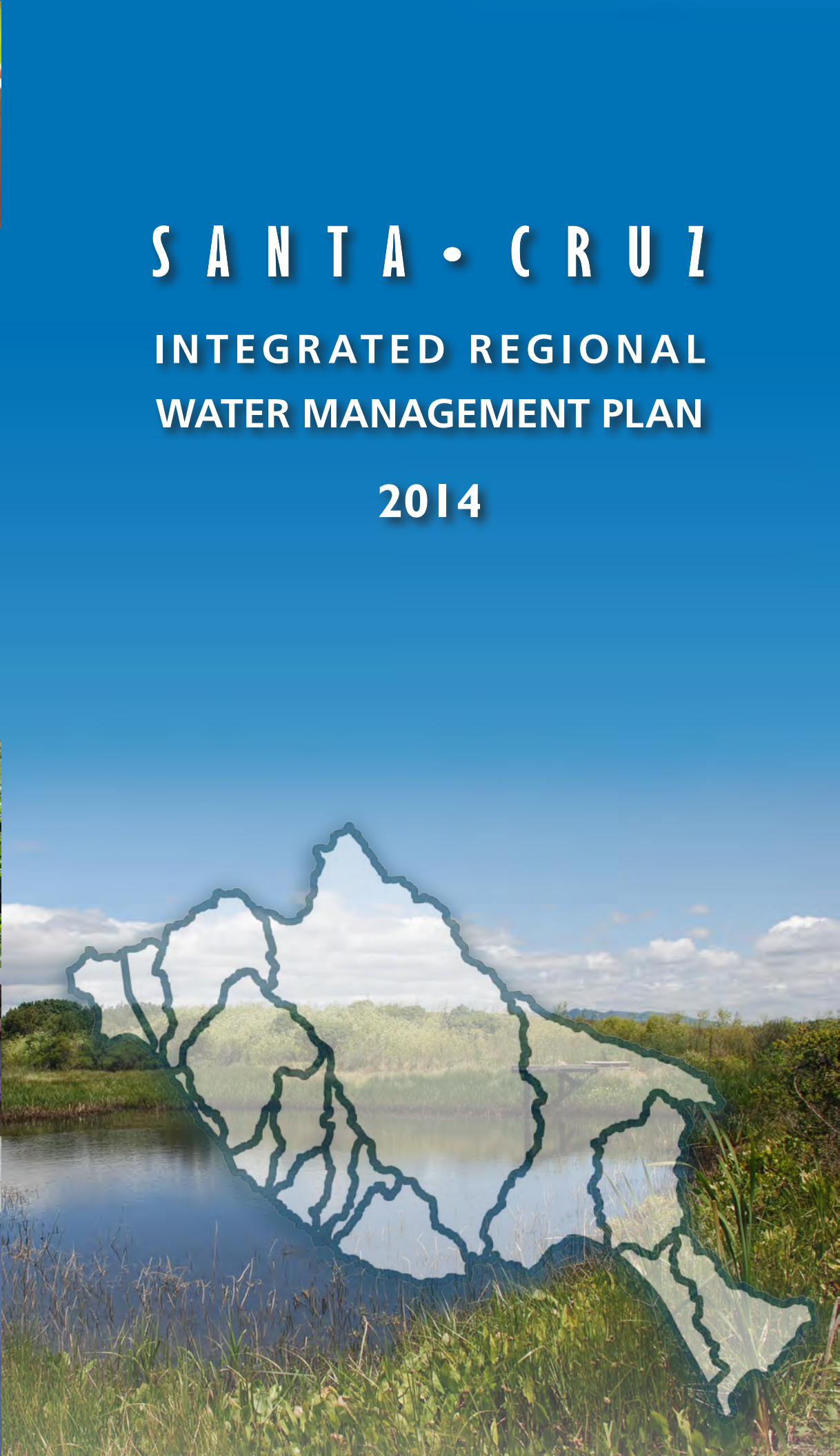




SANTA • CRUZ

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

2014



SANTA CRUZ
INTEGRATED REGIONAL WATER MANAGEMENT PLAN

JULY 2014

PREPARED BY:

**COUNTY OF SANTA CRUZ, HEALTH SERVICES AGENCY,
ENVIRONMENTAL HEALTH DIVISION, WATER RESOURCES PROGRAM**



IN ASSOCIATION WITH:

**REGIONAL WATER MANAGEMENT FOUNDATION, A SUBSIDIARY OF
COMMUNITY FOUNDATION SANTA CRUZ COUNTY**



ACKNOWLEDGEMENTS

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Central Water District
City of Santa Cruz
City of Watsonville
County of Santa Cruz
Santa Cruz County Sanitation District
Davenport County Sanitation District
Resource Conservation District of Santa Cruz County
Scotts Valley Water District
Soquel Creek Water District

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ACRONYMS

AB – Assembly Bill

ACS – US Census American Community Survey

AF – Acre Feet

AFY – Acre Feet Year

AMBAG – Association of Monterey Bay Area Governments

ASBS – Area of Special Biological Significance

BLM – U.S. Bureau of Land Management

BMP – Best Management Practice

CCAMP – Central Coast Ambient Monitoring Program

CCC – California Coastal Commission

CDFG – California Department of Fish and Game

CDP – Census Designated Place

CDPH – California Department of Public Health

CEDEN – California Environmental Data Exchange Network

CEQA – California Environmental Quality Act

CFR – Code of Federal Regulations

CISC – City of Santa Cruz

CiW – City of Watsonville

COS – Center for Ocean Solutions

CoSC – County of Santa Cruz

CPUC – California Public Utilities Commission

CRAM – California Rapid Assessment Methods

CWC – California Water Code

CWD – Central Water District

DAC – Disadvantaged Community

DAU – Data Analysis Unit

DCSD – Davenport Sanitation District

DMS – Data Management System

DWR – California Department of Water Resources

DWS – Drinking Water Standard

EIR – Environmental Impact Report

EJCW – Environmental Justice Coalition for Water

FEMA – Federal Emergency Management Agency

GAMA – Groundwater Ambient Monitoring and Assessment

GIS – Geographic Information System

GPM – Gallons per Minute

IPCC – Intergovernmental Panel on Climate Change

IRWM – Integrated Regional Water Management

IWRP – Integrated Watershed Restoration Program

LAFCO – Local Agency Formation Commission

LCP – Local Coastal Program or Local Coastal Plan

LID – Low Impact Development

MBNMS – Monterey Bay National Marine Sanctuary

MCL – Maximum Contaminant Level

MGD – Million Gallons per Day

MHI – Median Household Income

MOA – Memorandum of Agreement

MPA – Marine Protected Area

MS4 – Municipal Separate Storm Sewer System

NFWF – National Fish and Wildlife Foundation

NMFS – National Marine Fisheries Service

NOAA – National Oceanic and Atmospheric

NPDES – National Pollutant Discharge Elimination System

NPS – Nonpoint Source

NRCS – Natural Resources Conservation Service

O&M – Operations and Maintenance

OPR – Governor’s Office of Planning and Research

PRC – California Public Resources Code

RCAC – Rural Community Assistance Corporation
RCD – Resource Conservation District
RCDSCC – Resource Conservation District Santa Cruz County
RCM – Regional Climate Model
RWMF – Regional Water Management Foundation
RWMG – Regional Water Management Group
RWMG – Regional Water Management Group
RWQCB – Regional Water Quality Control Board

SB – Senate Bill
SCCSD – Santa Cruz County Sanitation District
SLR – Sea Level Rise
SqCWD – Soquel Creek Water District
SVWD – Scotts Valley Water District
SWAMP – California Surface Water Ambient Monitoring Program
SWMP – Stormwater Management Plan
SWRCB – State Water Resources Control Board

TAC – Technical Advisory Committee
TDS – Total Dissolved Solids
TMDL – Total Maximum Daily Load

US EPA – United States Environmental Protection Agency
USDA – United States Department of Agriculture
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey
UWMP – Urban Water Management Plan

WDR – Waste Discharge Requirement
WQPP – Water Quality Protection Program
WWW – Watsonville Wetlands Watch

EXECUTIVE SUMMARY

Integrated Regional Water Management (IRWM) is an initiative by California’s resource management agencies and local agencies that promotes an informed, collaborative, locally-driven approach to water resource management. At the core of the IRWM program is an IRWM Plan (IRWMP or Plan) developed by self-forming Regional Water Management Groups (RWMGs). The state IRWM program under the direction of the Department of Water Resources (DWR) provides standards that guide Plan development but the region-specific goals, priorities, strategies are for the RWMG and stakeholders to establish through a comprehensive, consensus-based, planning process.

The first IRWM Plan for the Santa Cruz Region was adopted in 2005 by six partner agencies. That Plan integrated various existing studies and programs to provide a framework for managing this region’s water and water-related resources. The Plan characterized the region’s conditions, issues, and needs and identified resource management strategies and projects to incrementally address these issues. In 2006, the Region successfully applied for a \$12.5 million IRWM Implementation Grant from the State Water Resources Control Board (SWRCB). This award, paired with \$17 million in local funding, enabled the completion of high priority projects identified in the initial IRWM Plan. From 2008 – 2013, 65 projects were completed at more than 80 sites throughout the County.

Santa Cruz IRWM:

- Promotes regional collaboration in managing water resources across jurisdictional and political boundaries
- Provides a cooperative framework for integrated planning in the region
- Identifies strategies, programs, and projects to address the region’s needs
- Opens the door to state and federal funding opportunities

In 2012, the Santa Cruz RWMG initiated an update to the 2005 IRWM Plan to ensure that it remains current in addressing the region’s water resources challenges and that it complies with the standards contained in the state’s 2012 Integrated Regional Water Management Grant Program Guidelines. The update expands upon the 2005 IRWM Plan, responds to the guidelines, and identifies ongoing regional water resources-related challenges and opportunities. Financial assistance from a DWR IRWM Planning Grant and contributions from the participating Santa Cruz agencies funded the development of this Plan and key technical studies.

The purpose of the Santa Cruz IRWM Plan is to develop a cooperative regional framework for water resources management that supports the identification and implementation of high priority projects and programs to address the challenges facing the region. This IRWM Plan is not intended to supersede local planning efforts; rather the intent of the IRWM Plan is to reflect those efforts, provide a regional context, and to support stakeholders in the IRWM process. As regional goals, objectives, and priorities evolve over time, the IRWM Plan will be adapted and updated to meet the changing needs of the region.

CHAPTER 1: INTRODUCTION

This chapter provides background on the IRWM program, the 2002 state legislation that established the IRWM program, the formation of the Santa Cruz region, and a summary of the Region’s IRWM planning and implementation efforts.

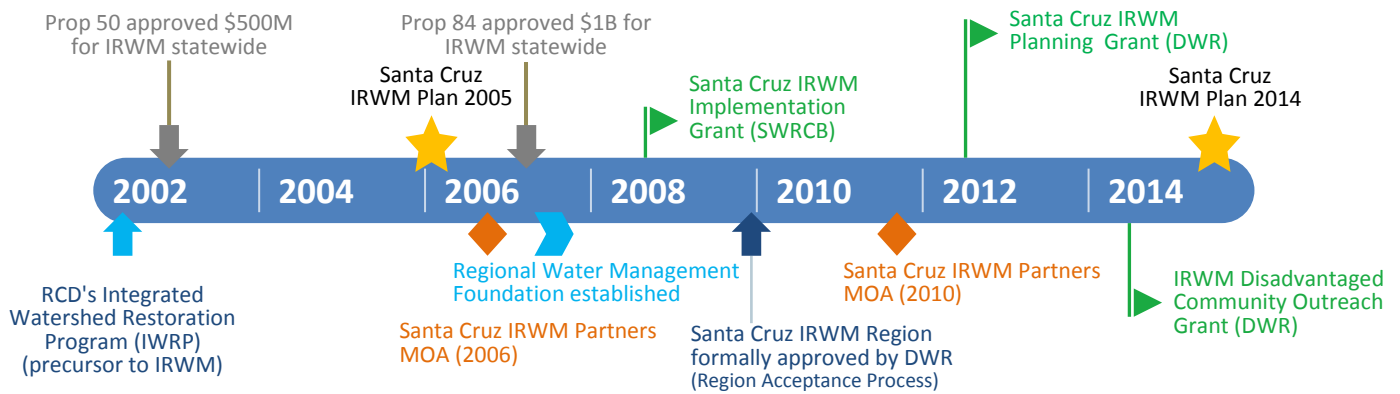


Figure ES-1. Timeline of Integrated Regional Water Management (IRWM) Program and Related Efforts

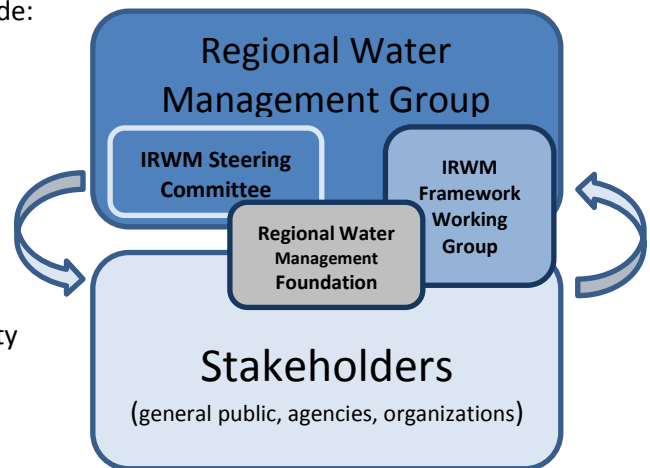
CHAPTER 2: GOVERNANCE

Chapter 2 describes the IRWM governance structure, the participating agencies and their management responsibilities, stakeholders, decision making, communications, opportunities for participation, and the process for future interim and formal Plan updates.

REGIONAL WATER MANAGEMENT GROUP

For the Santa Cruz IRWM program, the RWMG consists of nine local agencies with statutory authority over water management and related resources. They include:

- Central Water District
- City of Santa Cruz
- City of Watsonville
- County of Santa Cruz
- County Sanitation District
- Davenport County Sanitation District
- Resource Conservation District of Santa Cruz County
- Scotts Valley Water District
- Soquel Creek Water District



STEERING COMMITTEE

The IRWM Steering Committee is an active, decision-making sub-group of the RWMG that is designed to be broadly representative of the RWMG yet small enough to effectively make decisions in a timely manner. The Steering Committee is composed of three members selected from the RWMG, and appointed to ensure representation for each of the four functional planning areas – water supply, water quality, watershed resources, and flood and stormwater management. The Steering Committee currently consists of the County Water Resources division director, the executive director of the Resource Conservation District, and a water supply agency director/district general manager. The Steering Committee provides information and consults with the RWMG, and performs the following functions on behalf of the RWMG:

- guides IRWM Plan implementation;
- acts as a liaison to the Regional Water Management Foundation (see below) and all stakeholders, including state agencies, elected officials, and the public;
- coordinates funding proposals;
- promotes project integration of multi-benefit projects;
- ensures stakeholder participation; and,
- tends to administrative matters concerning IRWM efforts.

REGIONAL WATER MANAGEMENT FOUNDATION

The Regional Water Management Foundation (RWMF) was created in 2007 to serve an administrative role for the first IRWM Implementation grant awarded to the region and has subsequently provided a similar role on IRWM Planning grants. The RWMF is a separate 501(c)(3) tax-exempt nonprofit organization established as a subsidiary of the Community Foundation Santa Cruz County. In addition to serving as the fiscal agent, the RWMF also provides ongoing management and administration for the IRWM grants awarded to the region. The RWMF is guided by a seven-member Board of Directors consisting of four members appointed by the Community Foundation and the three members of the IRWM Steering Committee.

STAKEHOLDERS

The intent of IRWM stakeholder engagement is to engage, inform and provide opportunities for the region's diverse range of resource agencies, municipalities, local districts, interest groups, and residents to actively participate in IRWM efforts by providing opportunities to participate on an ongoing basis. The stakeholder engagement sought to ensure the diverse interests and perspectives were considered in establishing the region's water management goals, objectives, strategies and priorities. Local agencies, organizations, and stakeholders had opportunities for input on Plan development and specific projects through meetings and workshops and the broader community informed through boards, advisory groups, meetings and events.

MEMORANDUM OF AGREEMENT

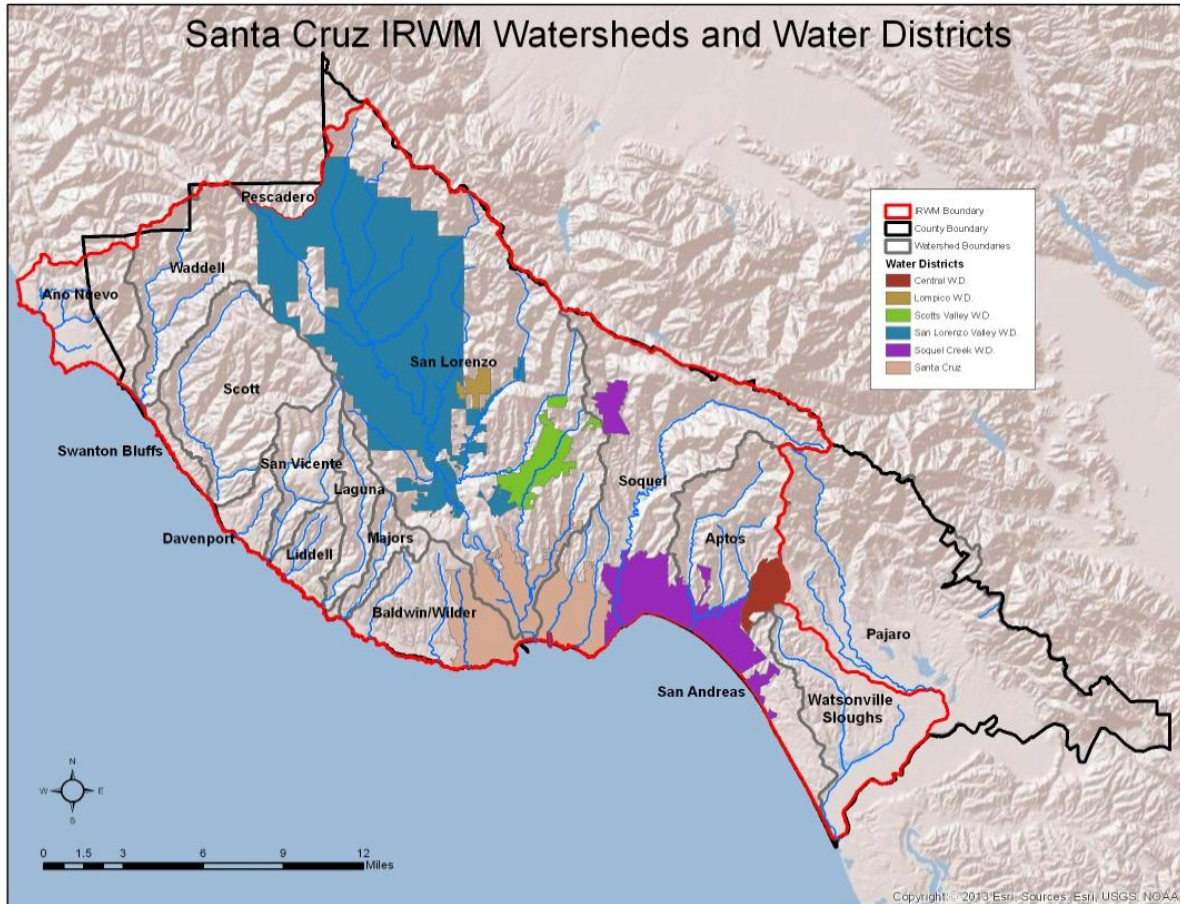
Each of the nine RWMG members is signatory to the 2010 Memorandum of Agreement for the Santa Cruz Integrated Regional Water Management Plan (MOA). The MOA establishes the institutional framework for the joint efforts of the participating agencies in developing, implementing, and updating the IRWM Plan.

FUTURE PLAN UPDATES

This IRWM Plan is intended to be a living document to be updated as conditions change, new issues arise, or as new projects need to be added. Minor changes to the Plan will be addressed by the Steering Committee through informal, interim amendments. Formal updates will occur for significant changes to the Plan, such as organizational structure and governance, water management conditions, or goals and objectives, and will require approval of the RWMG. An IRWM Plan update is a time and resource intensive undertaking. State guidelines encourage IRWM regions to formally review, revise, and adopt the IRWM Plan no less frequently than every five years. The RWMG will strive to adhere to this recommendation.

CHAPTER 3: REGION DESCRIPTION

Chapter 3 describes the physical, environmental, social, and demographic characteristics of the Region, provides an overview of its water systems, and identifies key issues and challenges facing the Region.



Although relatively small geographically, the Santa Cruz IRWM region features a complex mix of entities involved with water resources management who face a number of water supply, environmental, and social issues. The Region generally mirrors Santa Cruz County, and includes approximately 95% of the population and 85% of the geographic extent of County. The eastern and western boundaries are defined by the ridgeline of the Santa Cruz Mountains and the coastline of the Pacific Ocean, respectively. The northern boundary is roughly based on the County's boundary and the boundary between the Whitehouse Creek and Gazos Creek watersheds, which straddle the County line. The southern boundary is an overlapping border with the Pajaro River IRWM Region. Most of the Santa Cruz County portion of the Pajaro River watershed is addressed by the adjacent Pajaro River Watershed IRWM Region with the exception of the Watsonville Sloughs, for which both regions share management responsibilities. Specifically, the Santa Cruz IRWM Plan is responsible for water quality and watershed resource management in the shared area whereas the Pajaro IRWM Plan is responsible for water supply and flood management.

The following sections describe general and specific water resource issues and challenges in the Santa Cruz Region.

WATER SUPPLY

The Region relies entirely on rainfall, surface water, and groundwater within watersheds located in the County; no water is imported from outside the region. Water supply is not sustainable within the Region in years with normal precipitation, a situation that is exacerbated when below average water years occur. On average, the City of Santa Cruz obtains 79% of its supply from the San Lorenzo River and North Coast streams and 17% from Loch Lomond Reservoir on Newell Creek. The reliance upon surface water makes this supply vulnerable during dry years when there is inadequate supply to meet demands and aquatic habitat needs. Groundwater is the primary source of supply for agencies and residents in the mid and southern portion of the county. Groundwater basins are in a state of overdraft from long-term extraction rates exceeding the natural rate of recharge and replenishment. Streams and groundwater basins are both subject to extraction by private pumpers and agricultural users.

SURFACE WATER QUALITY

Water quality impairments caused by elevated bacteria and sediment levels are among the most pressing water quality concerns in the region. Elevated bacteria levels in surface waters can limit recreational activities and create human health threats. The supply of sand-sized sediment to streams significantly degrades the aquatic habitat quality, resulting in a myriad of negative ecosystem impacts that particularly affect the spawning and rearing habitat of sensitive salmonid species.

GROUNDWATER QUALITY

Seawater intrusion is occurring in the mid-County and Watsonville Sloughs watersheds, jeopardizing that source of supply. Much of the Region's groundwater has naturally high concentrations of arsenic and chromium VI, and newly proposed regulations by the State of California may require significant investments in treatment infrastructure to meet the new standard.

WATERSHED RESOURCES

Riparian encroachment and hydrologic modifications of wetlands, streams, estuaries, and lagoons impact the preservation and quality of habitat by affecting circulation (water quality), habitat structure (geomorphology), and the exchange of energy and nutrients.

FLOOD AND STORMWATER MANAGEMENT

Several areas of the Region have experienced flooding resulting in loss of life and significant economic impacts. Stormwater nuisance flooding is an ongoing concern in several low-lying areas, and stormwater regulations present a significant, unfunded mandate.

CLIMATE CHANGE

Findings from a 2012 U.S. Geologic Survey¹ study showed strong evidence for temperature increases in the future for the Santa Cruz Region along with altered patterns of rainfall and runoff and reduced recharge. Projected sea level rise will also challenge portions of water-related infrastructure and increase potential for flooding of coastal areas and channels.

¹ Flint, L.E., and Flint, A.L., 2012, Simulation of climate change in San Francisco Bay Basins, California: U.S. Geological Survey Scientific Investigations Report 2012-5132, 55 p.

CHAPTER 4: GOALS AND OBJECTIVES

Chapter 4 presents the goals and objectives for the Plan, and describes how they were developed. In 2012, as part of the Plan Update, the vision, goals, and objectives were revised through a year-long planning process to ensure objective-based decision making and strategy prioritization for the IRWM Plan. This collaborative process was led by a working group of representatives from the RWMG and stakeholders. The draft objectives were presented to the RWMG in 2012 as well as to stakeholders at a public workshop on August 16, 2012, which provided an opportunity for oral and written comments. The draft goals and objectives were posted to the Santa Cruz IRWM website and brought to the RWMG for review and comment prior to their finalization.

The Santa Cruz IRWM Plan goals are intended to be a general summary of the desired state that regional strategies are collectively working to achieve. The following are the goals for the Santa Cruz IRWM Plan:

- Provide a safe, reliable, and affordable water supply to meet current and expected regional demand without causing undesirable environmental impacts.
- Maintain and improve regional surface and groundwater quality to protect beneficial uses.
- Improve the condition of riparian and aquatic ecosystems to support the native species, watershed functions, and regional water needs.
- Reduce flood hazards and manage stormwater runoff through economical policies and projects that enhance natural hydrologic function and protect communities.

Objectives for the Santa Cruz IRWM Region are listed below, according to the four functional areas. Each objective is measurable by means of “objective indicators,” which are specific, quantifiable, time-limited statements that enable performance of the IRWM Plan to be measured over time. The Santa Cruz IRWM Plan objectives consist of the following:

Water Supply

- Ensure a reliable and sustainable local water supply through strategies that diversify the supply portfolio, develop production from alternative/supplemental sources, protect and enhance surface and ground water, protect against seawater intrusion, and maximize efficient delivery and use.
- Reduce water demand as technically and economically feasible, particularly in relation to the cost of additional sources.

Water Quality

- Reduce the sources of harmful pollutants (e.g., sediment, bacteria, nitrate, persistent organics and other toxic constituents) and their impacts on aquatic resources.

Watershed Resources

- Increase the habitat quality and quantity of critical aquatic ecosystems (i.e., streams, tidal wetlands, and freshwater wetlands).

Flood/Stormwater Management

- Implement integrated flood management strategies that reduce hazards and impacts from floods and, where feasible, provide multi-benefits (e.g., improve stormwater quality, ecosystem benefits, Low Impact Development (LID) / redevelopment and groundwater recharge).

CHAPTER 5: RESOURCE MANAGEMENT STRATEGIES

Within the context of IRWM planning, a resource management strategy is a project, program, or policy that helps local agencies manage their water and related resources. The IRWM Program Guidelines require the RWMG to evaluate the resource management strategies identified in the California Water Plan Update 2009 when considering which resource management strategies to include in the Region's portfolio. The intent is to promote a diversification of water management approaches in the region.

Santa Cruz IRWM Plan resource management strategies were developed specifically to address the region's objectives and include the following:

Objective	Strategy (<i>high priority</i> ; moderate priority)
<p>Ensure a reliable and sustainable local water supply through strategies that diversify the supply portfolio, develop production from alternative/supplemental sources, protect and enhance surface and ground water, protect against seawater intrusion, and maximize efficient delivery and use.</p>	<i>Develop production from alternative/supplemental sources</i>
	<i>Increase production from existing resources</i>
	<i>Implement system inerties</i>
	<i>Construct and maintain groundwater recharge facilities</i>
	<i>Shift groundwater pumping from coastal zone</i>
	Update/replace aging infrastructure
	Remove impervious coverage in recharge zones
<p>Reduce water demand as technically and economically feasible, particularly in relation to the cost of additional sources.</p>	<i>Support low impact development (LID)/redevelopment</i>
	<i>Utilize tiered rates /conservation pricing</i>
	<i>Conduct education/outreach on conservation strategies</i>
	<i>Implement policies to minimize additional demand from new growth</i>
	<i>Implement groundwater management that includes non-municipal pumpers, to promote sustainable groundwater use.</i>
	Utilize rebate/retrofit programs
<p>Reduce the sources of harmful pollutants (i.e. sediment, bacteria, nitrate, persistent organics and other toxic constituents) and their impacts on aquatic resources.</p>	Utilize temporary use restrictions as needed during critical supply shortages.
	<i>Conduct irrigation management and water conservation</i>
	<i>Perform rural road improvements and maintenance</i>
	<i>Implement BMPs related to timber harvest activities</i>
	<i>Implement erosion control / sediment capture BMPs for row crops / vineyard / orchards</i>
	<i>Implement fertilizer and irrigation management measures</i>
	<i>Implement septic system upgrades, provide incentives for upgrades and/or maintenance</i>
Perform sewer system upgrades and maintenance	
<i>Promote/implement private property sewer lateral upgrades and maintenance</i>	

Objective	Strategy (<i>high priority</i> ; moderate priority)
	<p>Restore riparian zones</p> <p>Remove homeless encampments from riparian zones</p> <p>Conduct street sweeping</p> <p>Conduct regular infrastructure cleaning and maintenance</p> <p>Implement exclusion of (livestock from riparian zones.</p> <p>Implement livestock waste management BMPs</p>
<p>Increase the habitat quality and quantity of critical aquatic ecosystems (i.e. streams, tidal wetlands and fresh water wetlands).</p>	<p><i>Reduce stream withdrawals and increase base flow at critical times to achieve streamflow targets</i></p> <p><i>Identify and eliminate illegal diversions</i></p> <p><i>Restore natural stream form & function</i></p> <p><i>Restore riparian zone through acquisition/easements</i></p> <p><i>Reduce riparian encroachment</i></p> <p><i>Reduce erosion and sedimentation from public and private roads, unpermitted grading, and other sources.</i></p> <p><i>Restore lagoon /wetland structure and biotic habitat complexity</i></p> <p><i>Increase/enhance wetland edge habitat</i></p> <p>Conduct riparian revegetation</p> <p>Remove or retrofit fish passage barriers</p> <p>Preserve or enhance large woody material in streams and riparian zone</p> <p>Remove non-native species</p> <p>Promote natural sand bar function</p> <p>Improve wetland hydrology</p> <p>Support education/outreach/technical training programs</p> <p>Support volunteer stewardship programs</p> <p>Support environmental education programs for schoolchildren</p> <p>Reduce illegal dumping</p>
<p>Implement integrated flood management strategies that reduce hazards and impacts from floods and, where feasible, provide multi-benefits (e.g., improve stormwater quality, ecosystem benefits, Low Impact Development (LID) / redevelopment and groundwater recharge).</p>	<p><i>Utilize riparian zones for flood management through acquisition or easement</i></p> <p><i>Maintain and improve levee conditions for flood management and environmental quality</i></p> <p><i>Increase channel width and floodplain function</i></p> <p><i>Remove channel constrictions</i></p> <p><i>Maintain storm drain conveyance efficiency</i></p> <p><i>Improve stormwater infrastructure & conduct maintenance</i></p>

Objective	Strategy (<i>high priority</i> ; moderate priority)
	<i>Reduce directly connected impervious area</i>
	<i>Implement low impact development/redevelopment</i>
	Conduct education and outreach on flood and stormwater issues
	Increase riparian setbacks
	Conduct vegetation management

CHAPTER 6: INTEGRATION AND PROJECT REVIEW PROCESS

This chapter describes the process in place to coordinate and integrate separate efforts to promote a more unified regional planning approach and promote greater institutional, stakeholder, resource and project integration. An example of integration of effort is the involvement of multiple public agencies, organizations, and private property owners in the development and promotion of stormwater infiltration practices that provide increased groundwater recharge, reduced runoff, and improved water quality.

This chapter also describes the methodology for evaluating projects that serves as a tool to help project proponents, stakeholders, and the State to categorize, describe, and assess the status, benefits, feasibility, and costs of the numerous projects in the Santa Cruz IRWM Plan. The RWMG has developed a suite of potential projects to address the objectives and strategies of the IRWM Plan.

76 projects were submitted in response to the call for projects for the 2014 Plan Update. These projects were evaluated using a methodology developed by the Steering Committee, which sought to characterize the extent to which projects:

- Address multiple high and/or moderate priority Santa Cruz IRWM Plan strategies
- Demonstrate partnership, geographic, and resource management integration
- Will be ready to proceed within a reasonable timeframe
- Demonstrate technical feasibility
- Will be able to demonstrate an effective cost/benefit ratio
- Will be able to demonstrate project effectiveness
- Assist the region in adapting to effects of climate change or in mitigating effects
- Directly address a critical water supply or water quality need of a DAC or Tribal interest, and/or address an environmental justice issue

In the event of future solicitations for IRWM funding applications, the Santa Cruz IRWM Steering Committee will work with the RWMG to develop an application derived from the 2014 list of projects. The Steering Committee will consider strategic aspects of plan implementation in determining which projects to include in an application, including selecting the projects that implement high and moderate level strategies in order to best enable the Region to achieve its objectives. Projects may also be submitted for other grant applications, depending on the specific criteria of those solicitations and the priority needs of the RWMG and its partner agencies at that time.

The current progress and trajectory of project implementation is described in the last section.

CHAPTER 7: BENEFITS AND IMPACTS

This chapter presents a summary of the anticipated benefits and impacts that will result from implementing in the IRWM Plan. There are numerous potential benefits from the strategies and projects in the Plan as they are implemented to achieve the stated goals and objectives. A summary of benefits by area is presented below.

Water Supply

- A more reliable water supply. If alternative water supplies are developed, (e.g., recycled water, increased use of winter streamflow, desalination) then water supply reliability would be enhanced and impacts on streamflows and groundwater would be reduced.
- Water system infrastructure improvements (repairs or upgrades to conveyance, storage, treatment, or distribution) would yield benefits to water supply, supply reliability, water use efficiency, and energy efficiency.
- Infrastructure improvements would provide greater operational flexibility and conveyance capacity and could improve delivery flexibility and redundancy.
- Upgraded and/or new treatment and storage facilities could improve drinking water quality (e.g., Chromium 6 wellhead treatment; water storage tank aerators)
- Diversification of the water supply portfolio and/or system interties could benefit water supply reliability under normal and emergency conditions.
- Groundwater recharge and conjunctive use would benefit groundwater aquifers and yield benefits for stormwater runoff management.
- Increased use of recycled water would benefit the reliability of regional water supplies and provide a comparatively more drought resistant source of water than surface water supply.

