.7 billion industry (as of 2011), ranking as the fourth largest industry in the Region. The County's unique topography creates a wide variety of microclimates resulting in nearly 30 different climate types of vegetation communities. This diversity allows for a multitude of different agricultural commodities to be produced in the County – from strawberries and tomatoes along the coast, to apples in the mountain areas. Chemicals applied during operations (e.g., pesticides and fertilizers) may be carried into the ground, and to surface waters or groundwater. The extent of potential contamination resulting from agricultural practices is currently unknown, and should be addressed in future data collection efforts.
	Characterization of Pathogen Impacts and Loading: In recent years, impaired water bodies formally listed under Section 303(d) of the Clean Water Act for bacterial indicators have become increasingly common. The listings for bacterial indicators present a problem, because the indicators themselves are not thought to present a threat to humans, i.e., their presence is merely an indicator of the potential presence of disease organisms. Future monitoring would benefit from the development of measures that provide a better indication of actual risk, as well as a basis for the identification and assessment of specific management measures. Likewise, site-specific epidemiological studies and source investigations (e.g., DNA source tracking) may also be useful to increase appropriate management of indicator bacteria.

Data Gap Topical Area	Information about Data Gaps
	Evaluation of Source Load Reductions: While considerable data collection has focused on identifying water quality problems and impairments throughout the Region, comparatively little is known about the effectiveness of specific management measures targeted to remedy these problems. The current Municipal Stormwater Permit requires that source load reductions be determined for a variety of sources regulated under the program. However, the current state-of-the-art for conducting load reduction estimates, especially at a broad programmatic level, is poorly evolved. Considerable effort is currently being invested in the development of new methods, but data are generally not available to support estimation either of non-structural BMP effectiveness or implementation frequency. This data gap must be addressed to improve the effectiveness and cost-efficiency of pollution management programs.
Receiving Water Monitoring	***Representative Watershed Sampling***: Water quality monitoring that does not include the upper portions of many of the Region's watersheds presents a spatial data gap. Stormwater programs have conducted mass loading monitoring at the base of the Region's watersheds since 1993-94. MS4 Copermittees in the Region have used this monitoring data and other information to determine watershed priorities, which have been well-established in management plans formalized by the Copermittees and their stakeholder groups. Moving forward, receiving water monitoring should be focused to update Basin Plan priorities such as beneficial use designations and water quality objectives; this will help to determine appropriate management actions and move away from water quality monitoring that is not necessary given the amount of water quality data that is available throughout the Region.
	Streamflow Monitoring: Ongoing streamflow monitoring provides a basic statistical understanding of surface water flows within major streams and rivers in the Region. A larger number and greater geographical distribution of streamflow gaging stations, however, is required to assess streamflow recharge of groundwater, to provide a better understanding of streamflow within smaller watersheds and lesser tributaries, and to provide streamflow data needed to develop TMDLs.
	Groundwater Monitoring: While groundwater data are collected in many watersheds within the Region, data are insufficient to adequately characterize groundwater quality, groundwater availability, and aquifer characteristics throughout much of the Region. This is particularly evident in areas exclusively dependent on groundwater supplies. Groundwater data are sufficient to characterize groundwater quality and availability only within some of the Region's major aquifers. Within groundwater-dependent communities in the inland portions of the County (outside the Region's major alluvial aquifers), water quality data are too scarce to effectively characterize and manage water quality problems. Spatial and temporal understanding of groundwater quality in these areas is therefore lacking. A centralized, coordinated groundwater data collection effort would be required to allow for more complete characterization of groundwater availability and quality within the Region.
	Monitored Constituents: Because monitoring strategies are often driven by regulatory mandates, the selection of monitored constituents tends to be broad, inclusive (e.g., all EPA Priority Pollutants), and static. In the past several years, watershed and water quality management in the Region has evolved to become increasingly focused on specific issues and problems. Likewise, watershed sources of pollution are in continual flux. For instance, it is estimated that there are currently more than 85,000 chemicals in commerce in the U.S., with more than 2,000 new chemicals being added to this mix annually (a rate of seven per day). Although the nature of water and environmental pollution generally remains the same over time, the details do not. Monitoring and data collection must therefore become increasingly focused on newly identified priorities, as well as "emerging chemicals of concern" (e.g., pyrethroid pesticides, brominated flame retardants, nanoparticles, and pharmaceutical wastes).

10.2.2 Data Collection and Sources

Many of the Region's monitoring programs and activities provide data that are useful to IRWM planning and management in the Region. Data collected to support the 2013 IRWM Plan will facilitate the development of local water management programs in a manner that ensures consistency with the standards established through statewide data management systems. Table 10-2 provides an overview and description of efforts thought to be of particular importance to IRWM planning, but is not intended as a comprehensive survey of all programs and activities.

In addition, a substantial amount of data is collected pertaining to stormwater for purposes of the Municipal Separate Storm Sewer System (MS4) permit. Specific stormwater-related monitoring efforts, which provide the basis for stormwater and water quality monitoring in the Region are detailed in Table 10-3.

The IRWM Program will support statewide data activities by potentially serving as a repository for regional compilation of water resources data and information, and by requiring that data collected to support project performance assessment is collected in a manner consistent with continuing statewide data collection programs. Consistency with Statewide monitoring programs is critical to ensuring that regional projects contribute to efficient, uniform, and comprehensive study design and data collection. Data collected as part of Plan implementation will be required to be comparable with applicable statewide data collection programs such as the Surface Water Ambient Monitoring Program (SWAMP) and Groundwater Ambient Monitoring and Assessment (GAMA) Program. Upon completion of the IRWM Program performance assessment, the project-specific data collected, along with its associated quality assurance/quality control information, would be provided to the state in a format that can be easily integrated into statewide data collection and tracking programs. All projects implemented with IRWM funding must follow state mandated protocols for data collection and reporting, and must also send regular reports to DWR. Through IRWM funding, the IRWM Program will facilitate data collection in accordance with statewide standards, and can also help to encourage project proponents and other stakeholders to contribute data to statewide databases.

Water quality monitoring data collection site at the Biofiltration Wetlands (San Diego Zoo Safari Park), partially funded through the IRWM Program.

Photo credit: Rosalyn Prickett, RMC Water and Environment

10.2.2.1 Typical Collection Techniques

Data are collected using common, standard techniques appropriate to the type of data collected, collection site conditions, resource availability, and how the data will be analyzed. Data collection techniques are typically described in reports associated with each dataset. Scientifically sound data will be considered for inclusion in the DMS, but methodology will be the responsibility of the individual organizations. Substantial concerns relating to appropriateness of methodology may be addressed through removal from DMS, at the discretion of the RAC and the RWMG.

