CHAPTER 8: PLAN PERFORMANCE AND MONITORING

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The Plan Performance and Monitoring standard described in the 2012 Proposition 84/1E Integrated Regional Water Management (IRWM) Grant Program Guidelines requires that IRWM Plans include a process through which it can be determined that:

- The Regional Water Management Group (RWMG) is making progress towards meeting the objectives of the IRWM Plan;
- The RWMG is implementing projects listed in the IRWM Plan; and that
- Each project in the IRWM Plan is monitored to comply with all applicable rules, laws, and permit requirements.

The first two requirements listed above are addressed through this chapter, while the third is addressed as part of the project solicitation process described in Chapter 6, Project Review Process and Integration. The project solicitation conducted as part of the update for this Plan required that project applicants document the status of permits and status related to regulatory feasibility. Any project that is funded through the IRWM Program will be monitored to ensure compliance with all applicable rules, laws, and permit requirements along with any additional performance measures prescribed for the project.

As part of this Plan's update, the Steering Committee sought to implement a planning process that directly linked strategies with achievement of objectives. The planning process, described as the development of a conceptual framework, was intended to guide IRWM implementation so as to ensure that those projects with the greatest potential to achieve Plan objectives are identified and implemented. A set of monitoring objectives was identified for each functional area (i.e., water supply, water quality, watershed and resource stewardship, and flood protection/stormwater management), as resources allow these will be used to track and report Plan progress. The monitoring objectives were developed in such a way as to be able to simply, but effectively, communicate progress of IRWM implementation strategies over time.

8.1 PRIOR EFFORTS TO CHARACTERIZE IRWM PLAN PERFORMANCE

Local agencies and organizations developed the Santa Cruz IRWM Plan to address a range of water supply, water resources, and watershed management challenges. A Proposition 50 grant to the Regional Water Management Foundation (RWMF) funded implementation of 15 high-priority water resource projects from 2008 - 2013. Under the initial, 2003 IRWM Program Guideline requirements for measuring plan effectiveness, a monitoring program was developed to account for IRWM effectiveness in two ways. First, project-specific monitoring was done to demonstrate that projects were implemented and achieved their goals as described in their Performance, Assessment, and Evaluation Plans (PAEPs). Second, broad interdisciplinary environmental trends analysis for key parameters evaluated the integrated effort as a whole and whether or not the collective projects had a discernible impact on natural systems. The lessons learned through this effort helped form the basis for measuring plan effectiveness going forward. In particular, the experience guided the need to identify and track meaningful indicators that reflect trends that can be tied to, and influenced by, management actions.

8.2 PROJECT TRACKING

A table will be populated with each Plan Performance Review to track the RWMG's implementation of projects listed in the IRWM Plan. The first table will simply list all of the projects in the IRWM Plan, their implementation status, and funding source. Projects that have been fully implemented will be highlighted, a truncated example table follows:

Table 8 - 1 Project Tracking and Plan Performance Table

Project Proponent & Project Title	Funding Source		Date of Implementation/Status
	IRWM Amount $	Other funds $ (cite source)	
1. xxx	$500,000	$250,000 County Flood Zone 5	7/2014; In construction
2. xxx			Not yet implemented
3. xxx	$250,000	$180,000 CDFW Fisheries Restoration Grant Program (FRGP)	Completed. 5/2014
4. xxx			Not yet implemented
5. xxx			Not yet implemented

8.3 PROJECT-SPECIFIC MONITORING

As described below, project-specific tracking and monitoring will be conducted by the project sponsor and reported on an ongoing basis to ensure that projects are implemented as designed and functioning as intended. Results will be communicated to granting agencies, as appropriate, and to a wider stakeholder audience through workshops, posting to the IRWM website, or through other events. Monitoring results will be also be incorporated into one-page project fact sheets summarizing the project and describing project effectiveness, which will also be made available on the Santa Cruz IRWM website.

Fish Sampling San Lorenzo River
Photo courtesy: SCWD

The Steering Committee anticipates that project proponents funded through the IRWM program will be responsible for the following project-specific monitoring responsibilities.