Water Conservation and Demand Management

- Continuation and/or expansion of water conservation strategies (retrofits; rebates; education/outreach; tiered rates; greywater use; rain capture) reduces overall water demand, and benefits water supply sources in the region with reduced impacts on summer stream flows, less groundwater extraction and improved drought preparedness.
- Water conservation and reduced consumption provides benefits from reducing water-related energy use (less water treatment and transport) and decreasing greenhouse gas emissions.

Water Quality

- Programs and projects to protect and improve surface water and groundwater quality benefits human health, aquatic species, ecosystem health, recreational opportunities, and the economy.
- Projects to maintain/improve septic systems, sewer systems, sewer laterals, and storm drain infrastructure would yield benefits by reducing potential sources of bacteria, pathogens, and nutrients.

Watershed Stewardship and Aquatic Ecosystems

- Programs and projects include measures to protect existing high quality habitat and restore and enhance impaired habitat with benefits to watershed conditions in critical aquatic ecosystems and native species.

- Projects to protect and enhance aquatic ecosystems and restore natural stream form and function promote the recovery of threatened and endangered species, notably keystone salmonid species.
- Programs to restore riparian zones through acquisitions/easements and reduce riparian encroachment provide benefits to aquatic habitat and species.
- If alternative water sources are developed (e.g., recycled water, increased use of winter streamflow, desalination) then impacts on streamflows and groundwater could be reduced. In addition to reduced diversions, reducing withdrawals could increase stream base (summertime) flow and benefit aquatic habitat and species.
- Efforts to identify and eliminate illegal stream diversions could increase streamflow and provide benefits to habitat and aquatic species.
- Projects to reduce erosion and control sediment will provide both habitat and water quality benefits.
- Riparian and wetland habitats provide benefits to water quality. These habitats also can delay and reduce peak flood flows, reducing localized flooding, with benefits to stormwater management as well as public health and safety.

Flood and Stormwater Management

- The benefits of implementing integrated flood management strategies include reducing the hazards and impacts from floods and, where feasible, provide multiple benefits (e.g., maintaining and improving levee conditions for flood management and environmental quality; stormwater capture and recharge).
- Infrastructure improvements which reduce impervious area directly connected to storm sewers with low-impact development measures can benefit stormwater management by reducing runoff volumes and peak flood events with the benefit of reducing flooding and improving public safety.

Enhanced Collaboration

- A benefit of IRWM that is less tangible but of significant value is fostering positive collaboration and strengthening partnerships amongst agencies, organizations, and stakeholders.
- The planning process encourages new partnerships and provides opportunities to identify multi-benefit projects that may achieve a multitude of goals and objectives for different entities.
- Integrated planning and collaboration can achieve cost savings through project cost-sharing, resource sharing, economies of scale, and the avoidance of duplication of efforts.

Some adverse environmental impacts may occur from implementation of the IRWM Plan. Adverse impacts would be purposefully minimized during the project planning and permitting process. Construction-related impacts may include temporary and localized disturbances to air and water quality, habitat, noise, and other environmental factors. Economic impacts may include increased costs associated with water infrastructure financing.

Project specific impacts and benefits will be analyzed in more detail prior to implementation of specific projects. For projects to be implemented, environmental review will be conducted in accordance with the California Environmental Quality Act (CEQA) and, if applicable, the National Environmental Policy Act (NEPA).

CHAPTER 8: PLAN PERFORMANCE AND MONITORING

This chapter documents the metrics by which IRWM Plan effectiveness will be evaluated and the institutional structure through which these evaluations will be carried out. This IRWM Plan is a dynamic document and its success is related to how well its goals and objectives are accomplished, at both the project and plan levels.

Plan performance will generally be evaluated through two mechanisms. First, project-specific monitoring will be done to demonstrate that projects were implemented as designed and functioning as intended. Second, broad, interdisciplinary environmental trends analysis for key parameters will evaluate the integrated effort as a whole. As resources allow, ideally at least once every three years, the RWMF will conduct an assessment of overall IRWM Plan performance using the indicators described in this chapter. 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.

CHAPTER 9: DATA MANAGEMENT

Chapter 9 discusses data management needs associated with the IRWM Plan. This section provides an overview of data needs in the Region, discusses data collection techniques, and the approach to data management and dissemination. Existing data collection and monitoring efforts are described, and data gaps with potential new data collection programs are identified. This section also discusses supporting statewide data needs via the abundance of information collected by the RWMG.

As part of IRWM Plan implementation, information and data will be collected and compiled at several levels, including: the IRWM programmatic information (e.g., meeting agendas, workshop notices, website); the project information (e.g., who, where, what, how much); and ambient environmental data (e.g., water quality, streamflow). At each of these levels, the RWMG considers effective data management and dissemination critical to successful implementation of the IRWM Plan.

CHAPTER 10: FINANCING

Chapter 10 identifies various funding sources, including their associated requirements and guidelines, which may be available to assist with implementation of Plan projects. The chapter also provides a summary of funding opportunities from local, state, and federal sources. The challenge of project funding is not unique to Santa Cruz, and is a major obstacle for the implementation of projects. Demands on limited local funds continue to increase, construction costs continue to rise, and existing infrastructure continues to require upgrades to meet growing demands. In this economic climate, agencies are challenged to balance costs associated with ensuring the highest standards of water quality and supply reliability for existing customers while protecting and enhancing the sensitive ecosystems within the region.

Historically, financial support for IRWM Plan development has come from the participating agencies. The original, 2005 Northern Santa Cruz IRWM Plan was funded by contributions from each agency. State grants through voter-approved bonds have funded a number of IRWM projects. With regard to projects and programs which form the Santa Cruz IRWM Plan, the estimated costs of projects range from several tens of thousands of dollars to multi-million dollars. Many of the project proponents have not yet

identified local funding sources to support implementation, as well as ongoing operations and maintenance, of their proposed projects.

CHAPTER 11: TECHNICAL ANALYSIS

This chapter documents that the IRWM Plan is based on sound technical information and analyses. It provides a description of the plans, studies, and methodologies used to shape the RWMG and Steering Committee's understanding of water management in the Santa Cruz IRWM Region. The Santa Cruz IRWM Plan was developed through collaborative discussions regarding regional water issues and proposed projects to address them. The basis for many of these discussions were the numerous studies, assessments, and planning documents prepared for the various stakeholders in the Region, which in turn included public review and comment. As the various regional stakeholders shared their needs and objectives, similarities and opportunities for collaboration were identified. During Plan preparation and development, particularly through the development of the Plan's conceptual framework, data and water management strategies were collected from a number of existing local and/or sub-regional planning documents, and were integrated into the regional strategies presented in this document. Examples of local planning documents reviewed during the IRWM Plan development and update include urban water management plans, water supply master plans, capital improvement plans, recycled water master plans, project environmental impact reports/environmental impact statements, and grant applications for other state and federal programs.

CHAPTER 12: RELATION TO LOCAL WATER AND LAND USE PLANNING

The 2012 IRWM Grant Program Guidelines require that the IRWM Plan describe the current relationship between land use and water resource managers (e.g., how water management input is considered in land use decisions and vice versa), identify current constraints to collaboration, and explore opportunities to facilitate improved collaboration between land use planners and water managers in the future. Local jurisdictions in the Santa Cruz Region have long sought to protect the environment, and specifically water resources, through ordinances and strong general plan policies. Water managers have relied upon the development and growth projections of local and regional land use agencies in projecting future water demands.

CHAPTER 13: STAKEHOLDER INVOLVEMENT

Ongoing public outreach to local agencies, organizations, and the general public about IRWM efforts has occurred since the development of the 2005 Plan and more actively following the 2008 IRWM Implementation grant award to the Region. A collaborative approach to regional water planning is not new to the Santa Cruz region, as local water districts, cities and the County share a history of working together that pre-dates the IRWM program by many years. However, the recent IRWM effort has provided a very effective vehicle to invigorate and create new relationships between agencies and stakeholders in the region and has provided a critical source of funding for planning and the implementation of more than 70 projects since 2008.

The intent of the stakeholder involvement process is to ensure that the wide range of interest groups and citizens are afforded the opportunity to participate in the IRWM Plan development and its implementation. Collectively, the identified stakeholders include a broad representation of water supply, water quality, wastewater, stormwater, flood control, watershed, municipal, environmental,

agricultural, regulatory, and community interests in the IRWM planning region, including non-governmental organizations, disadvantaged community representatives, Native American tribal contacts, and interested residents.

The list of stakeholders that have been notified of IRWM activities includes all of the major water resource management authorities in the region, as well as representatives from the neighboring Bay Area and Pajaro IRWM regions. The RWMG communicates through a website, meetings, workshops, email, and written correspondence and announcements. The participating agencies regularly conduct outreach with their own boards, councils, commissions, and constituents. Local agencies, organizations, and stakeholders are engaged through meetings, workshops and the broader community informed through boards, advisory groups, meetings and events.

CHAPTER 14: COORDINATION

This chapter presents an overview of the process to coordinate water management projects and activities with local, regional and state agencies, diverse stakeholders and neighboring IRWM regions. The intent of these efforts is to ensure an appropriate level of coordination is occurring within the region to avoid conflict and duplication of efforts, as well as to integrate planning efforts across agencies and jurisdictions to take advantage of efficiencies and optimize use of the region's water resources.

Within the region, IRWM-related planning and implementation activities are coordinated by the RWMG and include agencies with statutory authority over water management and related resources. The Santa Cruz IRWM region is bordered by the San Francisco Bay Area IRWM Region and the Pajaro IRWM Region. There is an open dialogue with these neighboring regions to coordinate on any projects that overlap regional boundaries, issues of mutual concern, and opportunities for collaboration. Coordination with numerous state and federal regulatory and resource agencies occurs in IRWM planning and implementation to ensure appropriate consideration of resource management, resource enhancement, and regulatory compliance. These agencies often play a critical role in the review and approval of IRWM projects in prior to implementation.

CHAPTER 15: CLIMATE CHANGE

Water managers in the Santa Cruz IRWM Region recognize the potential impact that climate change could have on local water resources resulting from increasing temperatures and changing patterns of precipitation. The potential impacts of these future climatic and hydrologic changes were evaluated in the context of each of the IRWM functional areas to identify opportunities for adaptation to reduce the vulnerability of water supply, water quality, aquatic ecosystems, and flood hazards in the region. In some instances projected changes may dramatically exacerbate the severity of local water issues, thus providing additional justification for the implementation of effective strategies now.

A 2012 U.S. Geological Survey study² of the Santa Cruz region indicated strong evidence for temperature changes in the future, but disagreement between simulation models for future precipitation patterns. Temperature projections show an increase of 3-4^o C for average monthly maximums and an increase in

² Flint, L.E., and Flint, A.L., 2012, Simulation of climate change in San Francisco Bay Basins, California: Case studies in the Russian River Valley and Santa Cruz Mountains: U.S. Geological Survey Scientific Investigations Report 2012-5132.

the variability (20-30% larger standard deviation) above the historic reference period (1971-2000), with spring and fall months experiencing warmer temperatures. While there is disagreement amongst climate model projections as to the timing of precipitation patterns, there is agreement that the future will be generally drier, resulting in a higher frequency of droughts and increased water demand for irrigation. Overall groundwater recharge in the Santa Cruz Region is projected to decline by 30% by 2100, which will reduce groundwater supplies and stream baseflow needed for water supply and aquatic habitat.

A 2009 report from the California Climate Change Center prepared by the Pacific Institute³ stated that rising sea levels will be among the most significant impacts of climate change to California, with climate model scenarios suggesting a very substantial increase in sea level over the coming century. Climate models indicate that sea level could rise by 3 feet by the year 2100, and will result in increased frequency of flooding, gradual inundation, increased rates of erosion, and exacerbated effects of storm surge, larger waves, and high tides.

³ California Climate Change Center, 2009, CEC-500-2009-024-F, Impacts of Sea-Level Rise on the California Coast.

PROJECT IMPLEMENTATION

Many of the sections of the Plan provide the information on the development of the Plan, according to a format specified by the State IRWM guidelines. This section on project implementation describes how project implementation in the Santa Cruz region is anticipated to proceed, based on the IRWM Plan and current RWMG and stakeholder efforts. The timing and pace of project implementation is a function of the goals, objectives, priority strategies, and funding sources. It is also influenced by the activities of the individual agencies, and may shift depending on timing, outcome of ongoing evaluations, and availability of funding.

Following is the current trajectory of project implementation for the major projects in the four functional areas.

Water Supply

- Soquel Creek Water District has declared a groundwater emergency and is implementing significant mandatory demand reduction and demand-neutral development while the District completes evaluation of the feasibility of various supplemental supplies, including desalination, wastewater recycling, water exchange, recharge enhancement.
- The Soquel Creek Water District and Central Water District are seeking to expand groundwater management programs to include the County, the City of Santa Cruz, Pajaro Valley Water Management Agency and private pumpers.
- Soquel Creek Water District, Central Water District and the City of Watsonville are evaluating methods to address naturally occurring chromium 6 in their current water sources that is in excess of the new drinking water standard by wellhead treatment or shifting pumping to other aquifers.
- Santa Cruz City Water Department is currently working with a Water Supply Advisory Committee to reevaluate the current supply and demand projections, consider the implications on water supply reliability of potential long term flow release commitments to restore fish habitat, and consider potential supplemental supply options to improve water supply reliability.
- Scotts Valley Water District is pursuing options to address overdraft of the Santa Margarita Groundwater Basin by optimizing use of its available recycled water supply, increasing groundwater recharge through stormwater retention and managed recharge projects, utilizing surface water through conjunctive use and water exchange.

Water Quality

- The County continues to implement wastewater management programs in the San Lorenzo Watershed and other parts of the county to identify and upgrade problematic onsite sewage disposal systems and promote improved function.
- The City of Santa Cruz is supporting management of watershed lands to protect and improve water quality for water supply and habitat.
- The County Sanitation District and the City of Santa Cruz have secured funding assistance to upgrade aging sewer infrastructure that has contributed leaks and spills of sewage into coastal waterways and beaches. More effort to improve private sewer laterals is anticipated.
- The County Public Works Department and Resource Conservation District are implementing a number of projects to improve drainage and reduce discharge of sediment from rural roads.

- The County Planning Department and other regulatory agencies are increasing efforts to prevent and correct illegal grading and land clearing.
- Various stormwater programs implemented by the Cities and County as described below will also result in water quality improvements.

Watershed Resources

- The Resource Conservation District continues to work with partner agencies to identify and implement priority projects through the Integrated Watershed Restoration Program. These projects include modification of fish passage barriers, restoration of streambank habitat, wetland restoration, and promotion of restoration projects on private land through permit coordination.
- The Watershed Resources Workgroup of the City of Santa Cruz Water Department implements the Watershed Resources Management Plan, which includes activities such as removing homeless encampments, educating school groups, maintaining the forestlands, patrolling City's watershed lands, and complying with environmental regulations.
- The County, City of Santa Cruz, and Resource Conservation District are working with the San Lorenzo River Alliance and other partners to assess riparian conditions and to develop priority implementation measures for the Coho and Steelhead Recovery Plans.

Flood and Stormwater Management

- The County, City of Santa Cruz, and City of Watsonville are enhancing monitoring and management programs to reduce stormwater runoff and pollutant loading and meet the new requirements of state stormwater regulations.
- The County, City of Santa Cruz, and City of Watsonville are implementing projects to infiltrate stormwater, reduce polluted runoff, improve groundwater recharge, reduce erosion and restore streambanks. For example, projects in the City of Santa Cruz are being designed to reduce polluted runoff and infiltrate storm water using Low Impact Development (LID) measures, such as vegetative drainage features and buffers. These measures reduce erosion and sedimentation which improves water quality, enhancing habitat for fish, aquatic, and riparian species. The City has increased its efforts to ensure that Low Impact Development (LID) design measures and both LID and Construction Best Management Practices are implemented during all phases of a construction project including: design, construction, and post-development long-term maintenance.
- The City of Santa Cruz is pursuing a project to repair and upgrade the Branciforte Creek flood control channel to improve fish passage and maintain flood protection.

CONCLUSION

The initial 2005 Santa Cruz IRWM Plan presented information and identified multi-benefit opportunities for addressing regional water resources issues in a collaborative manner. Much has been accomplished since that Plan was adopted, including the implementation of more than 70 projects, completion of key technical studies to inform resources management, and development of a framework to support effective IRWM implementation. The IRWM Plan 2014 incorporates the efforts to date, provides updated information and approaches to ensure it remains current in addressing the Region's challenges, and is compliant with the state's 2012 IRWM Plan Guidelines. The impacts of climate change on the Santa Cruz Region were evaluated through a U.S. Geologic Survey examining impacts upon rainfall, runoff and recharge. Efforts to engage stakeholders included the development of a new website

(www.SantaCruzIRWMP.org) and several community meetings and workshops where the public were encouraged to participate, review and comment on IRWM efforts. In 2014, ongoing resource management technical studies as well as outreach to assess water needs of local disadvantaged communities will continue to add breadth to the Plan. This IRWM Plan provides a framework for continued collaboration by describing the Region's most critical water resources challenges and identifying opportunities for regional collaboration. The implementation of the Santa Cruz IRWM Plan can better equip agencies to overcome future challenges by coordinating resources and more effectively meeting the needs of the region as a whole.

CHAPTER 1: INTRODUCTION

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1.1 INTRODUCTION TO INTEGRATED REGIONAL WATER MANAGEMENT PLANNING

Integrated Regional Water Management (IRWM) planning is a statewide initiative by California's resource management agencies to promote collaborative, local solutions to water management challenges. IRWM enables regions to identify, integrate and implement water management measures appropriate for their needs. The fundamental principle of IRWM is that regional water managers are best suited and best positioned to manage water resources. While large, inter-regional water management systems, such as the state Water Project, Central Valley Project, and large flood management systems are essential for California, the majority of the state's water resource management investments are made at the local and regional level. This is particularly evident in Santa Cruz, a region that does not rely on any imported water.

The IRWM program provides a set of broad, planning guidelines that guide IRWM plan development, but the specific details of the plan are left to local jurisdictions to develop. In contrast to traditional top-down planning, this approach enables regions determine their own objectives and supports implementation of a broad portfolio of resource management strategies that facilitate the implementation of projects with multiple benefits specific to local needs. IRWM promotes policies and practices to ensure sustainable water use, reliable water supply, better water quality, environmental stewardship, efficient urban development, protection of agriculture, and a strong economy. The California Water Plan (2009) is the state's blueprint for managing water resources, and it identifies the promotion and expansion of IRWM as a primary statewide objective with the goals of "providing long-term, reliable water supplies for all users at the lowest reasonable cost and with highest possible benefits for economic development, environmental quality, and other societal objectives." To make this objective a reality, significant voter-approved bond funding has been made available through the State Water Resources Control Board and the Department of Water Resources to support IRWM planning and project implementation.

Collaborative, regional water planning is not a new concept in Santa Cruz County, where local water districts, cities and the County have been implementing such solutions to challenging resource problems for decades. Santa Cruz County is in a unique position to demonstrate the benefits of collaboration in restoring watersheds. It is a small county with relatively small watersheds, most of which are contained entirely within the county boundaries. The forerunner to IRWM was a planning study completed in 1985 for the Water Policy and Planning Task Force, the land use and water agencies in the county, which sought to plan for current and future water demands in a manner that ensured environmental protection. This report quantified various water supply and demand projections and delineated several recommended regional water supply system alternatives.

This spirit of collaboration more recently was displayed through the development of the Integrated Watershed Restoration Program (IWRP), a program with a similar acronym to IRWM and a similar intent to foster a collaborative, regional approach to watershed restoration. Beginning in the late 1990s, eight watershed restoration plans and a number of other related assessments were developed for seven watersheds in Santa Cruz County. Anticipating the completion of the plans, the focus turned to ways to effectively implement the recommended projects and programs, given the numerous stumbling blocks that typically hamper watershed restoration efforts. Wanting to alleviate some of these stumbling blocks, staff from the Resource Conservation District of Santa Cruz County (RCD), Coastal Conservancy, California Department of Fish and Game, Coastal Watershed Council, and the City and County of Santa

Cruz began brainstorming possible solutions. They recognized that watershed restoration would be more effective as a coordinated county-wide effort and in May 2002 they developed the concept for IWRP. The goal of IWRP is to support local watershed partners in developing projects and to coordinate agencies that provide technical assistance, permits, and funds. Such coordination will reduce the staff time required while helping to ensure that critical projects are identified, funded, and permitted. Over 43 projects have been implemented to date through the IWRP program.

Collaboration continued in Santa Cruz in response to Chapter 8 of the voter-approved Proposition 50, which called for the development of so-called integrated regional water management (IRWM) plans. An IRWM Plan for the Santa Cruz Region was adopted in 2005 by eight partner agencies¹. A new updated IRWM Plan has now been prepared. The Santa Cruz IRWM Plan integrates various studies and programs to provide a framework for managing this region's water and water-related resources. The Plan includes strategies for developing and implementing policies and projects to ensure sustainable water use, reliable water supply, better water quality, improved flood protection and stormwater management, and environmental stewardship. The Santa Cruz IRWMP provides a collaborative planning process to foster communication, strengthen partnerships, support long-term planning, and provide a process to solicit, evaluate, and implement studies and projects that yield multiple benefits for water supply, water quality, and natural resources.

Due to Santa Cruz's history of collaborative resource planning, IRWM planning is seen less as an impetus for collaboration, and more as a vehicle for defining our region's priorities outside of a regulatory context. Also, practically, IRWM is a mechanism for potentially accessing grant funding. In order to accomplish the latter, the updated Plan must address a variety of standards identified in the 2012 IRWM Guidelines.

1.2 WHAT IS AN IRWM PLAN?

An IRWM Plan is a locally-derived, comprehensive, non-regulatory water resources planning document that crosses jurisdictional, watershed, and political boundaries; involves multiple agencies, stakeholders, individuals, and groups; and attempts to address the issues and differing perspectives of all the entities involved through mutually beneficial solutions. IRWM Plans identify integrated projects that achieve multiple benefits and address regional objectives set forth within the IRWM Plan.

The traditional approach to water resource management has typically involved separate entities individually managing different aspects of the hydrologic cycle, i.e., water supply, water quality, flood management, and natural resources management. In contrast, the main objective of IRWM planning is to consider the hydrologic system as a whole and to identify and implement projects with multiple benefits across that system. The IRWM planning process brings together water supply and natural resource managers, stormwater engineers, and water quality specialists along with other community stakeholders. The multiple perspectives that each group provides allows for collaborative planning where ideally benefits from collaborative projects are greater than what would have been realized if implemented individually.

¹ 2005 Plan Partner Agencies Include: Soquel Creek Water District; Scotts Valley Water District; Davenport Sanitation District; City of Santa Cruz; City of Watsonville; Santa Cruz Sanitation District; Resource Conservation District of Santa Cruz County; and, County of Santa Cruz – Environmental Health Services and Department of Public Works.

1.3 LEGISLATIVE BACKGROUND

Over the past decade California voters have approved several statewide bond measures providing billions of dollars to support local and regional water management activities. In November of 2002, California voters passed Proposition 50 (the Water Security, Clean Drinking Water, Coastal and Beach Protection Act), which established the IRWM Program. In November 2006, California voters passed Proposition 84, the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Act of 2006 which provides \$5.388 billion to support various water resource needs in the State. This includes \$1 billion in funding for the IRWM Grant Program statewide; \$52 million is allocated for the Central Coast Funding Area which extends from Santa Barbara to Santa Cruz counties. Proposition 1E, the Disaster Preparedness and Flood Prevention Bond Act of 2006, also passed in 2006, authorized \$4.09 billion in bonds to rebuild and repair vulnerable flood control structures to protect homes and prevent loss of life from flood-related disasters; and to protect California's drinking water supply system by rebuilding delta levees that are vulnerable to earthquakes and storms. To be eligible for IRWM grant funds through Proposition 84 or Proposition 1E, a project must be contained within an adopted IRWM Plan. According to the California Water Code §10540(c), an IRWM Plan must address at a minimum all of the following:

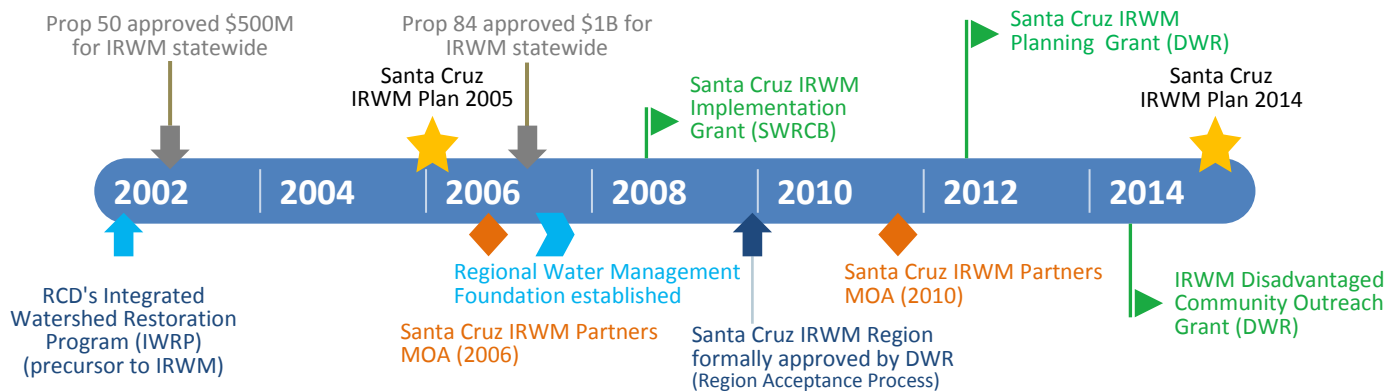
- Protection and improvement of water supply reliability, including identification of feasible agricultural and urban water use efficiency strategies.
- Identification and consideration of the drinking water quality of communities within the area of the plan.
- Protection and improvement of water quality within the area of the plan, consistent with the relevant basin plan.
- Identification of any significant threats to groundwater resources from overdraft.
- Protection, restoration, and improvement of stewardship of aquatic, riparian, and watershed resources within the region.
- Protection of groundwater resources from contamination.
- Identification and consideration of the water-related needs of disadvantaged communities in the area within the boundaries of the plan.

1.4 IRWM EFFORTS IN THE SANTA CRUZ REGION 2005 - 2014

In 2005, eight partner agencies (now referred to as the Regional Water Management Group) financed, developed and adopted the Integrated Regional Water Management Plan (IRWM Plan) for Northern Santa Cruz County. The main impetus for this Plan was a funding opportunity through Proposition 50, although it was the realization of over a decade of coordinated water resources planning in Santa Cruz County. Now simply called the Santa Cruz IRWM Plan, the Plan follows the state's vision of IRWM as a collaborative planning initiative to promote an informed, locally-driven, and consensus-based approach to regional water resources management.

In October 2005, the region completed its initial Integrated Regional Water Management Plan. The IRWM Plan identifies the region's conditions, issues, needs, goals and objectives, resource management strategies and priorities, and projects (e.g., construction, technical studies, research, pilot projects).

Figure 1 - 1 Timeline of Integrated Regional Water Management (IRWM) Program and Related Efforts



1.4.1 IRWM IMPLEMENTATION GRANT

In 2006, the Santa Cruz IRWM region successfully applied for a \$12.5 million Proposition 50 Round 1, Step 2 Implementation Grant from the State Water Resources Control Board (State Water Board). The IRWM grant funds 16 components which includes administration and coordination (Component 1) and projects that were designated as “high priority” and selected through a regional public process from 55 projects identified in the region’s initial IRWM Plan (grant Components 2 – 16). The grant was awarded in 2007 and was executed and initiated in April 2008 (Grant Agreement No. 07-507-550-0).

In 2007, the Regional Water Management Foundation (RWMF) was established to provide an organizational structure to support the implementation of the Santa Cruz IRWM Plan. The RWMF is a subsidiary of the Community Foundation Santa Cruz County. The RWMF served as the grantee and provided the grant administration and coordination; eight local agency partners (sub-grantees) provided the lead role in the implementation, oversight and management of their respective components (projects).

The funded projects serve to protect communities from drought, protect and improve water quality, and improve local water security. The funded components and lead agencies include:

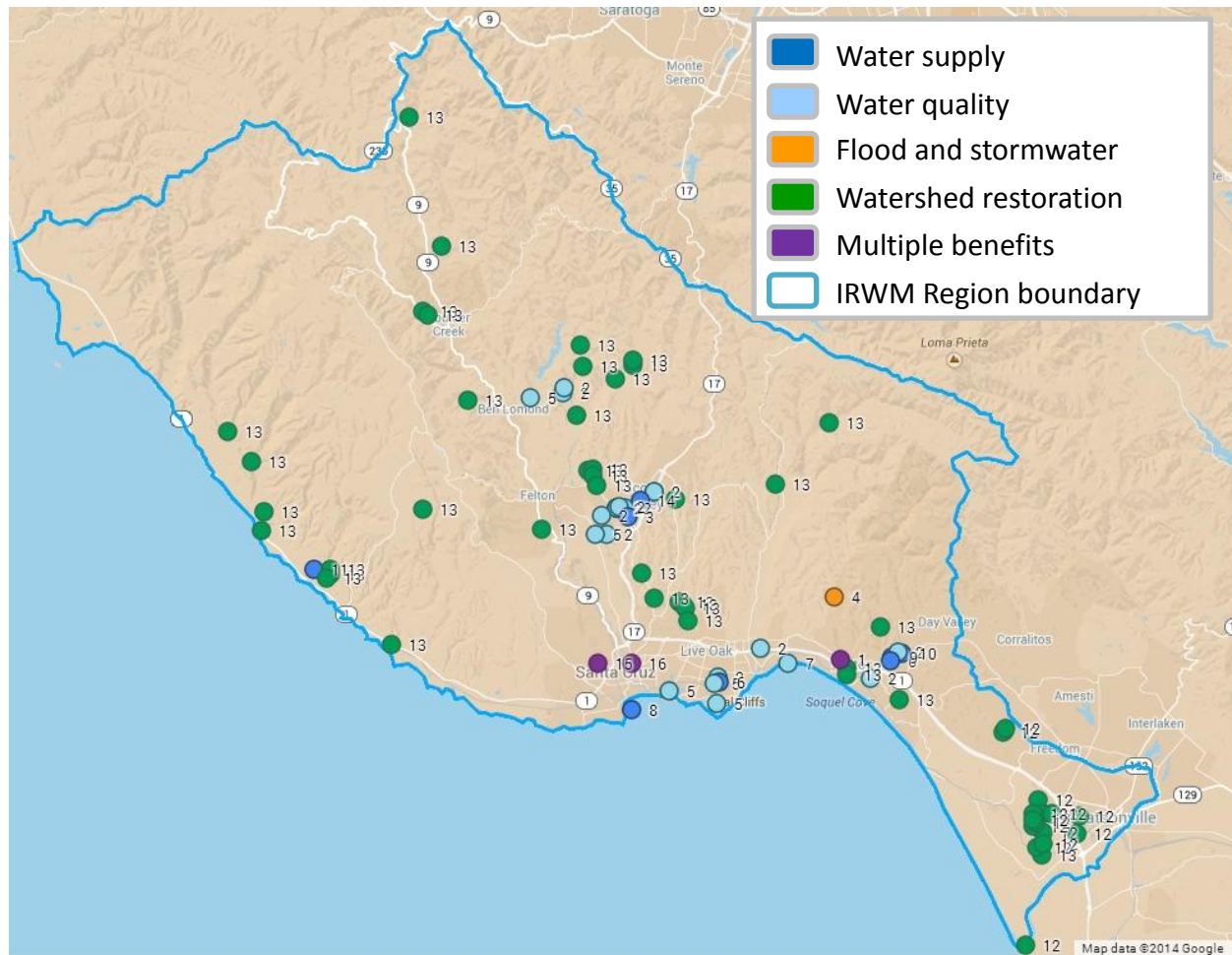
1. Manage Implementation and Administration of the Grant (Regional Water Management Foundation)
2. Abandoned Well Destruction Program (County of Santa Cruz, Environmental Health Services)
3. Conjunctive Use and Enhanced Aquifer Recharge (County of Santa Cruz, Environmental Health Services)
4. Aptos Watershed Drainage Master Plan (County of Santa Cruz, Public Works)
5. Santa Cruz County Stormwater Pollution Prevention Program (County of Santa Cruz, Public Works)
6. Groundwater Recharge and Policies (County of Santa Cruz, Environmental Health Services)
7. Sewer Main Relocation New Brighton/Seacliff State Beaches (County of Santa Cruz, Sanitation District)
8. Intake study for Desalination Facility (City of Santa Cruz Water Dept., Soquel Creek Water District)
9. Polo Grounds Well, Treatment Plant, Pipelines, and Water Conservation (Soquel Creek Water District)
10. Groundwater Monitoring Wells in the Aromas and Purisima Formations (Soquel Creek Water District)
11. Davenport Drinking Water Improvement (County of Santa Cruz, Davenport County Sanitation District)

12. Watsonville Sloughs Integrated Watershed Restoration (Resource Conservation District Santa Cruz Co.)
13. Integrated Watershed Restoration Program, Phase 2 (Resource Conservation District Santa Cruz County)
14. Scotts Valley Recycled Water Distribution System (Scotts Valley Water District)
15. Coordinated Monitoring Program (County of Santa Cruz, Environmental Health Services)
16. Improve Integration of Regional Water Management (Co. of Santa Cruz, Environmental Health Services)

Several of components, particularly 12 and 13, feature multi-benefit projects with on-the ground improvements in more than one location. In total, 65 projects were completed at more than 80 sites throughout the County. Implementation occurred from April 2008 – September 2013. The total cost of the implementation of the 16 components was over \$30 million; the State Water Board IRWM grant contribution totaled \$12.5 million and the matching funds totaled \$17.8 million. The IRWM grant funding was effectively leveraged as the contributed local match funds accounted for approximately 60 percent of the total project costs. Figure 1-1 provides map of completed projects. Insert. A summary of the 16 projects is available at www.SantaCruzIRWMP.org.