Table 10-2: List of Potential Data Sources for IRWM Planning

Monitoring	Collected by	Reported to	Notes
Various GIS datasets	San Diego Association of Governments (SANDAG)	San Diego Geographic Information Source (SanGIS)	SanGIS, a joint project of the County of San Diego and SANDAG, is a publicly-available regional geographic information system (GIS) data warehouse. The data provided by SanGIS includes a variety of sources of information from local, statewide, and federal databases, and ranging from landbase information (lots, parcels, roads, etc.) to demographic data, and specific water resources data such as impaired water bodies, groundwater basin locations, floodplains and flood zones, and more. SanGIS: http://www.sangis.org/
Real-time or recent surface-water, groundwater, or water-quality data	U.S. Geological Survey (USGS)	National Water Information System (NWIS)	The NWIS is a comprehensive and distributed application that supports the acquisition, processing, and long-term storage of water data. NWIS: http://waterdata.usgs.gov/nwis
Routine monitoring of public water systems	Operators of public water systems	California Department of Public Health (CDPH)	Sampling is conducted at treatment plants, within distribution systems, and at the tap, and monitoring results are evaluated to ensure that applicable drinking water quality standards are met. For regulated constituents, results are compared to Primary and Secondary MCLs, and unregulated contaminants are evaluated against CDPH Detection Limits for Purposes of Reporting (e.g., color, corrosivity, and odor). For more information on CDPH's Drinking Water Program, visit http://www.cdph.ca.gov/programs/Pages/DWP.aspx
Routine monitoring of small water systems (i.e., community water systems that serve 199 connections or less from groundwater supply wells)	There are over 150 small water systems within the Region.	San Diego County Department of Environmental Health (DEH)	DEH Land Use Program staff inspects small water systems and monitors the reporting of water samples to ensure that they comply with Safe Drinking Water Act and EPA requirements for supplying potable water. Monitoring results are reported monthly to CDPH. Monitoring for the constituents described above for all water suppliers is conducted every three years, and more frequent monitoring is conducted for bacteria and nitrates. For more information on DEH's Small Drinking Water Systems program, visit http://www.sdcounty.ca.gov/deh/water/lu_sws.html
Chemical contaminants in oysters and mussels and in sediments	National Oceanic and Atmospheric Administration (NOAA)	National Oceanic and Atmospheric Organization (NOAA) Status and Trends Program, Mussel Watch Project	NOAA collects and analyzes samples of bivalve tissue biennially and sediments every decade to track long-term trends in organic and inorganic contaminants along the coast. These data are used to assess changes in water quality and provide context for local regulators. Tissue banks are maintained from all sampling efforts to allow retrospective analyses for new or emerging contaminants of concern. For more information on the Mussel Watch program, visit http://ccma.nos.noaa.gov/about/coast/nsandt/musselwatch.aspx
Streamflow data at 94 stations in the County; Depth to groundwater at 20 stations in the County	United States Geological Survey (USGS) monitoring stations	United States Geological Survey (USGS) National Water Information System	USGS collects streamflow data across the nation, as well as monitors water quality. USGS also partners with local agencies to produce studies and reports on the status of surface and groundwater. For more information about the National Water Information System or to access data, visit http://waterdata.usgs.gov/nwis

Monitoring	Collected by	Reported to	Notes
"Ambient" surface water monitoring in all County watersheds	Regional Board and organizations collecting water surface water quality data using funding from Propositions 13,40,50, and 84	State Water Resources Control Board (State Board) Surface Water Ambient Monitoring Program (SWAMP)	The main functions of SWAMP are to accept, manage and store SWAMP data and to share this data within SWAMP and among stakeholders. The database is designed to transfer data into larger data exchange networks. Water quality, toxicity, sediment chemistry, microbiological, habitat, biological, fish and shellfish tissue data and metadata are managed within a central database that is fed from peripheral databases. SWAMP is designed to support and expand water quality assessments, to determine 303(d) listings and de-listings, and help prioritize or support site-specific actions. SWAMP works closely with the California Water Quality Monitoring Council (CWQMC). For more information on SWAMP, visit http://www.waterboards.ca.gov/water_issues/programs/swamp/
Water quality monitoring to assess receiving water conditions (surface and groundwater) and verify that targeted load reductions are occurring	Dischargers as named in permits, the Water Quality Control Plan for the San Diego Basin (Basin Plan), and Regional Board Orders	Total Maximum Daily Loads (TMDLs), Waste Discharge Requirements (WDRs), and Investigation Orders	Water quality monitoring is conducted as part of TMDL assessments. Additional monitoring by dischargers is at the discretion of the Regional Board, and is often required in support of TMDLs or possible future TMDLs. For more information on the Regional Board's TMDL program, visit http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/tmdls/index.shtml
Water quality monitoring to verify compliance with permit conditions	Permitted parties	Regional Board Point-Source Discharge Permit Compliance Monitoring	Regional Board regulates point-source discharges through WDR or NPDES permits. Both of these permits require monitoring to verify compliance with standards associated with applicable conditions. Data in this category also includes permitting required for ocean dischargers (outfalls). For more information the point-source discharge monitoring via WDR permits visit: http://www.swrcb.ca.gov/sandiego/water_issues/programs/ground_water_basin/recycled_subsurface/recycledwater_subsurfacedisposal_programs.shtml For more information on monitoring through NPDES permits visit: http://www.waterboards.ca.gov/water_issues/programs/npdes/
Extensive monitoring of urban runoff discharges and receiving waters	Permitted parties	Regional BoardMS4 Program	As part of the MS4 permit issued by the Regional Board, the Copermittees have implemented runoff monitoring programs. Monitoring has been conducted since the 1993-94 wet season, but evolved to address monitoring goals and management questions. Program components are described in Table 10-3. For more information about the MS4 permit, visit: http://www.swrcb.ca.gov/sandiego/water_issues/programs/stormwater/sd_stormwater.shtml For information regarding stormwater management in the IRWM Region, visit: http://www.projectcleanwater.org/html/copermittees.html
Beach water quality at 110 locations as part of AB411 requirements	Cities, wastewater agencies, DEH	DEH Ocean and Bay Recreational Water Program and individual city/wastewater agency programs	Water quality samples are collected at 78 beaches (110 locations) weekly from April through October every year. Samples are collected from a smaller number of beaches from November through March commensurate with beach use and budget. For more information, visit http://www.sdcounty.ca.gov/deh/water/beach_bay.html

