

# CHAPTER 9: DATA MANAGEMENT

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The intent of the Data Management standard in the Proposition 84/1E IRWM Program Guidelines is to ensure stakeholder access to data, effective use of that data, and to ensure that the data generated by Integrated Regional Water Management (IRWM) Plan implementation activities can be integrated into existing state databases. Where feasible, the Regional Water Management Group (RWMG) will utilize existing statewide protocols for the Region's data management needs in order to ensure long-term support and standardization, and to facilitate dissemination to stakeholders. This section describes how data from IRWM-funded projects as well as ambient data related to overall IRWM effectiveness will be collected, stored, validated, and shared.

## **9.1 INTRODUCTION**

Local agencies and organizations developed the Santa Cruz IRWM Plan to address a range of water resource challenges. Documenting project implementation and evaluating the success in addressing these challenges will require an organized, collaborative approach to monitoring (see Chapter 9, Plan Performance and Monitoring) and sound data management.

Throughout the Santa Cruz IRWM Region, a great deal of valuable environmental data is being collected. Unfortunately, while there is a lot of monitoring occurring, few of these efforts are coordinated and data is seldom shared. This is due in large part to the fact that most data collected is program specific with outcomes intended for a particular question or purpose, hence the transferability is limited. The IRWM planning process can help to facilitate better information sharing and to identify data needs that will help the RWMG, agencies and organizations, project proponents, and stakeholders in the region better understand environmental conditions and the effects of management efforts.

The objective of adopting uniform data management principles for IRWM Plan projects is to create information that will be more accessible and useful for addressing regional questions about the health of resources and to facilitate data sharing in the region. Complete standardization of all data types throughout the region would require substantial resources from data generators and would also require the creation of an entity for centralized data management. Efforts to completely standardize data sets have been ongoing in the Monterey Bay area for a number of years with limited success. Challenges to complete standardization include differences in monitoring or implementing organizations' long-term data storage objectives, technical capacities, and reporting requirements.

A less costly alternative with a greater chance for success is the adoption of similar data management documentation practices for IRWM Plan projects (see Plan Performance and Monitoring, Chapter 8) along with the rigorous standardization of the most critical information across projects and data types. Given resources currently available, it is not possible to centralize the management of the diverse data types that may include physical implementation, monitoring, restoration, design, inspection, education, and outreach. Further, tasking a single entity with managing data they did not collect risks errors and problems with quality control and assurance, and would be difficult to finance and maintain on an ongoing basis. However, as resources allow, the Region should adopt and implement standardized data management protocols and establish procedures to make data more accessible.

In the meantime, adopting common data documentation standards and standardizing key metadata fields is a sensible and useful first step. The RWMG will facilitate data discovery and sharing, ensure

appropriate use of data, and facilitate addressing regional data needs. The RWMG will work to ensure that, to the extent feasible, the Region will utilize state database frameworks including, the California Surface Water Ambient Monitoring Program (SWAMP), the California Environmental Data Exchange Network (CEDEN), the California State Groundwater Elevation Monitoring (CASGEM) program, and the Groundwater Ambient Monitoring and Assessment (GAMA) database.

## 9.2 DATA NEEDS

### 9.2.1 IRWM PROGRAM INFORMATION

The Region's data management system should document the local IRWM planning process and all of its associated meetings and workshops. Meetings and workshops will be announced on the website along with posting of appropriate meeting materials (agendas, minutes, presentations, etc.). Stakeholders will be able to download these materials from the website or have links provided that will take them to the online resources discussed at the event. Meeting materials will be archived so that they can be organized and accessed as needed after the event. The RWMG will also compile and make available IRWM-related information, such as technical studies, research papers, and monitoring results, among other information, that stakeholders will be able to access. Apart from those containing sensitive information, publicly funded data and materials are made available to the public via the Santa Cruz IRWM website ([www.SantaCruzIRWMP.org](http://www.SantaCruzIRWMP.org)) in an easily accessible and searchable format.

### 9.2.2 PROJECT-SPECIFIC DATA

A primary data need within the Santa Cruz IRWM Region is to collect and maintain accurate, reliable, and current data about the projects included in the IRWM Plan that have received IRWM grant funding. As described in Chapter 8, Plan Performance and Monitoring, data will be gathered at the project level to assess the performance of projects in meeting their objectives, and to gauge the Region's progress toward achieving its goals. One-page fact sheets for each project completed through the IRWM program will be developed by the project proponent and the RWMG and posted to the website. This will allow stakeholders to quickly familiarize themselves with each project and to understand the types of data collected. Fact sheets will include keywords, location data, monitoring metadata, participating organizations, budget, status, etc. The RWMG will serve as the hub for accessing the project-specific data generated from each IRWM-funded project.