This grant was instrumental in fostering the efforts of the Santa Cruz IRWM region by putting the Plan into action with the implementation of high priority projects throughout the region. Its successful implementation served to strengthen existing partnership and create new partnerships amongst local agencies and stakeholders. Through the successful implementation of IRWM projects the region is incrementally addressing the key water supply, water quality, and environmental challenges facing the region.

Figure 1 - 2 Santa Cruz IRWM Completed Projects 2008 - 2013



1.4.2 IRWM PLANNING GRANT

In 2011, the California Department of Water Resources awarded \$999,750 to the Regional Water Management Foundation on behalf of the Santa Cruz Region to update the 2005 IRWM Plan and complete key technical studies to guide water resources management. This grant supports work to improve and expand the Plan to meet local needs and the state's IRWM Plan Standards. The proposed technical studies provide critical information to evaluate resource management strategies to address the water resource challenges facing the Region. Local partners on this grant include Santa Cruz County, Scotts Valley Water District, Central Water District, and the Resource Conservation District of Santa Cruz County.

The Santa Cruz IRWM partners share the responsibility and challenge of identifying solutions to sustainably manage local water resources. The Plan presents strategies for developing and implementing policies and projects to ensure sustainable water use, reliable water supply, better water quality, improved flood protection and stormwater management, and environmental stewardship. Santa Cruz County Water Resources Division led the effort to update the Plan, including the development of the IRWM Conceptual Framework. The County also led the work to identify and

incorporate climate change response strategies. \$165,500 in grant funds supported the development of the Plan and climate change strategies.

In addition, the grant supports the following four technical studies (Lead Agency; Grant Amount):

Aromas and Purisima Groundwater Basin Management Study (Central Water District; \$200,000). This planning and feasibility analysis examined the potential for redistribution of groundwater pumping between the Aromas and Purisima Formations near the boundary of the Central Water District and Soquel Creek Water District. Groundwater from both aquifers is currently the sole source of water supply for both Districts. The Aromas is subject to seawater intrusion, elevated levels of hexavalent chromium (Cr-6), and groundwater overdraft. This study evaluated the potential to shift pumping from the Aromas to inland portions of the Purisima to balance the pumping and potential treatment costs for Cr-6 removal. This study was completed in 2014. The findings informed the Plan and resulted in project included on the IRWM Plan 2014 Project List.

Santa Margarita Groundwater Model Update (Scotts Valley Water District; \$221,519). Groundwater levels in Scotts Valley area have declined over 200 feet in the past 30 years. The District relies upon a groundwater model and other monitoring data to inform its groundwater management. SVWD is updating, calibrating, and improving the existing groundwater basin model to more accurately evaluate groundwater-surface water interactions. This will inform the District's efforts to restore groundwater levels and increase stream baseflow (summertime) which is key to habitat determinant for salmonids. This work will be completed in 2014. Work thus far has informed the Plan and resulted in new projects from Scotts Valley Water District that are included on the IRWM Plan 2014 Project List.

Conjunctive Use and Water Transfers - Phase II (Santa Cruz County; \$164,500). Phase I technical studies (2008-11) evaluated the feasibility of large-scale water exchanges and aquifer recharge to mitigate the water management problems in the Region, as well as the potential for interties among local water agencies. Phase II builds upon Phase I to identify specific groundwater recharge strategies/projects, develop preliminary designs, and address legal and regulatory constraints. Work thus far has informed the Plan a regional interties project that is on the IRWM Plan 2014 Project List.

Watsonville Sloughs Hydrologic Study (Resource Conservation District; \$199,056). This study provided essential information to develop and implement strategies to improve this wetland ecosystem. Proposed projects have been repeatedly delayed due to the lack of critical information on the hydrologic functioning of this complex system. A hydrologic assessment of surface and shallow groundwater flows in the sloughs was completed and is supporting the development of resource management strategies to enhance water supply, flood management, ecosystem restoration, water quality, and recreational opportunities. This is an interregional study that also has benefits the neighboring Pajaro River Watershed IRWM Region. This study was completed in 2014. It is informing several proposed projects in the Watsonville Sloughs that were added to the IRWM Plan 2014 Project List.

Funding from this grant was important to supporting the ongoing planning efforts of the Santa Cruz IRWM region.

1.4.3 IRWM DISADVANTAGED COMMUNITY OUTREACH PILOT PROJECT

In 2013, Santa Cruz was one of seven IRWM regions in the state awarded an IRWM Planning Grant for Disadvantaged Community Outreach. The region received \$100,000 from DWR to support this effort. This work is currently in progress and will be completed in December 2014. Results of the work will be included as an addendum to the 2014 Plan in 2015.

This effort is intended to identify and advance projects to meet water needs in Watsonville and Davenport. Work currently underway includes DAC identification and assessment. An important element of this work includes the identification and assessment of other impoverished or socially vulnerable communities beyond Watsonville and Davenport. Through this task DACs in the IRWM region not previously identified nor engaged in IRWM efforts will be identified and assessed. Census data, mapping tools, and local community knowledge are being employed to identify and assess DACs. This task may result in identifying other economically disadvantaged pockets in the region that may not meet the DAC criteria based upon census data, but may warrant further assessment and outreach for engagement in IRWM planning efforts.

In 2014, the RWMG with assistance from Environmental Justice Coalition for Water (EJCW) and support from the University of California at Davis (UCD) Center for Regional Change (CRC) began mapping socially vulnerable communities. CRC is utilizing the Communities Environmental Health Screening Tool CalEnviroScreen Version 2.0 to identify communities that are disproportionately burdened by multiple sources of pollution. CRC is also using its Regional Opportunity Index (ROI) to identify people and places with the greatest need. This will inform targeted outreach to engage these communities in the IRWM planning process and, as resources allow, technical support to enable project readiness.

The Region is currently conducting outreach to engage key DAC community contacts to empower and engage DACs in the IRWM planning process. This includes conducting community outreach by convening working groups of interested community members to participate in meetings, and interviews or discussions to identify and evaluate water resource needs and priorities. As the needs and priorities of DACs are identified, work will continue to provide the critical support necessary to enable project readiness in IRWM planning and implementation. This includes the review and prioritization of projects and needs; an assessment of planning, feasibility and pre-design activities to enable project readiness; meetings to identify and gather project data and to investigate partnerships with conservation organizations and local governments; and exploring project integration of multi-benefit projects. This work to date has already informed the 2014 Plan. Davenport and Watsonville have multiple projects on the 2014 IRWM Plan list of projects.



Aerial view of the Santa Cruz region (photo: Robert Campbell)

1.5 IRWM PLAN 2014 PURPOSE AND FORMAT

In 2012, the California Department of Water Resources has established a set of guidelines that establish the general purpose, procedure and criteria that DWR will use to implement the IRWM grant program. Key components of the guidelines are the sixteen IRWM Plan Standards, which describe what must be included in an IRWM Plan. Generally, those standards require that an IRWM Plan:

- Clearly describe water resources related goals,
- Establish water resources management objectives and measurable targets,
- Provide geographic, political and jurisdictional context,
- Identify and evaluate appropriate water resources management strategies,
- Identify opportunities for integrating proposed water supply, water quality, aquatic ecosystem and flood management strategies,
- Identify priority strategies and methods by which success will be measured,
- Describe relationships between the IRWM and local land use and water supply planning,
- Assess the region's vulnerability to impacts from climate change, and identify high-priority adaptation strategies, and,
- Provide a mechanism for comprehensive stakeholder input to water resources planning.

To facilitate plan review, this IRWM Plan is organized in accordance with IRWM Plan Standards established within Appendix A of the July 2012 versions of the DWR Planning Guidelines. Although regional actions often provide the best avenue to implementing water related efforts, other actions are

still best implemented by individual jurisdictions and/or sub-regional associations or partnerships. This Plan focuses on identifying the efforts, goals and objectives of stakeholders overall while not attempting to dictate the specific method of implementation for the various activities that are ongoing within the region. Key to this Plan is an IRWM conceptual framework that informed the development of Goal and Objectives (Chapter 4) and priority Resource Management Strategies (Chapter 5). It also informed the identification of performance metrics and measurements to gauge effectiveness and system responses that informed Plan Performance and Monitoring (Chapter 8), and updating and modifying IRWM approaches to adapt to change.

CHAPTER 2: GOVERNANCE

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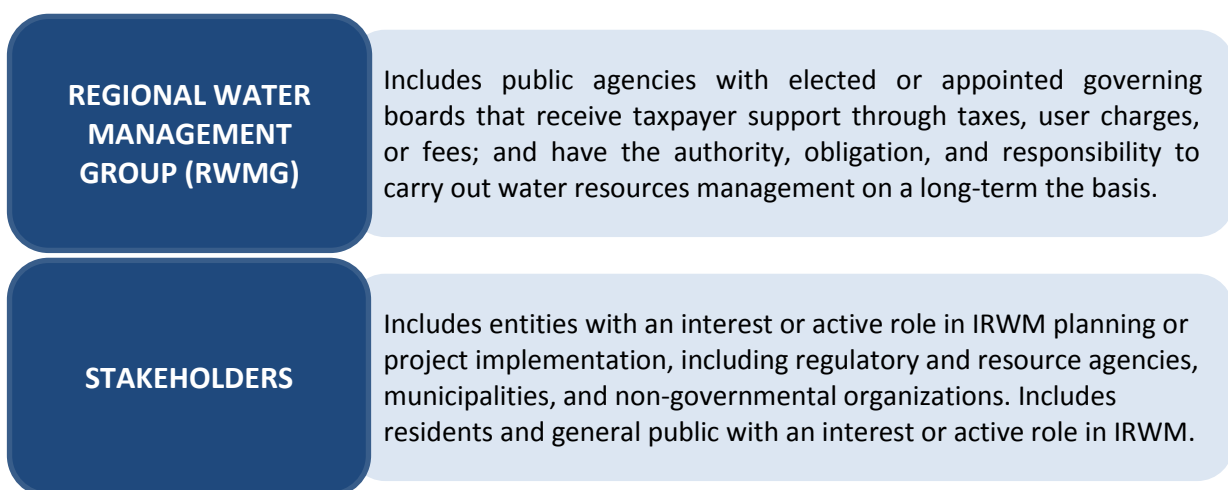
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2.1 SANTA CRUZ IRWM GOVERNANCE STRUCTURE

The Regional Water Management Group (RWMG) includes the agencies responsible for development and implementation of the Santa Cruz Integrated Regional Water Management (IRWM) Plan. The RWMG is organized according to the California Water Code, but has its origins in the region's long history of collaborative watershed planning efforts.

For the Santa Cruz IRWM program, the RWMG consists of nine local agencies with statutory authority over water management and related resources. In addition, the IRWM program provides opportunity and encourages the participation and engagement of interested stakeholders throughout the Santa Cruz IRWM Region (and beyond). Stakeholders include regulatory and resource agencies, municipalities, non-governmental organizations, business and community groups, and citizens who may otherwise have an interest in IRWM planning and project implementation. The RWMG and Stakeholders are broadly defined as follows:



The following sections describe these various levels of participation within the Santa Cruz IRWM planning process - the RWMG, Steering Committee, Regional Water Management Foundation, and Stakeholders - and the ways in which the Santa Cruz IRWM governance operates to ensure effective implementation of the ongoing IRWM program.

2.1.1 SANTA CRUZ REGIONAL WATER MANAGEMENT GROUP

The makeup of the Santa Cruz RWMG is defined by §10539 of the California Water Code:

“RWMG means a group in which three or more local agencies, at least two of which have statutory authority over water supply or water management, as well as those other persons who may be necessary for the development and implementation of a plan that meets the [IRWM] requirements ... participate by means of a joint powers agreement, Memorandum of Understanding (MOU), or other written agreement, as appropriate, that is approved by the governing bodies of those local agencies.” (CWC §10539)

RWMG eligibility is defined through a set of criteria that includes:

1. Authority, obligation, and responsibility to carry out water resources management within the Region’s IRWM boundary; and
2. Public agencies with elected or appointed Boards; and
3. Receive support from public funds; and
4. Signatory to the IRWM Memorandum of Agreement.

The purpose of these criteria is to ensure that the RWMG consists of public agencies with a civic responsibility for long-term resources management and public accountability. As the IRWM Plan is expanded, additional agencies that meet these criteria may join this partnership. RWMG members are committed to:

- Establishing and fostering relationships with regional, state, and local governments, individuals, and other interested organizations to develop and implement management practices to preserve and protect Santa Cruz County water resources.
- Undertaking cooperative research and resource management initiatives that are regional in scope and disseminate information resulting from these activities.
- Producing and sharing relevant informational materials among the RWMG; particularly monitoring data information useful in assessing plan effectiveness.
- Recommending to the respective governing boards actions necessary to successfully develop and implement the IRWM Plan.
- Sponsoring appropriate stakeholder projects, and acting as an administrative and fiscal agent for those projects in the event they receive IRWM funding.
- Establishing goals and objectives for the Santa Cruz IRWM.
- Contributing the personnel and financial resources necessary to develop and implement the IRWM Plan proportional to their potential benefit.

Nine agencies have signed a Memorandum of Agreement to participate in the RWMG. They include:

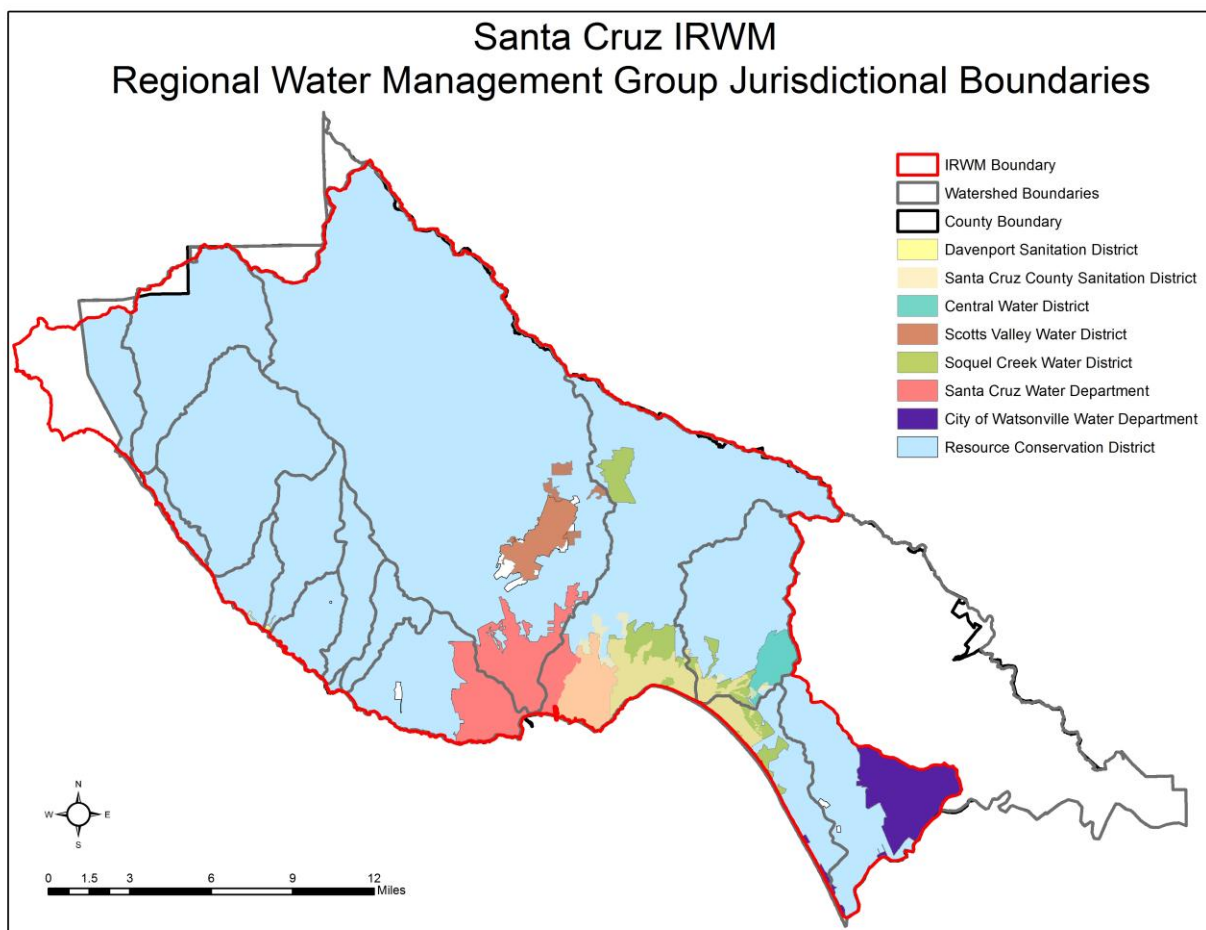
- Central Water District
- City of Santa Cruz
- City of Watsonville
- County of Santa Cruz
- Santa Cruz County Sanitation District
- Davenport County Sanitation District
- Resource Conservation District of Santa Cruz County
- Scotts Valley Water District
- Soquel Creek Water District

The functional responsibilities of each RWMG member are outlined in the table below, and briefly described.

Table 2 - 1 RWMG Members and Areas of Functional Responsibility

Regional Water Management Group	Primary Functional Area Responsibilities			
	Water Supply	Water Quality	Watershed Resources	Flood / Stormwater Management
Central Water District	✓			
City of Santa Cruz	✓	✓	✓	✓
City of Watsonville	✓	✓	✓	✓
County of Santa Cruz	✓	✓	✓	✓
County Sanitation District		✓		
Davenport County Sanitation District	✓	✓		
Resource Conservation District		✓	✓	
Scotts Valley Water District	✓			
Soquel Creek Water District	✓			

Figure 2-1 Jurisdictional Boundaries



Central Water District

The Central Water District has a five square mile service area in the rural area of Aptos. The District serves a population of approximately 2,700 people through about 840 connections, all of which are residential with the exception of seven commercial and 16 irrigation and public facilities. The District has two intertie connections with the Soquel Creek Water District for line flushing and limited assistance during emergencies. The District relies on groundwater from the Aromas Red Sands and Purisima aquifers for supply.

City of Santa Cruz

The City of Santa Cruz Water Department (SCWD) serves a 20 square mile area that extends from the agricultural lands west of the City to 41st Avenue in the City of Capitola. The service area includes the developed portion of UC Santa Cruz campus, Live Oak, Pasatiempo, and some other unincorporated areas surrounding the City. The City serves water to approximately 91,000 customers through over 24,000 connections, of which 88 percent are residential.

The City's Water Resources Management Section is responsible for the drinking water source protection, environmental regulatory compliance, and general natural resource management work that is an important part of the delivery of clean drinking water to City customers. Along with other

responsibilities, Resource Management staff provide environmental review and compliance support for the Department; conduct biological and hydrologic surveys, including drinking water source stream gaging and anadromous fishery habitat typing and population assessments; work on the Department's Habitat Conservation Plan; manage watershed lands; develop drinking water source assessments; and perform outreach and education with drinking water source watershed stakeholders.

In addition to acting as a water supply agency, the City performs several other water resources-related functions. The City maintains 7 miles of underground stormwater pipelines, 8 miles of surface storm ditches, 1 pump station, approximately 1,500 catch basins and 125 outfalls. The City also maintains the US Army Corps of Engineers levee system on the lower San Lorenzo River, which is approximately 3 miles long with 5 pump stations. The City's operations and maintenance program for the flood control facilities on the San Lorenzo River includes removal of sand and silt from the channels of the river and Branciforte Creek; maintenance of pumps, gates and levees; and removal of weeds and growth in drainage ditches and catch basins. As a best management practice, the City conducts routine street sweeping and regularly cleans the storm drain pipeline system, among other activities.

The City of Santa Cruz wastewater collection system serves approximately 15,000 connections and operates the wastewater treatment facility, which serves the City as well as the Santa Cruz County Sanitation District, CSA 10 and UC Santa Cruz. Fifty percent of the wastewater treated at the plant is generated within the City. The effluent is treated to a secondary level and disposed of through a deep ocean outfall constructed in 1980 and shared with the City of Scotts Valley. Approximately 150 acre-feet per year of treated water is retained for use at the treatment plant. The collection system includes 23 lift stations with a total capacity of 10.6 million gallons per day.

County of Santa Cruz

Although it does not have a centralized water supply agency, the County of Santa Cruz has historically coordinated countywide water management efforts through long-range water supply planning, watershed management programs, and development and implementation of general plan policies and programs for water resource protection and management. Current efforts focus on monitoring, investigation, planning, policy development, and management activities in the areas of water quality protection, erosion control, habitat restoration, stormwater management, and flood management. Efforts are being made to expand programs in the areas of water supply planning and comprehensive management. County water resource management programs are presently carried out in three departments: Planning, Public Works, and the Environmental Health Services Division of the Health Services Agency, with overall coordination by Environmental Health. Areas of responsibility with regard to water resources are described below.

Environmental Health Services (EHS), a division of the Health Services Agency, is responsible for coordinating the County's water resource management efforts. EHS acts as the administrative lead for the IRWM program efforts. EHS staff monitors bacteria, nitrate, and runoff at ocean beaches, coastal lagoons, streams, and storm drains. Staff maintain a database on streamflow and water quality, oversee hazardous materials facilities operations and cleanups, oversee 130 small water systems, regulate installation of new wells, ensure adequate water supply for new development using individual water systems, and oversee onsite wastewater treatment systems. EHS has oversight of water conservation, groundwater supply, and groundwater recharge programs and provides staff support to the County Water Advisory Commission and the County Fish and Game Advisory Commission. Additionally, EHS participates in regional monitoring efforts conducted by the Monterey Bay National Marine Sanctuary,

the Regional Water Quality Control Board and others. EHS reviews water rights applications and promotes stream habitat improvement projects. EHS also conducts a large woody material management program, and provides oversight and management of a countywide fish monitoring program. The Planning Department provides environmental review of all projects, and oversight of development activities such as grading, clearing, building, quarries, erosion control, and riparian corridor disturbance. The department develops and implements general plan policies and programs, and provides code compliance review and correction of erosion problems, riparian corridor impacts, and other illegal damage to environmental resources.

Public Works is responsible for the following areas of water resource management: compliance monitoring for sewage discharge requirements and industrial waste dischargers; maintenance and upgrade of sewage collection systems and small plants; operation of the Household Hazardous Waste Program; maintenance, improvement, and operation of drainage facilities, including silt and grease traps, flood control channels, and sloughs; maintenance and improvement of roads, including drainage and erosion control features; assessment and repair of road-related sediment sources and conditions for fish passage; operation of ALERT Flood Warning system for key watersheds; coordination and implementation of the stormwater management program; and groundwater monitoring around County landfills.

Santa Cruz County Sanitation District

The Santa Cruz County Sanitation District provides wastewater collection, treatment, and disposal services for the City of Capitola and the unincorporated communities of Aptos, Soquel, and Live Oak. The District also serves Harbor High School, a satellite medical center, and the Port District that are within the City of Santa Cruz and outside the District's boundary. The District has treatment capacity rights of 8 million gallons per day at the City of Santa Cruz Wastewater Treatment Plant. The District currently maintains over 31,000 connections. Sewage is transported from the Lode Street facility near Capitola to the wastewater treatment plant at Neary Lagoon, which is owned and operated by the City of Santa Cruz. The District administers, maintains, and improves sanitary sewer facilities. Staffing is provided by the Santa Cruz County Public Works Department. Sanitation personnel in Public Works also provide service to Davenport, Freedom, Place de Mer, Sand Dollar Beach, Boulder Creek Country Club, Rolling Woods, and Trestle Beach.

Davenport County Sanitation District

The Davenport Sanitation District is a public agency providing clean drinking water and sewage collection, treatment, and disposal services to the economically disadvantaged community (DAC) of Davenport, located in northern Santa Cruz County. There are currently 89 sanitary sewer connections and 108 water service connections, serving a population of approximately 500. The district operates and maintains 3 miles of gravity lines, 1.3 miles of force main, and 3 pump stations. The District provides collection and treatment services as well as recycled water. Recently, the District received state grants to update drinking water distribution lines and construct a new drinking water treatment plant and storage facilities. The District is managed by the County Department of Public Works.

Resource Conservation District of Santa Cruz County

The mission of the Resource Conservation District of Santa Cruz County (RCD) is to help people protect, conserve, and restore natural resources through information, education, and technical assistance programs. The RCD provides a broad range of services related to soil and water conservation throughout Santa Cruz County. The RCD operates pursuant to the Resource Conservation District Act; it is a public

resource agency but does not have any regulatory or enforcement authority. The RCD leverages available technical, financial, and educational resources to meet the needs of local land users within three primary areas of service¹:

Agricultural Community: The RCD continues to serve the agricultural community as it has since the District's formation. Through a cooperative agreement with the US Department of Agriculture's Natural Resources Conservation Service (NRCS), the RCD offers the services of NRCS Conservationists to assist agricultural landowners with land management issues, including irrigation, fertilizer management, soil development, erosion control, crop cover, etc. The RCD places a high priority on issues and work related to the protection of prime and important farmland within Santa Cruz County.

Erosion Control and Sedimentation: The RCD prioritizes controlling accelerated erosion and sedimentation from human activities, including the following: rural roads, inadequate drainage, major land use changes, and erosion and reactivation of chronic landslide masses from landslides induced by human activities as well as natural events. To address these issues the RCD offers conservation assistance to road associations, timberland owners, livestock owners, environmental organizations, government resource agencies, and the general public through conferences, workshops, and demonstrations.

Watershed Management: Soil and water conservation is an important element of watershed planning and management. Through the Integrated Watershed Restoration Program (IWRP) the RCD is directly involved in a number of watershed management initiatives. The RCD assists watershed groups and landowners with dissemination of conservation information and implementation of on-the-ground resource enhancement projects, including managing grant programs. In conjunction with the NRCS, the RCD offers permit coordination services through the Santa Cruz Countywide Permit Coordination Program.

Scotts Valley Water District

The Scotts Valley Water District (SVWD) service area encompasses six square miles, including most of the City of Scotts Valley and unincorporated areas to the north. The District currently serves approximately 10,000 customers through nearly 4,000 connections, of which 93 percent are residential. The District is dependent on groundwater. Water supply is obtained from three water-bearing formations within the Santa Margarita Groundwater Basin: the Santa Margarita Sandstone, and the Lompico and Butano formations. The District has an emergency intertie with the San Lorenzo Valley Water District and plans to increase the size of the connection to enhance mutual aid opportunities in the future. In 2011, the District delivered approximately 200 acre-feet of recycled water from the City of Scotts Valley Wastewater Treatment Plant.

Soquel Creek Water District

The Soquel Creek Water District (SqCWD) serves an area of 14 square miles that includes portions of the City of Capitola as well as the unincorporated areas of Soquel, Aptos, Seacliff, Rio Del Mar, Seascapes, La Selva Beach, and Canon del Sol. The District serves over 37,000 customers through approximately 15,000 connections with 94 percent of those being residential. The District is entirely dependent on groundwater from two aquifers – the Purisima Formation (62 percent of its supply) and the Aromas Red Sands aquifer (38 percent of supply).

¹Santa Cruz County Local Agency Formation Commission. 2005. Countywide Service Review

City of Watsonville

The City of Watsonville is within an area of overlap for the Santa Cruz IRWM and Pajaro IRWM planning regions. As a water supply agency, the City has approximately 14,000 service connections, of which 85 percent are residential. The City of Watsonville provides domestic water services in much of the Pajaro Valley that lies within Santa Cruz County, from Pajaro Dunes to Corralitos. Some new developments that lie outside the city limits also will be served if they meet the City's minimum density requirements and include affordable housing. The majority of the City's water supply is obtained from the Aromas Red Sands aquifer with the balance coming from surface water. The City's potable water distribution system is comprised of 152 miles of pipeline, eight reservoirs or water storage facilities, and 10 pumping stations.

The City of Watsonville implements a water conservation program, and has developed a recycled wastewater project in conjunction with the Pajaro Valley Water Management Agency to serve agricultural users to reduce groundwater pumping in the coastal area. The City also operates a wastewater treatment plant that treats approximately 7 million gallons of wastewater per day to secondary standards and discharges to the ocean. The City has implemented a Storm Water Management Program since 2003, and enforces a series of best management practices and associated measurable goals to meet the six minimum control measures identified in the Phase II NPDES Program. A Trails Master Plan has recently been developed that proposes a system of footpaths, bicycle paths, point access for disabled users, and tie-ins to commercial development.

Watsonville also provides wastewater collection services within the City's boundaries. The City's treatment facility located on Panabaker Lane treats wastewater from the City as well as from the Salsipuedes Sanitary District, the Freedom County Sanitation District, and the Pajaro County Sanitary District located in northern Monterey County. Wastewater is treated to the tertiary level. Treated effluent is discharged through an ocean outfall over a mile offshore. The City's wastewater system has 12 lift stations with a combined capacity of 2.4 million gallons per day.

2.1.2 IRWM STEERING COMMITTEE

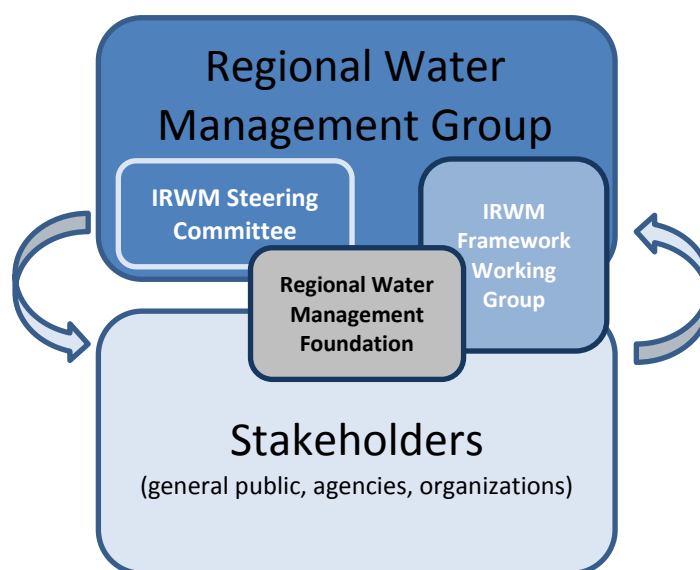
The IRWM Steering Committee is an active, decision-making sub-group of the RWMG that is designed to be broadly representative of the RWMG yet small enough to effectively make decisions in a timely manner. The Steering Committee is composed of three members selected from the RWMG, and appointed to ensure representation for each of the four functional areas – water supply, water quality, watershed resources, and flood and stormwater management. The Steering Committee currently consists of the County Water Resources division director, the executive director of the Resource Conservation District, and the manager of one of the water supply agencies.

The Steering Committee meets on a regular basis (currently monthly) to discuss IRWM administration and to coordinate efforts as needed. The RWMG representatives on the Steering Committee are appointed by majority vote of the RWMG (based on one vote per agency). Steering Committee members serve on the Committee for as long as they choose, unless they are voted out by the RWMG (by majority vote).

The Steering Committee provides information and consults with the RWMG, and performs the following functions on behalf of the RWMG:

- guides IRWM Plan implementation;
- acts as a liaison to the RWMF and all stakeholders, including state agencies, elected officials, and the public;
- coordinates funding proposals;
- promotes project integration of multi-benefit projects;
- ensures stakeholder participation; and,
- tends to administrative matters concerning IRWM efforts.

Figure 2- 2 Santa Cruz IRWM Participatory Diagram



2.1.3 REGIONAL WATER MANAGEMENT FOUNDATION

The Regional Water Management Foundation (RWMF) was created in 2007 to serve an administrative role for the first IRWM Implementation grant awarded to the region. The RWMF is a separate 501(c)(3) tax-exempt nonprofit organization established as a subsidiary of the Community Foundation Santa Cruz County. In addition to serving as the fiscal agent, the RWMF also provides ongoing management and administration for the IRWM grants awarded to the region. The RWMF acts as a central hub and provides technical expertise for consolidation of items for review, reporting, invoicing, and inter-agency coordination, as well as an interface between the RWMG and the funding state agency.

The RWMF is guided by a seven-member Board of Directors consisting of four members appointed by the Community Foundation and the three members of the IRWM Steering Committee. The RWMF actions are guided by a set of bylaws adopted in 2007, which establish a process for meetings, decision making, and membership, among other information. The Board typically meets on a quarterly basis, more frequently as needed.

The RWMF has served as grantee for the three IRWM grant awarded to the region. As grantee, the RWMF has provided the grant administration and coordinated the reporting, invoicing, and inter-agency coordination. The RWMF has played this role on all of the IRWM grants awarded to the region, which includes:

- Proposition 50 IRWM Implementation Grant \$12.5m from the State Water Board (2008 - 2013)
- Proposition 84 IRWM Planning Grant \$999,750 from DWR (2011 - 2014)
- Proposition 84 IRWM DAC Outreach Pilot Project Grant \$100,000 from DWR (2011 - 2014)
- The RWMF also provides similar services to some of the RWMG agencies on efforts outside the IRWM program, such as the State Water Board's Stormwater Grant Program.