Monitoring	Collected by	Reported to	Notes
Watershed sanitary surveys of public water systems	Water agencies with surface reservoirs	CDPH	Per Title 22, § 64665 of the California Code of Regulations, CDPH requires watershed sanitary surveys be conducted every 5 years to identify sources of contamination or other factors which might adversely affect quality of water used for domestic drinking water. These surveys are conducted by individual water agencies using surface water reservoirs. More information can be found on agency and city websites. An example from the City of San Diego can be found here: http://www.sandiego.gov/water/quality/environment/sanitarysurvey.shtml
Marine environmental research	Member agencies	Southern California Coastal Water Research Project (SCCWRP)	SCCWRP is a joint powers agency for marine environmental research on the Southern California Bight. Its mission is to gather data so that agencies can effectively protect the Southern California marine environment. It focuses on Publicly Owned Treatment Works (POTWs), urban runoff, and surface water quality monitoring. For more information, visit: www.sccwrp.org
Areas of Special Biological Significance (ASBS) information management	Scripps Institution of Oceanography (SIO), City of San Diego, San Diego Coastkeeper	SIO Coastal Observing Research and Development Center (CORDC)	CORDC is the lead for ASBS information management. The CORDC system includes automatic data transfer and ingestion, data archiving and backup, public display of data and historical data download. It uses a modified SWAMP template, and allows for users to query and view data. The goal is to establish infrastructure needs and generate conceptual design required for long-term assessment of ASBS performance and management decisions. For more information, visit: https://cordc.ucsd.edu/projects/asbs/
Characteristics of Southern California Bight	Research organizations, such as SIO	Southern California Coastal Ocean Observing System (SCCOOS)	SCCOOS maintains databases of surface currents, satellite imagery, wave condition and forecasts, meteorological conditions and forecasts, water quality, ocean temperature, salinity, chlorophyll, and density. It also presents and manages data in various data interfaces and products, utilizing web-based mapping to provide localized interactive data displays. For more information on SCCOOS or to access data, visit: http://www.sccoos.org/index.html
Citizen-based volunteer surface water quality monitoring	Citizen scientists working under the supervision of various non-governmental organizations(NGOs)	San Diego Stream Team; San Diego CoastKeeper Water Quality Monitoring Program; San Diego River Park Foundation's RiverWatch Team; Carlsbad Watershed Network's Watershed Stewards Training Program	Citizen science provides significant, important data sets. Most of these efforts are supervised by local NGOs. More information on citizen monitoring efforts can be found on these organizations' websites: San Diego CoastKeeper has a data portal that contains field screening data collected by volunteers. The data portal contains field screening data collected by volunteers that were trained in accordance with State Water Resources Control Board and EPA field methods. CoastKeeper: http://www.sdwatersheds.org/wiki/Main_Page The Common Grounds Project is conducted by the City of San Diego, San Diego State University and San Diego CoastKeeper to incorporate data from regional water quality monitoring programs and integrate the data on a watershed level using a web-based interactive application. Common Grounds: www.sdbay.sdsu.edu The San Diego River Watershed Data Portal is an online resource for citizen-based monitoring programs. Currently the Data Portal has compiled data for the San Diego River Park Foundation's RiverWatch program. These data have been collected at 15 sites on a monthly basis since 2004. San Diego River Watershed Data Portal: http://www.ecolayers.biz/sdrpf-riverwatch/ Carlsbad Watershed: http://www.carlsbadwatershednetwork.net/stewards_training.php

Monitoring	Collected by	Reported to	Notes
Groundwater monitoring as part of compliance with underground storage tank regulations	County of San Diego	DEH and Regional Board	Groundwater monitoring is required as part of regulating compliance with underground tank regulations, and is normally limited to near underground tanks to check for leaks. Where leaks have been detected, more extensive monitoring is required. More information can be found on the Regional Board's Underground Storage Tank (UST) Program Website, at http://www.waterboards.ca.gov/sandiego/water_issues/programs/ground_water_basin/ust_program.shtml Or at the County of San Diego's UST Program site at http://www.sdcounty.ca.gov/deh/hazmat/ust.html
Biological resource/habitat surveys and biological monitoring programs	Wildlife agencies	Multiple Species Conservation Program (MSCP) Databases	The programs developed as part of the MSCP typically include general habitat monitoring, species specific monitoring and surveys, and other tools such rapid assessment protocol surveys, vernal pool inventories, photo monitoring, and post-fire recovery surveys. The County of San Diego is developing a comprehensive database to track and more efficiently manage monitoring activities. When complete, the database will provide information such as past monitoring activities, future monitoring requirements, locations of preserved lands within the County's MSCP Subarea, and locations of monitoring sites. For more information on the MSCP, visit: http://www.sdcounty.ca.gov/pds/mscp/ The City of San Diego (www.sandiego.gov) has also developed an integrated Management and Monitoring Database that tracks their MSCP biological monitoring and management activities. It includes a GIS component, field data collection using a pocket personal computer, and field and office demonstration to other agencies. Future phases may include a web-based internet application made available to the public for education and information.
Status and distribution of bird populations	Local birders	San Diego Audubon Society's Christmas Bird Counts	The annual Christmas Bird Count, conducted by the Audubon Society through its local chapters, monitors the status and distribution of bird populations in the Western Hemisphere. The results are compiled into the longest running database in ornithology. Trends seen in these data can indicate habitat fragmentation or signal an environmental threat. More information about the Christmas Bird Count can be found at http://birds.audubon.org/christmas-bird-count
Outdoor research and education activities	Field Station Program staff, visiting researchers	San Diego State University (SDSU) Biological Field Stations	The SDSU Field Stations Program supports outdoor research and education activities. Three of the Program's sites are located within the IRWM Region. The field stations are established as reserves, totaling over 5,000 acres, and provide visitor access, education and outreach, and sites for scientific research. More information can be found at http://fs.sdsu.edu
Natural resources data	Varies	California Environmental Resources Evaluation System (CERES)	CERES is an information system to facilitate access to natural resource data. CERES' goal is to improve environmental analysis and planning by integrated natural and cultural resource information from multiple contributes and making it available and useful to a variety of users. CERES: http://ceres.ca.gov/
Variety of water data	Varies	Water Data Library (WDL)	The WDL contains data from monitoring stations across state. Allows users to easily query areas of interest. Includes groundwater levels, water quality, surface water flow, rainfall/climate and well logs. Links to other data resources. WDL: http://www.water.ca.gov/waterdatalibrary/