1. Prepare project-specific monitoring and quality assurance project plans, as necessary, prior to the start of project construction or implementation.
2. Conduct pre, during, and post-project monitoring in accordance with the project-specific monitoring plan.
3. Ensure that data is recorded and managed according to all local and state requirements (i.e., California Environmental Data Exchange Network (CEDEN), California Statewide Groundwater Elevation Monitoring (CASGEM), etc).
4. Seek opportunities to integrate, where possible and practical, multi-benefit elements in order to better achieve regional goals.

5. Compile, organize, and provide updated project-specific monitoring information to the RWMG for posting on the website or including in fact sheets.
6. Identify a point person for contact regarding monitoring methods, results, and data.
7. Comply with grant requirements, including submitting project information to the Natural Resources Project Inventory (NRPI), as identified by the funding agency, RWMF, or other organizations.

As part of the IRWM Plan performance assessment, projects will be evaluated with respect to stated performance measures, usually described in a project's PAEP or similar document. The PAEP will guide monitoring activities that will characterize whether or not the project was implemented according to designs and whether or not it is functioning as intended.

Project-specific monitoring plans shall reflect the Department of Water Resources requirements identified in the 2012 IRWM Grant Program Guidelines, which include the following:

1. A description of what is being monitored. Examples include:
    a. Water quality: Estimated pollutant load reductions
    b. Aquatic ecosystems: Miles of natural streams restored and/or rehabilitated
    c. Water supply: Increase in local water supplies
    d. Water supply: Amount of water conserved
    e. Aquatic ecosystems: Acres of invasive species removed
    f. Water supply: Acre-feet water storage and conjunctive management of surface and groundwater resources
    g. Climate change mitigation: Megawatt or kilowatt reduction in energy use
2. A description of measures to remedy problems encountered during monitoring.
3. A description of the location of monitoring and monitoring frequency.
4. A description of monitoring protocols and methodologies, and assignment of responsibility for monitoring.
5. A description of what data will be shared with IRWM Plan Stakeholders and with what frequency.
6. Identification of the state databases that information will be provided to, and requirements for data submittal.
7. Resources and procedures to ensure the monitoring schedule will be maintained (e.g., identify responsible parties and alternates, and funding for monitoring).

Ideally, as resources allow, monitoring will be conducted on an annual basis. Projects that are included in the IRWM Plan, but are not funded through the IRWM program, will also be encouraged to follow a similar monitoring and reporting plan. Project proponents will be asked to provide monitoring and reporting information on their projects to the RWMG.

8.4 OVERALL IRWM PLAN PERFORMANCE ASSESSMENT

As resources allow, ideally on at least a triennial basis, the RWMG will conduct an assessment of overall IRWM Plan performance using the methods described below. These methods were developed through the conceptual framework planning process, which identified a set of performance measures that would have the sensitivity to management actions and relationship to IRWM goals and objectives to gauge

effectiveness. Informing the selection of these performance measures was a baseline analysis of overall IRWM Plan effectiveness that was conducted under Component 15 of the Proposition 50 Implementation grant.

As part of the plan performance assessment, the RWMG will collect and manage data as described in Chapter 10, Data Management. The RWMG will use an adaptive management approach to incorporate "lessons learned" from project-specific monitoring into the IRWM Plan in terms of objectives, resource management strategies, or other aspects of the Plan or planning process. Additionally, as more effects of climate change manifest, new tools are developed, and new information becomes available, the RWMG may need to adjust the objectives and strategies of the IRWM Plan to better address these changes.

The following sections list the performance measures and generally describe how monitoring will be conducted.

WS1. By 2030, meet or exceed target groundwater elevations or maintain increasing trends in groundwater elevations for wells that do not have targets.

Indicator: Minimum groundwater elevations for selected monitoring wells measured by water district compared to elevation targets and demonstrated net increasing trend in groundwater elevations. Comparisons of targets to actual groundwater elevations reported as +/- ft. Trend reported as +/- slope and statistical significance.

Hypotheses: The coastal groundwater aquifers in the region are currently over drafted and the corresponding groundwater elevations have been decreasing over time, increasing the landward progression of saltwater intrusion. Groundwater elevation targets by 2030 are defined for a series of regional monitoring wells and demonstration of achievement and/or increasing water level trends will demonstrate protection of groundwater resources as a result of multiple effective strategies. Targets have not been established yet for the inland Santa Margarita Basin, but in the absence of targets and increasing trend in groundwater levels will be sought.