2.1.4 STAKEHOLDERS

Stakeholders participate in and contribute to IRWM planning and implementation activities, but do not have the voting rights of RWMG members. Stakeholders include regulatory and resource government agencies, municipalities, local districts, nonprofit environmental organizations, community organizations, environmental and social justice organizations, academic institutions, agricultural representatives, Native American tribes, neighboring IRWM regions, and private citizens, among others. Stakeholders' roles vary from issuing permits for IRWM projects, to acting as sub-grantees to RWMG members for the implementation of IRWM projects, to providing direct input into IRWM Plan milestones, such as goals and objectives, to simply having a general interest in IRWM planning activities. Stakeholders have the opportunity for participation or input in Plan development and specific projects through public meetings, stakeholder workshops, and project solicitations. They may also become involved at the project implementation stage as technical advisors or in the project permitting process.

Stakeholders in the Santa Cruz IRWM planning process include, but are not limited to, those listed below:

- Action Pajaro Valley
- Amah Mutsun Tribal Band of Ohlone/
Costanoan Indians
- Arana Gulch Watershed Alliance
- Bay Area IRWM Region
- Bureau of Land Management
- CA Department of Fish and Wildlife
- CA Department of Parks and Recreation
- CA Department of Water Resources
- CAL FIRE
- Cal Poly Swanton Ranch
- California Coastal Commission
- California Coastal Conservancy
- Center for Integrated Water Research
- Central Coast Regional Water Quality
Control Board
- City of Capitola
- City of Scotts Valley
- Coastal Watershed Council
- Ecology Action
- Environmental Justice Coalition for Water
- Friends of Pajaro Dunes
- Land Trust of Santa Cruz County
- Monterey Bay Channel Keeper
- Monterey Bay National Marine Sanctuary
- Natural Resources Conservation Service
- NOAA's National Marine Fisheries Service
- O'Neill Sea Odyssey
- Pajaro Valley IRWM Group
- Regional Water Management Foundation
- San Lorenzo Valley Water District
- San Lorenzo Valley Women's Club
- Santa Cruz County Farm Bureau
- Santa Cruz Port District
- Save Our Shores
- Scotts Creek Watershed Council
- Sierra Club
- State Water Resources Control Board
- Surfrider Foundation
- The Otter Project
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- UC Santa Cruz
- Watsonville Wetlands Watch

2.1.5 FUTURE IRWM COLLABORATION AND NEW PARTNERSHIPS

The Steering Committee serves a lead role in identifying and cultivating new partnerships, working towards project integration, and encouraging participation in the IRWM process. The Steering Committee's outreach activities are detailed in Chapter 14, Stakeholder Involvement. Additional

agencies and organizations are anticipated to become involved as the Santa Cruz IRWM efforts expand and new collaborations develop.

2.2 GOVERNANCE MECHANISMS

2.2.1 MEMORANDUM OF AGREEMENT

Each of the RWMG members is signatory to the *Memorandum of Agreement for the Santa Cruz Integrated Regional Water Management Plan* (MOA) (Appendix A). The MOA establishes the institutional framework for the joint efforts of the participating agencies in developing, implementing, and updating the IRWM Plan. The initial Santa Cruz IRWM MOA was developed and signed in 2006 by six participating agencies and entities, the term of which carried through until 2010. In 2011, the MOA was updated and renewed, and signed by nine partner agencies. The MOA establishes the mutual understandings of the signatories and defines procedures and roles in regard to the following:

- Purpose
- Scope of the IRWM Plan
- Decision-making process
- Commitment of personnel and financial resources
- Reports and communications
- Role of the Steering Committee
- Levels of engagement (RWMG members and Stakeholders)
- Eligible project types
- Process for collaboration and new partnerships
- Interim and formal Plan amendments
- Project list updates

2.2.2 EFFECTIVE DECISION MAKING

The Steering Committee is tasked with principal duty of guiding IRWM activities in the Region, including decision making regarding coordination, planning, and implementation. Decisions are by consensus through an interactive process that seeks the consent of all participants. The process has proven effective for the RWMG in the successful application and completion of IRWM Implementation and Planning grants, regional technical planning studies, and collaboration on related resources stewardship issues. On matters of significance to the larger RWMG (e.g., deciding to apply for funding opportunities), the Steering Committee consults with the full RWMG. All Steering Committee decisions with material financial implications are ratified by a majority vote of the full RWMG. The Steering Committee also guides the formation of committees or working groups composed of representatives from the RWMG.

2.2.3 EFFECTIVE COMMUNICATION

Internal Communications

Communication within the RWMG is conducted through a variety of avenues including meetings, email, website, presentations, and workshops. The Steering Committee meets on an approximately monthly

basis. The Steering Committee and staff schedule meetings with the full RWMG on an as-needed basis, typically multiple times each year. Typically, these meetings occur in response to issues with particular effect upon the RWMG. In general, meetings will be scheduled to address such concerns as:

- Updates to the MOA
- Revised or updated IRWM guidelines
- Funding solicitations
- Change in Steering Committee membership
- IRWM project solicitation
- Updates to the IRWM Plan

Website updates, listserv, and informal emails and phone calls may also be used to coordinate among RWMG members, depending on the nature of the subject matter.

External Communications

The Santa Cruz IRWM website is updated on a frequent basis and serves to inform the general public about IRWM efforts, including: information on IRWM projects and planning documents; opportunities for public engagement through meetings and workshops; information on funding opportunities; a document library; information and materials from upcoming and recent meetings; a sign-up for email updates; contact information on the IRWM program staff; and news and information on how to submit a project to be considered for inclusion in the IRWM Plan. The email distribution listserv is also used to inform stakeholders of important announcements, such as planning or implementation milestones, news and events, meetings and workshops, funding opportunities, and project solicitations. See below for a more detailed description of the Region's public outreach and involvement process.

The Santa Cruz IRWM Region participates in the statewide Roundtable of Regions, a consortium of IRWM regions that shares IRWM-related information amongst the participating regions as well as routinely communicates with the Department of Water Resources staff to exchange information and perspectives on IRWM program and matters broadly pertaining to IRWM functionality and funding. The Santa Cruz Region also coordinates with the five other IRWM regions in the Central Coast funding area, with regional representatives participating in meetings and conference calls to exchange information on topics such as the status of planning and implementation activities, emerging issues, opportunities for interregional collaboration, and funding.

2.3 HOW THE GOVERNANCE ENSURES AN OPEN, BALANCED, AND COLLABORATIVE PROCESS

The following sections describe how the Santa Cruz governance structure functions to ensure an effective, open, balanced, and inclusive process that achieves the goals and objectives described in this Plan.

SANTA CRUZ INTEGRATED REGIONAL WATER MANAGEMENT

IRWM ABOUT PLAN UPDATE 2014 PROJECTS RESOURCES CONTACT

The Santa Cruz Integrated Regional Water Management (IRWM) program provides a framework for local stakeholders to manage this region's water and water-related resources. The Santa Cruz IRWM Plan was developed in response to California's IRWM planning initiative to promote an informed, locally-driven, and consensus-based approach to water resources management.

The IRWM Plan includes strategies for developing and implementing policies and projects to ensure sustainable water use, reliable water supply, better water quality, improved flood protection and stormwater management, and environmental stewardship. [Find out more](#)

IRWM Plan Update Nearing Completion
This effort is led by the County of Santa Cruz in conjunction with the local agencies, stakeholders and in partnership with the Regional Water Management Foundation (RWMF).
Remain current in addressing region's challenges

- Review and update goals and objectives
- Identify water resource management strategies
- Complete technical studies
- Update list of projects from stakeholders

Meet the state's new IRWM Plan standards

- Climate change response actions
- Relation of local water planning and land use planning

This work is funded in part through a competitive grant awarded by the Department of Water Resources and with local agency funds. The Plan will be completed in summer 2014.

2014 IRWM Project Solicitation
The 2014 IRWM Plan project submission period is closed. 77

Stakeholder Meetings and Workshops

Coming Up ...
County Water Advisory Commission – Special Meeting
Presentation of the IRWM Plan for the Santa Cruz Region
July 16, 2014, Wednesday, 4:00pm - 6:00pm
Location: County Health Center at 1080 Emeline, Santa Cruz Health Services - Large Auditorium
[Agenda \(PDF\)](#)

Past Meetings
April 24, 2014, Thursday, 2:00pm - 4:00pm
Location: Simpkins Family Swim Center, Santa Cruz
IRWM Meeting - Drought Projects Solicitation
[Presentation \(PDF\)](#)

2.3.1 COLLABORATIVE PROCESS USED TO ESTABLISH PLAN OBJECTIVES

IRWM Plan objectives were initially developed for the 2005 Northern Santa Cruz IRWM Plan, derived from numerous water resource and watershed planning documents. Subsequently, the RWMG, led by the Steering Committee, developed an overarching vision for the Santa Cruz IRWM Plan and refined the goals and objectives as part of the 2009 Regional Acceptance Process.

In 2012, as part of the Plan Update, the vision, goals, and objectives were revised through a year-long planning process to ensure objective-based decision making and strategy prioritization for the IRWM Plan. This collaborative process was led by a working group of representatives from the RWMG and participating Stakeholders. This working group oversaw the development of objectives over approximately 12 months as part of a comprehensive effort to develop a conceptual framework for the Santa Cruz IRWM Plan (See Chapter 4 Goals and Objectives). The purpose of that effort was to build off of prior work on the goals and objectives in a way that directly linked strategy implementation with achievement of objectives and the indicators by which progress towards achievement could be measured. The draft objectives were presented to the RWMG in 2012 as well as to stakeholders at a public workshop on August 16, 2012, which provided an opportunity for oral and written comments. The draft goals and objectives were posted to the Santa Cruz IRWM website and brought to the RWMG for review and comment prior to their finalization.

2.3.2 BALANCED ACCESS AND OPPORTUNITY FOR PARTICIPATION

Most of the agencies and stakeholders in the region that have the responsibility for water management issues are members of the RWMG and these stakeholders have representation in the decision-making structure. The RWMG appoints three members of the RWMG to serve on the Steering Committee, ensuring balanced representation of the four functional areas (water supply, water quality, flood protection/stormwater management, and watershed and resource stewardship) in the RWMG's decision making. The governance structure supports additional participation in the IRWM planning process through working groups, stakeholder informational meetings and workshops, targeted outreach to DACs, and public outreach programs. Stakeholders are encouraged to participate in the IRWM planning process with no requirement or expectation to contribute financially to the IRWM Plan.

2.3.3 PUBLIC OUTREACH AND INVOLVEMENT PROCESSES

The RWMG engaged and will continue to engage interested stakeholders and provide opportunities for the general public to become informed and involved, and to provide feedback on IRWM efforts and Plan updates. Any interested stakeholder may participate in the Santa Cruz IRWM planning process by attending workshops, responding to calls for projects, commenting on the draft IRWM Plan, or simply by contacting the Steering Committee or staff. The Santa Cruz IRWM website is the primary mechanism for distributing information to the general public and posting upcoming events, planning efforts, implementation projects, and documents. The website includes a sign-up for email registration to receive emails on IRWM news and events. This email list-serve is one of the primary mechanisms for distributing information to stakeholders and RWMG members. Chapter 14 provides a more comprehensive description of Stakeholder Outreach and Involvement.

During the IRWM Plan update process, the RWMG encouraged participation from other water, agricultural, watershed, wetland, and environmental non-governmental and community-based

organizations, agencies, and special districts. In 2013-2014, the RWMG targeted involvement of DACs through DWR's DAC Outreach Pilot Project. The RWMG communicates through a website, meetings, workshops, email, local media, written correspondence and public announcements. The RWMG members regularly conduct outreach with their own boards, councils, commissions, constituents, and members through emails, newsletters, websites, and public meetings. The RWMG will continue to engage the community through established boards, advisory groups, meetings, and events, including:

- Elected and appointed agency boards and councils
- Santa Cruz County Water Advisory Commission
- City of Santa Cruz Water Commission
- Integrated Watershed Restoration Program Outreach
- Blue Circle Meetings
- SCWD2 Task Force – Outreach Program
- Santa Cruz Watershed Action Group (SWAG)
- Santa Margarita Basin Advisory Committee
- Municipal Stormwater Permit Outreach Program
- Soquel-Aptos Groundwater Management Alliance

As with the 2005 IRWM Plan, the 2014 IRWM Plan will be formally adopted by the RWMG through a public process that allows for comment on the Plan. A public workshop will be held, followed by adoption by each of the governing boards and then by the RWMG meeting as a whole. A template of the Resolution for Adoption is provided in Appendix B.

Figure 2 - 3 IRWM Plan 2014 Adoption Dates of RWMG

RWMG Entity	Anticipated Date of Adoption
City of Santa Cruz	7/22/2014
Soquel Creek Water District	8/12/2014
Resource Conservation District of Santa Cruz County	8/13/2014
Scotts Valley Water District	8/14/2014
Central Water District	8/19/2014
County of Santa Cruz	8/19/2014
Davenport Sanitation District	8/19/2014
Santa Cruz County Sanitation District	8/21/2014
City of Watsonville	8/26/2014
Regional Water Management Group	8/27/2014

2.4 COORDINATION WITH NEIGHBORING REGIONS

Representatives of the Santa Cruz RWMG participate in the Central Coast Funding Area workgroup conference calls and meetings, and keep an open dialogue between neighboring IRWM regions. The RWMG participates in neighboring IRWM Plans (particularly Pajaro), and coordinates on any projects

that overlap regional boundaries. The Santa Cruz Region is abutted on the south and east by the Pajaro Region including one area of overlap (Watsonville Sloughs); and to the north and east by the Bay Area IRWM Region.

2.4.1 COORDINATION WITH PAJARO REGION

The Pajaro IRWM effort, which covers all of the Pajaro River Watershed, including the portion within Santa Cruz County, is viewed as parallel and complementary. The Pajaro IRWM Plan primarily addresses issues of groundwater management, flooding, and water quality in the Watsonville Sloughs area, while the Santa Cruz County IRWM Plan addresses water quality protection and habitat restoration in the sloughs. Both Pajaro and Santa Cruz are within the Central Coast Hydrologic Region. Several Santa Cruz RWMG members also have projects in the Pajaro region, and the Santa Cruz RCD and County staff participate in the Stakeholder Advisory Committee of the Pajaro IRWM planning process. Coordination primarily occurs around overlapping projects and around projects in the Watsonville Sloughs. The two regions have many common stakeholders. Both regions participate in regular Central Coast IRWM coordination meetings and also in the Roundtable of Regions. The County Water Resources Division reviews and comments on both IRWM Plans. County and RCD staff as well as staff from the City of Watsonville attend both Regions' meetings. There is also some coordination and collaboration on grant funding outside of IRWM efforts.

2.4.2 COORDINATION WITH THE BAY AREA REGION

The Bay Area and Santa Cruz IRWM regions connect in rather remote geographic areas – in the upper Santa Cruz Mountains, and on the coast near Año Nuevo. The Bay Area IRWM Region is in RWQCB Region 2 (San Francisco Bay), and Santa Cruz is in Region 3 (Central Coast). The planning efforts are viewed as parallel and complementary, although there is limited interaction between water managers in these regions as the water resources are almost completely separate. Both regions participate in the Roundtable of Regions, and information is also shared through informal networks. There is also close coordination and collaboration between the RCD of Santa Cruz County and San Mateo County RCD.

2.5 COORDINATION WITH STATE AND FEDERAL AGENCIES

Several different state and federal agencies are directly involved in the IRWM planning process. These agencies generally serve in an advisory role for the RWMG, and may participate or provide input in Plan development and project development through public meetings, stakeholder workshops, and project solicitations. They may also become involved at the project implementation stage as technical advisors or in the project permitting process. The following federal and state agencies currently participate in the Santa Cruz IRWM process:

- California Coastal Commission
- California Coastal Conservancy
- California Department of Fish and Wildlife
- California Department of Forestry and Fire Protection (CAL FIRE)
- California Department of Parks and Recreation
- California Department of Water Resources
- Central Coast Regional Water Quality Control Board
- NOAA Monterey Bay National Marine Sanctuary
- NOAA National Marine Fisheries Service

- State Water Resources Control Board
- U.S. Army Corps of Engineers
- U.S. Bureau of Land Management
- U.S. Fish and Wildlife Service
- USDA Natural Resources Conservation Service

2.6 PROCESS FOR PLAN UPDATE AND AMENDMENT

This IRWM Plan is intended to be a living document to be updated as conditions change, new issues arise, new information becomes available, or as new projects need to be added. The process by which the update occurs depends on the nature of what is being updated, as described below. The intent of the various levels is to allow a streamlined process while ensuring adequate Plan oversight within the RWMG.

2.6.1 PROJECT LIST UPDATES

This Plan includes a list of projects submitted by the RWMG that were evaluated and included based upon each project's anticipated contribution towards meeting the goals and objectives of the IRWM Plan. To ensure the IRWM Plan is not a static document, but rather continues to be useful and to reflect current priorities, the list of projects will be periodically updated as projects are completed and as new priorities arise. Project list updates are also anticipated in advance of future state IRWM Program funding solicitations. The Steering Committee is tasked with coordinating updates, and will conduct a review of the Project List no less frequently than every five years, and as needed, initiate and coordinate a publicly announced solicitation for projects. Incorporation of new projects will not require the re-adoption of the Plan by the RWMG.

2.6.2 INFORMAL PLAN CHANGES

Minor changes to the Plan will be addressed through informal, interim amendments. The Steering Committee will have discretion to determine what constitutes a minor change, but such changes generally include organizational changes (e.g., adding RWMG members) or other administrative matters that do not necessitate a decision by the governing bodies of the RWMG. The IRWM Steering Committee will provide guidance and coordination of amendments. Staff will generally identify and complete minor IRWM Plan changes; however RWMG members may also present an amendment for consideration to the Steering Committee. In either case, the full RWMG will be informed of and provided an opportunity for input on proposed interim amendments, which will be posted on the website (SantaCruzIRWMP.org). The Steering Committee will ratify amendments by consensus; approved amendments will be posted on the website. Interim amendments will be incorporated into the IRWM Plan during the next formal Plan update.

2.6.3 FORMAL PLAN UPDATES

Formal updates reflect any significant changes to IRWM Plan including processes, organizational structure and governance, water management conditions, or goals and objectives. An IRWM Plan update is a time and resource intensive undertaking. DWR encourages IRWM regions to formally review, revise, and adopt the IRWM Plan no less frequently than every five years. The Santa Cruz IRWM region will strive to adhere to this recommended update frequency. The IRWM Steering Committee will

provide a leadership role in guiding and coordinating the formal IRWM Plan updates to ensure an inclusive and transparent decision-making process. Formal updates will include outreach efforts to RWMG partners and Stakeholders, including DACs, to ensure that interested entities have the opportunity to comment and participate in Plan development and implementation. Following completion of the IRWM Plan update, it is expected that it will be approved and adopted by all participating RWMG members, and formally adopted by all project proponents named in an IRWM grant application.

2.6.4 PUBLIC NOTICE OF PLAN DEVELOPMENT AND ADOPTION

A notice of intention to prepare the Plan, and then a notice of intention to adopt the Plan, was published in the *Santa Cruz Sentinel* newspaper in accordance with §6066 of the Government Code. In 2014, each of the RWMG members have or will accept, approve, or adopt the Santa Cruz IRWM Plan through resolution by their governing boards or similar process according to their organizational protocol. Each project proponent named in an IRWM grant application will also be required to adopt the IRWM Plan in conjunction with the submittal of the application. On <<August 27, 2014>>, the Santa Cruz IRWM Plan was formally adopted by the RWMG in a public meeting of the RWMG governing board.

2.7 LONG-TERM IMPLEMENTATION OF THE IRWM PLAN

The IRWM Plan is intended to be a living document that will be assessed and periodically updated to ensure it remains up to date as conditions change, projects are completed, and new projects and priorities arise. Following the adoption of the Santa Cruz IRWM Plan in 2014, implementation of the Plan will occur through the completion of the planning, technical studies, and implementation projects in the Plan by the project proponents. The goals, objectives, and strategies developed through development of the IRWM Plan and 2012 conceptual framework² established a process and metrics for evaluating progress toward attaining the regional goals and objectives over time. To ensure the ongoing effectiveness of the IRWM Plan, the RWMG will monitor and periodically assess Plan implementation (see Chapter 9, Plan Performance and Monitoring).

The Santa Cruz IRWM program is anticipated to be a dynamic program that will continue to develop and evolve over time with assessments and future work conducted through an adaptive management approach. The current governance structure provides an effective and adaptive framework that will support IRWM Plan implementation into the future. The Steering Committee will continue to guide IRWM planning and implementation efforts, and will continue to meet on a regular, as-needed basis to:

- guide IRWM Plan implementation
- act as a liaison to the RWMG, DWR, RWMF, Stakeholders, other IRWM Regions
- identify funding opportunities and coordinate funding proposals
- promote project integration of multi-benefit projects
- ensure stakeholder participation
- tend to administrative matters concerning IRWM efforts

² 2ND NATURE, LLC., 2013, Santa Cruz IRWM Conceptual Framework

IRWM Plan activities and projects may be implemented with the benefit of funding through the IRWM program, but are equally likely to be implemented through alternative grant sources from the state or federal government, through private grant sources, or through funding from the agencies themselves. In the case of IRWM funding, the RWMF will serve as the fiscal sponsor and will be responsible for administering the grant to ensure that all contract terms are met. At the request of any RWMG member and approval of the Board, the RWMF may administer grants or other funding mechanisms outside of the IRWM program. Individual agencies or groups of agencies or will be responsible for actual implementation of the projects.

Since 2005, the RWMG members have consistently shared costs for IRWM grant applications and related IRWM activities. Beginning in 2013, the RWMG made annual contributions to the RWMF for IRWM support and coordination services. The RWMF is anticipated to continue to serve as the fiscal sponsor and provide grant administration and coordination services on IRWM grants.

As the Santa Cruz IRWM planning process continues into the future, the Steering Committee will periodically solicit projects from the RWMG and Stakeholders to include in the IRWM Plan. The RWMG will continue to utilize a public website (SantaCruzIRWMP.org) to disseminate news and information about IRWM efforts including meeting and workshop announcements, project descriptions and information, maps, project final reports, technical studies, grant related reporting, and other tools to share information and promote collaboration.

CHAPTER 3: REGION DESCRIPTION

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3.1 INTRODUCTION

Although relatively small geographically, the Santa Cruz IRWM Region features a complex mix of entities involved with water resources management who face a number of water supply, environmental, and social issues. Blessed with a beautiful and diverse landscape, the Region's natural resources support agriculture and tourism, the two main industries that drive the local economy. The region is dominated by residential land use, including rural and mountain residential; timber harvesting; and a mix of commercial and special districts.

The Region faces significant water resource challenges including impaired water quality, overdrafted groundwater basins, depleted streams, and locally degraded riparian habitat. Historic salmon and steelhead populations have been greatly diminished by reductions in streamflow, increased erosion and sedimentation, barriers to migration, and removal of large woody material from streams. Coastal water quality has been degraded by urban runoff and leaky sewer systems. The natural benefits of wetlands, floodplains, riparian corridors, and groundwater recharge areas have been significantly diminished by development and agricultural use.

Domestic supply within the Santa Cruz IRWM Region is provided by eight public agencies, small public water systems, and individual and shared wells and springs. Groundwater provides 55-60% of public water agency supply in the Santa Cruz Region, with the remainder coming from local surface water sources. The Region has a long history of collaborative watershed planning, and agencies and organizations are actively implementing recommendations from watershed plans and studies conducted over the years. Sanitation and flood management services are provided by a mix of city and county departments and special districts.

3.2 PHYSICAL SETTING

The physical environment of the Santa Cruz IRWM Region is one of the most beautiful and diverse in California. The topography of the Region is varied, containing the rugged, geologically active and forested Santa Cruz Mountains in the north and east, the mid-county coastal terraces where a large portion of the population is located, and the alluvial south that is predominantly in agricultural use. The central California coast location and the Region's topographic features contribute to the mild Mediterranean climate featuring warm, dry summers and cool, wet winters.

The Region is situated on the northern end of Monterey Bay, 65 miles south of San Francisco, 35 miles north of Monterey, and 35 miles southwest of the Silicon Valley. The mountainous topography encompasses 15 principal watersheds, which can be grouped and generally characterized as: North Coast streams that drain the western slope of Ben Lomond Mountain; the San Lorenzo River and its tributaries; Soquel and Aptos Creeks; and the Watsonville Sloughs, which discharge to the Pajaro River mouth. These watersheds are comprised of 58 smaller drainage basins or subwatersheds, each having unique characteristics based on variations in size, aspect, elevational gradient, precipitation, geology, and soils. With the exception of the Pajaro River, which originates in San Benito County, the Region's streams originate within the Region and they all drain to Monterey Bay south of Año Nuevo. Together, the two rivers and numerous streams that traverse the Region total over 850 miles in length.¹

¹Mackenzie, A., J. McGraw, and M. Freeman. 2011. *Conservation blueprint for Santa Cruz County: An Assessment and Recommendations from the Land Trust of Santa Cruz County*. Land Trust of Santa Cruz County. Santa Cruz, CA. May 2011. 180 pages. Available at: <http://www.landtrustsantacruz.org/blueprint>

3.3 REGION BOUNDARIES

The Santa Cruz Integrated Regional Water Management (IRWM) boundaries were selected primarily on the basis of common water management issues, regulatory, and jurisdictional boundaries. The Region generally mirrors Santa Cruz County, and includes approximately 95% of the population and 85% of the geographic extent of the county. The eastern and western boundaries are defined by the ridgeline of the Santa Cruz Mountains and the coastline of the Pacific Ocean, respectively. The northern boundary is roughly based on the county's boundary and follows the ridge between Whitehouse and Gazos Creek watersheds, which straddle the county line near Point Año Nuevo. The southern boundary is an overlapping border with the Pajaro River Watershed IRWM Region. Most of the Pajaro River Watershed is within the adjacent Pajaro River Watershed IRWM Region with the exception of the Watsonville Sloughs, for which both Regions share management responsibilities. Specifically, the Santa Cruz IRWM is responsible for water quality and watershed resource management in the shared area while the Pajaro IRWM is responsible for water supply and flood management.

The Region is appropriate for IRWM planning because it is consistent with past and ongoing water resources management efforts and partnerships; is based upon shared issues and concerns; and provides for the necessary jurisdictional and statutory authorities for project implementation.

Figure 3- 1 Santa Cruz IRWM Region



3.3.1 OVERLAP WITH PAJARO RIVER WATERSHED REGION

As noted above, the Pajaro and Santa Cruz IRWM Regions overlap in the Watsonville Sloughs watershed. The Watsonville Sloughs system drains a 12,500-acre watershed from the coastal plain and foothills of southern Santa Cruz County into Monterey Bay. The Watsonville Sloughs watershed includes six individual sloughs: Watsonville, Harkins, Struve, West Branch, Gallighan, and Hanson. These are located around the mouth of the Pajaro River. These sloughs sustain large wetland marsh and riparian habitats, economically important agricultural lands, and the City of Watsonville, the fastest-growing area in Santa Cruz County in terms of development. Because of the extensive wetland habitats and unique pressures in the Watsonville Sloughs Watershed, considerable effort has been placed on implementing watershed conservation and restoration plans. These efforts have been coordinated in large part by the Resource Conservation District of Santa Cruz County (RCD) through its Integrated Watershed Restoration Program.

Water supply reliability for both agriculture and municipal uses is also a significant concern in the Watsonville Sloughs watershed. Underlying groundwater is part of the larger Pajaro Basin, which is in a state of overdraft caused by a combination of overuse and reduced recharge. Wells as far inland as Harkins Slough have become too brackish for domestic or agricultural use due to seawater intrusion. Similarly, flooding has been an ongoing concern in the Region, which has experienced repeated floods in 1955, 1982-1986, and 1995. Considering these existing management responsibilities, the Santa Cruz IRWM Region is responsible for water quality and watershed management efforts in the Watsonville Sloughs while the Pajaro Region coordinates flood control and water supply concerns. Both the Santa Cruz and Pajaro Regions acknowledge the overlap and are in agreement on the shared responsibilities.

3.3.2 SHARED BORDER WITH BAY AREA IRWM REGION

The Bay Area and Santa Cruz IRWM Regions connect in rather remote areas – in the upper Santa Cruz Mountains and on the coast near Año Nuevo. Whitehouse, Año Nuevo, and Waddell Creek watersheds straddle the San Mateo/Santa Cruz county line, but because these watersheds are primarily within the Santa Cruz County boundary as well as the jurisdiction of the Central Coast Regional Water Quality Control Board, they are included as part of the Santa Cruz IRWM Region. Gazos Creek is adjacent to Whitehouse and Waddell Creek watersheds, but is not under the jurisdiction of any Santa Cruz IRWM partners and is not included in the Santa Cruz Region or the Bay Area Region. The portion of the Pescadero Creek watershed that extends into Santa Cruz County is included in the Bay Area IRWM Region. San Mateo County agencies are more active and have jurisdictional authority and management opportunities in these areas. Both Regions have agreed upon these assignments.

3.4 POPULATION AND DEMOGRAPHICS

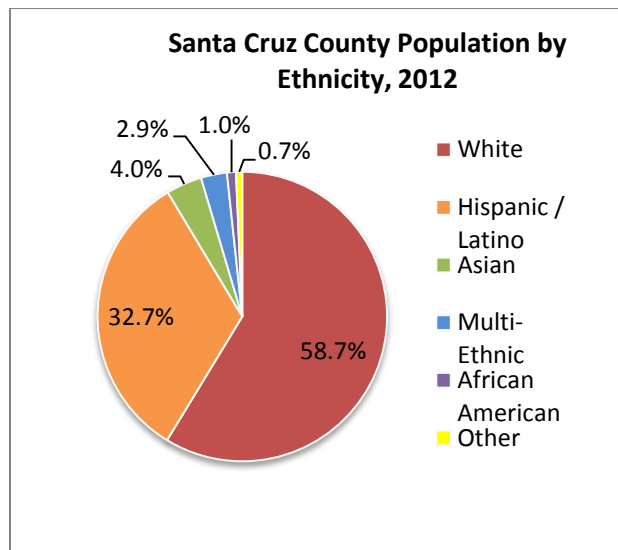
The Santa Cruz IRWM Region encompasses approximately 250,000 people, which is approximately 95% of Santa Cruz County’s total population (262,340).² The County includes the four incorporated cities of Santa Cruz, Watsonville, Scotts Valley and Capitola. Approximately half of the population lives in unincorporated portions of Santa Cruz County. The Region features national and ethnic communities from Mexico, Central and South America, Africa, Europe, Asia, and the Pacific Islands (Figure 2), with Hispanics representing the fastest growing segment of the population. The Region includes a portion of the territory of the Amah Mutsun tribal band of Ohlone/Costanoan Native Americans.

Table 3-1 Population of Cities and Communities in the Region ³

Geography	Population
<i>Santa Cruz County</i>	262,340
Aptos CDP	6,317
Aptos Hills-Larkin Valley CDP	1,636
Ben Lomond CDP	6,317
Bonny Doon CDP	2,743
Boulder Creek CDP	5,188
Brookdale CDP	1,887
Capitola city	9,914
Davenport CDP	235
Day Valley CDP	3,416
Felton CDP	4,043
Freedom CDP	3,368
La Selva Beach CDP	2,537
Live Oak CDP	16,747
Lompico CDP	1,029
Mount Hermon CDP	1,115
Pajaro Dunes CDP	265
Paradise Park CDP	513
Pasatiempo CDP	1,183
Pleasure Point CDP	5,254
Rio del Mar CDP	8,993
Santa Cruz city	60,319
Scotts Valley city	11,532
Seacliff CDP	3,133
Soquel CDP	9,919
Twin Lakes CDP	5,147
Watsonville city	50,945
Zayante CDP	790

CDP is Census Designated Place

Figure 3-2 Santa Cruz County Population by Ethnicity, 2012 ⁴



² U.S. Census Bureau; American Community Survey, 2012 American Community Survey 5-Year Estimates / California Department of Finance.

³ U.S. Census Bureau; American Community Survey, 2012 American Community Survey 5-Year Estimates / California Department of Finance.

⁴ US Census Bureau 2010.

English is the only language spoken in the majority of homes in the County; however, there is an increasing trend in the number of homes where English is not the primary language.

Table 3- 2 Languages Spoken in Santa Cruz County⁵

Language	2006	2007	2008	2009	2010	2011	2012	'06 – '12 percentage point change
English Only	72.0%	71.4%	70.6%	72.5%	69.1%	67.8%	68.1%	-3.9%
Language other than English	28.0%	28.6%	29.4%	27.5%	30.9%	32.2%	31.9%	3.9%
Spanish	22.9%	23.8%	23.5%	22.7%	25.6%	26.5%	25.5%	2.6%
Other Indo-European Languages	3.2%	2.5%	3.6%	2.6%	2.2%	2.5%	2.9%	-0.3%
Asian, Pacific Islander Languages	1.8%	2.1%	2.1%	2.0%	2.5%	2.9%	2.9%	1.1%
Other Languages	0.2%	0.2%	0.2%	0.2%	0.5%	0.3%	0.6%	0.4%
Total Population (Ages 5+)	233,221	235,598	236,235	239,206	248,383	249,132	251,704	

3.5 HISTORIC AND PROJECTED POPULATION

Over the past decade, Santa Cruz County's population increased by 6,700 (0.27%), a growth rate that is less than half that of the State of California as a whole (Table 3-3). This rate is in stark contrast to the rapid rates of growth experienced in the county between 1970 and 1980, when annual rates of growth exceeded 5%. Approximately 85% of development during the 1970s was single-family residences, which exerted many pressures on the county's natural resources and open space. In response, in 1978 the voters of Santa Cruz County passed Measure J, a ballot referendum that instituted a comprehensive growth management system in the county that included population growth limits, limitations on issuance of building permits, limits on growth outside urban areas, provision of affordable housing, and preservation of agricultural lands and natural resources.