Monitoring	Collected by	Reported to	Notes
Groundwater elevation data	Local water suppliers overlying groundwater basins	California Statewide Groundwater Elevation Monitoring Program (CASGEM)	CASGEM is a collaboration between local organizations and DWR to collect groundwater elevations statewide. Tracks seasonal and long-term trends in groundwater elevations. Data available on the CASGEM Online System. CASGEM: http://www.water.ca.gov/groundwater/casgem/
Variety of data	California Natural Resources Agency	California Environmental Information Catalog (CEIC)	CEIC is a library of existing data and where to find it. CEIC facilitates identification and access to data and improves efficient use of data. CEIC: http://ceic.resources.ca.gov/
Variety of data	Various entities, compiled by State Board	California Environmental Data Exchange Network (CEDEN)	CEDEN is a cooperative data exchange program for organizations involved in water and environmental resources in California. Scores of programs have been connected into CEDEN. Projects are underwater to extend data exchange to additional standards. CEDEN: http://www.ceden.org/
Variety of data	Various entities, compiled by State Board	Surface Water Ambient Monitoring Program (SWAMP)	SWAMP is a statewide monitoring effort to assess the conditions of surface waters throughout California. Some state funding sources require reporting to SWAMP if projects involve surface water monitoring. SWAMP: http://www.waterboards.ca.gov/water_issues/programs/swamp/
Variety of data	Various entities, compiled by State Board	Groundwater Ambient Monitoring and Assessment program (GAMA)	GAMA was created to improve statewide ambient groundwater quality monitoring and assessment and increase the availability of groundwater quality information to the public. It consists of the California Aquifer Susceptibility (CAS) assessment and the Voluntary Domestic Well Assessment Project. GAMA: http://www.waterboards.ca.gov/water_issues/programs/gama/
Variety of data	Various entities, compiled by DWR	Integrated Water Resources Information System (IWRIS)	IWRIS is a data management tool for water resources data. It utilizes databases such as WDL, CDEC, USGS Streamflow, Local Groundwater Assistance Grants, and local agency data to allow users to access and visualize multiple sets of data simultaneously. It was designed to support IRWM efforts. IWRIS: http://www.water.ca.gov/iwris/
Variety of data	Various entities, compiled by The Climate Registry (TCR)	TCR	The California Climate Action Registry has been integrated into TCR, which collects GHG emissions data from members. Data are verified by third-party organizations before being submitted. All three RWMG member agencies and the Metropolitan Water District of Southern California (Metropolitan) are TCR members. TCR: http://www.theclimateregistry.org/
Variety of data	Various entities, compiled by California Department of Fish and Wildlife	California Bio-Geographic Information and Observation System (BIOS)	BIOS is a statewide data management system that allows DFG and partner organizations to manage, exchange, and geographically visualize a variety of environmental/biological data BIOS: http://bios.dfg.ca.gov/
Variety of data	Various entities, compiled by California Department of Fish and Wildlife	California Natural Diversity Data Base (CNDDB)	CNDDB is a database of rare species and communities. It is maintained and updated by the California Department of Fish and Wildlife, and data can be accessed either directly or through BIOS. CNDDB: http://www.dfg.ca.gov/biogeodata/cnddb/

Table 10-3: Stormwater Monitoring Program Components from the 2007 MS4 Permit

Monitoring Element	Description	Frequency
A. Receiving Waters Monitoring Program		
Mass Loading Station Monitoring	11 stations located in downstream segments of major watersheds, upstream of tidal influence	Samples collected during three storm events per year
Temporary Watershed Assessment Station (TWAS) Monitoring	Same as mass loading stations, but stations are located in upstream reaches	Twice during wet weather and twice during dry weather
Bioassessment Monitoring	Conducted at 20 sites (two reaches within each of the 10 watershed management areas) and 3 reference sites	Samples collected twice per year, annually
Toxicity Identification Evaluations (TIEs)	Conducted to evaluate the extent and causes of pollution in receiving waters and prioritize and implement management actions	When monitoring results indicate degradation
Ambient Bay and Lagoon Monitoring (ABLM)	Sediment testing as well as chemistry, toxicity, and benthic community testing	Annual
Coastal Storm Drain Monitoring	Bacterial sampling conducted in sewer outfalls and receiving waters (coastal and lagoon) during dry- and wet-weather periods	Samples collected twice monthly
Pyrethroids Monitoring	Monitoring program to measure and assess the presence of pyrethroids in receiving waters	Water quality samples collected during storm events twice per year, sediment samples collected following first-flush rainfall event
B. Urban Runoff Monitoring		
MS4 Outfall Monitoring	To characterize pollutant discharges from MS4 outfalls in each watershed	Wet and dry weather
Source Identification Monitoring	To identify sources of discharges of pollutants causing the priority water quality problems within each watershed	As practicable
Dry Weather Field Screening and Analytical Monitoring	Consists of (1) field observations; (2) field screening monitoring; and (3) analytical monitoring at selected stations	April - October
C. Regional Monitoring		
Southern California Bight '08	Optional participation in the Bight '08 study, data collected from 2007 to 2012	Offshore Water Quality: monthly; Coastal Wetlands and Estuaries: continuously for water quality parameters, bimonthly for primary producer biomass

10.2.3 IRWM Data Management System

Rather than duplicate existing data management systems in the Region, the 2013 IRWM Plan proposes to build on them through the augmentation of the San Diego IRWM website (http://www.sdirwmp.org). As part of the 2013 IRWM Plan development process, the San Diego IRWM website was comprehensively updated such that it contains up-to-date information about workgroups, workshops, and other meetings held in relation to the planning process. The website also contains work products from the various planning studies and technical efforts undertaken for the 2013 IRWM Plan, as well as information about project selection and solicitation associated with IRWM grant opportunities (Proposition 84 and Proposition 1E). Finally, the website also contains updated information about projects that have been funded through the IRWM Program (Proposition 50 and Proposition 84), including project overviews, budgets, and major project amendments. The San Diego IRWM website provides a venue through which stakeholders can learn about IRWM Plan implementation and progress. In 2011, a Report Card was created to assess progress on implementation of the 2007 IRWM Plan. As discussed in *Chapter 11, Implementation,* it is anticipated that the 2013 IRWM Plan will be assessed in a similar fashion, and results of this

assessment (the comprehensive Report Card) will continue to be posted on the San Diego IRWM website for review by stakeholders and other interested parties.

Future IRWM Program activities will include further updates to the San Diego IRWM website such that the website will include a Data Management System (DMS) that will be publicly-accessible through the website. The DMS is intended to address three primary data and information management goals, which are described in the following sections.

10.2.4 Data Management Objectives and Goals

Data and information management is an essential element of the IRWM planning and management process. An effective data management strategy must address several key objectives:

- *Support for IRWM Planning* – Data and information must support ongoing IRWM planning and decision-making processes. Through the planning process, a basis can be established for evaluating the performance of individual projects, programs, the2013 IRWM Plan, and the IRWM Program as a whole, as well as for supporting statewide data needs and integration with regional and statewide programs.
- *Evaluation of Project, Program, and Plan Performance* – Projects and programs must be periodically evaluated according to established criteria to monitor their progress and evaluate their success. Collective 2013 IRWM Plan progress and performance must also be evaluated, and the results of these evaluations used to provide feedback into the ongoing planning process.
- *Facilitation of Public Participation* – Dissemination of data and information to stakeholders and the public is critical to ensuring their ongoing participation in IRWM planning and implementation activities.

In support of these objectives, three data management goals have been developed for the IRWM Program. These goals and details regarding how these goals will be implemented are discussed in below.