### 9.2.3 AMBIENT DATA

Ultimately, IRWM project implementation is hoped to influence trends in ambient conditions towards desired conditions. A variety of ambient data may be used depending upon functional area (i.e., water supply, water quality, watershed resource, or flood/stormwater management), but may include (see Chapter 8):

- streamflow
- surface water extracted
- volumes of supplemental water

- groundwater elevations
- groundwater pumping
- precipitation
- water demand
- water quality data
- locations of sensitive habitats and species
- hydrogeologic and hydrologic data
- land use / flood risk information

Working with the project sponsors, the RWMG will ensure that applicable statewide database structures and formats are utilized, including various statewide data management frameworks.

For surface water quality monitoring and biological monitoring, the RWMG has opted to use guidance developed by the State Water Resource Control Board's (SWRCB's) Surface Water Ambient Monitoring Program (SWAMP). Groundwater monitoring will follow both the Groundwater Ambient Monitoring Assessment (GAMA) and California Statewide Groundwater Elevation Monitoring (CASGEM) Programs. Chemical measurements typically include sediments, nutrients, bacteria, pesticides and herbicides, persistent organic pollutants, and trace metals. Additionally, a number of programs collect measurements that reflect ecosystem level health including toxicity, periphyton assays, bioassessments, and rapid condition assessments. Through cooperative agreements with local agencies, the United States Geological Survey (USGS) maintains, collects, processes and publishes streamflow data at specific sites in the Santa Cruz Region and provides access to real-time or historical data sets via the web, accessible from USGS websites. Below are data collection techniques for the previously mentioned programs and methods.



**Urban Watch Water Quality Monitoring Program**

*Photo courtesy Coastal Watershed Council*

SWAMP: Typical data collection techniques for surface waters include both field measurements and laboratory analysis. Field measurements are either collected using meters or field kits for a common list of constituents including but not limited to water temperature, pH, conductivity, dissolved oxygen, and turbidity. Example field data sheets and a complete list of SWAMP required fields can be found at the SWAMP website.<sup>1</sup> There is a large list of possible analytes that are measured in surface waters that require laboratory analysis. Typical laboratory analysis includes fecal indicator bacteria, metals, nutrients, persistent organic pollutants, and turbidity. SWAMP provides guidance on methods and quality assurance, which can be found published online by the State Water Resources Control Board.<sup>2</sup>

Biological monitoring is helpful for determining the health of a system and whether it is able to sustain a diverse community of benthic macroinvertebrates. Standard operating procedures for determining a stream's physical/habitat condition and benthic invertebrate assemblages can be found on the SWAMP website.<sup>3</sup>

<sup>1</sup> [http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp\\_sop\\_field\\_measures\\_water\\_sediment\\_collection\\_v1\\_0.pdf](http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp_sop_field_measures_water_sediment_collection_v1_0.pdf).

<sup>2</sup> [http://www.waterboards.ca.gov/water\\_issues/programs/swamp/docs/qapp/qaprp082209.pdf](http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/qaprp082209.pdf).

<sup>3</sup> [http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp\\_sop\\_bioassessment\\_collection\\_020107.pdf](http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp_sop_bioassessment_collection_020107.pdf).

GAMA: The GAMA Priority Basin Project is grouped into 35 groundwater basin groups called study units. Each study unit is sampled for common contaminants regulated by the California Drinking Water Program, and also for unregulated chemicals. Testing for these chemicals will help public and private groundwater users to manage this resource. Some of the chemical constituents that are sampled by the GAMA Priority Basin Project include:

- Low-level volatile organic compounds (VOCs)
- Low-level pesticides
- Stable isotopes of oxygen, hydrogen, and carbon
- Emerging contaminants (pharmaceuticals, perchlorate, chromium VI, and other chemicals)
- Trace metals (arsenic, selenium, lead, and other metals)
- Radon, radium, and gross alpha/beta radioactivity
- General ions (calcium, magnesium, fluoride)
- Nutrients, including nitrate and phosphates
- Bacteria: total and fecal coliform bacteria

CASGEM: The goal of the CASGEM program is to regularly and systematically monitor groundwater elevations that demonstrate seasonal and long-term trends in California's groundwater basins and to make this information readily and widely available to the public. The CASGEM program relies upon the many established local long-term groundwater monitoring and management programs.