Table 3- 3 Historical Population Growth, 1970 – 2010⁶

Year	<u>County</u>		<u>State of California</u>	
	Population	Annual Growth Rate	Population	Annual Growth Rate
1970	123,790	-	19,957,304	-
1980	188,141	5.2	23,668,145	1.86
1990	229,734	2.21	29,758,213	2.57
2000	255,602	1.13	33,873,086	1.38
2010	262,382	0.27	37,253,956	1

⁵ United Way of Santa Cruz County. "Community Assessment Project, 2013." Applied Survey Research, 2013. Pg. 22.

⁶ California Department of Finance, 2013, U.S. Census Bureau.

Table 3- 4 Population Growth Projections, 2010 – 2035 ⁷

	2010	2020	2025	2030	2035	Compound Annual Growth Rate	Change Over Forecast Period
Santa Cruz County	262,382	279,381	287,512	298,095	308,582	0.65%	17.61%
Capitola	9,918	9,119	9,427	9,758	10,088	0.07%	1.71%
Santa Cruz	59,946	66,860	70,058	73,375	76,692	0.99%	27.94%
Scotts Valley	11,580	11,638	11,696	11,754	11,813	0.08%	2.01%
Watsonville	51,199	59,446	61,452	63,607	65,762	1.01%	28.44%
Balance Of County	129,739	132,318	134,879	139,601	144,227	0.42%	11.17%

The Association of Monterey Bay Area Governments (AMBAG) projects that between 2010 and 2035, Santa Cruz County's compound annual growth rate is less than 1% resulting in an additional 46,242 residents in the county. Proportionally speaking, that would result in approximately 44,000 residents in the IRWM Region. The County's housing element portion of the General Plan estimates that 17,000 units could be added in the county by 2035. Despite increasing population, water use in the county has been declining for a number of years. This is due to the successful implementation of local conservation programs by municipalities and water districts. However, this trend will be difficult to sustain. As additional growth occurs and opportunities for additional water use efficiency diminish, there will be a tendency for increased water demand.

3.6 LAND USE

Land use in the region is dominated by residential use (including rural and mountain residential) timber preserve, agriculture, and a mix of commercial and special districts. The lower portions of the watersheds, close to Monterey Bay, are more urbanized with residential, commercial, light industrial, and special district land uses. Upper watershed land use consists predominantly of rural residential, timberland and/or open space, some mining, and limited agriculture. On the north coast, the coastal terraces are utilized for agriculture and grazing. Figure 3-3 illustrates land cover in the region.

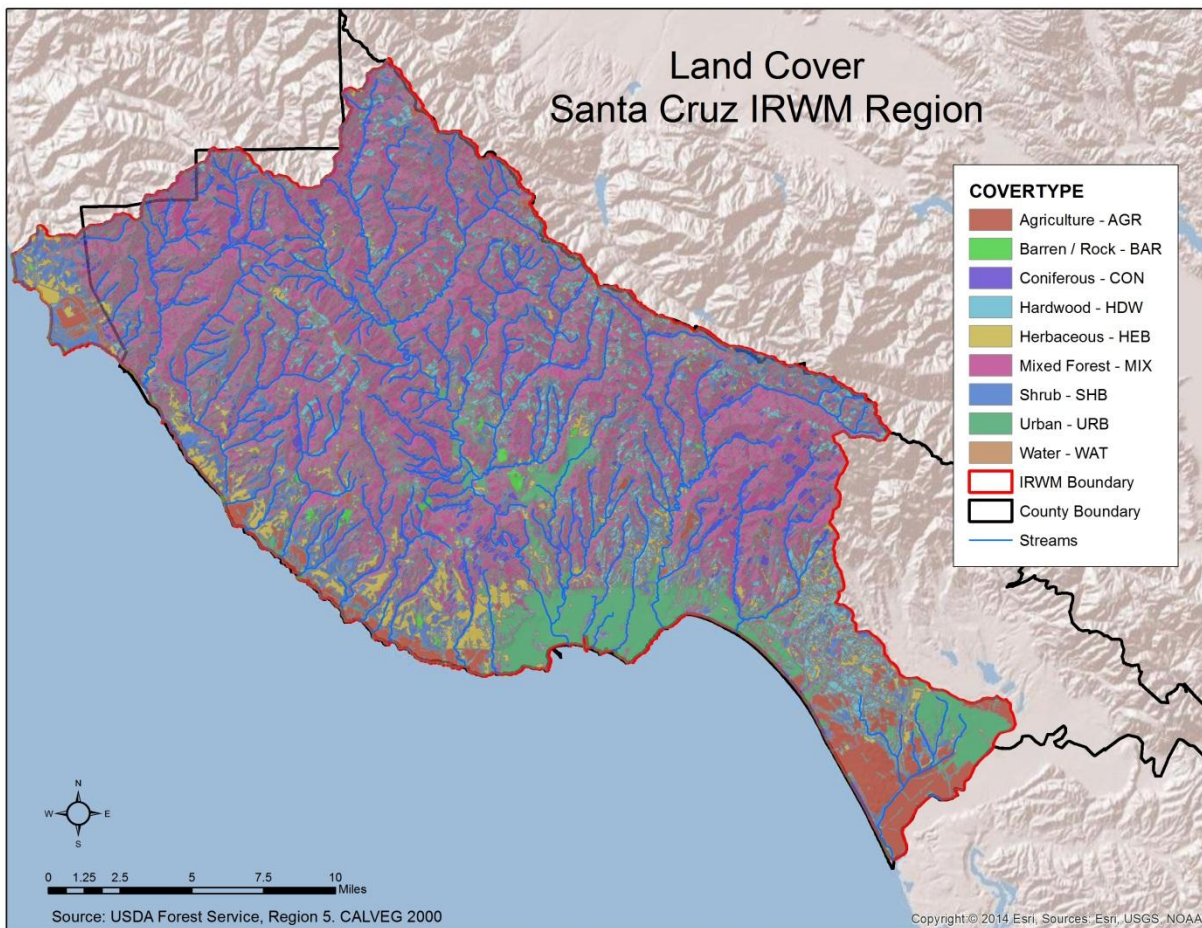
Agriculture represents approximately 14% (40,000 acres) of the total land area. Residential land is approximately 4% (11,428 acres) of the land area; developed non-residential uses comprise approximately 1.5% (4,285 acres). Parks, recreation and open space comprise 1.4% (4,000 acres); and miscellaneous uses comprise 3.6% (10,286 acres) of the land area. The remaining acreage is undeveloped.⁸ In 2010, the California Department of Conservation identified 21,828 acres as Important Farmland and 17,952 acres as grazing land.⁹ In 2013, 19,227 acres were designated as protected under Williamson Act contracts.¹⁰

⁷ Association of Monterey Bay Area Governments (AMBAG), 2014, 2014 Regional Growth Forecast.

⁸ Santa Cruz County, 2013.

⁹ Department of Conservation, 2010.

¹⁰ AMBAG. 2035 MTP/SCS and RTPs for Monterey, San Benito and Santa Cruz EIR. Draft February 2014.

Figure 3- 3 Santa Cruz IRWM Region Land Cover ¹¹

3.7 ECONOMIC OVERVIEW

Early industries of the Santa Cruz IRWM Region drew heavily on the region's seemingly unlimited natural resources. Lumber camps were established in the redwood forests of the Santa Cruz Mountains, concentrating in the San Lorenzo Valley and Aptos areas. Besides lumber, fine grade limestone was seen as a critical source for building materials. The largest limestone industry was operated by Henry Cowell on what is now the University of California, Santa Cruz (UCSC) campus. Its earliest quarry dates from the 1850s.

Today, mild weather, natural beauty, a major university, and proximity to the Silicon Valley are elements that contribute to the economic activity and quality of life in the Santa Cruz IRWM Region. With its spectacular coastline and accessible beaches and mountains, the Region is a popular vacation and recreation area.

¹¹ County of Santa Cruz, Water Resources Division. 2014.

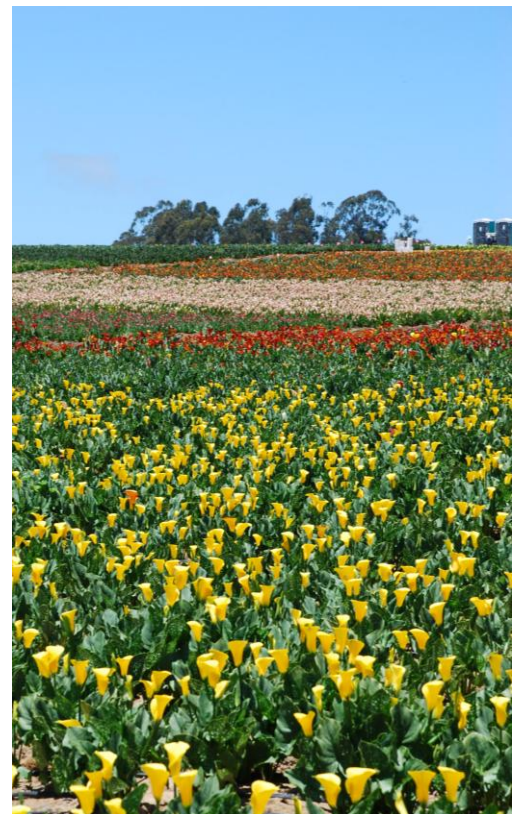
3.7.1 ECONOMIC ACTIVITY

Santa Cruz County's labor force includes 153,291 workers.¹² The agriculture-related production employs approximately 9,078 people, which includes direct agricultural production employment (5,378) and an additional 3,700 jobs through related indirect employment (purchases of farm equipment, fertilizer, seed, insurance, banking, other).¹³ Within non-farm employment, government remains the largest source of jobs in the county at 20,500 jobs, followed by wholesale/retail trade with 15,000 jobs, 13,900 in health and education, 11,600 in leisure and hospitality, 9,700 in professional services, 5,600 jobs in manufacturing, and 3,000 in construction.

Currently, the county's overall unemployment rate is 7.1% (May 2014), however certain areas of the county are much higher. For example, the City of Watsonville (characterized as a disadvantaged community) currently has an unemployment rate of 15.5%.¹⁴ The county's median household income is \$66,571, and 14.4% of county residents live below the poverty level.¹⁵

Like much of California, Santa Cruz County suffered during the economic recession that began in 2008 but appears to be rebounding, albeit modestly. Between 2013 and 2018, employment growth is projected to be broad-based. However, the largest gains are expected to occur in education and healthcare, wholesale and retail trade, leisure and hospitality, and government. Together, it is projected that these sectors will account for 61% of net job creation in the county.¹⁶

The Santa Cruz IRWM Region's two primary industries include tourism and agriculture. In 2012, Santa Cruz County saw \$717 million in direct travel spending, resulting in over \$45 million in local and state tax receipts.¹⁷ In 2013, the overall crop production value in the county was \$599 million. Over the ten-year period from 2003 to 2013, overall crop production value in the county increased by 61% (from \$371 million to \$599 million). Strawberries continue to be the highest grossing crop produced in the county, valued at \$202 million in 2013. Raspberries are the second highest valued crop, valued at \$152 million.¹⁸



Growing flowers in Larkin Valley

¹² Santa Cruz County Chamber of Commerce, 2014.

¹³ Agricultural Impact Associates LLC, 2013. Economic Contributions of Santa Cruz County Agriculture.

¹⁴ State of California Employment Development Department, 2014. Santa Cruz County June 20, 2014 Report. Available at: <http://www.labormarketinfo.edd.ca.gov>

¹⁵ ACS 2012 Five-year estimate.

¹⁶ California Department of Transportation, 2013. Santa Cruz County Employment Forecast (2006-2012 History, 2013-2040 Forecast).

¹⁷ Dean Runyan Associates, 2014. California Travel Impacts by County, 1992-2012. 2012 Preliminary State & Regional Estimates. Prepared by Dean Runyan Associates for the California Travel & Tourism Commission, May 2014.

¹⁸ Santa Cruz County Agricultural Commissioner's Office, 2013. Santa Cruz County 2013 Crop Report.

Table 3- 5 Annual Crop Production (in Millions of Dollars) – Santa Cruz County ¹⁹

Crop	2009	2010	2011	2012	2013	5-year % Change
Berries	\$306.2	\$324.6	\$363.2	\$367.9	\$390.1	27.4%
Nursery / Ornamental Crops	\$118.5	\$118.8	\$122.6	\$113.5	\$107.9	-8.9%
Vegetables	\$47.0	\$61.8	\$55.8	\$57.8	\$74.2	57.9%
Tree and Vine Products	\$10.7	\$16.7	\$14.7	\$18.1	\$16.8	57.0%
Livestock and Animal Products	\$5.6	\$5.8	\$6.6	\$6.5	\$6.9	23.2%
Field Crops	\$0.1	\$0.1	\$0.1	\$0.0	\$0.0	-100.0%
Total Crops Value	\$488.1	\$527.8	\$562.9	\$563.9	\$595.9	22.1%
Timber Farming	\$3.5	\$4.8	\$2.8	\$2.3	\$3.4	-2.9%
Total Production Value	\$491.6	\$532.5	\$565.7	\$566.2	\$599.3	21.9%

Table 3- 6 Tourism Revenue (in Millions of Dollars) – Santa Cruz County ²⁰

Category	2008	2009	2010	2011	2012	5-year % Change
Direct Travel Spending	\$649.6	\$609.8	\$651.9	\$699.9	\$717.0	10.4%
Industry Earnings	\$197.4	\$194.6	\$195.1	\$193.8	\$206.0	4.4%
Local Tax Receipts	\$14.2	\$12.8	\$14.0	\$15.5	\$16.3	14.8%
State Tax Receipts	\$25.7	\$26.8	\$29.0	\$29.9	\$29.0	12.8%
Total	\$886.9	\$844.0	\$890.0	\$939.1	\$968.3	9.2%
# of Jobs Generated By Tourism	8,030	8,040	7,920	7,910	8,210	2.2%

3.7.2 DISADVANTAGED COMMUNITIES IN THE PLANNING REGION

A disadvantaged community is defined as a community that has an annual median household income (MHI) that is less than 80% of the statewide MHI, or less than \$49,120.²¹ According to American Community Survey 2012 5-year survey data conducted by the U.S. Census Bureau, the Santa Cruz IRWM Region contains one city plus several census tracts that qualify as “disadvantaged communities.” The City of Watsonville (population 51,586), which is largely contained within the planning region, had a MHI of \$46,603 in 2012. Watsonville comprises almost 19% of the total population of the county (266,766). Two census tracts within the City of Watsonville qualified as “severely disadvantaged,” with a MHI less than 60% of the statewide MHI. In addition, two census tracts within the City of Santa Cruz qualified as

¹⁹ Santa Cruz County Agricultural Commissioner Crop Reports, 2009 - 2013.

²⁰ Dean Runyan Associates, Inc. May 2014. California Travel Impacts by County, 1992-2012, 2013 Preliminary State & Regional Estimates. Prepared for the California Travel & Tourism Commission.

²¹ Department of Water Resources. U.S. Census Bureau. American Community Survey, 2008-2012.

“disadvantaged,” with one of them qualifying as “severely disadvantaged.” The table below shows the disadvantaged communities in the Santa Cruz IRWM Region along with population and MHI.

Table 3- 7 Economically Disadvantaged Communities (DAC) within the IRWM Region ²²

Census Designated Place (CDP)	Population	Median Household Income
City of Watsonville	50,945	\$46,603
Census Tract 1007 (Santa Cruz)	1,710	\$40,813
Census Tract 1010 (Santa Cruz)	7,943	\$32,804
Census Tract 1101 (Watsonville)	7,410	\$42,201
Census Tract 1103 (Watsonville)	7,182	\$32,664
Census Tract 1105.01 (Watsonville)	6,652	\$36,711
Census Tract 1105.02 (Watsonville)	6,817	\$48,561

Note that census methodology may not capture all pockets of lower income residents within the Region, such as the town of Davenport, where an independent 2008 income survey was completed that showed the town met the criteria of a disadvantaged community.

In addition to the designated disadvantaged communities, several communities have a high percentage of residents’ household earning “low,” “very low,” or “extremely low” incomes. Table 6 below shows the income distribution categories in the county, expressed as a percentage of the county median household income (\$62,100) as defined by the U.S. Census Bureau, and the corresponding income ranges for a three-person household. For example, households earning at “extremely low” levels make less than \$15,525, while households earning at “very low” levels earn between \$15,525 and \$35,397.

Table 3- 8 Income Distribution Categories and Corresponding Income Ranges in Santa Cruz County Based on 2010 Median Household Income of Three-Person Households

Category	2010 Income Range
Extremely Low Income (0%-24% Median)	\$0-\$15,525
Very Low Income (25%-56% Median)	\$15,525-\$35,397
Low Income (57%-80% Median)	\$35,397-\$50,301
Moderate Income (81%-120% Median)	\$50,301-\$75,141
Above Moderate Income (121%+ Median)	\$75,141+

Table 3-9 illustrates the large income disparities in the county. Despite a fairly high countywide median income, the table shows large percentages of households in each community within the Region that earn “extremely low” or “very low” incomes.

Four communities, including the City of Watsonville, have 15% or more of three-person families with “extremely low” incomes, while 10 of the 15 “low income” communities have more than 10% of their households in this category. Seven communities have at least one-third of three-person households in

²² U.S. Census Bureau. American Community Survey, 2008-2012.

either the “extremely low” or “very low” income categories, earning less than \$35,397, with the City of Watsonville showing nearly half of its families earning below this level. The large numbers of families with such low earnings are due in part to a large agricultural sector with many migrant workers whose earnings are exceptionally low. Finally, six communities have more than half of their three-person households earning a “low” income (\$50,301) or less. Given the extremely high cost of housing described below, the difficulties of these households are exacerbated.

Table 3- 9 Low Income Three-Person Households in Communities within the Santa Cruz Region ²³

Community	Percentage of ‘Extremely Low’ Income Households	Percentage of ‘Extremely Low’ or ‘Very Low’ Income Households	Percentage of ‘Extremely Low’, ‘Very Low’, or ‘Low’ Income Households
	<i>Income below \$15,625</i>	<i>Income below \$35,397</i>	<i>Income below \$50,301</i>
Watsonville	15.9%	46.0%	62.8%
Twin Lakes	16.6%	44.8%	59.0%
Opal Cliffs	16.4%	39.3%	57.3%
Felton	15.0%	33.3%	55.2%
City of Capitola	13.7%	36.6%	54.6%
Live Oak	10.5%	34.8%	52.4%
City of Santa Cruz	14.5%	35.1%	49.4%
Soquel	12.1%	26.7%	45.8%
Ben Lomond	10.2%	27.7%	43.4%
Boulder Creek	11.3%	31.6%	42.1%
Aptos	8.4%	25.5%	39.2%
Day Valley	7.4%	21.2%	36.8%
Aptos Hills- Larkin Valley	8.2%	22.3%	34.8%
City of Scotts Valley	5.8%	22.8%	34.7%
Rio Del Mar	8.0%	19.3%	32.0%

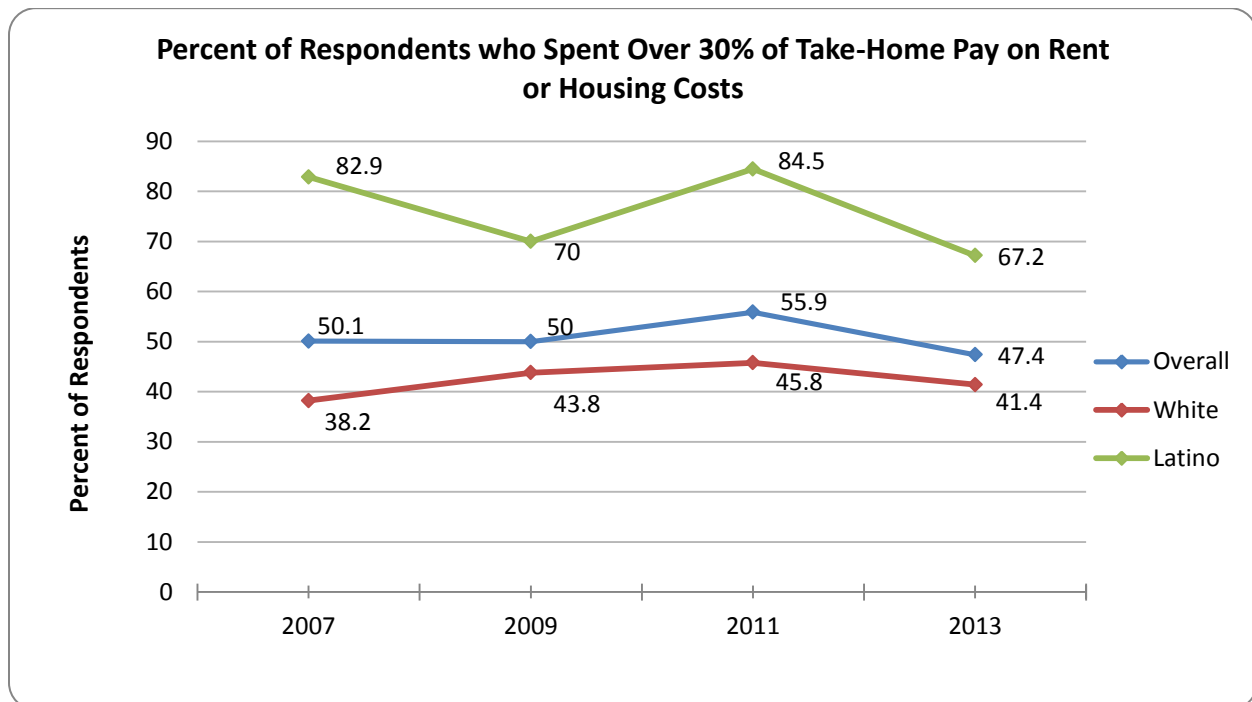
From fall 2013 to fall 2014, with financial support from a DWR IRWM Grant for disadvantaged community outreach, the Santa Cruz Region is working to identify, assess, and engage DACs in the IRWM planning process. Additional information on this specific effort is provided in Chapter 13 Stakeholder Involvement. This effort will identify and advance projects to meet water resource needs in Watsonville and Davenport. In addition, work includes the potential identification of other low income communities in the Region not previously identified nor engaged in IRWM. Census data, mapping tools, and local community knowledge are being used to identify these areas. This task is intended to aid in identifying other economically disadvantaged pockets in the region that may not meet the DAC criteria based upon census data, but may warrant further assessment and outreach for engagement in IRWM planning efforts.

²³ Ibid.

3.7.3 COST OF LIVING

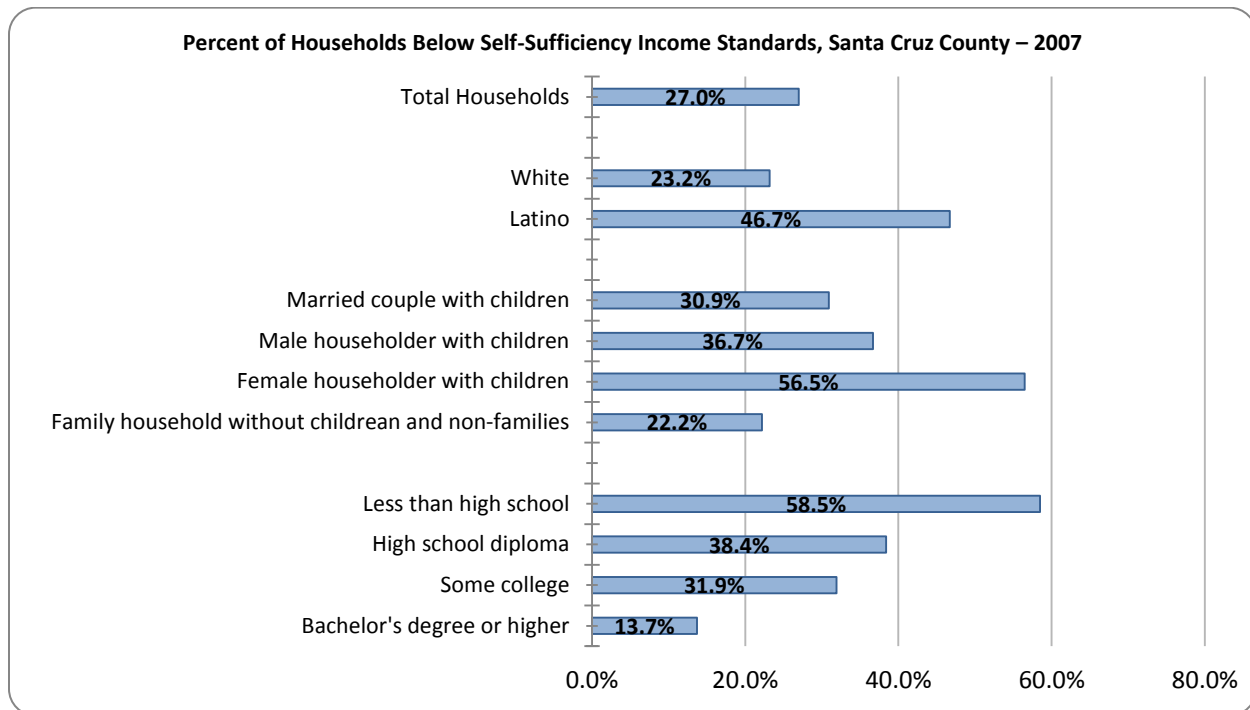
The Santa Cruz IRWM Region is known for its high cost of living. Nearly 14% of county households live at or below the federal poverty line, yet the county consistently has been near the top for the country's least most affordable areas. The median house value, while decreasing significantly during the recession, is still over \$600,000, and only 54% of homes in the county are affordable for median income families. Rents are similarly high, and while median sale price decreased during the recession, rents rose during the same time period. Nearly 56% of residents spend more than 30% of take-home pay on housing costs.

Figure 3- 4 Percent of Households Overpaying on Housing Costs ²⁴



The Self-Sufficiency Standard for California provides information on how much income is needed in different counties in order for families of different sizes to meet their basic needs without public or private assistance. This standard provides a much more comprehensive measure of income adequacy than Federal Poverty Thresholds by taking into account housing, child care, health care, transportation, food, taxes, and miscellaneous costs, as well as economic differences between counties. It also accounts for changing costs over time, and at various rates. A single adult in Santa Cruz County would need to earn \$15.28 per hour in 2011 in order to be self-sufficient; rising to \$25.17 for a single adult with a teenage and a school age child.

²⁴ United Way of Santa Cruz County. "Community Assessment Project, 2012." Applied Survey Research. 2012.

Figure 3- 5 Percent of Households Below Self-Sufficiency Income Standards, Santa Cruz County, 2007²⁵

3.8 CLIMATE AND PRECIPITATION

The Region has a temperate coastal climate with warm, dry summers and mild wet winters. The average maximum temperature varies between approximately 60 degrees Fahrenheit in December and January, to approximately 75 degrees Fahrenheit in August and September. Mountains in the county rise dramatically from the coast, reaching more than 3,000 feet in elevation in the span of just a few miles. High peaks and cooler winter temperatures, especially at higher elevations, combine to generate substantial rainfall. Average annual rainfall ranges from about 28 inches near Santa Cruz to more than 60 inches along the ridge of Ben Lomond Mountain.

Table 3- 10 Monthly Climatological Data²⁶

	Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Maximum Temperature (°F)	68.5	59.8	62.2	64.2	67.4	70.5	73.5	74.1	75	75.8	72.7	65.8	60.4
Average Precipitation (Inches - Santa Cruz)	30.66	6.56	5.49	4.34	2.14	0.66	0.2	0.08	0.09	0.34	1.27	3.86	5.63

In this Mediterranean climate, 85% of the annual rainfall occurs between December and May. These rains drive stream flows in the Santa Cruz Mountains, with the highest flows typically occurring between

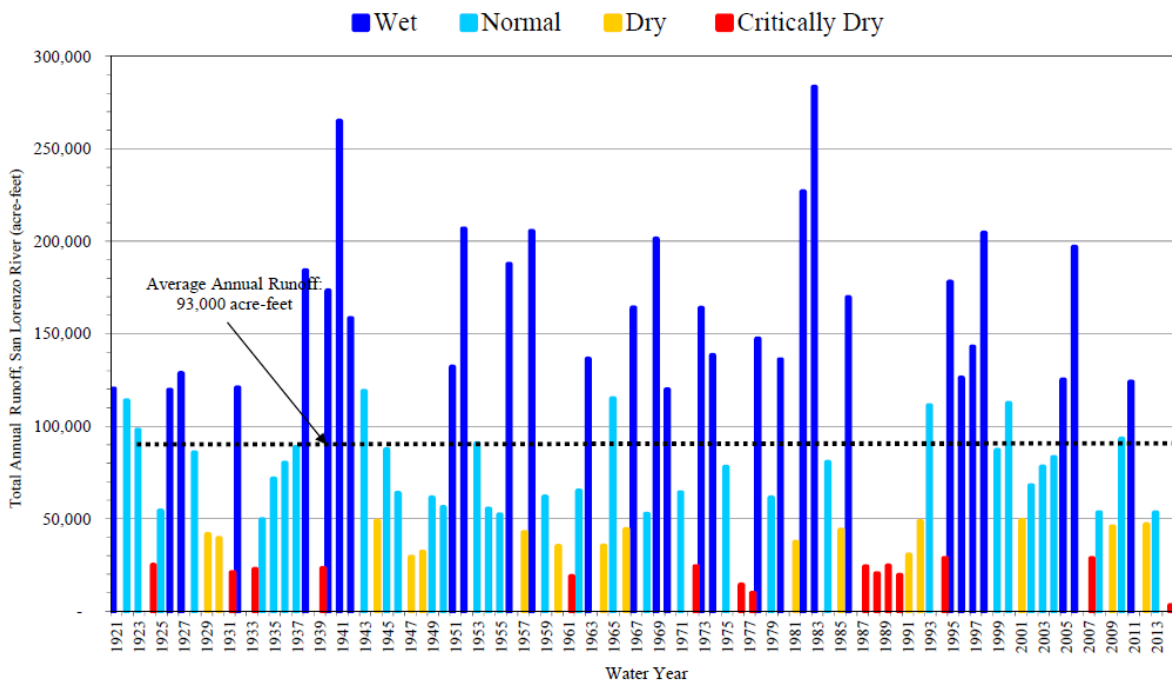
²⁵ United Way of Santa Cruz County. "Community Assessment Project, 2012." Applied Survey Research. 2012.

²⁶ Proposed scwd2 Regional Seawater Desalination Project Draft Environmental Impact Report SCH# 2010112038. Prepared for City of Santa Cruz and Soquel Creek Water District.

December and March when winter storms are at their peak and when soils are saturated. Peak flows drop off considerably after the winter rains cease, although many streams maintain smaller but steady flows in the dry months due to the slow release of stored subsurface water.

A driving factor in the area’s water supply picture is the annual variability in rainfall amounts (Figure 3-6). Santa Cruz has a recorded rainfall history that goes back to 1868. Over this period, the average rainfall is 28.5 inches, but annual totals range from a low of 10.2 inches in 1924 to a high of 61.3 inches in 1941. There are well documented dry periods with below average rainfall that extended for three or more years in a row: 1868-71, 1896-99, 1917-20, 1928-34, 1953-55, 1959-63, 1975-77, and 1987-92.²⁷ The City of Santa Cruz is almost totally reliant upon local surface water for its supply, and the San Lorenzo Valley Water District relies upon local surface water for approximately 60% of its supply. With limited surface storage in the region, the annual rainfall variability can have significant impacts on water supply reliability.

Figure 3-6 Water Year Types²⁸



3.9 CLIMATE CHANGE

Projected climate changes are expected to have a number of negative impacts on watersheds and water resources in the Santa Cruz IRWM Region. Findings from a study conducted by the USGS²⁹ showed

²⁷ Griggs, G., and Haddad, B. City of Santa Cruz City Climate Change Vulnerability Assessment. 2011. Pg. 36.

²⁸ URS, 2013. Proposed scwd2 Regional Seawater Desalination Project Draft Environmental Impact Report SCH# 2010112038. Prepared for City of Santa Cruz and Soquel Creek Water District.

²⁹ Flint, L.E., and Flint, A.L. 2012. Simulation of climate change in San Francisco Bay Basins, California: Case studies in the Russian River Valley and Santa Cruz Mountains: U.S. Geological Survey Scientific Investigations Report 2012–5132, 55 p.

strong evidence for temperature changes for the Santa Cruz Region due to global climate change, but disagreement between models for future precipitation patterns. Temperature projections showed an increase of 3-4 degrees Celsius for average monthly maximums and an increase in the variability (20-30% larger standard deviation) above the historic reference period (1971-2000), with spring and fall months experiencing warmer temperatures. Groundwater recharge is projected to diminish by 31% by 2100, which will impact both groundwater supply and stream baseflow. Sea level is projected to rise 1.0-1.4 cm above 2010 levels, expanding the coastal areas inundated during a 100-year flood event. While there is disagreement amongst climate model projections as to the timing of precipitation patterns, there is agreement that the future will be generally drier, resulting in a higher frequency of droughts and less groundwater recharge. Predicted impacts to the region include:

- Anticipated changes in rain patterns and intensity adding to the uncertainty of water supply and to creek instability
- Potential impacts from sea level rise and storm surges on coastal aquatic resources and water infrastructure
- Exacerbation in saltwater intrusion in groundwater basin from sea level rise
- Anticipated increase in number and severity of wildfire events, with subsequent erosion and water quality problems
- Potential increase in flooding due to climate change

Modeled climate projections and hydrologic responses in the Santa Cruz Region are described in more detail in the Climate Change chapter of this IRWM Plan (Chapter 16). In some instances projected changes may dramatically exacerbate the severity of local watershed and water resource issues. The Regional Water Management Group (RWMG) recognizes that, in light of climate projections, historical records will only go so far in predicting future water resource conditions in the Region. While historical water records show the Region's water supplies to be constrained under existing conditions, water supplies will likely be considerably more constrained under future conditions of climate change. During this 2014 IRWM Plan update process, the RWMG has evaluated potential impacts of climate change to identify opportunities for adaptation to reduce the vulnerability of water supply, water quality, aquatic ecosystems, and flood hazards in the Santa Cruz Region (see Chapter 16).