<u>Goal 1 – Provide Simplified Access to Existing Sources of Data and Information</u>

A considerable amount of water management data and information is provided through numerous existing monitoring and research efforts. Although many agencies and organizations have developed useful web-based resources for disseminating data and information, users often lack the specific knowledge necessary to find and effectively use this information. A key component of the DMS will be to establish a centralized point for interested parties to find and explore these existing resources, and to more easily obtain the specific data they need. This will likely include web links and contact information for agencies and organizations collecting or managing water management data.

It is important to recognize that many existing efforts provide a considerable degree of data centralization and access to data sources and databases. In some cases, there may be opportunities for integration or consolidation of efforts over time. In other cases, the goal will simply be to ensure that monitoring and data management efforts are not duplicated between programs, or that data are collected and disseminated in a consistent manner such that various data sets may be reasonably compared and analyzed in a similar fashion.

Written and electronic work products will also continue to be a key part of the data and information dissemination process. In addition to providing contact information for obtaining these products, documents and reports will be posted or linked through the DMS. Examples of such documents and

reports include Urban Water Management Plans (UWMPs), Metropolitan's Integrated Resources Plan updates, Consumer Confidence Reports, Annual Multiple Species Conservation Program (MSCP) management and monitoring reports, plant and wildlife surveys reports, and area-specific management plans.

Goal 2 – Provide Direct Access to IRWM-Generated Data and Information

As described in *Chapter 11, Implementation*, performance data will be tracked to allow the RWMG to assess the progress of implementation and the success of individual IRWM projects and programs, as well as the 2013 IRWM Plan and IRWM Program as a whole. Through the San Diego IRWM website, stakeholders can directly access data and information on all IRWM initiatives. As noted above, the San Diego IRWM website was recently updated to include detailed information about the IRWM planning process such as meeting dates, agendas, and notes for workshops, workgroup meetings, Regional Advisory Committee (RAC) meetings, and other public/outreach meetings. The website will also continue to provide information on the 2013 IRWM Plan development process and relevant documents such as the triennial Report Card that will be produced to comprehensively assess IRWM Program implementation and progress.

Plan stakeholders and the general public will continue to be informed of the IRWM planning process and online data availability through email announcements and in-person announcements made during regular RAC and other stakeholder meetings. Local press will also continue to be informed as future work is completed and data become available online. Specifically, newspaper announcements will continue to be made, as necessary, in accordance with requirements set forth in California Water Code §10541.

In addition, it is anticipated that future work will continue to build upon the extensive public outreach that was conducted for the 2013 IRWM Plan. For additional information on existing and anticipated future stakeholder outreach and involvement activities, please refer to *Chapter 6, Governance and Stakeholder Involvement*.

Goal 3 – Provide User-Defined Interactive Access to Key Data Sets

Selected data sets will be incorporated into a centralized GIS database of key parameters that can be queried by the user. This feature, which is not a current feature of the San Diego IRWM website, is intended to increase the overall access and utility of water management data for the Region. Building on the example of SanGIS (see Table 10-2), the following types of functionality are anticipated: (1) user-based and pre-defined interactive outputs that may be tailored to specific user categories; (2) access to raw data, analyzed data, reports, maps, and other documents; (3) map building via queries, which can be used in conjunction with more advanced functions. The specific format and content of the GIS database is not known at this time, as it will be designed in accordance with substantial stakeholder input and specifically tailored to meet regional data needs. Database design is underway and content and functionality will address the needs identified by stakeholders during the design process.

The IRWM DMS will provide a central repository for data related to water management. Such data may include water quality, flow, rainfall, watershed and stream mapping, and water agency jurisdictional boundaries, among others. The DMS has been envisioned as a comprehensive, water-oriented, publicly available source of information and data. However, given that DMS design is not yet finalized, the aforementioned vision for the DMS may change as necessary to fit the needs identified by stakeholders (refer to Section 10.2.4.2 for more information on the DMS development process).

Entity Responsible for Maintaining DMS

The San Diego IRWM Program, with leadership from the County of San Diego, will be responsible for implementing and maintaining the DMS. The County's Watershed Protection Program in the Department of Public Works, has initiated DMS design by issuing a Request for Proposals (RFP) for DMS design recommendations. Despite the County's current lead on initiating DMS design, with limited exception, ownership and responsibility for the management of data resides with the parties that collect them (i.e., permitted dischargers, NGOs, research institutions) and/or that require their collection (i.e., permitting agencies).

DMS Development and Vision

The DMS will provide a central location for interested qualified parties to submit and access data related to water management in the San Diego IRWM Region. It will be populated with data from partner organizations, including members of the RWMG, the RAC, and projects receiving funding through IRWM grants. Other organizations will be encouraged, but not required, to participate. Protections will be implemented for sensitive data and proprietary information.

Data Availability – Near Term

Water-related data are currently publicly available on the San Diego IRWM Program website (www.sdirwmp.org), through the WaterGIS page. This page allows for direct download of Regional water data, including watershed data, agency boundaries, water quality data, water infrastructure, various jurisdictional and land use data, and other data used in the development of this Plan. , Information related to IRWM Plan projects can be accessed through the Project Database, also available on the San Diego IRWM Program website. Data available on this website will be updated as necessary, and remain available until they can be incorporated into the complete DMS. WaterGIS will contribute to DWR's efficient use of data and stakeholder access to data standards while the DMS is being developed.

DMS Development – Long Term

The DMS is expected to reach final design within two years of adoption of the2013 IRWM Plan. As mentioned above, the County has issued an RFP for the DMS design. This RFP details the expectation of the design process. In accordance with DWR and the RWMG's preference for stakeholder involvement, DMS design will be guided through stakeholder meetings. The design phase of the DMS may include the following steps:

1. A program for NGOs designed to build capacity participation in stakeholder meetings and enable NGOs to participate by providing funding to assist in covering participation expenses. Enabling NGO participation allows for a broader range of stakeholder participation in the design process.
2. Management of the DMS Advisory Workgroup to provide guidance on DMS needs and functionality through development of assessment approaches and methodologies, development of a vision for the DMS design recommendations document, drafting the DMS design recommendations, and providing input throughout the design process.
3. Needs assessment of stakeholder groups to solicit input from stakeholder groups on their existing and past data management efforts and their planned data management needs.
4. Input on draft DMS design recommendations to provide feedback on DMS design recommendations, which will help ensure that all stakeholder needs are considered, and provide for a more transparent process..