Data: Groundwater elevation targets defined by participating water districts for specific wells at critical locations to reduce and/or stop the landward progression of saltwater intrusion and minimize additional overdraft.

WS2. Increase the annual production to meet alternative water source supply targets established by participating water districts by 2030.

Indicator: Annual alternative source production compared to regional targets. Comparisons of targets to actual annual production reported as +/- afy and +/- percent relative to regional targets.

Hypotheses: Alternative sources include desalination, municipal recycling, and water transfers. Increasing the maximum potential production from alternative sources will improve flexibility to meet regional demand while also lessening pressure on local surface and groundwater resources. Dry years will be the most critical times for water use from alternative sources to protect the condition of streams, reservoirs, and aquifers.

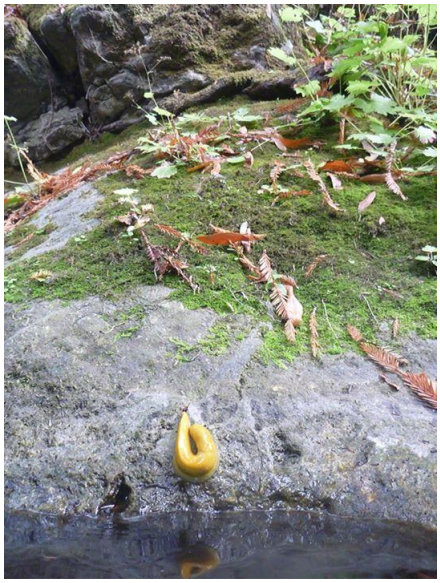
Data: Alternative source production targets for participating water districts.

WS3. Reduce the number of days flow targets are not achieved in the San Lorenzo River, Soquel Creek, and North Coast streams.

Indicator: Frequency that the actual mean daily streamflow is less than the flow targets. Objective tracked as number of days per year where mean daily flow is less than target and maximum percent deviation of mean daily discharge (cfs) from target by site.

Hypotheses: Ability to achieve in-stream flow targets will indicate both flexibility in supply and improved aquatic habitat conditions.

Data: Identify indicator streams gage(s) and associated critical discharge (cfs) to serve as regional targets at which extractions will cease until levels recover. The determination of specific flow targets will be informed by rigorous surveys and evaluations at critical locations in the respective tributaries. These evaluations will link the hydro-geomorphic conditions with the desired habitat characteristics for salmonids and their supporting ecosystem, therefore providing high confidence that achievement of objective WQ3 corresponds to the desired distribution of suitable habitat.



Banana slug streamside
Photo courtesy: SCWD

This objective also supports Aquatic Ecosystem goals**.**

WS4. Decrease and maintain per capita consumption for commercial, residential, and agricultural customers to meet 2030 targets specified by each water district.

Indicator: Regional per capita consumption. Calculate per capita consumption by water district using average water production by district for previous five years divided by district average service population for same time period.

Hypotheses: Reducing customer water demand will directly reduce water supply needs. Increases in usage efficiency, conservation, and water recycling techniques will directly lessen pressure on the municipal water supply sources. District-specific per capita consumption targets will accommodate the difference in per capita consumption across districts that are due to localized climate and land use variations.

Data: Residential per capita consumption targets defined by water district.

Below are the specific Water Quality strategy implementation objective statements that include desired target conditions by 2030, the working hypotheses of how IRWM strategies will result in objective obtainment, and a summary of the data needed to report and track incremental progress.

WQ1. Achieve statistically significant decreasing trends of fecal indicator bacteria and human-specific fecal indicators at key locations of the San Lorenzo, Soquel, and Aptos watersheds by 2030.

Indicator: Bacteria log mean and human indicator trends (MPN/yr) at key locations on 3 - 5 year time steps.

Hypotheses: Cumulative source control actions within watersheds are expected to reduce monthly and annual bacteria concentrations and human-specific contributions within water bodies over the long term. Utilize existing and continued County bacteria sampling dataset to conduct annual trend analyses that account for seasonal climatic and flow variability.