3.10 WATERSHEDS

The following sections provide an overview of the physical and biological elements of the Region's watersheds. As summarized in Table 3-12 below, the Santa Cruz IRWM Region is comprised of 15 major watersheds that are all tributary to coastal waters of the Monterey Bay National Marine Sanctuary.

Figure 3- 7 Watersheds and Groundwater Basins ³⁰

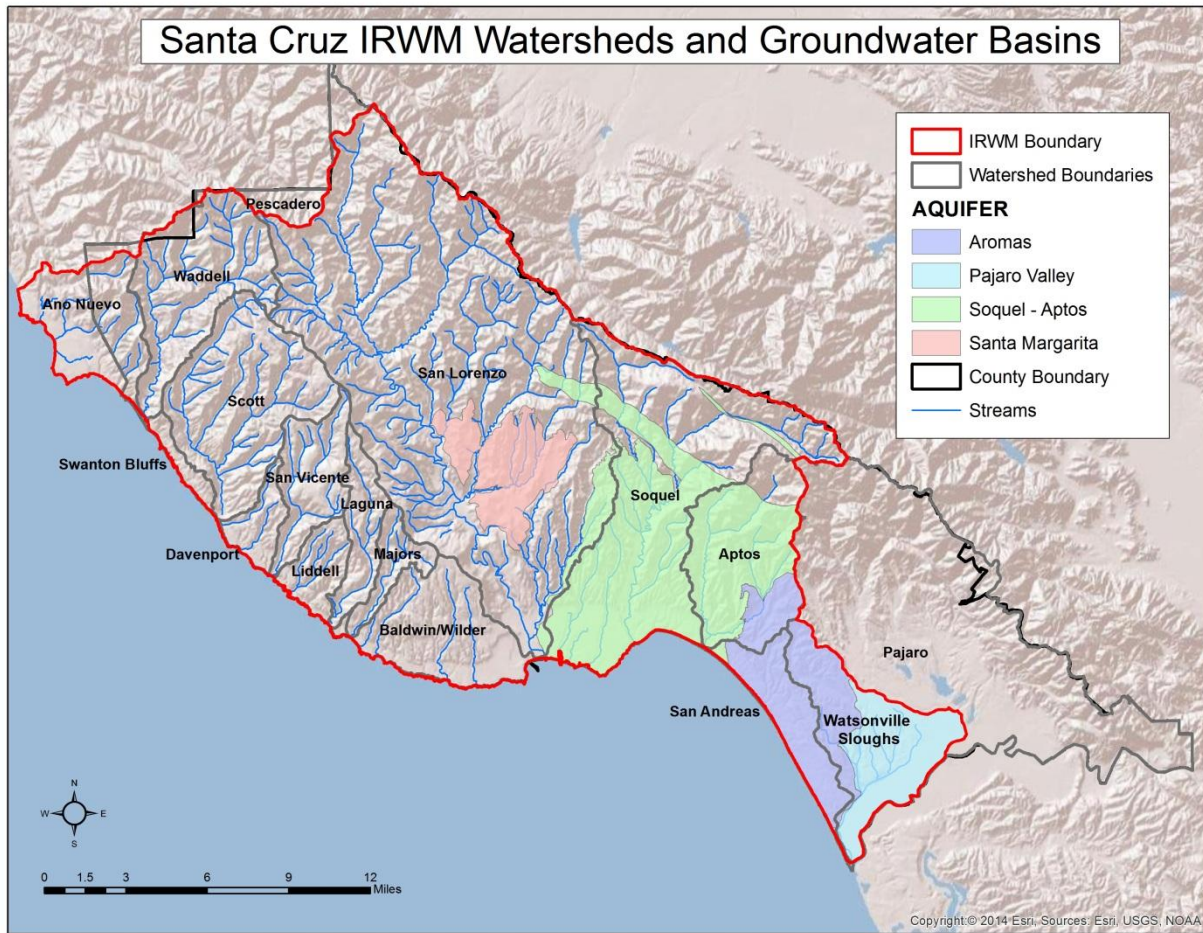


Table 3- 11 Santa Cruz IRWM Watersheds ³¹

Watershed Name	Area (Sq. Mi.)	Main Tributaries	Water Supply Watershed	Impaired
San Lorenzo	138	Branciforte, Carbonera, Zayante, Bean, Fall, Newell, Bear, Boulder, Kings Creeks	San Lorenzo; Hare, Jamison, Corvin, Forest Springs; Bracken Brae Creek; Peavine, Silver, Foreman, Clear, Sweetwater Crreks; Fall, Bennet, Bull	San Lorenzo - Pesticides, Pathogens, Nutrients, Sediment; Zayante - Pesticides, Pathogens, Sediment; Bean - Sediment; Boulder - Sediment; Lockhart Gulch - Sediment, Micellaneous; Bear - Sediment; Branciforte - Sediment, Pathogens; Carbonera - Nutrients, Sediment, Pathogens; Fall - Sediment; Kings - Sediment;

³⁰ County of Santa Cruz

³¹ County of Santa Cruz General Plan; updated to reflect current conditions.

Watershed Name	Area (Sq. Mi.)	Main Tributaries	Water Supply Watershed	Impaired
			Creeks; Lompico Creek; Tunnell Gulch	Lompico - Nutrients, Pathogens, Sediment; Love - Sediment; Mountain Charlie - Sediment; Newell - Miscellaneous, Sediment; Shingle Mill Creek - Nutrients, Sediment
Soquel	42	West, East Branch Soquel Creek; Noble, Porter, Tannery Gulches; Borregas Creek	Laurel Creek	Soquel Creek - Pathogens, Sediment; Nobel Gulch - Pathogens; Porter Gulch - Pathogens; Corcoran Lagoon - Pathogens, Miscellaneous
Scott	39	Big, Little, Queseria, Berry, Boyer, Dead Man's, Winter, Archibald Creeks	No	No
Waddell	27	Last Chance, East and West Branch Waddell Creeks	No	No
Aptos	25	Valencia Creek; Mangels, Trout Gulches	No	Aptos Creek - Pathogens, Sediment; Valencia Creek - Sediment, Pathogens
Baldwin / Wilder	20	Lombardi, Sandy Flat, Old Dairy Gulches, Wilder, Moore Creeks	No	No
San Andreas	15	Busch Gulch	No	No
San Vicente	14	Mill Creek	Mill, San Vicente Creeks	San Vicente - Sediment
Watsonville Sloughs	14	Harkins, Gallighan, Hanson, Main and West Branch Struve Soughs	No	Hanson Slough - Pathogens; Harkins Slough - Pathogens, Nutrients; Watsonville Slough - Pathogens, Nutrients, Sediment

Watershed Name	Area (Sq. Mi.)	Main Tributaries	Water Supply Watershed	Impaired
Año Nuevo	10	Whitehouse, Cascade, Elliot, Wilson, Green Oaks, Finnelly Creeks, Willows Gulch	No	No
Davenport	8	Molino Creek	No	No
Laguna	8	Reggiardo Creek	Reggiardo, Laguna Creeks	No
Liddell	8	West Liddell, Yellow Bank Creeks	Liddell Creek	No
Majors	5	N / A	Yes	No
Swanton Bluffs	5	N / A	No	No
Arana Gulch-Rodeo	3.5	Arana Gulch, Leona Creek, Schwan Lake, Rodeo Creek Gulch	No	Arana: Chlorpyrifos, E. coli, fecal coliform

3.10.1 SAN LORENZO RIVER

The San Lorenzo River is a 138 square mile watershed located in northern Santa Cruz County. It is the largest watershed lying completely within Santa Cruz County. Originating in the Santa Cruz Mountains, the watershed consists of a 25-mile long main stem and 9 principal tributaries that include the following (with associated smaller waterways shown in parentheses: Branciforte (Glen Canyon Creek, Redwood Creek, Granite Creek, Crystal Creek, Tie Gulch, and Blackburn Gulch), Carbonera (Camp Evans Creek and several unnamed streams), Zayante (Lompico Creek, Mill Creek, and Mountain Charlie Gulch), Bean, Fall, Newell (Loch Lomond Reservoir), Bear (Hopkins Gulch, whalebone Gulch, Deer Creek, Connely Gulch, and Shear Creek), Boulder (Foreman Creek, Silver Creek, Pea Vine Creek, Bracken Brae Creek, Jamison Creek, and Hare Creek), and Kings Creeks (Logan's Creek). Smaller creeks and waterways include Powder Mill Creek, Eagle Creek, Gold Gulch, Shingle Mill Creek, Bull Creek, Bennett Creek (Fall Creek and South Fall Creek), Mason Creek, Love Creek (Smith Creek and Fritch Creek), Hubbard Gulch, Alba Creek, Clear Creek, Malosky Creek, Spring Creek Gulch, Two Bar Creek, Spring Creek, and numerous unnamed streams and creeks. The watershed includes the cities and communities of Santa Cruz, Scotts Valley, Felton, Ben Lomond, and Boulder Creek. Much of the watershed is forested with the exception of these pockets of urban areas. The San Lorenzo River is listed on the 2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments for sediment, pathogens, and nutrients. Sediment Total Maximum Daily Load (TMDL) for the San Lorenzo River (and associated tributaries Carbonera Creek, Lompico Creek, and Shingle Mill Creek) has been adopted by the Regional Board.

3.10.2 SOQUEL CREEK

Located between the cities of Santa Cruz and Watsonville, the Soquel Creek watershed drains an area of 42 square miles. Major tributaries include the West Branch (Burns, Laurel, Hester Creek, Amaya Creek, Fern Gulch, Ashbury Gulch, Hinkley Creek, and numerous unnamed waterways) and the Main Branch (fed by Moore's Gulch, Grover Gulch, Love Creek and Bate's Creek). Smaller tributaries include Noble Gulch, Porter Gulch, Tannery Gulch and Borregas Creek. Principal land use in the watershed includes urban development, rural residential development, agriculture, parks and recreation, and mining and timber harvesting. The unincorporated town of Soquel and the City of Capitola are both located in the lower reaches of the watershed. Sedimentation and impairment of important fish habitat have been identified as principal resource concerns in this watershed. Soquel Lagoon is listed on the Clean Water Act Section 303(d) List of Water Quality Limited Segments for nutrients, pathogens, and sedimentation/siltation.

3.10.3 SCOTT CREEK

Scott Creek encompasses a 39 square mile watershed in northern Santa Cruz County. Big Creek and Little Creek are the major tributaries to Scott Creek. Smaller tributaries include Queseria Creek, Berry Creek, Boyer Creek, Deadman Gulch, Winter Creek, Mill Creek, Archibald Creek, and numerous unnamed streams and creeks. Principal land uses in the watershed include agriculture and timber, industrial use (particularly in the vicinity of lands held by Lockheed-Martin), residential use, and recreation. The stream provides salmonid habitat for both spawning and rearing anadromous salmonids. Coho salmon spawn naturally in Scott Creek, making it the only major stream south of San Francisco where this occurs. Serious aggradation has occurred in the lower reaches of Scott Creek resulting in accelerated sedimentation that threatens to impair critical spawning habitat of the coho and steelhead. Invasive and exotic plant species such as French broom (*Genista monspessulana*), Cape ivy (*Senecio mikanioides*), and other nonnative invasive species are also a problem and are present throughout the riparian corridors of the watershed.

3.10.4 WADDELL CREEK

The Waddell Creek watershed drains an area of approximately 27 square miles and is comprised by Last Chance Creek, the two major tributaries of Waddell Creek, East Waddell and West Waddell, and numerous unnamed tributaries. East Waddell Creek is fed by Blooms Creek, Sempervirens Creek, Maddocks Creek, Rogers Creek, Opal Creek, and Union Creek. West Waddell is fed by Henry Creek and Berry Creek. Big Basin State Park constitutes the majority of land cover in the watershed with small pockets of rural residential and agricultural use near the coast.

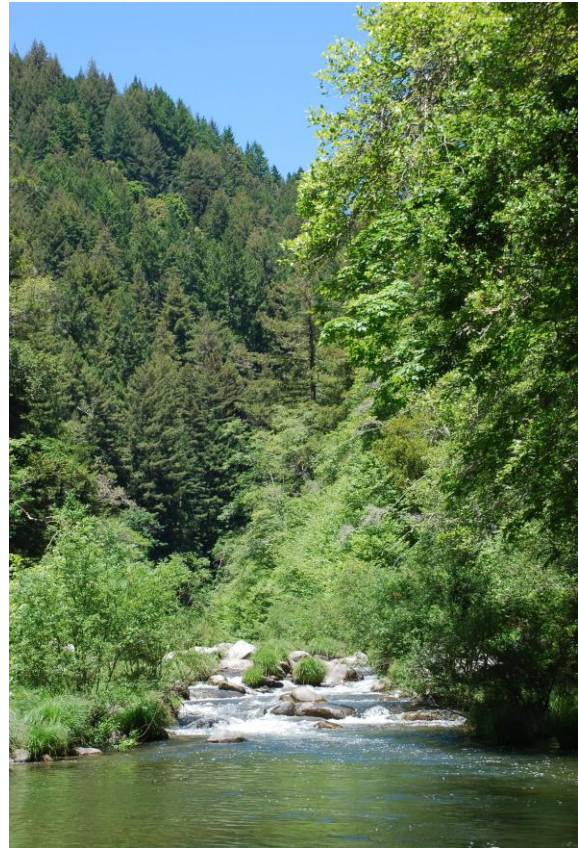
3.10.5 APTOS CREEK

The Aptos Creek watershed drains an area of approximately 25 square miles in southern Santa Cruz County. Aptos Creek and Valencia Creek are the principal tributaries in the watershed. Aptos Creek converges with Valencia Creek approximately 1 mile inland of the Bay. Bridge Creek and Mangels Gulch empty into the Aptos Creek portion of the watershed and Trout Gulch empties into Valencia Creek. Land use in this watershed is comprised of forested lands, state parks and some rural residential areas. More than half of the Aptos Creek portion of the watershed is forested, with the majority of the creek running through the southern portion of the Nisene Marks State Park. Land use in the Valencia Creek portion of

the watershed is primarily rural residential and urban development. There are historical and modern day logging sites in both sub-watersheds. The Aptos Creek watershed provides important habitat to coho and steelhead. Excessive sedimentation, low stream flow resulting from overpumping of groundwater in the region, fish barriers, loss of channel complexity, and poor water quality in the coastal lagoon are some principal resource concerns associated with the Aptos Creek watershed.

3.10.6 BALDWIN WILDER

The Baldwin Wilder watershed is located just south of and adjacent to Majors watershed and the San Lorenzo River watershed. It drains an area of approximately 20 square miles and is comprised of Baldwin Creek, Lombardi Gulch, Sandy Flat Gulch, Old Dairy Gulch, Wilder Creek (Peasley Gulch, Adams Creek, and Cave Gulch), and Moore Creek. The majority of the watershed is comprised of Wilder Ranch State Park with some agriculture along the coast and a quarry along Old Dairy Gulch.



San Lorenzo River

3.10.7 SAN ANDREAS

The San Andreas watershed is bordered on the north and east by the Pajaro River watershed and to the west by the Aptos Creek watershed. San Andreas drains an area of approximately 15 square miles and is comprised of Bush Gulch and two unnamed streams. Land use is predominantly agriculture with some rural and urban residential areas.

3.10.8 SAN VICENTE CREEK

The San Vicente watershed drains an area of approximately 14 square miles and is comprised of San Vicente Creek fed by Mill Creek and several unnamed tributaries. Land use in the watershed is predominantly residential with 2 quarries located on Mill Creek and on one of the unnamed tributaries to San Vicente Creek. There is also a small pocket of agricultural land along the coast. Anadromous fish passage is thought to be limited to about 4 miles due to past quarry activities.

3.10.9 WATSONVILLE SLOUGH

Watsonville Slough drains 14 square miles from the hills of southern Santa Cruz County into the Pajaro River and Monterey Bay. The Watsonville Slough system is comprised of six individual sloughs including Watsonville Slough, Harkins Slough, Gallighan Slough, Hanson Slough, the main branch of the Struve Slough, and the western branch of Struve Slough. The Sloughs represent significant water supply resources, part of which is being used to offset salt-contaminated coastal wells in the region. Nutrient

loading, oftentimes exacerbated by the absence of marsh vegetation, coupled with poor water circulation has resulted in eutrophic conditions in many areas of the Sloughs. Watsonville Slough is listed on the 2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments for pathogens, pesticides, and sedimentation/siltation (Swanson Hydrology and Geomorphology 2003).

3.10.10 AÑO NUEVO CREEK

The Año Nuevo watershed is located in the northwestern portion of the County along the border of San Mateo County. The watershed covers an area of approximately 10 square miles. The headwaters of this watershed begin in Santa Cruz County but empty into the Monterey Bay along the San Mateo coastline. The portion of this watershed in Santa Cruz County includes the headwaters of Whitehouse Creek, Cascade Creek, Elliot Creek, Wilson Creek, Green Oaks Creek, Año Nuevo Creek, Finney Creek, and Willows Gulch. Big Basin Redwood State Park is present in the eastern portion of the watershed. Other land uses in the watershed include residential and agricultural land use.

3.10.11 DAVENPORT

Davenport watershed is located between Scotts Creek and San Vicente and drains an area of approximately 8 square miles. Molino Creek and several unnamed creeks comprise this watershed. Major land uses in this area include agriculture and mountain residential commercial and residential uses in the town of Davenport.

3.10.12 LAGUNA CREEK

The Laguna Creek watershed drains an area of approximately 8 square miles and is comprised of Laguna Creek, Reggiardo Creek, and several unnamed streams. Approximately half of the land use in the watershed is agriculture with the remaining area comprised of residential and resource conservation uses.

3.10.13 LIDDELL CREEK

The Liddell Creek watershed drains an area of approximately 8 square miles and is comprised of Liddell Creek, West Liddell Creek, and Yellow Bank Creek. Land use in the watershed is predominantly agriculture (about 60%) with the remainder comprised of mountainous residential areas.

3.10.14 MAJORS

Majors watershed is located between the Laguna and Baldwin Wilder watersheds. It drains an area of approximately 5 square miles and is comprised of Majors Creek and three unnamed tributaries. Land use is predominantly parkland with the remainder comprised by rural residential and a small area of agricultural production.

3.10.15 SWANTON BLUFFS

Swanton Bluffs is a small watershed adjacent to the Scotts Creek and Waddell Creek watersheds. The watershed is approximately five square miles and is comprised of two unnamed streams. Land use is

predominantly agriculture with small strips of parkland along the coast as well as some residential areas.

3.10.16 ARANA GULCH-RODEO

The Arana Gulch-Rodeo watershed drains a 3.5 square-mile area at the outer (eastern) edges of the City of Santa Cruz. Major waterways and water bodies in this watershed include Arana Gulch, Leona Creek, Schwann Lake, Rodeo Creek Gulch, and several unnamed waterways. Principal land uses in the watershed are urban, primarily residential, commercial, and light industrial, plus institutional areas such as schools, hospitals, and cemeteries. Habitat types present in the watershed include wetlands and freshwater marsh, streambank vegetation, mixed evergreen/mixed broadleaf forest, and a few patchy areas of chaparral habitat. High sediment loads threaten the quality of habitat for the steelhead and other aquatic species in Arana Gulch. Reducing the delivery of sand and sediments to Arana Gulch, its tributaries, and the Santa Cruz Small Craft Harbor and providing passage for migrating adult steelhead to the eastern and central branches of Arana Gulch are identified as principal goals for the Arana Gulch watershed.

3.10.17 PAJARO RIVER

The Pajaro River Watershed drains an area of approximately 1,300 square miles of land in Central California in Santa Cruz, San Benito, Santa Clara, and Monterey Counties. Approximately fifteen percent, or 200 square miles, of the Pajaro River Basin lies within Santa Cruz County. Only the Watsonville Slough System is within the Santa Cruz IRWM Region; the entirety of the watershed is in the Pajaro Watershed IRWM. The Pajaro River watershed is comprised of the Watsonville Slough System (fed by Gallighan Slough, Harkins Slough, and Struve Slough), Corralitos Creek (fed by Rider Creek, Eureka Gulch, Diablo Gulch, Redwood Creek, Browns Creek, and Ramsey Creek), and Salsipuedes Creek (fed by College Creek, Green Valley Creek, Hughes Creek, Pinto Lake, Casserly Creek, and Gaffey Creek). Predominant land use practices in the Lower Pajaro and its tributaries include irrigated croplands, rangelands, timberlands, urbanization, and rural residential development. The watershed is home to several special status species including the tidewater goby, steelhead trout, Santa Cruz long-toed salamander, and the California red-legged frog. The Pajaro River and several tributary streams are considered to be water quality impaired due to sedimentation.

3.11 BIOLOGICAL RESOURCES

In 2011, the Land Trust of Santa Cruz County worked with other partners and stakeholders to prepare the *Conservation Blueprint for Santa Cruz County*³² that collected, synthesized, and analyzed relevant land use, conservation, and resource data for the County, resulting in a comprehensive biodiversity assessment for the region. The assessment noted Santa Cruz County to be a global hotspot of biodiversity that supports:

- More than 1,200 native vascular plant species
- Rich and abundant wildlife, including more than 350 birds and 18 endemic animals found nowhere else
- Mosaic of natural communities including the globally rare old-growth redwood forests, Santa Cruz sandhills, northern maritime chaparral, and coastal prairie
- Coastal streams totaling 850 miles that support steelhead and coho salmon
- More than 1,500 acres of wetlands including sloughs and sag ponds that support diverse wildlife assemblages



Peregrine Falcon Photo courtesy: Gary Kittleson

Despite ongoing conservation efforts, numerous challenges to biodiversity in the Region persist, including the loss of important habitat, which threatens the persistence of many of the Region's endemic species. Remaining habitat is fragmented by urban and intensive agricultural land use. Additionally, localized threats, such as pollution and non-native species (e.g., sticky eupatorium weed, *Arundo donax*., Cape ivy, zebra mussels), as well as climate change, are increasingly problematic.

The function and condition of aquatic systems is inextricably linked to the adjacent and upland land use in which they occur. The amount and quality of water in streams and wetlands depends upon the condition of the watershed, with intact vegetation promoting essential hydrologic functions including recharge and filtration. Upland habitats exchange materials and energy with the aquatic systems and are essential for species that require both environments to complete their lifecycle, including amphibians such as the Santa Cruz long-toed salamander and California red-legged frog. Most aquatic systems in the Region have been altered as a result of urbanization, cultivation, road building and other land uses that alter their hydrologic function. Streams have been channelized and natural hydrology altered; wetlands have been filled or drained; and riparian vegetation altered or removed altogether. Many aquatic systems have been significantly degraded by sediment, nutrients, and pathogens.

³² Mackenzie, A., J. McGraw, and M. Freeman. 2011. *Conservation blueprint for Santa Cruz County: An Assessment and Recommendations from the Land Trust of Santa Cruz County*. Land Trust of Santa Cruz County. Santa Cruz, CA. May 2011. 180 pages. Available at: <http://www.landtrustsantacruz.org/blueprint>

Table 3- 12 Highly Significant Terrestrial Biological Systems ³³

Name	Description	Biological Conservation Value	Occurrence and Conservation Status in Santa Cruz County
unique costal prairies and pocket meadows	small herb-dominated communities often on thin soils on coastal terraces or in forest openings within the mountains	high native plant richness including numerous locally unique species, endemic, and undescribed species	small pocket meadows dot the mountains; remnant patches of prairie occur on the coastal terraces and foothills.
coastal grasslands	herb-dominated communities on the coastal terraces and foothills	support populations of many rare or locally unique animal species; contain patches of native coastal prairie	historically widespread along the coast but now limited to the North Coast, Pajaro Hills, and isolated patches elsewhere
Swanton floristic area	plant species diversity hot spot within the Scott Creek and Swanton Bluffs watersheds	area of exceptionally high plant species richness that contains more than 600 plant species, including many rare, locally unique, and undescribed species	precise boundary has not been delimited
sandstone outcroppings	areas of exposed Butano, Lompico, Vaqueros, and Zayante sandstone	support rich and unique native plant assemblages; feature an abundance of native insects and unique bird assemblages	scattered locations throughout county

³³ Ibid.

Table 3- 13 Highly Significant Aquatic Biological Systems in Santa Cruz County³⁴

Name	Description	Biological Conservation Value	Occurrence and Conservation Status in Santa Cruz County
high priority coastal watersheds	perennial streams that flow to the Pacific ocean, many of which feature lagoons and associated marshes	support rare salmonids: coho salmon and steelhead; feature other native animals including tidewater goby, Monterey roach, speckled dace, Pacific lamprey, California red-legged frog, foothill yellow-legged frog, western pond turtle and San Francisco garter snake	experts identified 29 watersheds totaling 174,000 acres that are critical to streams of important conservation value
Watsonville Sloughs	one of the largest remaining coastal wetlands in California	exceptionally important habitat for birds including migratory and wintering waterbirds, shorebirds, and riparian species; support aquatic species including California red-legged frog and western pond turtle	complex of several sloughs totaling approximately 800 acres with adjacent upland habitat is essential to slough habitat condition and many aquatic species' persistence
Santa Cruz long-toed salamander (SCLTS) ponds	ponds in the Larkin Valley and Rio Del Mar areas and adjacent chaparral and woodlands	ponds that support breeding Santa Cruz long-toed salamanders, and endangered species endemic to coastal southern Santa Cruz and northern Monterey counties; the ponds provide breeding habitat for California red-legged frog, western pond turtle, and other amphibians and reptiles, as well as birds; adjacent maritime chaparral and San Andreas oak woodland, which provide important upland habitat	17 known breeding ponds. Upland habitat and corridors between ponds are essential to the species' long-term persistence. Highway 1 bisects the range and is a barrier to SCLTS.

3.11.1 RARE AND ENDANGERED TERRESTRIAL SPECIES

As presented in the *Conservation Blueprint for Santa Cruz County*, the Region supports 73 known rare plant species, 16 of which are endemic to Santa Cruz County, and 13 of which have been listed as threatened or endangered. The region also supports 81 rare or locally unique animal species, 19 of which are endemic to Santa Cruz County, and 13 of which are threatened or endangered.

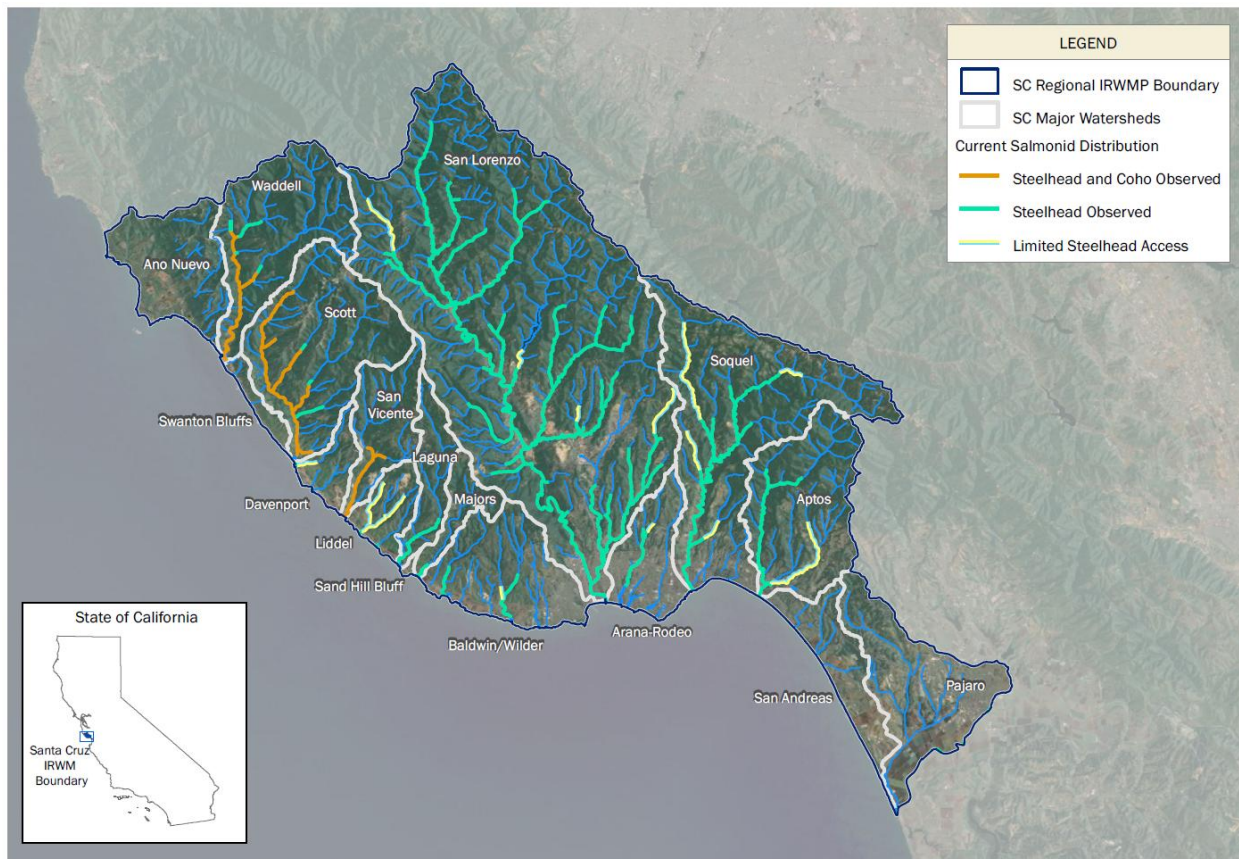
3.11.2 RARE AND ENDANGERED SALMONID SPECIES

³⁴ Ibid.

The Santa Cruz IRWM region supports populations of steelhead (*Oncorhynchus mykiss*) and coho salmon (*Oncorhynchus kisutch*). Water needs for the salmonids are discussed under the subsequent section on environmental water needs. Steelhead are listed as threatened under the federal Endangered Species Act (ESA) and belong to the Central California Coast Distinct Population Segment (DPS—a genetically similar population group). Steelhead have core populations in Scott, San Lorenzo, Soquel and Aptos creeks and also occur in most perennial streams throughout the region. While steelhead numbers are low compared to historical estimates, projects and activities that improve stream habitat will conserve and restore local steelhead populations.

Coho salmon are listed as endangered under both the Federal and State ESA and belong to the Central California Coast Evolutionary Significant Unit (ESU - a genetically similar population group). This ESU includes Santa Cruz County’s North Coast streams and the San Lorenzo River, Soquel Creek and Aptos Creek. Coho salmon are critically endangered in Santa Cruz County and no longer occur in most streams. A conservation hatchery supports a small population in Scott Creek and contributes to another small population in San Vicente Creek. The National Marine Fisheries Service has prepared a Coho Salmon Recovery Plan that includes actions to restore coho salmon to the San Lorenzo, Soquel and Aptos creeks, where coho are currently absent.

Figure 3- 8 Salmonid Supporting Streams in the Santa Cruz Region ³⁵



³⁵ 2NDNATURE, LLC. Santa Cruz IRWM Conceptual Framework. Final Draft March 2013.

3.12 WATERSHED MANAGEMENT

Various agencies have active roles in watershed management within the Santa Cruz IRWM Region. A variety of projects and programs are implemented across the region including water quality projects focusing on nutrients and sediment, fish passage and stream restoration, and rural roads management.

3.12.1 CITY OF SANTA CRUZ WATER RESOURCES MANAGEMENT SECTION

The Water Resources Management Workgroup in the Watershed Section of the City of Santa Cruz Water Department is responsible for drinking water source protection, environmental regulatory compliance, and general natural resource management work that is an important part of the delivery of clean drinking water to city customers. Water Resources Management Workgroup staff have worked for over a decade on a habitat conservation plan for coho salmon and steelhead trout. Water Resources Management Workgroup staff develop drinking water source assessments; and perform outreach and education with drinking water source watershed stakeholders (i.e. agencies, schools, landowners, conservationists, and other City staff).

Along with other responsibilities, Water Resource Management staff participate in technical advisory committees (TAC) including the San Lorenzo River TAC, San Lorenzo River Alliance, San Lorenzo Urban River Task Force, San Lorenzo “Cost-Share for Roads” TAC, On-site Wastewater Disposal, (Septic) TAC, Manure Management TAC, City of Santa Cruz Watershed Resources Technical Advisory Task Force, Comparative Lagoon Ecological Assessment Plan (CLEAP) TAC, Climate Change TAC, Karst Protection Zone Planning TAC and others. Water Resources Management Workgroup staff provide environmental review and compliance support for the Water Department with respect to the Endangered Species Act, California Fish and Game Code, California Water Code, Safe Drinking Water Act, Clean Water Act, California Environmental Quality Act, and the California Coastal Act.

The Water Resources Management Workgroup conducts biological and hydrologic surveys that include monitoring of 12 drinking water source stream gaging stations including the USGS gages on the San Lorenzo River, terrestrial monitoring and anadromous fishery habitat typing/population assessments. Other chemical/physical monitoring work is performed on the North Coast and San Lorenzo River systems to measure sediment, turbidity and temperature, and a variety of other analytes. Watershed Section staff also manage Loch Lomond Reservoir and monitor, restore, and protect habitat in the City's 3,880 acres of watershed lands. Restoration work Watershed staff are engaged in includes, but is not limited to, the following: Mountain Charlie Creek Passage, Apple Orchard Acacia removal and revegetation, numerous pipeline leak, slide, and access road related projects, San Vicente Creek Coho Rescues, E. Zayante Rd improvements, Trinkling Creek Rd. improvements, San Lorenzo and North Coast Juvenile Salmonid Monitoring, Felton Fish Trapping, Newell Creek Fuel Work, the Riparian Conservation Program.