Table 10-4: Data Layers Available on WaterGIS (www.sdirwmp.org)

Data Layer	Original Data Source
Integrated Flood Management Data	Potential flood hazard zones developed for the 2013 IRWM Plan (refer to *Chapter 7, Regional Coordination* for more information)
Watershed boundaries	Tierra Data Systems, Interagency California Watershed Mapping Committee via SanGIS Data Warehouse: www.sangis.org
Water agency boundaries	Compiled by IRWM Program
Sanitation district boundaries	Compiled by IRWM Program
Municipal boundaries	SanGIS Data Warehouse: www.sangis.org
Groundwater basins	DWR via SanGIS Data Warehouse: www.sangis.org
Impaired water bodies	State Board 303(d) List: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml
Disadvantaged communities	U.S. Census data, processed by IRWM Program and Nielson-Claritas; Community Planning Areas from County of San Diego and City of San Diego, via SanGIS Data Warehouse: www.sangis.org
Community Planning Areas	City of San Diego, County of San Diego; via SanGIS Data Warehouse: www.sangis.org
Land uses in Region	SANDAG, County of San Diego, Cleveland National Forest, Bureau of Land Management, State Parks, compiled by SANDAG; via SanGIS Data Warehouse: www.sangis.org; U.S. Fish and Wildlife Service: http://www.fws.gov/gis/data/national/index.html#NWRS BOUNDARY ; BLM: http://www.geocommunicator.gov/ARCGIS/REST/services/SMA/MapServer ; California State Parks: http://projects.atlas.ca.gov/projects/calstprksbndys. Land uses consolidated by IRWM Program
Precipitation in Region	SanGIS Data Warehouse: www.sangis.org
Water infrastructure	Compiled by IRWM Program; County Assessor via SanGIS Data Warehouse: www.sangis.org
Tribal Nations	SanGIS Data Warehouse: www.sangis.org
Natural Resources	U.S. Fish and Wildlife Service: http://criticalhabitat.fws.gov/; State Board: http://www.swrcb.ca.gov/water_issues/programs/oceans/asba_areas.shtml

It is anticipated that final DMS design will be the result of these efforts, and once funding is secured, that this design will be implemented. Given the early stage of DMS design at the time of this writing, it is anticipated that changes may be made to the preliminary DMS development and implementation process. Upon completion, the DMS will be made publicly available, with links provided to the DMS online portal on each RWMG member's website, the San Diego IRWM Program website, and RAC member organization websites. Other relevant organizations will also be encouraged to post a link or direct visitors to the DMS. Additionally, a press release will be written and distributed to further notify the public when the DMS is available.

Stakeholder Contribution to DMS

As described above, stakeholders will guide DMS design through workshops, work groups, and public meetings. It is expected that the DMS will be designed to allow stakeholders to submit data for inclusion in the database. Though DMS design is not yet complete, it is likely that the process by which stakeholders contribute data to the DMS will involve an automated submittal process through the DMS website, coordination with a staff member tasked with managing the DMS, or some combination of the two. The exact mechanism for stakeholder contribution to the DMS beyond the forums required in the RFP will be determined through the design process.

QA/QC Measures

Quality Assurance/Quality Control (QA/QC) measures will primarily be the responsibility of the party that collects the data or requires the collection of data. The system is likely to include some form of standardization for data (such as a format compatible with relevant statewide databases), which may act as a cursory QA/QC safeguard. It is also anticipated that DMS users who identify problems with data will be able to report these problems to the DMS manager. It is also anticipated that significant QA/QC problems will be addressed through removal of erroneous data from the system, and suppliers of said data notified of the problem in order to allow for corrections to future data submissions. It is not anticipated that any of the likely data suppliers will present QA/QC problems, given their long history of data collection and analysis, their frequent need to report data to various regulatory agencies, and the use of standard sampling methodologies.

Sharing Data

The purpose of the DMS is to provide a central clearinghouse for regionally-relevant water data to facilitate data sharing and increased integration of data collection and analysis. The DMS will be advertised through the San Diego IRWM website, as well as the websites of RWMG and RAC member organizations. The DMS will be designed for public access, and is anticipated to be user-friendly, with clear instructions for use readily available. Included in the DMS will be data collected through IRWM funded projects. This is a requirement for all projects included in IRWM funding packages, as legally appropriate. Sensitive data are anticipated to be protected through a restricted area of the DMS, though will remain available for DMS users who meet the requirements for access to this data. These requirements will depend on the type of data whose access will need to be restricted, and is anticipated to be determined during the planning or implementation phase of the DMS. All legal requirements relating to data access will be met.

Data will be transferred and shared with stakeholders through downloadable GIS-based data layers. The purpose of WaterGIS and the future full-scale DMS is to provide public access to water resources datasets and to support the RWMG's efforts to share collected data with all interested stakeholders.

Benefits of DMS

Development of the DMS will provide transparent access to water resources data sets and will help support robust water management decision-making. Table 10-5 provides a summary of the benefits of the DMS.

Table 10-5: Benefits of San Diego IRWM DMS

Need	How IRWM Plan Supports Need
Increased Data Availability	The primary objective of the IRWM Plan is to support existing statewide priorities and preferences. Projects and programs funded through IRWM Program will provide data and information consistent with and supportive of these priorities and make them more available to the state and public.
Statewide Water Supply Assessment and Management	Data will assist in updating the California Water Plan.
Evaluation of Regulatory Compliance	Data will assist regulators in evaluating compliance with various permits, regulations, and laws.
Non-point source (NPS) and Watershed Management Initiatives	Data will support NPS Management Plan goal of providing single, coordinated statewide approach to dealing with NPS pollution. Data will also directly support priorities in the Regional and State Boards' Watershed Management Initiatives.
Regional and Watershed Assessments	Data will directly support programs to assess regional and watershed water quality, such as SWAMP and 303(d) listings. Data will also assist in updating various regional and local watershed management plans. As the DMS is developed and implemented, data collected as part of the IRWM program will be easier to access and provide more support for local, regional, and statewide assessments.
Groundwater Assessment and Management	Data will comply with and support objectives of GAMA, including improvement of statewide ambient groundwater quality monitoring and assessment, and increasing groundwater information availability. Groundwater projects funded through the IRWM Program will meet applicable GAMA data standards.
Natural Resource Assessment and Management	Habitat and natural resource data will comply with and support applicable objectives and standards of statewide natural resource conservation and management programs, including MSCP. Project partners will be encouraged to submit data to applicable statewide databases.
Regional Planning Focus/Increased Coordination of Efforts	Bringing together all parties necessary to achieve integrated regional water management will provide an unprecedented level of focus on, and analysis of, existing and new data and information. This will lead to increased insight and stakeholder and public participation. The IRWM Program also encourages integrated thinking, planning, and project design/implementation. Increased coordination should improve the quality and usefulness of data collection efforts in the Region.

10.3 Technical Analysis

The 2013 IRWM Plan is based on sound technical information reviewed by the RWMG, members of the RAC, and other interested SDIRWM stakeholders. Published documents such as regional plans, studies, and technical reports were reviewed, experts were consulted, and meetings with various interest groups were held to understand the short-term and long-range needs of the Region. Stakeholder outreach efforts are detailed in *Chapter 6, Governance and Stakeholder Involvement*, and include soliciting input on the water needs of the Region. Descriptions of the technical information reviewed during development of the 2013 IRWM Plan are provided in the following sections.