Data: Standard approach for statistical analysis and reporting.

WQ2. Reduce frequency of septic system overflows and failures by 30% by 2030.

Indicator: Frequency of septic system failures; number of parcels with septic systems that experience overflows and other issues annually.

Hypotheses: Septic system failures are an important source of bacteria to surface water systems and may contribute to human health impacts in rural wells and coastal waters with high recreational use.

Data: Refine the procedures and information system to identify and document septic system problems and failure locations.

WQ3. Improve the rural road conditions in the San Lorenzo, Soquel, and Aptos watersheds by 40% as measured by increases in rural roads rapid assessment scores by 2030.

Indicator: Rural road condition tracking using Rural Road Rapid Assessment Method (RAM). Quantitative objective would be defined as 40% reduction in the miles of rural roads with RAM scores < 2.0 by 2030.

Hypotheses: Rural roads are significant sources of sediment to surface waters that can be mitigated with effective road improvements and continued maintenance. The development and application of Rural Road RAM will facilitate quantification of road condition distribution and tracking of improvements over time.

Data: Develop the Rural Road RAM in 2014 and obtain/map existing conditions of known and accessible road networks. Once existing conditions are mapped, miles of road within each RAM category < 2.0, 2-4 and > 4 can be quantified and the 40% reduction placeholder can be evaluated and revised if necessary.

This objective also supports Aquatic Ecosystem goals.

WQ4. Clean out 100% of urban roads and storm drain drop inlets to best achievable conditions by October 1 of each year.

Indicator: Stormwater BMP condition Oct 1; Probabilistic sampling of 20-30% of urban roads and drop inlets throughout urban areas and frequency of samples with BMP RAM scores < 4. In order to achieve objective, 100% of samples must obtain BMP RAM scores > 4.

Hypotheses: Pollutant delivery is particularly high during initial winter storms, and this "first flush" of pollutants is responsible for substantial delivery of bacteria, sediments, nutrients, persistent organic pollutants (POPs), etc. to rivers and nearshore ocean waters. Focused stormwater maintenance actions such as effective street sweeping and drop inlet cleanouts during the late summer and early fall can reduce the mobilization and transport of urban-derived pollutants to local surface waters.

Stormdrain
Photo courtesy: County of Santa Cruz

Data: Adoption of Best Management Practices Rapid Assessment Method or equivalent to inventory and track road and storm drain drop inlet conditions using simple and rapid visual methods to verify that street sweeping and drop inlet cleanouts were effective.

Below are the specific Aquatic Ecosystem strategy implementation objective statements that include desired target conditions by 2030, the working hypotheses of how IRWM strategies will result in objective obtainment, and a summary of the data needed to report and track incremental progress.

AE1. Improve riparian zone condition by 40% as measured by increases in rapid riparian zone condition assessment scores by 2030.

Indicator: Riparian zone condition tracking. Quantified as miles of riparian zone at or above a desired threshold condition.

Hypotheses: The amount and composition of vegetation cover, channel stability, channel floodplain relationship, degree of encroachment, etc., are critical components of stream aquatic habitat quality. Significant opportunities exist to improve the condition of riparian areas throughout the region.

Data: Identify assessment methods to document and quantify riparian condition. Opportunities exist to create simple techniques using aerial imagery, tributary characteristics, parcel datasets, and field verifications that can be feasibly implemented throughout the region. Alternative options include utilizing existing methods such as California Rapid Assessment Method (CRAM; www.cramwetlands.org). There is a need to quantify existing riparian conditions and define achievable improvements in order to set a quantitative objective target.

This objective also supports Flood/Stormwater Management goals.

AE2. Improve habitat conditions in streams that currently support salmonids for spawning, migration and rearing by 40% as measured by increases in salmonid habitat condition tracking scores by 2030.

Indicator: Salmonid habitat condition tracking. Quantified as miles of stream at or above a desired threshold condition.

Hypotheses: The condition of regional streams can be greatly improved to support salmonid spawning, migration, and rearing life cycles. The critical components of the priority streams where improvements are necessary include:

- reductions in the amount and spatial extent of fine sediment (sand or finer) in the channel,
- increased amount and spatial distribution of large woody debris (LWD),
- increased riparian cover and condition,
- increased hydro-geomorphic function,
- reduced water depth limitations for salmonid migration and rearing during baseflow conditions, and
- removal of critical physical barriers that prevent fish passage.