3.12.2 SANTA CRUZ COUNTY

Santa Cruz County's Water Resources Program is organized within the Environmental Health Services Division of the Health Services Agency. The Water Resources Program is not a water supply agency, but rather works in collaboration with other county departments, agencies, special districts and non-governmental organizations to solve water resources and environmental issues through long-range water supply planning, water quality protection, and watershed management.

Environmental Health Services also has responsibility for Zone 4 of the Santa Cruz County Water Conservation and Flood Control District. Zone 4 is a countywide zone established to preserve and enhance the county's watershed resources, including water quality, groundwater, surface water, fish, and wildlife. Services include reviewing timber harvest plans and participating in pre-harvest inspections; protecting and enhancing groundwater recharge; monitoring fish populations and stream habitat quality; evaluating and funding necessary log jam removal by the Department of Public Works; funding environmental code compliance activities in the Planning Department; administering stream enhancement projects; promoting water conservation and water quality protection; participating in countywide stormwater management; conducting water supply planning; implementing groundwater recharge projects and well destructions; and supporting administration and development of IRWM in the Santa Cruz Region. Zone 4 is funded through an annual, countywide property tax assessment, grants and contributions from other agencies.

Other County departments are also involved in watershed management activities. Public Works has implemented programs to improve road maintenance activities, upgrade culverts and crossings, improve drainage and stormwater management, promote water infiltration, and improve flood protection while restoring riparian habitat. The Planning Department implements environmental code compliance and various aspects of development review and approval to require the protection of riparian corridors, groundwater recharge areas, floodplains, and biotic resources, and to limit land clearing grading and erosion.

3.12.3 RESOURCE CONSERVATION DISTRICT OF SANTA CRUZ COUNTY

The mission of the Santa Cruz County Resource Conservation District (RCD) is to help people protect, conserve, and restore natural resources through information, education, and technical assistance programs. The RCD provides a broad range of services related to soil and water conservation throughout Santa Cruz County. The RCD operates pursuant to the Resource Conservation District Act; it is a public resource agency but does not have any regulatory or enforcement authority. The RCD leverages available technical, financial, and educational resources to meet the needs of the local land users within three primary areas of service:

Agricultural Community: Through a cooperative agreement with the US Department of Agriculture's Natural Resources Conservation Service (NRCS), the RCD offers the services of NRCS Conservationists to assist agricultural landowners with land management issues, including irrigation, soil development, erosion control, crop cover, etc. The RCD places a high priority on issues and work related to the protection of prime and important farmland within Santa Cruz County.

Erosion Control and Sedimentation: The RCD prioritizes controlling accelerated runoff, erosion and sedimentation from human activities, including the following: rural roads, inadequate drainage, major land use changes, and erosion and reactivation of chronic landslide masses from landslides induced by human activities as well as natural events. To address these issues the RCD offers conservation assistance to road associations, timberland owners, environmental organizations, government resource agencies and the general public through conferences, workshops, demonstrations, and direct technical and financial assistance funded by grants.

Watershed Management: Soil and water conservation is an important element of watershed planning and management. Through the Integrated Watershed Restoration Program (IWRP) the RCD is directly involved in a number of watershed management initiatives. The RCD assists watershed groups and landowners with dissemination of conservation information and implementation of on-the-ground resource enhancement projects, including managing grant programs. In conjunction with the NRCS, the RCD offers permit coordination services through the Santa Cruz Countywide Permit Coordination Program.

3.13 WATER SUPPLY

3.13.1 STREAMFLOW

Streamflow is a major element of the water cycle, and refers to the flow of water in streams, rivers, and other channels. Ephemeral streams only flow during periods of stormwater runoff during the winter months, whereas perennial streams flow year-round, supplied by groundwater discharge groundwater. Streamflow is determined by topography, land use, and permeability, and the frequency, intensity, and timing of rainfall events.

Streamflow has historically been measured in many county streams by the US Geological Survey (USGS), County, water agencies, and others. Currently operating USGS gages exist on only two streams in the Region – the San Lorenzo River and Soquel Creek. Table 3-11 shows the period of record associated with each of these gages, and Figure 3-7 illustrates the seasonal variability in streamflow for the Region. The vast majority of streamflow volume on an annual basis is derived from precipitation and direct runoff primarily during the five-month period between December and April.

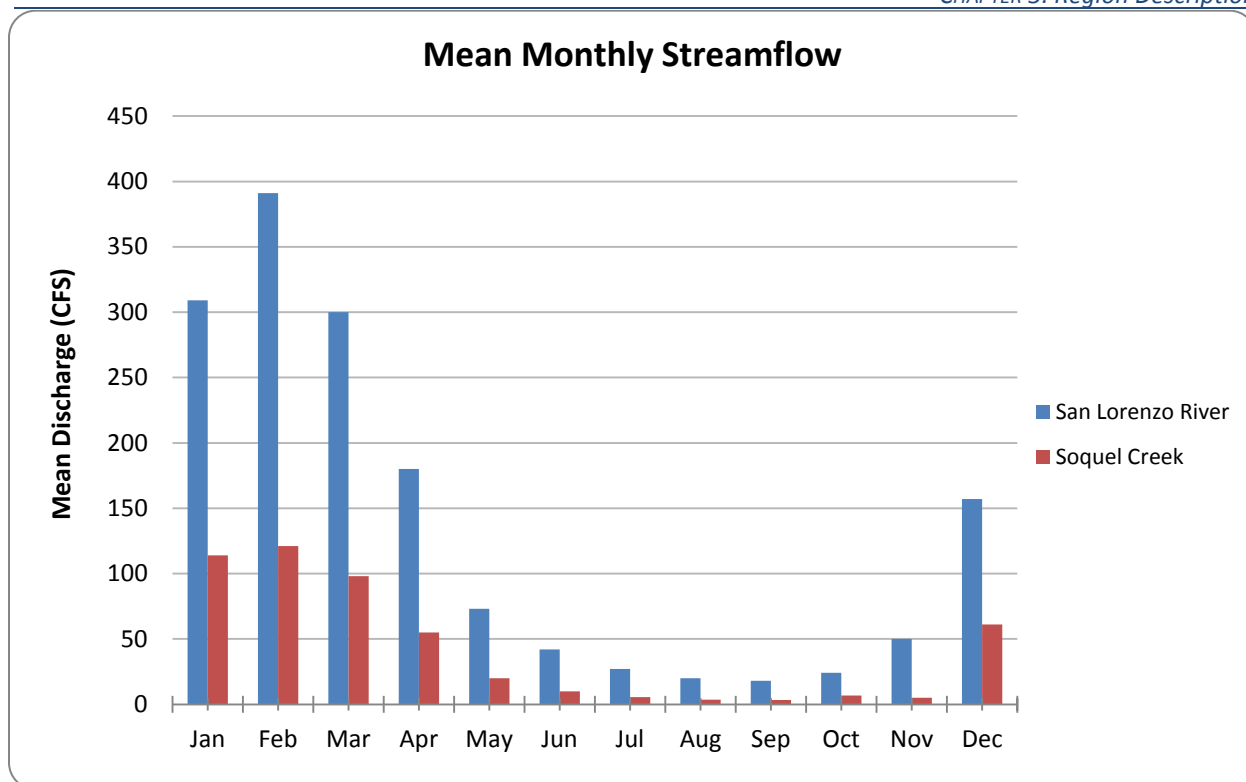
Table 3- 14 U.S. Geological Survey Surface Flow Gages ³⁶

Watershed	Gages	Period of Record
San Lorenzo River	San Lorenzo River @ Santa Cruz	10/01/1952 - current
	San Lorenzo River @ Big Trees	10/01/1936 - current
Soquel Creek	Soquel Creek @ Soquel	5/01/1951 - current

Figure 3- 9 Mean Monthly Streamflow ³⁷

³⁶ U.S. Geological Survey National Water Information System: <http://waterdata.usgs.gov/nwis/sw>

³⁷ U.S. Geological Survey National Water Information System: Web Interface <http://waterdata.usgs.gov/nwis/rt>



3.13.2 WATER SUPPLY WATERSHEDS

The fact that the Region's water supply is locally derived provides special opportunities to adopt and enact land use policies that protect that supply. As indicated in Table 3-15, there are a number of watersheds with supply streams that are directly used for municipal or domestic water supply and are designated as water supply watersheds. Objective 5.5a of the County's General Plan is to manage the watersheds of existing and future surface water supplies to preserve the quality and quantity of water produced and stored in these areas to meet the needs of county residents, local industry, agriculture, and the natural environment. Several General Plan policies are in place to protect these watersheds through minimum parcel sizing for development and runoff retention (please refer to Chapter 13, Relationship to Local Water and Land Use Planning for additional information).

Table 3- 15 Water Supply Watersheds and Related Water Systems³⁸

North Coast	
San Vicente Creek, Mill Creek	Davenport Water System
Liddell Spring, Laguna Creek, Majors Creek	City of Santa Cruz
Reggiardo Creek	City of Santa Cruz
Redwood Spring (Trib. to Majors Ck.)	Redwood Spring Mutual Water Company
Sempervirens Creek	Big Basin State Park
San Lorenzo	
San Lorenzo River	City of Santa Cruz
Hare Creek, Jamison Springs, Corvin Spring, Forest Spring	Big Basin Water Company

³⁸ County of Santa Cruz, Water Resources Division.

Forest Spring	Forest Spring Mutual Water Company / Big Basin Water Company
Bracken Brae Creek / Spring trib. to Bracken Brae	Bracken Brae County Club
Peavine, Silver, Foreman, Clear, Sweetwater Creeks	San Lorenzo Valley Water District
Newell Creek Reservoir (aka Loch Lomond)	City of Santa Cruz
Fall, Bennet, Bull Creeks	San Lorenzo Valley Water District
Lompico Creek	Lompico County Water District
Spring (Trib. To Zayante Creek)	Zayante Acres Mutual Water Company
Tunnell Gulch (Trib. to Gold Gulch)	River Grove Mutual Water Company
Soquel – Aptos	
Laurel Creek	Villa del Monte Mutual Water Company
Laurel Creek	Summit Mutual Water Company
Spring (Trib. to W.B. Soquel Ck.)	Redwood Lodge Mutual Water Company
Spring (Trib. to W.B. Soquel Ck.)	Cathedral Wood Mutual Water Company
Pajaro	
Corralitos, Browns Valley Creeks	City of Watsonville

3.14 GROUNDWATER

There are three major groundwater basins in the Santa Cruz IRWM Region – the Santa Margarita (Scotts Valley, north region), Mid-county (Soquel-Aptos, Purisima and Aromas, central region), and Pajaro Valley (south region). The Region’s water purveyors generally utilize permeable bedrock aquifers due to both the limited extent of alluvial basins as well as the presence of the large, permeable geologic formations in the county. Alluvial groundwater basins coincide with surface watershed areas, but in contrast, bedrock basins can underlie and interact with multiple watersheds. For example the Purisima formation begins under the eastern portion of the San Lorenzo Watershed and extends under the Soquel, Aptos, and Pajaro watersheds. The Aromas formation overlies the Purisima and provides water supply beginning in the eastern portion of the mid-county area, but extends under the Pajaro watershed and serves as the primary water-bearing formation of the Pajaro groundwater basin.

3.14.1 SANTA MARGARITA GROUNDWATER BASIN

The Santa Margarita Basin, located in the San Lorenzo River watershed, is roughly triangular shaped and bounded on the west by the Ben Lomond Fault, on the north by the Zayante Fault, and on the east by a granitic bedrock high. The basin consists of a sequence of Tertiary-age sandstone, siltstone, and shale underlain by the granite. The sedimentary rocks are divided into several geologic formations that are defined on the basis of rock type and relative geologic age.

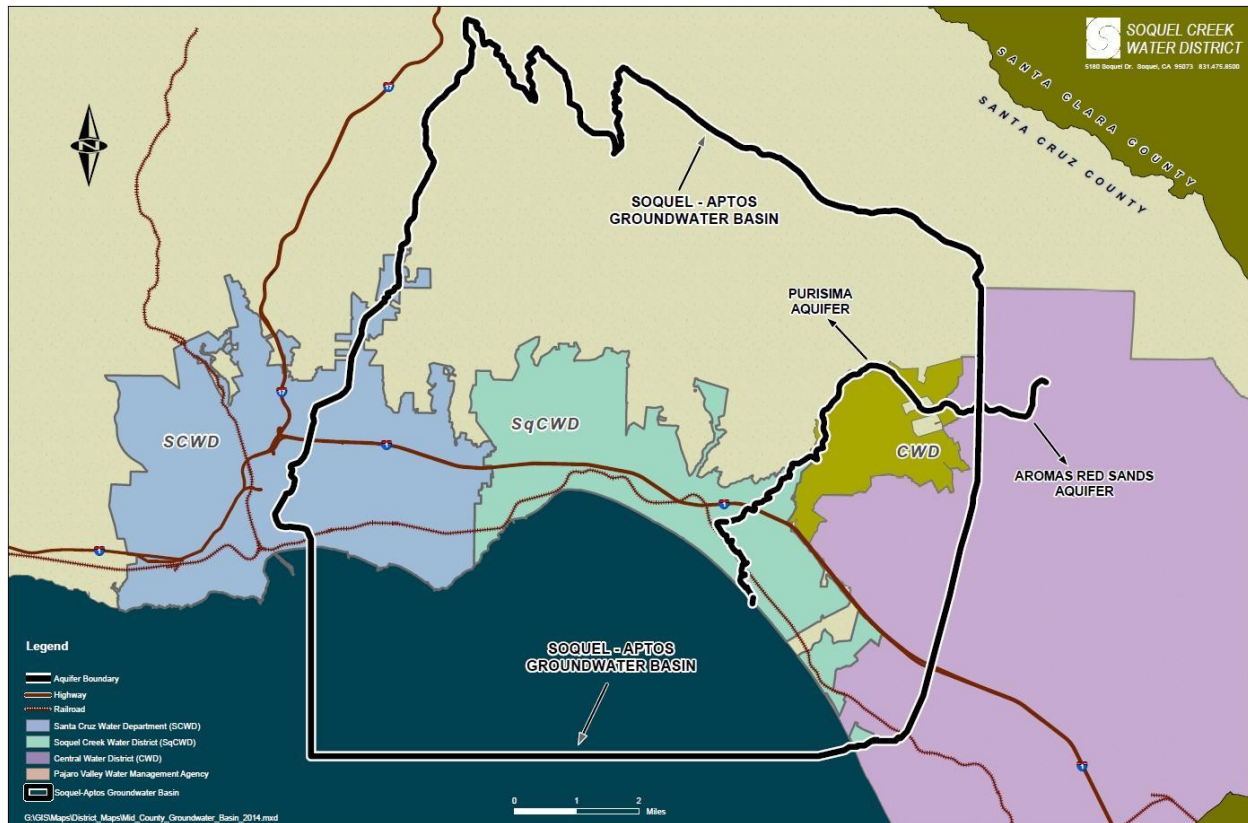
The majority of the water supply in the Scotts Valley area is derived from three main formations – the Santa Margarita, Lompico, and Butano, although limited amounts are drawn from sandy zones within the Monterey Formation and the Locatelli formation. In 2006, the consultant for Scotts Valley Water District completed a groundwater model of the Santa Margarita Basin. The model calculated sustainable yield for the Scotts Valley subarea was estimated to be 2,600 AFY. At that average groundwater withdrawal rate, the model results indicate that there should be no additional groundwater level declines or stream baseflow loss beyond the current conditions. Although current pumping rates are less than the modeled sustainable yield, groundwater pumping is concentrated in the Lompico because of

technical and logistical difficulties accessing the other aquifers. Because of this, groundwater levels in the Lompico are still declining in many parts of the Scotts Valley subarea; therefore, recharging the Lompico is a priority for the region.

3.14.2 SOQUEL-APTOS GROUNDWATER BASIN

The Soquel-Aptos (Mid-County) Groundwater Basin consists of the Purisima Formation, an older undifferentiated Tertiary sandstone that occurs at depth in the western portion of the mid-county area, and the Aromas formation that overlies the Purisima in the eastern portion of the basin. Both the Purisima Formation and the Aromas formation extend under the Pajaro Valley. The Soquel-Aptos basin is bounded on the north by the Zayante Fault, to the south by Monterey Bay, and to the west by a granitic high. The boundary to the east is less well defined by a slight hydrologic high before the formations and the groundwater gradient dip beneath the Pajaro Valley. Where uneroded, the Purisima is approximately 2,000 feet thick. The Purisima consists of several distinct water bearing units separated by aquicludes, and the Aromas directly overlays the permeable upper layers of the Purisima. In the western area, most of the younger Purisima has been removed by erosion. No detailed numeric groundwater model has been developed for the Soquel-Aptos groundwater basin, although models have been developed for the Pajaro Basin, and more recently for the Aromas area of the mid-county basin in the vicinity of Central Water District. An updated mass balance estimate by Hydrometrics WRI (2012) suggests that the sustainable yield of the Purisima area is less than 4,300-5,300 AFY, however there is some uncertainty of the sustainable yield as a peer review of this estimate discussed at a Soquel Creek Board meeting July 15, 2014 resulted in a higher estimate for sustainable yield³⁹. Groundwater production over the past five years is estimated by the Santa Cruz County Water Resources staff to have averaged 5,250 AFY. In 2012 pumping from the Purisima is estimated to have been approximately 5,100 AFY. Because the Purisima and Aromas Formations extend offshore beneath Monterey Bay, the aquifer is in hydrologic connection with the Pacific Ocean. Consequently, overdraft of the basin has the potential to pull seawater into the aquifer beneath the inland areas. Seawater influence has already been detected in the western portion of the Purisima at Soquel Point and in the eastern part of the basin in the Aromas formation.

³⁹ Hydrometrics WRI, 2012, Revised Protective Groundwater Elevations and Outflows for Aromas Area and Updated Water Balance for Soquel-Aptos Groundwater Basin, letter to Laura Brown, Soquel Creek Water District, April 12, 2012.

Figure 3- 10 Soquel-Aptos Groundwater Basin⁴⁰

3.14.3 PAJARO VALLEY GROUNDWATER BASIN

The Pajaro Valley Groundwater Basin consists of younger and older alluvium overlying the Quaternary-Tertiary aged Aromas Formation. The Purisima Formation is encountered at depth, but groundwater production from the Purisima in Pajaro Valley usually only occurs along the margins of the basin. The basin extends into Santa Cruz, Monterey, Santa Clara, and San Benito counties. In Santa Cruz County the basin is bounded on the north by the San Andreas Fault, on the south by Monterey Bay, and on the west by the shallow hydrologic high at the eastern edge of the mid-county basin. The Aromas Formation has been generally divided into upper and lower units that are often separated by a low permeability clayey zone.

All the water bearing units of the Pajaro Basin extend offshore and are in hydrologic connection with Monterey Bay. Groundwater use in the basin is estimated at 55,000 to 60,000 AFY. Sustainable yield is estimated to be between 30,000 and 50,000 AFY. A key symptom of overdraft in coastal basins is seawater intrusion. Seawater intrusion has been an ongoing problem in the Pajaro Basin and was first documented in a 1953 Department of Water Resources report. Currently, constituents of seawater have been detected in wells in excess of two miles inland from the coast. In the Pajaro Valley, seawater intrusion has been expanding inland from the coast at an average rate of 100-250 feet per year. The Pajaro Valley Water Management Agency has detected seawater with chloride concentrations greater than 500 mg/L in wells one mile inland. Sixty percent of the basin now has groundwater levels below sea level.

⁴⁰ Soquel Creek Water District, 2014.

3.14.4 MISCELLANEOUS WATER BEARING UNITS

Ben Lomond Mountain: While not considered a typical groundwater “basin,” the Ben Lomond Mountain area of northern Santa Cruz County is an important source of groundwater for this relatively sparsely populated region. Groundwater is extracted from relatively thin deposits of Santa Margarita sand, karst deposits of intermingled marble and schist, and from weathered granite that is often exposed at or near the ground surface. While the transmissivity of these units is typically very high (i.e., they can transmit large volumes of groundwater very rapidly), due to the thin nature of these water-bearing materials, the total volume of groundwater they can store is very limited. The permeable surface materials capture significant amounts of the high volume of rainfall that occurs on Ben Lomond Mountain and slowly feed the captured water through weathered material and fractures to support private wells and maintain a high level of dry season baseflow in streams draining to the north coast and San Lorenzo watersheds. As such, Ben Lomond mountain provides a substantial portion of the surface water used by the San Lorenzo Valley Water District and the City of Santa Cruz.

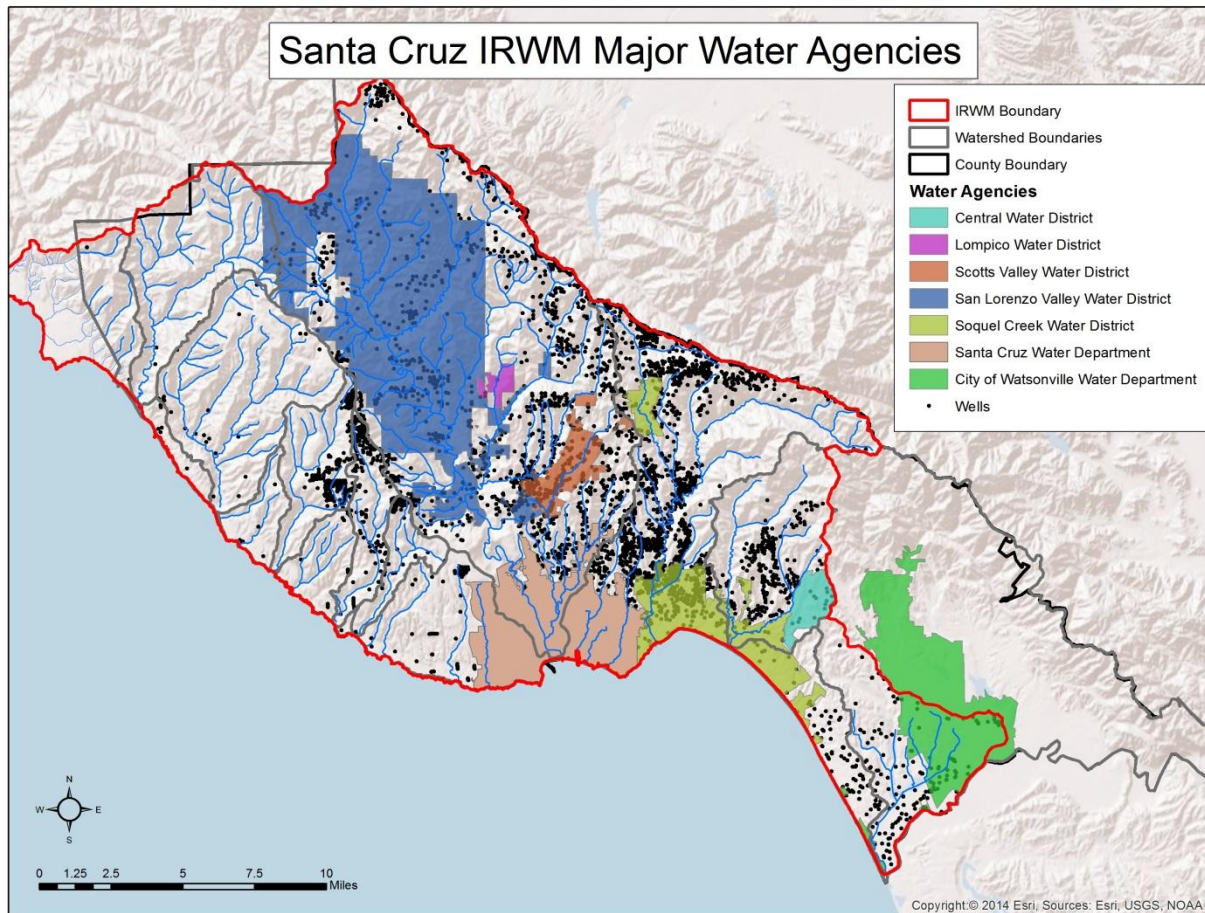
Summit Area: There is limited groundwater in the Summit area. Due to the limited porosity, geologic units in the Summit area do not contain large amounts of water and water availability is limited to favorable fracture zones. Most potable water along the Summit is drawn from bedrock wells or springs, imported from Santa Clara County, or hauled in by water trucks during the dry season when marginal wells cannot meet demand.

3.15 WATER SUPPLIERS

Domestic water supply within the Santa Cruz IRWM Region is provided by seven public agencies, by small public water systems, and by individual and shared wells and springs (Figure 3-9). Groundwater provides 55-60% of public water agency supply in the Santa Cruz Region, with the remainder coming from local surface water sources. With the exception of a small volume obtained through surface diversions, the non-agency water users (agriculture and rural residences and businesses) rely entirely on groundwater. Except for 200-300 parcels in the Summit area that receive water through the Monte Vina pipeline from the San Jose Water Company, the Santa Cruz Region is supplied exclusively by local water sources. This situation is unusual in California; most communities rely to some extent on imported water to support their populations.

Although the water agencies are independent, they share the same water resources and are facing similar constraints and resource management issues, and have conducted collaborative planning and project implementation accordingly. The following sections describe the water suppliers in the Santa Cruz IRWM Region.

Compiling information on supply and demand for many of the water agencies has been very challenging as these figures have been frequently updated in recent years, particularly for Santa Cruz City and Soquel Creek Water District. There are also many unknowns, including the effect of recovery from the recession, climate change, the extent and effectiveness of future water conservation measures and the need to reduce extraction from existing sources to address aquatic habitat needs or reduce groundwater overdraft. All of the major water agencies completed urban water management plans in 2011, according to a prescribed methodology. These were used to provide a common basis for information and compilation. More recent information for some agencies is also provided as available.

Figure 3- 11 Santa Cruz IRWM Water Supply ⁴¹

3.15.1 CITY OF SANTA CRUZ WATER DEPARTMENT

The City of Santa Cruz Water Department (SCWD or City) is a municipal utility that is owned and operated by the City. The SCWD serves a 20-square-mile area that extends from the agricultural lands west of the City to 41st Avenue in the City of Capitola. The service area includes the developed portion of UC Santa Cruz campus, Live Oak, Pasatiempo, and some other unincorporated areas surrounding the city. The SCWD serves ~24,351 connections of which 88% are residential, with a total population of approximately 94,000. Approximately 61,100 people, or about two-thirds of the total population, live inside the city limits.

SCWD is primarily a surface water user (~96% of total supply), all of which is derived from the northern county watersheds. The remaining ~4% percent of the SCWD water supply comes from groundwater, all of which is extracted from wells in the Purisima Formation in the mid-county area. In addition to surface diversions on four north coast streams (Reggiardo, East Branch Liddell, Majors, and Laguna creeks) and on the San Lorenzo River at Tait Street and Felton, SCWD utilizes Loch Lomond, an 8,600 acre-foot (2,817 million gallons) capacity reservoir on Newell Creek, a major tributary to the San Lorenzo River.

⁴¹ County of Santa Cruz, Water Resources Division. 2014.

Approximately 500 acre-feet per year (AFY) of water is derived from groundwater via the Beltz wells, located in the Live Oak area of the unincorporated county. Except for the water produced by the Beltz wells, all raw water is treated at the Graham Hill Water Treatment Plant. The City currently has a total treated water storage capacity of 44.4 acre-feet (14.8 million gallons), or 1.3 times average daily demand.

One of the challenges the City faces is a lack of adequate water supply during periods of drought. Because the City is primarily supplied by surface water, it has surplus water in wet years and is seriously impacted during periods of drought. In single dry years, the system relies heavily on water stored in Loch Lomond reservoir to satisfy demand, which draws down the reservoir level lower than usual and depletes available supply in the event of a subsequent dry year. In multiple dry years, or drought conditions, very low surface water flows in the San Lorenzo River and North Coast creeks and springs, combined with depleted supply stored in Loch Lomond reservoir, reduces that City's available supply to a level that cannot support water demand.

Table 13 below shows supply and demand projections based on the 2010 UWMP. These projections have been updated since and continue to be evaluated by the Water Supply Advisory Committee. SCWD has already reduced available supply since the 2010 UWMP was completed due to the need to reduce their diversions and bypass more flow downstream to help restore passage and rearing habitat for steelhead and salmon. Negotiations with fishery agencies and modelling work are continuing. Preliminary estimates suggest that SCWD could see a reduction in stream diversions of 700-1400 af/yr. The impact of this becomes more pronounced when peak daily demand is compared to available supply during a critical dry year. Preliminary estimates suggest shortages could range from 21-48%, however this continues to be evaluated.⁴²

The SCWD acknowledges that it would only be able to service approximately half of the normal dry season demand during a worst case multiple-year drought. Along with conservation and use curtailment, the City's Integrated Resources Water Management Plan identifies seawater desalination as the preferred alternative to provide backup supply. The City had been pursuing a joint desalination facility with Soquel Creek Water District, and a draft EIR was prepared for that project. However, in the face of community concerns about the project, the City decided to pause work on the project in order to facilitate a community discussion about water supply, demand, and alternatives. Meanwhile, conservation efforts have been successful; in 2011 Santa Cruz users averaged 106⁴³ gallons per capita per day (gpcd), which is well below the statewide average of 192 gpcd, the Central Coast Regional average of 154 gpcd, and the year 2020 Urban Water Use Target of 117 gpcd.⁴⁴ The City has implemented water rationing and is developing a water conservation master plan that is evaluating various water conservation actions. Water demand will vary depending on the level of conservation actions implemented and the success of those efforts. Recent information from the City has projected demand in the year 2030 to range from 12,409 AFY to 14,555 AFY⁴⁵.

⁴² URS, 2013. Proposed **scwd**² Regional Seawater Desalination Project Draft Environmental Impact Report SCH# 2010112038. Prepared for City of Santa Cruz and Soquel Creek Water District.

⁴³ City of Santa Cruz Water Department. "Memorandum – Per Capita Water Use Calculations." May 2, 2011.

⁴⁴ Ibid.

⁴⁵ City of Santa Cruz Water Department (T. Goddard). "Memorandum to Water Commission" Meeting dated 01/29/14.

The number of water supply sources and their current volumes has provided flexibility to SCWD to select water of highest quality for treatment and distribution to its customers. As the requirements of the City's diversions become more complex and stringent, SCWD must treat water of reduced quality to meet customer demand. In the face of drought and long term uncertainty with regard to water supplies, the City is evaluating its treatment and operations to ensure its customers continue to receive high quality water.

Table 3- 16 City of Santa Cruz Supply and Demand Projections (water units are acre-feet per year unless otherwise specified)

City of Santa Cruz						
	Normal Year		Single Dry Year		Multiple Dry Years	
	2010	2030	2010	2030	2010	2030
Population	91,291	98,600	91,291	98,600	91,291	98,600
Supply	14,749	14,855	12,748	14,034	11,428	10,106
Demand	12,577	14,448	12,577	14,448	12,577	14,448
Difference	2,172	407	171	(414)	(1,149)	(4,342)
Per Capita Use (GPD)	123	131	123	131	123	131
<i>References</i>						
	Normal Year		Single Dry Year		Multiple Dry Years	
	2010	2030	2010	2030	2010	2030
Population	<i>UWMP Table 2-3</i>					
Supply	<i>UWMP Table 5-6</i>		<i>UWMP Table 5-7</i>		<i>UWMP Table 5-8</i>	
Demand						
Difference	<i>Calculated</i>					
Per Capita Use (GPD)	<i>Calculated</i>					

3.15.2 SOQUEL CREEK WATER DISTRICT

The Soquel Creek Water District (SqCWD) serves a portion of the City of Capitola as well as the unincorporated areas of Soquel, Aptos, Seacliff, Rio Del Mar, Seascape, La Selva Beach, and Canon del Sol. The district's service area encompasses 14 square miles including seven miles of coastline. The district serves 13,570 connections with 94% residential and a total population of approximately 37,000. The district is entirely dependent on groundwater from two aquifers, drawing 62% of its water supply from the Purisima Formation and 38% from the Aromas Red Sands aquifer, with all water being treated at the wellheads. These aquifers are shared with adjoining water agencies and a multitude of private well users. The Aromas is already experiencing seawater intrusion along the coastline in the SqCWD service area. Depressed groundwater elevations in the Purisima indicate a strong potential for future seawater intrusion into the aquifer.

The District's consultant has concluded that the mid-county (Soquel-Aptos) groundwater management area is in overdraft based on low groundwater levels. that create the potential for seawater intrusion into the drinking water aquifers. Increasing salt concentrations have been detected in coastal monitoring wells for much of the Aromas and at limited locations in the Purisima Formation. The current

long term sustainable yield estimate for the basin is approximately 4,600-7,000 AFY, which is utilized by the district and other users. However, because the basin has experienced long term and overdraft and pumping needs to be reduced in order to recover the basin, the district has set a target pumping goal of 2,900 AFY for 20 years. SqCWD average per capita daily water usage (108 gpcd over past five years) is well below the state and central coast averages, but significant, additional conservation will be required to reach the new target, which is expected to also involve developing a supplemental supply. SqCWD had been evaluating the desalination plant with the SCWD as a supplemental water supply to help it reach that lower pumping threshold, but since that project was put on hold, the District has been revisiting other potential supply options including water transfers and recycled water.