10.3.1 Technical Information

The needs identified in the 2013 IRWM Plan were developed through an extensive review of literature and consultation with experts and interest groups. Examples of literature reviewed for IRWM Plan development and updates include regional plans such as urban water management plans, groundwater management plans, and land use plans. Many of the sources are themselves reviews of literature or studies, such as the *California Water Plan Update 2009*, or the 2004-2005 Regional Urban Runoff Monitoring Program Update. Wherever possible, the source of data analyzed in relevant portions of these plans, reports, or studies are noted in Table 10-6.

Whenever possible, regional data, reports, or studies were used to build the foundation for the needs and management direction in the 2013 IRWM Plan. This improves the ability of the IRWM Plan Update to identify and address the unique water needs of the Region, and provides for a more accurate and thorough analysis of the Region. Primary sources of data are the Regional Board, the Water Authority, the County of San Diego, the City of San Diego, the CDFW (previously the California Department of Fish and Game), and other local agencies. Utilizing data from these sources ensures reliable, consistent, and complete information that has been collected and analyzed following accepted standards. Data were also frequently provided by SANDAG, the regional transportation planning agency in San Diego, which is led by a Board of Directors comprised of representatives from the eighteen cities that lie within the Region, and the County of San Diego. This emphasis on local and regional data supports the ability of the IRWM Plan Update to address region-specific needs.

Data gaps identified during IRWM Plan Update development and update are described in Section 10.2.1, above. Section 10.2.3 details how the IRWM Program activities will work towards bridging the identified data gaps.

10.3.2 Technical Analysis and Methods

A description of the studies, models, and other technical methodologies performed in the analyses or literature reviewed used in developing the IRWM Plan Update are provided in Table 10-6. Table 10-6 represents a selection of the primary technical sources used during the writing of the IRWM Plan Update, though as provided on page 58 of the 2012 Guidelines, Table 10-6 may not include every study used. In addition to detailing the type of data used, Table 10-6 also describes how the data were analyzed, the relevant results from the analysis, how the data were used in the IRWM Plan Update, and the source of the data. Much of the technical information used in the creation of the 2013 IRWM Plan stems from UWMPs and other similar planning documents. These documents are updated frequently (every five years), and undergo extensive public review. This process, along with the local and regional focus of these documents, helps to ensure an accurate source of information for local and regional planning. While it is not always possible to identify how data were analyzed in order to write these planning documents, an effort has been made to further define the data that were used in preparation of the documents that form the basis for the planning decisions made in this IRWM Plan Update.

Table 10-6: Technical Analysis and Methods Used in the 2013 IRWM Plan

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
Region Description – Boundaries, Jurisdictions, etc.				
2050 Regional Growth Forecast	SANDAG	Existing demographic and economic trends; local land use plans; forecast model utilizing existing development, future land use plans, proximity to existing job centers, past development patterns, travel times to project location of future growth; consultation with local land use planners	Future land use; future population	Used to determine existing and projected land use, also used to discuss water use and demand
Western U.S. Climate Summaries	Western Regional Climate Center	NOAA coop stations –average annual total rainfall	Rainfall pattern in Region over 150+ years	Used to describe climate, local water source from precipitation
2010 Urban Water Management Plan	Water Authority	SANDAG 2050 Regional Growth Forecast vetted through the Water Authority and the Water Authority's member agencies	Future population within Water Authority service area	Used to determine how many people are served by Water Authority, and in discussion of future water demand
San Diego IRWM Region Acceptance Process (RAP)	RWMG in association with the RAC	Analysis of the Region's unique water management issues to determine an appropriate boundary	Water agency jurisdictional boundaries; Wastewater agency service areas; County boundaries; Physical/hydrologic characteristics	Used to describe appropriate Region boundaries as approved of by DWR in the RAP
San Diego Regional Municipal Separate Storm Sewer System Stormwater Permit (2007)	Regional Board	Permit terms	Duties of Copermittees and principal Copermittee required by MS4 permit	Description of stormwater and urban runoff management responsibilities – this guides how the plan addresses urban runoff and stormwater, and affects project selection, 2013 IRWM Plan objectives, and the Resource Management Strategies Used to determine appropriate Region boundaries
Region Description – Water Supply				
2011 Annual Report	Water Authority	Review of existing records	Water supply volumes or purchases	Used to describe source of water supplied to or by Water Authority member agencies
Bulletin 118	DWR	Review of all Bulletin 118 documents for the Region's groundwater basins	Groundwater yield data, and groundwater balance data (as applicable)	Used to determine groundwater basin locations, limitations of groundwater availability outside Water Authority service area, and establish potential need for protection of groundwater supplies through groundwater management or project selection

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
2010 Urban Water Management Plan	Water Authority	IWR-MAIN computer model modified to meet Region's parameters and renamed CWA-MAIN	Uses SANDAG 2050 Regional Growth Forecast for input data; Water demand related to income, water prices, and weather	Used to discuss water demand in Region in the context of use type and volume. Also used to link population growth/development with increased water demand.
	Water Authority	Review of information presented in the UWMP	Location of groundwater resources for municipal supply, demineralization treatment capacity for groundwater	Used to discuss groundwater resources used for municipal supply
	Water Authority	Review of information presented in the UWMP	Reservoir capacity	Used to discuss capacity of water storage in reservoirs
	Water Authority, City of San Diego	Review of information presented in the UWMP for the Water Authority and the City of San Diego	Water treatment capacity	Used to discuss potable water production capacity, as well as identify source of raw water for treatment facilities
	Water Authority	Review of projected water supply information	Projected surface water supply, reservoir capacity	Projected Water Supply Table: used to determine water supply reliability in various weather years, provides information in order to develop plan to minimize impacts of drought-related water shortages. Used to produce the California Water Plan Update 2009
2003 Colorado River Quantification Settlement Agreement (QSA)	Water Authority	Terms of the QSA agreement	Volume of water transferred from the Imperial Irrigation District	Used to describe source of imported water in Region
Streamflow monitoring	United States Geological Survey (USGS)	Streamflow gauges	Streamflow information	Used to calculate streamflow volume annually, monthly, to demonstrate availability and timing of surface water from streams, as well as influence of urbanization on streamflow
California Water Plan Update 2009	DWR, Water Authority	Review of Resource Management Strategies (RMS) and information pertaining to water supply availability	Identifies short-term and long-term issues that may impact water supply availability	Used to inform *Strategic Plan* that emphasizes diversification of Region's water portfolio. This priority is used in project selection, BMPs, RMS and other parts of the 2013 IRWM Plan