## 9.3 EXISTING AMBIENT MONITORING PROGRAMS IN THE SANTA CRUZ REGION

### 9.3.1 GROUNDWATER

Groundwater is the primary source of supply for much of the Santa Cruz region and effective management is critical to long-term sustainability of this resource. Unfortunately, each basin within the region is in a state of overdraft as a result of demand and reduced recharge. The California Groundwater Management Planning Act (CWC Section 10750) declares that groundwater is a valuable natural resource in California that should be managed to ensure both quality and quantity. The Act requires certain districts (referred to as AB 3030 districts) to conduct regular monitoring and analysis of groundwater basins. In the Santa Cruz Region, these districts include the Scotts Valley, Soquel Creek, and Central Water Districts. The monitoring and analysis conducted under this requirement provides valuable information regarding the status and trends of the Region's primary groundwater basins. This data formed the basis for discussion in the analysis of groundwater status and trends in the Region Description chapter of this IRWM Plan. Data will continue to be managed by each of the responsible districts, and requested by the RWMG as part of each five year Plan review.

### 9.3.2 STREAMFLOW

Streamflow, principally summer baseflow, is an important consideration when evaluating the health of a watershed, and is arguably the most important factor regarding the fate of aquatic organisms in surface

water. Streams with adequate baseflow can sustain fish and the critical aquatic organisms during the prolonged summer and early fall dry periods. In the Santa Cruz Region, streamflow is affected by precipitation, diversions, and long-term conditions in groundwater aquifers. Three primary sources of streamflow data exist: the City of Santa Cruz gaging of the North Coast Streams (Liddell, Laguna and Majors Creeks), the USGS gages on the San Lorenzo River and Soquel Creek, and County flow measurements of ungaged streams on a quarterly or biannual basis. As resources allow, the RWMG will compile streamflow data from each data generator and will organize the data in the DMS so that it is accessible to stakeholders.

### 9.3.3 WATER QUALITY

Water quality in the Santa Cruz Region is impacted most by nonpoint source runoff from urban, rural, and agricultural areas. Primary pollutants of concern include sediment, nutrients and pathogens. These pollutants have a variety of impacts, including degraded aquatic habitat, toxicity to aquatic organisms, increased treatment costs for potable water supply, flooding, fisheries decline, and public health impacts from recreating in contaminated waters. Hydromodification, or the alteration of natural runoff timing and volume, has occurred throughout much of the developed areas of the county. The effects of hydromodification include increased runoff, erosion, sedimentation, and pollutant loads in receiving waters. There are several ongoing water quality monitoring programs in the region:

#### County Water Quality Monitoring Program

The County's Environmental Health Services (EHS) conducts a comprehensive water quality monitoring program that includes weekly sampling and analysis at approximately 14 beaches and six freshwater sites; monthly or bi-monthly at approximately eight beaches and 15 freshwater sites; and other monitoring in support of specific studies. This monitoring program has been generating data since 1976, although the amount of monitoring has fluctuated over time with varying levels of resources. Data generated through this monitoring effort will be maintained by the County of Santa Cruz and made available to stakeholders and the RWMG for periodic reviews.

#### CCAMP

The Central Coast Ambient Monitoring Program (CCAMP) is a monitoring program administered by the Central Coast Regional Water Quality Control Board. The CCAMP monitoring strategy for watershed characterization calls for dividing the Region into five watershed rotation areas and conducting sampling each year in one of the areas. Sites are placed at the lower ends of tributaries and along the mainstem, with additional sites placed to characterize changes in land use, or to focus on waterbodies of special concern. The program's overall coverage is similar to the County's monitoring program; however the specific monitoring sites do not match the County's. Over a five-year period all of the Hydrologic Units in the Board's region are monitored and evaluated. In addition to the watershed characterization work, CCAMP conducts a coastal confluences monitoring program. The CCAMP monitoring strategy for coastal confluences includes ongoing sampling at 33 river and stream mouths, just above salt water influence. This program serves as a census of water quality conditions in all of the larger watersheds, and provides a basis for detecting long-term trends and assessing broad-scale performance of water quality management efforts. These monitoring locations are in closer proximity to the County's lagoon monitoring locations. Coastal confluence monitoring is conducted on an ongoing basis. CCAMP stores its own data and provides useful data summaries on the CCAMP website. These sources will be utilized during the triennial Plan review process.