Data: Identify assessment methods to document and quantify habitat conditions that integrate the critical stream components listed above and can be feasibly implemented throughout the region. Opportunities exist to adopt/adjust existing rapid assessment methods implemented by other monitoring programs. There is a need to quantify existing salmonid habitat conditions and define achievable improvements in order to set a quantitative objective target.

AE3. Increase the wetland habitat area by 30% by 2030 to support native plants and animals.

Indicator: Sum of tidal and freshwater wetland habitat acreage.

Hypotheses: Opportunities exist to increase the area of tidal and freshwater wetlands within the region through acquisition, protection and restoration. Effective areal increases would include morphologic improvements that reduce the width to depth ratio of the wetted area and restoration of native vegetation.

Data: Defined standardized approach and subsequent inventory of existing wetland area and future achievable target that may adjust the initial 30% increase target defined above.

AE4. Reduce frequency of dissolved oxygen conditions < 3 mg/L in San Lorenzo and Aptos tidal wetlands by 30% by 2030.

Indicator: Frequency of dissolved oxygen conditions < 3 mg/L.

Hypotheses: Measurable improvements in the dissolved oxygen conditions of tidal wetlands will contribute to the improved success of fish species of concern that depend on healthy tidal wetlands. Since tidewater goby spend their entire lives within local tidal wetlands, they are dependent on tidal wetland habitat quality during both summer and winter. Summer rearing of steelhead trout in local tidal wetlands is a critical component of supporting the watershed's adult population.

Data: Extensive and continued water quality monitoring has been completed in a number of local tidal wetlands to identify factors that contribute to healthy habitat conditions. A preliminary standardized data analysis approach has been developed using long-term dissolved oxygen data from San Lorenzo

and Laguna tidal wetlands, but continued and comparable water quality data collection would need to be expanded to Aptos and any other tidal wetlands of interest.

Below are the specific Flood Protection and Stormwater Management strategy implementation objective statements that include desired target conditions by 2030, the working hypotheses of how IRWM strategies will result in objective attainment, and a summary of the data needed to report and track incremental progress.

FSM1. Reduce the estimated regional economic cost of a 100-year discharge event by 30% by 2030.

Indicator: Regional economic cost of a 100-year storm event.

Hypotheses: Economic loss in flood-prone areas can be significantly reduced by either greater flood protection (i.e., reduction of flood-prone area) or reducing the economic cost of flooding in high risk areas through land use modifications such the creation of riparian easements, transformation to parks or parking lots, raised structures, and basement parking, etc.

Data: Identify and adopt a method to quantify the economic cost associated with a 100-year flood occurrence in the region and define approach to control for inflation or deflation of property value. Develop an existing FEMA HAZUS analysis and update every five years. Existing conditions need to be quantified to set/adjust appropriate target and then objective would be revised to include a target that quantifies desired flood risk cost savings.

FSM2. Increase the number of private and public parcels that retain the 1 inch 20 year rainstorm on site using LID principles either by retrofit or new construction by 2030.

Indicator: Percent of public/private parcels with infiltration BMPs per regional low impact development (LID) principles.

Hypotheses: A large spatial application of LID principles in the region will significantly reduce the directly connected impervious area (DCIA) in urban areas. Infiltration features on public and private parcels will reduce stormwater volumes by allowing rainfall to infiltrate and reduce the fraction of rainfall that is routed to the stormwater system and lost to the ocean. Infiltration to the soil will directly reduce the public infrastructure capacity needs, restore urban areas to a more natural hydrology, and reduce climate change vulnerability. In addition, soil water interactions filter pollutants and can improve regional groundwater and surface water quality.

Data: Expand and implement programs to assist, guide, educate and track the implementation of public and private parcel LID modification and infiltration BMP implementation. Track parcel certifications issued for proper installation and renew on a five-year inspection basis to demonstrate adequate maintenance and continued performance.

This objective also supports both Water Supply and Water Quality goals.