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
Region Description – Recycled Water				
2010 Urban Water Management Plan	Water Authority and member agencies	Review of recycled water supply and demand information Water use records; permits	Projected recycled water supply and demand Volume of recycled water use; capacity of recycled water facilities	Used to describe recycled water demand and projected future demand in the Region. Also used to describe the recycled water capacity in the Region
Tertiary treatment capacity permits	Regional Board	Permit language	Permitted recycled water capacity in million gallons per day	Used to locate existing recycled water capacity
Recycled water discharge permits	Regional Board	Permit language	Permitted discharge flows	Used to discuss discharge of recycled water through existing outfalls
Region Description – Water Quality				
California Toxics Rule	Regional Board	US EPA methodologies to protect human health and aquatic life (as referenced in US EPA 40 CFR Part 131, Derivation of Criteria)	Water quality criteria for cyanide, metals, toxic organics	Used to establish water quality standards
Water Quality Control Plan for Ocean Waters of California	State Board	Review of established objectives for ocean waters	Water quality objectives for ocean waters	Used as reference for information on receiving water standards
303(d)-Listed Waters	Regional Board, State Board	Review of 303(d)-listed water bodies in the Region	List of 42 impaired inland waters in Region, 40 impaired coastal waters	Used to discuss water impairment, provide context for priorities, opportunities for improvements, etc. Used to establish constituents of concern for the Region
TMDL studies	Regional Board	Review of TMDLs in the Region	Adopted and initiated studies	Used to discuss progress on establishing TMDLs for impaired waters in the Region.
2004-2005 Regional Urban Runoff Monitoring Program Update	San Diego County Municipal Stormwater Copermittees	Core monitoring, baseline long-term effectiveness assessments	Constituents of concern in the Region	Used to describe constituents of concern for Region, by watershed
1997 San Diego County Groundwater Report	Water Authority	Review of information presented on the Region's groundwater basins	Water quality issues within groundwater aquifers	Used to establish constituents of concern in the Region's principal groundwater aquifer

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
Region Description – Beneficial Use Protection				
Water Quality Control Plan for the San Diego Basin	Regional Board	Review of Areas of Special Biological Significance	ASBS designation and impact	Determination of 2 ASBSs in Region, which must be protected from change due to human activity
Water Quality Control Plan for the San Diego Basin	Regional Board	Review of Beneficial Uses	Beneficial Use designation	Used to explain the designated beneficial uses for water in the Region
Water Quality Control Plan for the San Diego Basin	Regional Board	Review of water quality objectives	Water quality objectives (surface and groundwater)	The water quality objectives from the Basin Plan are designed to protect beneficial uses. Used to describe surface water quality standards.
Region Description – Flood Management				
Multi-Hazard Mitigation Plan	County of San Diego, Rancho Santa Fe Fire District, all incorporated cities in the Region, FEMA, California Emergency Management Agency	Federal Emergency Management Agency (FEMA)Flood Insurance Rate Map (FIRM) data, Base flood elevations in the HAZUS-MH model	Location and extent of flood hazard areas	Used to discuss areas at risk from flooding in the Region.
Region Description – Stormwater Management				
San Diego Regional Municipal Separate Storm Sewer System Stormwater (MS4) Permit (2007)	Regional Board	Permit terms	Duties of Copermittees and principal Copermittee required by MS4 permit	Description of stormwater and urban runoff management responsibilities – this guides how the plan addresses urban runoff and stormwater, and affects project selection, 2013IRWM Plan objectives, and RMS
Tentative San Diego Regional Municipal Separate Storm Sewer System Stormwater Permit (2013)	Regional Board	Permit terms	Changes to the 2007 MS4 permit, requirement of the Water Quality Implementation Plans	Used to discuss potential changes in stormwater management that will occur during the life of the 2013 IRWM Plan.

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
Region Description – Climate Change				
Climate Change Planning Study	Climate Change Workgroup, San Diego IRWM RAC.	Review of scientific literature. A selection of key sources used in this study is provided below.	Study provides climate change data analysis relevant to the Region, describes relevant policies and legislation, provides a vulnerability analysis for the Region, describes the effects of climate change on the Region, and provides management strategies and recommendation for addressing climate change and its likely impacts.	Used to develop recommendations for the Plan to include regarding climate change mitigation and adaptation.
Regional Focus 2050 Study	San Diego Foundation	Review of scientific literature, consultation with climate change experts and local scientists	Effects of climate change on San Diego region. Key impacts: Climate hotter and drier, sea level rises 12-18 inches, water shortage in County, more frequent and intense wildfires, increased public health risks, loss of native species, inability to meet energy needs.	Used in Climate Change Planning Study as a primary source of information on local impacts of climate change as well as local efforts to address climate change.
Focus 2050 White Paper	Coastal Data Information Program	LIDAR for elevation mapping, and projected sea level rise	Maps of projected inundation levels for mean sea level in 2050.	Used to show the impact of sea level rise on beaches and low-lying coastal communities, as well as the risks they face from inundation levels.
Climate Change Handbook for Regional Planning	DWR	Review of scientific literature	Summary of climate change impacts, methods for assessing climate change in individual regions	Used to describe the threats to local and regional water resources from climate change in the Climate Change Planning Study. Methodologies used to assess climate change vulnerabilities in Region.
Energy Aware Planning Guide	California Energy Commission	Review of scientific literature	Links between energy and water use, strategies to reduce energy use in the water sector	Used in the Climate Change Planning Study to discuss the role water use in the Region plays in GHG emissions. It provides the basis for claims of emissions reductions from Plan actions.
California Water Plan Update 2005; Progress on Incorporating Climate Change into Management of California's Water Resources	DWR	Review of scientific literature	Summary of probable climate change impacts	Used to identify which changes may impact the Region and how these impacts may be felt. This provides a selection of needs that the plan addresses through its objectives, project selection, and management plans.

Data Used to Support Plan				
Data or Study	**Reference or Source**	**Analysis Method**	**Results/Derived Information**	**Use in IRWM Plan**
Region Description – DACs				
Median Household Income	American Community Survey, US Census Bureau	Review of census tracts within the Region	Median Household Income (MHI)	Used to determine location of DACs in the Region
Region Description – Wildlife and Habitat				
Multiple Habitat Conservation Program (MHCP) and Multiple Species Conservation Program (MSCP)	County of San Diego	Review of location of sensitive resources in the Region, particularly those within relation to water resources	1,075 square miles covered, additional 2,907 square miles to be covered in MSCPs being developed	Conservation plans to protect sensitive resources Habitat linkages
San Diego County Multiple Species Conservation Plan EIR/EIS	United States Fish and Wildlife Service , California Department of Fish and Wildlife(DFW)	Review of vegetation communities within the Region	Information about vegetation communities in the Region, particularly those associated with water resources	Used to describe Vegetation communities in the Region
San Diego County Multiple Species Conservation Plan EIR/EIS	USFWS, DFW	Review of wildlife and threatened species within the Region	Information about wildlife and threatened species in the Region, particularly those associated with water resources	Wildlife and threatened species

10.4 References

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