### Sediment Monitoring

Erosion and the resulting sedimentation is the primary cause of degraded aquatic habitat and impaired water quality in Santa Cruz County. Excess sediment smothers spawning beds and rearing areas for threatened steelhead and endangered coho salmon, compromises domestic water supply, transports persistent organic pollutants, and clogs drainage infrastructure. Despite the significant impact of sediment, resource limitations generally prohibit sediment monitoring from occurring in the Santa Cruz Region. Proposition 50 funds provided a unique opportunity to collect valuable sediment data, and it is hoped that sediment monitoring will continue on some interval into the future, as resources allow. The effort funded through Proposition 50 will serve as the baseline methodology for this monitoring, which included suspended-sediment monitoring at five sites, with continuous monitoring of turbidity using field-deployed optical backscatter type sensors. Two sites were current USGS gaging stations, located on the San Lorenzo River at Big Trees and Soquel Creek at Soquel. The other sites at Bean, Zayante, and Valencia creeks included the installation of stream gages, from which sediment-rating curves and sediment loads were computed.

### 9.3.4 FISHERIES

Seven local agencies collaborate to fund a juvenile salmonid and stream habitat monitoring program, which is administered by the County of Santa Cruz. The program provides valuable data on local steelhead and coho salmon juvenile densities and stream habitat conditions in three of the Region's watersheds including San Lorenzo, Soquel, Aptos, as well as the Corralitos Creek watershed, which is adjacent to the Region's boundary. Steelhead are listed as threatened under the federal Endangered Species Act (ESA). Coho salmon are listed as endangered under state and federal ESAs and are at high risk of extinction in Santa Cruz County. These data can be used to track steelhead and coho salmon spawning and rearing habitat conditions, prioritize restoration and conservation efforts, and inform land and water use decisions. This information can provide habitat and juvenile salmonid (steelhead and coho salmon) density information for permitting and monitoring restoration and public works projects. In addition, these data support an understanding of local population dynamics, which help focus and track conservation efforts. The monitoring program collects four categories of data: (1) habitat data within half-mile stream segments; (2) fish and habitat data at specific sampling sites within the half-mile stream segment; (3) quantity and type of large woody material within half-mile stream segments and (4) steelhead occurrence in lagoons. Data is housed and managed by the County.



Juvenile Steelhead (photo: Morgan Bond, Ph.D.)

## 9.4 DATA MANAGEMENT AND DISSEMINATION

Each organization or project proponent that collects data related to habitat condition, biological monitoring, or water quality will be responsible for maintaining their own data management system and quality control. Primary data management responsibilities for surface water quality data lies with the data collecting organization, with integration at the regional level by the Regional Data Center (Moss Landing Marine Labs) and at the state level by California Environmental Data Exchange Network. The same is true for data related to habitat conditions and groundwater. If this type of monitoring is required by funding source guidelines, the entity collecting the data will maintain their own data storage system for their organization in advance of uploading the data into the appropriate statewide databases.

### 9.4.1 QUALITY ASSURANCE (QA) / QUALITY CONTROL (QC)

While data management practices need not be equivalent for all projects included in the Santa Cruz IRWM Plan, it is important that protocols and practices are documented in a methodical way such as a Quality Assurance Project Plan (QAPP), so that users of the data can assess its comparability with other data sources. IRWM Plan projects will be compatible with all applicable statewide quality assurance protocols, as previously discussed.

### 9.4.2 DATA TRANSFER AND SHARING

This section describes how data collected for IRWM Plan implementation will be transferred and/or shared between members of the RWMG and other interested parties throughout the region, including local, state, and federal agencies.

The intent and design of the Santa Cruz IRWM Plan data management system focuses on a localized approach to data collection and management with the primary goal of uploading data of known quality into a statewide database with web tools for dissemination. It is not reasonable to expect every organization that has implementation projects to change the way they store and manage their data. In addition, the Santa Cruz RWMG does not have the resources to develop and fund a centralized data storage system. The most logical system is to fully leverage and support the efforts and resources the state has developed for data compilation and dissemination. These systems make data collection much more informative and valuable when it is easily accessible and available to the RWMG for resource management and decision making.

## 9.5 DATA GAPS AND POTENTIAL NEW MONITORING EFFORTS

While extensive water resources monitoring is ongoing in the region, additional opportunities exist for data gathering to fill gaps and expand knowledge about the region's remaining water resources. Some perceived gaps in monitoring include:

- Riparian assessment: A key performance measure related to the aquatic ecosystems functional area is the development of a rapid riparian assessment method.
- Groundwater quality: There is limited information regarding groundwater quality in some areas of the region, particularly as it relates to nutrient concentrations.

- Land use/impervious surfaces: No single layer exists that provides enough information to inform the extent of impervious surfaces within the Region. Compiling such information would support each of the functional areas.
- Emerging contaminants: Little is known about the extent and severity of pollutants categorized as emerging contaminants (e.g., personal care products, endocrine disrupting compounds, etc.).

The data management subcommittee will identify the most pressing gaps and will seek to develop approaches to funding that might support those activities.