Table 3- 17 Soquel Creek Water District Water Supply and Demand Projections

Soquel Creek Water District						
	Normal Year		Single Dry Year		Multiple Dry Years	
	2010	2030	2010	2030	2010	2030
Population	37,720	39,550	37,720	39,550	37,720	39,550
Supply	4,610	2,900	4,610	2,900	4,610	2,900
Demand	4,615	4,116	4,615	4,116	4,615	4,116
Difference	(5)	(1,216)	(5)	(1,216)	(5)	(1,216)
Per Capita Use (GPD)	109	93	109	93	109	93
References						
Population	UWMP Table 2-2					
Supply	UWMP Table 5-5	HydroMetrics WRI 4/3/12	UWMP Table 5-5	HydroMetrics WRI 4/3/12	UWMP Table 5-5	HydroMetrics WRI 4/3/12
Demand	UWMP Page 2-4	UWMP Table 5-11	UWMP Page 2-4	UWMP Table 5-12	UWMP Page 2-4	UWMP Table 5-13
Difference	calculated					
Per Capita Use (GPD)	calculated					

3.15.3 SAN LORENZO VALLEY WATER DISTRICT

The San Lorenzo Valley Water District serves a 58-square-mile area that covers most of the western portion of the San Lorenzo River Watershed and serves an average of 2,300 AFY to a population of approximately 22,000. The district provides water service to the communities of Boulder Creek, Brookdale, Ben Lomond, Zayante, Felton, and portions of the City of Scotts Valley. The district has three separate major service areas with independent systems and sources of supply. The northern area serves the unincorporated area of the San Lorenzo Valley north of Felton, including Zayante. Water supply in the northern San Lorenzo Valley area is obtained from the Santa Margarita groundwater basin as well as surface water from tributaries to the San Lorenzo River. The Felton subarea is supplied by springs and surface streams near Felton. Water supply in the southern area around Scotts Valley is obtained from the Santa Margarita basin. The district derives approximately 1,200 AFY of water from surface sources, and nearly 1,100 AFY from groundwater. Between 2000 and 2010, average per capita daily use ranged from approximately 85 to 109 gpcd.⁴⁶ Because the northern area is supplied both by surface and

⁴⁶ San Lorenzo Valley Water District. "Draft – SLVWD Urban Water Management Plan." 2012. Pg. 3-4.

groundwater, it has a more reliable water supply and has opportunities conjunctive use. However, during a multiple year drought there is not enough groundwater available to make up for the decline in surface sources and demand reduction is required. Current supply limitations are discussed by Johnson (2014). SLVWD is initiating the process to evaluate the effects of its diversions on fish habitat and may have to reduce its diversions in the future to adequately protect habitat. The supply and demand table below assumes that there will be a 10% loss of supply in the future. Efforts are currently underway to link all the areas with emergency interties, which have the potential to be used in future for conjunctive use once fishery and water rights issues are resolved.

Table 3- 18 San Lorenzo Valley Water District Water Supply and Demand Projections ⁴⁷

San Lorenzo Valley Water District						
	Normal Year		Single Dry Year		Multiple Dry Years	
	2010	2030	2010	2030	2010	2030
Population	22,174	22,527	22,174	22,527	22,174	22,527
Supply	2,490	2,290	2,250	2,050	1,900	1,700
Demand	2,211	2,072	2,211	2,072	2,211	2,072
Difference	279	218	39	(22)	(311)	(372)
Per Capita Use (GPD)	89	82	89	82	89	82
<i>References</i>						
Population	<i>Table 2-9 Draft UWMP</i>					
Supply	<i>Johnson, 2014, Drought Plan Presentation, 2030 estimate based on 10% reduction for fish release</i>					
Demand	<i>Table 3-9, 3-14, Draft UWMP</i>					
Difference	<i>calculated</i>					
Per Capita Use (GPD)	<i>calculated</i>					

3.15.4 SCOTTS VALLEY WATER DISTRICT

The Scotts Valley Water District (SVWD) service area encompasses a six-square-mile area that includes the City of Scotts Valley and unincorporated areas to the north. The district currently serves 3,700 connections, of which 93% are residential, and includes a population of approximately 10,000. According to its 2010 Urban Water Management Plan, the district is projecting build-out in 2020. Water supply is obtained from three water-bearing formations within the Santa Margarita Groundwater Basin: the Santa Margarita Sandstone, the Lompico, and the Butano. Storage capacity is equivalent to 2.25 times average day demand.

Groundwater production from the various formations is approximately 1,400 AFY. The SVWD also owns and operates a wastewater tertiary-level treatment plant that provides an average of 140 AFY of recycled water for irrigation. The part of the Santa Margarita groundwater basin from which SVWD extracts groundwater has experienced significant declines in groundwater levels since the mid-1980s. Groundwater levels in the vicinity of Scotts Valley have dropped between 100 and 200 feet since that time. Ten-year average per capita use for the district (1995-2004) is approximately 180 gpcd. The 2020

⁴⁷ Johnson, Nicholas M., 2014, Hydrologic Basis for SLVWD Drought Management Plan, presented to SLVWD Board of Directors, March 6, 2014.

target for the district is approximately 144 gpcd.⁴⁸

Table 3- 19 Scotts Valley Water District Water Supply and Demand Projections

Scotts Valley Water District						
	Normal Year		Single Dry Year		Multiple Dry Years	
	2010	2030	2010	2030	2010	2030
Population	10,309	11,076	10,309	11,076	10,309	11,076
Supply	1,507	1,766	1,507	1,501	1,507	1,412
Demand	1,507	1,766	1,507	1,501	1,507	1,412
Difference	0	0	0	0	0	0
Per Capita Use (GPD)	131	142	131	121	131	114
<i>References</i>						
Population	<i>UWMP Table 2-2</i>					
Supply	<i>Table 6-6 UWMP</i>		<i>Table 6-7 UWMP</i>		<i>Table 6-8 UWMP</i>	
Demand						
Difference	<i>calculated</i>					
Per Capita Use (GPD)	<i>calculated</i>					

3.15.5 CENTRAL WATER DISTRICT

The Central Water District (CWD) has a five-square-mile service area in the rural area of Aptos. CWD serves 2,700 customers through 842 connections, all of which are residential with the exception of seven commercial and 16 for irrigation and public facilities. Approximately 5% of the water demand is for agricultural use; the water supplied is all potable. The district relies on groundwater from the Aromas Red Sands and Purisima aquifers for supply. The district has five wells.

Although the CWD has wells in both the Purisima and Aromas formations, the Purisima wells, due to high levels of iron and manganese, are infrequently used. CWD is evaluating the construction of a treatment facility so that the Purisima wells can be used on a more regular basis. Because CWD is in what is believed to be a recharge area for the Aromas, and possibly Purisima formations, groundwater levels have been stable since records were first kept in the mid-1970s. Because CWD is smaller than the state threshold for UWMP reporting, no formal projections for future water use in the district have been made.

⁴⁸ Scotts Valley Water District, 2011. "2010 Urban Water Management Plan – Section 2 – Water Use." Pg. 2-10, 11.

Table 3- 20 Central Water District Water Supply and Demand Projections

Central Water District Water District						
	Normal Year		Single Dry Year		Multiple Dry Years	
	2010	2030	2010	2030	2010	2030
Population	2,700	2,900	2,700	2,900	2,700	2,900
Supply	580	600	580	600	580	600
Demand	580	600	580	600	580	600
Difference	0	0	0	0	0	0
Per Capita Use (GPD)	192	185	192	185	192	185
<i>References</i>						
Population	<i>CWD Personal Communication with County Water Resources Staff</i>					
Supply						
Demand						
Difference						
Per Capita Use (GPD)	<i>calculated</i>					

3.15.6 DAVENPORT COUNTY SANITATION DISTRICT

The Davenport County Sanitation District serves 114 water connections in the Old Town, New Town, and San Vicente areas of Davenport. The district relies on surface water diverted from Mill Creek and San Vicente Creek for supply. The District is managed by the County Department of Public Works and infrastructure needs are funded by water and sewer rates and grants.

3.15.7 LOMPICO COUNTY WATER DISTRICT

The Lompico County Water District serves the Lompico community near Felton. The District's service area encompasses two square miles and all 498 connections are for residential service. The community is considered built-out and is under a moratorium on any new water hook-ups. Water supply is obtained from the Santa Margarita and Monterey aquifers as well as Lompico Creek. In 2014, the Lompico and San Lorenzo Valley Water District have been working with the County and the Local Agency Formation Commission (LAFCo) to dissolve the Lompico District and merge with San Lorenzo. An emergency intertie was constructed between the two service areas in 2014.

3.15.8 SMALL DRINKING WATER SYSTEMS AND PRIVATE USERS

There are three other small water systems that are not public agencies: Big Basin Water Company (598 connections, 85% surface water); Mount Hermon Association (530 connections, groundwater) and Forest Lakes Mutual Water Company (330 connections, groundwater). There are an additional 130 small water systems serving 5 - 199 connections in the county serving roughly 2,500 households. The large majority of these use groundwater. Additionally, there are at least 8,000 private wells in the Santa Cruz Region that serve between 1 and 4 households.

Some landowners use small stream diversions for irrigation and occasional domestic use. There is not a complete inventory of these and most have not registered their use with the State Division of Water Rights. Extensive stream surveys of the San Lorenzo River and its major tributaries in the 1970s indicated a total of 100 private diversions. More recent surveys of individual reaches have shown about a 50-70% reduction in the number of diversions since the 1970s.

3.16 WATER SUPPLY AND DEMAND

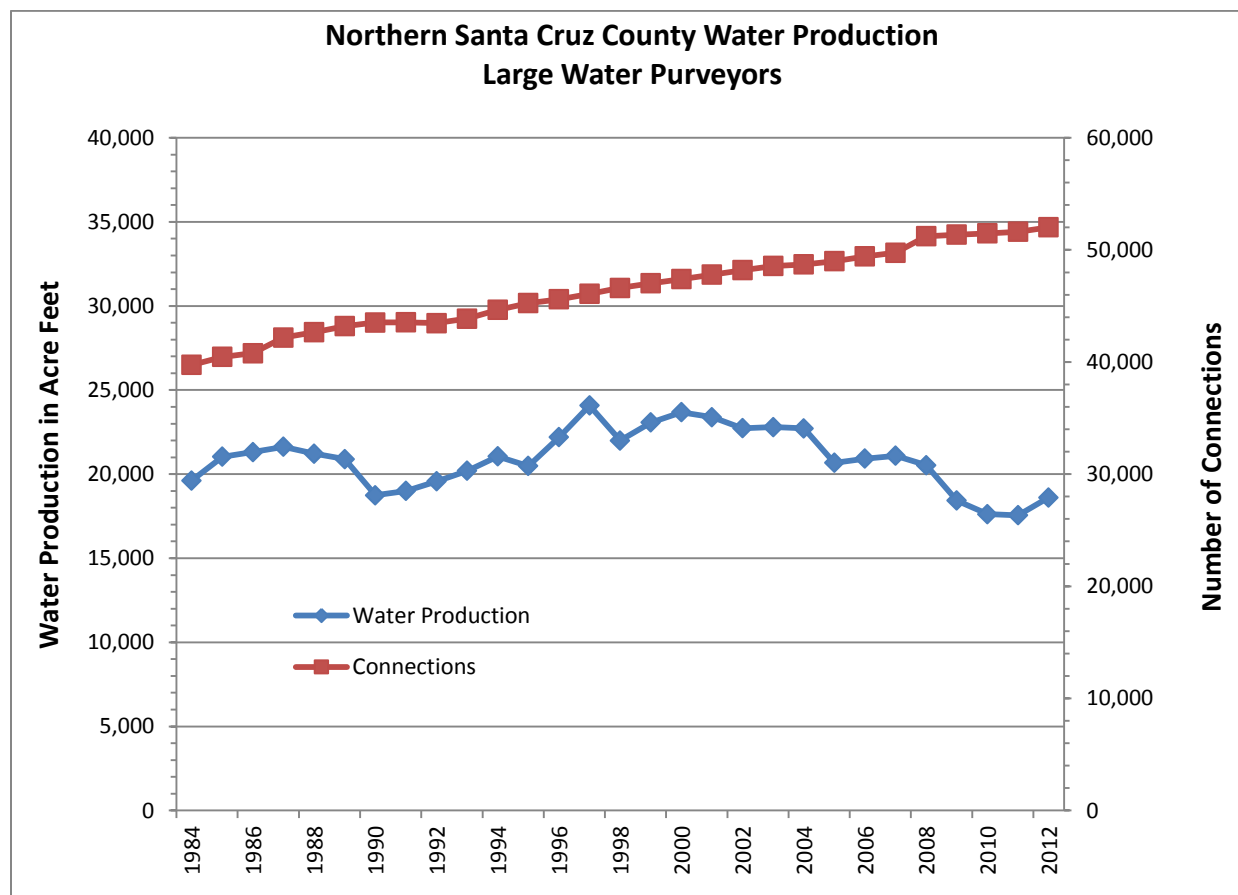
Although the water agencies in the Region all vary in size and source of supply, they all face challenges related to water supply reliability, including threats to baseline supplies, increasing demands, regulatory constraints, hydrologic variations, and infrastructure limitations. These challenges are described in more detail in Chapter 5, Resource Management Strategies. Generally, these challenges include:

- **Seasonal demand versus seasonal supply:** Like much of the rest of the state, water demand in the Santa Cruz Region is highest in the summertime when surface supply is at its lowest, and least in the winter when potential supplies are at their greatest. This juxtaposition presents both a challenge and an opportunity for water supply planning.
- **Source of supply:** Districts that rely upon surface water usually have more than sufficient supplies during winter months, but can face challenges in meeting summertime demand in dry and critically dry years. Groundwater agencies, for the most part, utilize overdrafted basins and are constantly challenged with balancing supply and demand.
- **Conservation and changing economy:** The Santa Cruz Region's water users have recently demonstrated a strong water conservation ethic demonstrated through low per-capita usage. Also, as several large industries have left the Region, total use has gone down.
- **Climatic variability:** As illustrated in Figure 5 (seasonal variability in streamflow), the annual precipitation varies greatly in the Santa Cruz Region. This fact along with limited storage capacity and the Region's complete dependence upon a local water supply greatly impact the Region's ability to meet demand – particularly for those agencies relying upon surface water for supply. Climate change is expected to exacerbate this situation by increasing the intensity of storms and shortening the traditional rainy season.
- **Inter-district variability:** Water supply and demand varies by the type of user within each district as well as the overall water supply outlook for that district.
- **Environmental flow needs:** Historical stream diversions and groundwater extractions have reduced streamflow available for fish habitat. Promoting recovery of threatened and endangered salmonid habitat will require reducing water extractions to restore streamflow needed for critical life stages.

3.16.1 HISTORICAL WATER USE

Detailed records of water used by the major purveyors have been compiled for approximately 30 years. Water use demonstrates variability from year to year (Figure 3-11) depending upon on the factors previously discussed. Between 1984 and 1997, there was a general upward trend in water use that primarily reflected a growing population. Since 1997, there has been a steady downward trend in per-capita water use as the local economy has changed and conservation programs have been implemented and have taken effect.

Figure 3- 12 Urban Water Production and Connections – Large Water Purveyors in Santa Cruz Region ⁴⁹



Note: Totals exclude small drinking water systems, individual users, and agriculture

3.16.2 CURRENT WATER USE

Recent water demand figures compiled (for the calendar year 2012) show that the Region as a whole used approximately 29,000 acre-feet of water. Additional water use in the Pajaro Groundwater Basin, which partly underlays the Santa Cruz region, accounted for an additional 33,000 acre-feet, primarily for agriculture and the City of Watsonville. Within the IRWM Region, in 2012, 57% of the water supply was from groundwater, 42% from surface water with an additional 1% coming from recycled water. Including the Pajaro Basin in these figures, the percentage swing to 79% groundwater, 20% surface water, and 2% recycled water (Table 3-21).

⁴⁹County of Santa Cruz, Water Resources Division.

Table 3- 21 Water Supply and Demand, 2012 ⁵⁰

Water Supplier	Connects	Population Served	Total Dry Year Demand	Ground Water AF	Surface Water AF	Recycled Water AF	Ground water	Surface Water	Recycled Water	% Overall Use	Per Capita gpd
Santa Cruz City Water Dept.	24,425	93,339	10,134	523	9,611	0	5%	95%	0%	15.3%	97
Soquel Creek Water District	15,562	38,000	4,171	4,171	0	0	100%	0%	0%	6.3%	98
San Lorenzo Valley WD	7,278	22,200	2,238	1,030	1,208	0	46%	54%	0%	3.4%	90
Scotts Valley Water District	3,900	11,700	1,537	1,356	0	181	88%	0%	12%	2.3%	117
Central Water District	810	2,700	535	535	0	0	100%	0%	0%	0.8%	177
Lompico County Water District	495	1,287	93	72	21	0	77%	23%	0%	0.1%	65
Smaller Water Systems	3,600	10,800	2,410	2,120	290	0	88%	12%	0%	3.6%	199
Individual Users	8,000	20,000	5,000	4,750	250	0	95%	5%	0%	7.5%	223
Mid- & North-County Agriculture	-	-	2,400	1,800	600	0	75%	25%	0%	3.6%	
Subtotal Santa Cruz IRWM Region	64,070	200,026	28,518	16,357	11,980	181	57%	42%	1%		
Pajaro Agriculture (SC Co only)	-	-	25,254	25,254	0	900	100%	0%	4%	38.1%	
Watsonville City Water Dept.	14,843	65,000	7,760	7,127	633	0	92%	8%	0%	11.7%	107
Subtotal Pajaro Basin (SC County)	14,843	65,000	33,014	32,381	633	900	98%	2%	3%		
Total	78,913	265,026	61,532	48,738	12,613	1,081	79%	20%	2%		

3.16.3 PROJECTED WATER USE

Past projections of urban water demand tended to be high because they were typically based on usage trends prior to 2000, roughly the time when per capita usage started to decline. The first standardized projections of urban water use in California occurred in 2005 with the state mandated Urban Water Management Plan requirements of AB 610 and AB 221. The 2005 UWMPs by SCWD, SVWD, SqCWD, and the City of Watsonville indicated a combined growth in water demand of 14% from 2005 to 2030. For the 2010 UWMPs, the same county water purveyors indicated a demand of 26,733 AFY growing to a projected demand of 29,197, depending upon the water year type, by the year 2030. This represents an increase in usage of 9% over the 20-year analysis period. These projections are currently being re-evaluated as a part of current water planning.

⁵⁰ County Water Resources Status Report, presented to Santa Cruz County Board of Supervisors, January 28, 2014, Health Services Agency

Table 3- 22 Regional Water Demand Projections ⁵¹

Regional Water Demand Projections						
	Normal Year		Single Dry Year		Multiple Dry Years	
	2010	2030	2010	2030	2010	2030
Population	230,933	248,344	230,933	248,344	230,933	248,344
Supply	31,390	30,678	29,149	29,352	27,479	24,985
Demand	28,944	31,269	28,944	31,004	28,944	30,915
Difference	2,446	(591)	205	(1,652)	(1,465)	(5,930)
Per Capita Use (GPD)	112	111	112	111	112	111

Projections of future private and agricultural water use are more difficult. However, it is anticipated that private well water use will be stable as new growth rates in rural areas are low and households will tend to implement water conservation and replace less efficient water using appliances (e.g., dish and clothes washers). Additionally, the County has a water conservation ordinance that requires sellers of properties in the unincorporated areas to replace showerheads and toilets with high efficiency water fixtures. These replacements will contribute to less household water use. Future water use is also expected to decline as part of landscape conservation requirements that have been mandated by the state beginning in 2011. Agricultural use is expected to be relatively stable as there is little new agricultural land conversion, except for scattered small, vineyards, which generally have low water use. The effect of conversion of some crop types to higher water use is offset by increased irrigation efficiency and water conservation measures implemented by growers, as documented by water use trends in the Pajaro Valley where wells are metered.

3.16.4 ENVIRONMENTAL WATER

Adequate streamflow must be left in the streams to maintain aquatic habitat, riparian habitat and wetlands. In most of the Santa Cruz region, endangered coho salmon and threatened steelhead are the primary species of concern. If habitat conditions are maintained for them, other environmental values will be supported. Adequate flows must be maintained at different times of the year to support the various life cycle needs of the salmonids: adult migration in winter, spawning and incubation in winter and spring, juvenile down migration in spring and summer, rearing in summer and fall, and sufficient flow for maintenance of cool temperatures and suitable water quality. During dry periods (June – November) and droughts, natural flows are usually well below optimal flows needed for habitat and any reduction in flow will result in a direct loss of habitat and reduction of fish populations.

Water for the environment is specified in various water rights documents or more recently in studies developed to determine how much existing diversions need to be reduced to support recovery of coho salmon and steelhead trout. The level of specificity and degree of protection varies significantly. Minimum downstream bypass flows have been established for newer water rights on Fall Creek, Newell

⁵¹2010 Urban Water Management Plans (UWMP) City of Santa Cruz, Soquel Creek Water District, Scotts Valley Water District, City of Watsonville; Draft UWMP San Lorenzo Valley Water Dist.; Central Water District personnel communication

Creek and the Felton Diversion on the San Lorenzo River. Maximum diversion rates are specified for the City's Tait Street diversion on the San Lorenzo, but no minimum bypass flows are specified.

The City of Santa Cruz is currently negotiating with the fishery agencies regarding the amount of water that needs to be left in their water supply streams. Specific flow targets have been developed for different seasons and different classes of water year, but these numbers are still being finalized. The San Lorenzo Valley Water District is starting the process to evaluate the impact of their diversion and then to establish minimum bypass requirements.

Surface water rights for Soquel Creek were adjudicated in 1977. Although the adjudication itself does not specify environmental water, the appropriative permits that were issued in 1955 specify maintenance of 15 cfs or the natural flow from December 1 to June 1, and 4 cfs or the natural flow from June 1 to December 1 to maintain fish life. The mean discharge for Soquel in September is 3.1 cfs, but many years it is much lower. There are no records of any instream flow requirements for Aptos or Valencia Creeks. Soquel, Aptos and Valencia are not subject to municipal diversions, but flow is subject to depletion resulting from private diversions and depressed groundwater levels.

3.17 WASTEWATER

Wastewater services within the Santa Cruz IRWM Region are provided by three cities and 12 special districts as shown in Table 3-23. Facilities range from individual or small community septic systems to local wastewater collection systems and regional treatment plants.

Table 3- 23 Wastewater Management Roles ⁵²

Agency	Wastewater Collection	Wastewater Treatment	Recycled Water	Septic System Oversight
Cities				
Santa Cruz	✓	✓	✓	
Scotts Valley	✓	✓	✓	
City of Watsonville	✓	✓	✓	
Special Districts				
Davenport Sanitation District	✓	✓	✓	
Freedom Sanitation District	✓			
Santa Cruz County Sanitation District	✓			
CSA 2 – Place de Mer	✓	✓		
CSA 5 – Sand Dollar Beach and Canon del Sol	✓	✓		
CSA 7 – Boulder Creek Country Club	✓	✓	✓	
CSA 10 – Rolling Woods/Pasatiempo	✓	✓		
CSA 12 – Wastewater Management				✓
CSA 20 – Trestle Beach	✓	✓		
San Lorenzo Valley Water District	✓	✓		
Private Systems				
Mount Hermon Association	✓	✓		
Big Basin Water Company	✓	✓		

⁵² County of Santa Cruz, Water Resources Division.

Various camps, conference centers, small communities	✓	✓		
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3.17.1 CITY OF SANTA CRUZ

The City of Santa Cruz maintains a wastewater collection system that serves approximately 130,000 residents through 15,000 connections and operates the wastewater treatment facility, which serves the city as well as the Santa Cruz County Sanitation District, CSA 10, and UC Santa Cruz. Approximately 50% of the wastewater treated at the plant is generated within the city. On average 8 MGD of effluent is treated to a full secondary level with UV treatment and disposed of with effluent from the City of Scotts Valley through a deep ocean outfall constructed in 1985. . Approximately 150 acre-feet per year (135 gallons per day) of treated water is retained for use at the treatment plant. The City’s Wastewater Treatment Facility was designed to treat 17 MGD in dry weather. The collection system includes 23 lift stations with a total capacity of 10.6 million gallons per day.

3.17.2 CITY OF SCOTTS VALLEY

The City of Scotts Valley provides wastewater services to 3,922 connections including 30 that are outside of the city’s boundary. The city has eight lift stations, all with backup pumps and alarm systems that automatically notify personnel in case of a power outage or high-level conditions. The Scotts Valley Wastewater Treatment Plant has a permitted capacity of 1.5 million gallons per day and treats water to secondary and tertiary levels. Secondarily treated effluent that is not used for recycled water is transmitted via a main to Santa Cruz and discharged to the ocean through the outfall shared with the City of Santa Cruz. Recycled water was first produced in 2002 and used in the city’s landscape medians. Initially, 250,000⁵³ gallons of recycled water was produced, which has been expanded to a current capacity of 150 AFY.⁵⁴ There is presently capacity to produce up to 1 mgd of tertiary water, which is well in excess of current demand.

3.17.3 DAVENPORT COUNTY SANITATION DISTRICT

The Davenport County Sanitation District (DCSD) serves 89 connections in the Davenport community in northern Santa Cruz County. The District provides collection and treatment services as well as recycled water. The district is managed by the County Department of Public Works and governed by the County Board of Supervisors. The DCSD sanitary sewer system facilities include approximately three miles of gravity sewers, 1.3 miles of force main, and three pump stations.

3.17.4 FREEDOM COUNTY SANITATION DISTRICT

The Freedom County Sanitation District (FCSD) provides wastewater collection service for the Buena Vista/Calabasas area of Freedom and the Green Valley Road corridor outside the Watsonville city limits. The district also serves three connections outside its boundaries, including one duplex, one single family

⁵³ LAFCO. “Countywide Service Review – Wastewater Services.” 2005. Pg. 3-18.

⁵⁴ Scotts Valley Water District. “Groundwater Management Program 2011 Annual Report.” 2011. Pg. 9.

dwelling, and the Pinto Lake County park ranger's residence. Wastewater is treated at the Watsonville Wastewater Treatment Plant. The FCSD sanitary sewer system facilities include approximately 15.3 miles of gravity sewers, 1.2 miles of force main, and eight pump stations.

3.17.5 SANTA CRUZ COUNTY SANITATION DISTRICT

The Santa Cruz County Sanitation District (SCCSD) provides wastewater collection service for the City of Capitola and the unincorporated communities of Aptos, Soquel, and Live Oak. The district also serves Harbor High School, a satellite medical center, and the Port District that are within the City of Santa Cruz and outside the district's boundary. SCCSD has treatment capacity rights of 8 million gallons per day at the City of Santa Cruz Wastewater Treatment Plant. The SCCSD sanitary sewer system facilities include approximately 188 miles of gravity sewers, 14 miles of force main, and 35 pump stations. The district is managed by the County Department of Public Works and governed by a three member board that consists of one Capitola City Council member and two members of the County Board of Supervisors.

The DCSD, FCSD and SCCSD proactively clean all gravity sewers that are 12 inches in diameter and smaller every three years, and preventively clean sewers with a history of problems every 1, 3, 6 or 12 months. SCCSD visually inspects the condition of its larger sewers every three years and cleans them as needed. The DCSD, FCSD and SCCSD all use close circuit television to determine the condition of the gravity sewers and to determine the primary cause of blockages and sanitary system overflows. Each district also uses chemical root control throughout their systems on an as-needed basis. Pump stations are inspected weekly, and emergency generators are exercised monthly.

3.17.6 SALSIPUEDES SANITARY DISTRICT

The Salsipuedes Sanitary District provides wastewater collection services for 507 connections within an unincorporated area northeast of Watsonville. Treatment is provided by the Watsonville Wastewater Treatment Plant. The district has two lift stations and seven miles of sewer pipeline. The Salsipuedes district is entirely outside of the Santa Cruz IRWM region.

3.17.7 COUNTY SERVICE AREAS – CSAs 2, 5, 7, 10, 12, 20

There are six County Service Areas (CSAs) within the Santa Cruz Region that provide wastewater services. These districts are managed by the County Department of Public Works and governed by the County Board of Supervisors

CSA 2 serves the Place de Mer subdivision which encompasses 0.02 square miles. The wastewater system is a community septic system.

CSA 5 serves the Sand Dollar Beach and Canon Del Sol subdivisions with a total estimated population of 450. The wastewater system consists of two on-site interconnected package treatment plants that provide secondary treatment.

CSA 7 serves the Boulder Creek Country Club on Highway 236. The service area encompasses 0.3 square miles and has an estimated population of 640. The wastewater system is a full treatment plant offering secondary and tertiary treatment with primary disposal via a community leach field and some recycled water used seasonally on the golf course.

CSA 10 serves the Rolling Woods and Woods Cove subdivisions and the Graham Hill corridor and encompasses about 1 square mile with a population of 500. Wastewater generated in CSA 10 is treated at the City of Santa Cruz Wastewater Treatment Plant.

CSA 20 serves the Trestle Beach subdivision near La Selva Beach which encompasses 0.02 square miles and has a population of 50. The wastewater system provides on-site treatment to a secondary level.

CSA 12 provides funding for septic system management and oversight in the unincorporated areas of the county not served by sewer systems. The CSA funds capacity at the Watsonville and Santa Cruz Wastewater Treatment Plants for disposal of septic tank sludge, operation and maintenance of the Santa Cruz Septage Disposal Facility, annual inspections and monitoring of nonstandard systems, and computerized tracking of septic system performance. A separate zone, Zone A, was established to provide financing for the implementation of the San Lorenzo Wastewater Management Plan. Implementation is required by the Regional Water Quality Control Board as a condition for allowing the continued use of septic systems in the watershed. Enhanced services in Zone A include regular inspections of septic systems, promotion of septic system upgrades and maintenance, property owner education, water quality monitoring, and development of alternative wastewater disposal methods where conventional septic systems are not suitable.

3.17.8 SAN LORENZO VALLEY WATER DISTRICT

The San Lorenzo Valley Water District provides wastewater collection and treatment services for 54 connections in portions of the Bear Creek Estates residential subdivision. The District's wastewater system has two lift stations and a treatment capacity of 16,500 gallons per day.

3.17.9 PRIVATE SEWER SYSTEMS

Big Basin Water Company provides sewer service to a small community of some 30 homes off of Highway 236. Mount Hermon Association provides sewer collection and treatment to its conference facilities as well as homes within the Mount Hermon community. A number of other private sewer collection, treatment, and onsite disposal systems are operated in the region by large camps or small communities.

3.18 FLOOD CONTROL AND DRAINAGE AGENCIES

Flood protection and stormwater drainage is provided by the county and four cities as well as two dependent special districts (see table below). The Santa Cruz County Flood Control and Water Conservation District was formed by a special act of the State Legislature and is the designated flood protection agency for the county. Six zones of benefit have been established to provide additional funding for flood protection. In addition to these agencies, CSA 57 provides drainage services for the Woods Cove Subdivision on Graham Hill Road. The agencies providing flood protection and drainage services within Santa Cruz County are as follows:

Table 3- 24 Flood Control Agencies ⁵⁵

⁵⁵ County of Santa Cruz, Water Resources Division.

Jurisdiction	Flood Protection	Stormwater Collection
Cities		
City of Capitola		✓
City of Santa Cruz	✓	✓
City of Scotts Valley		✓
City of Watsonville	✓	✓
Special Districts		
Santa Cruz County Flood Control and Water Conservation District (including Zones 7, 7A)	✓	✓
Pajaro Storm Drain Maintenance District	✓	✓
Santa Cruz County Flood Control and Water Conservation District Zones 5, 6, 8		✓
CSA 57 – Graham Hill Road/Woods Cove		✓

3.18.1 SANTA CRUZ COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

The Santa Cruz County Flood Control and Water Conservation District, operated through the County Public Works Department, performs a broad range of services related to the monitoring of water conditions and control of surface waters. There are three distinct geographic zones within the Santa Cruz IRWM Region that deal with specific drainage and stormwater management. The County Board of Supervisors serves as the Board of Directors for the general Flood Control District. The Supervisors also serve on the boards of zone 5 and Zone 7, with addition of other local agency representatives for Zone 7 (Watsonville and Pajaro Valley Water Management Agency) and Zone 5 (City of Capitola and Soquel Creek Water District).

Table 3- 25 Zones of the County Flood Control and Water Conservation District

Zone	Area	Square Miles
5	Live Oak, Capitola and Soquel	8.75
6	Aptos	4.74
8	San Lorenzo Valley	76.44

3.18.2 ZONES 5, 6, AND 8

The facilities within Zones 5, 6, and 8 include underground storm drain systems and above ground ditches and watercourses. The Storm Water Management section of Public Works provides engineering services and coordination for the Santa Cruz County Flood Control and Water Conservation Districts Zones 5, 6, and 8. Funding comes from one-time development impact fees. Zone 5 also has some ongoing property tax increment. Services include:

- Development and building permit reviews for all developments within the unincorporated area of Santa Cruz County.
- Design of storm drain flood control projects within the flood control zones.
- Advising the public on drainage issues and resolving drainage complaints when possible.
- Coordination of the County's National Pollutant Discharge Elimination System (NPDES) Phase II

3.18.3 ZONES 7 AND 7A, PAJARO STORM DRAIN MAINTENANCE DISTRICT

Zone 7 provides funding for the operations and maintenance of the federal flood control project on the Pajaro River and Salsipuedes Creek, as well as related long-term debt service. This reach of the Pajaro River experienced catastrophic flooding in 1995 and 1998. Flood issues on the Pajaro River are addressed through the Pajaro IRWM Region.

Zone 7A was established in December 2004 to augment existing funding for flood control improvements in the Pajaro River Watershed area in Santa Cruz County, excluding the City of Watsonville. The district provides administrative and engineering services for the replacement, upgrading, and maintenance of drainage and flood control facilities in the district. The boundary of Zone 7A is coterminous with the Pajaro Storm Drain Maintenance District., and includes the Watsonville Slough system. The district notes that one of the challenges it faces over the next few years is implementing the Phase II NPDES permit to protect water quality.

3.18.4 CSA 57 – GRAHAM HILL

CSA 57 – Graham Hill is a dependent special district formed to provide enhanced stormwater drainage services to the Woods Cove subdivision. The CSA encompasses approximately one-tenth of a square mile. The county maintains the CSA's underground storm drain systems and above ground drainage ditches and watercourses as well as the storm drain line between the subdivision and the San Lorenzo River where the outfall is located. The CSA was formed in 2001 and the infrastructure is new. There have been no reported flooding incidents and no infrastructure deficiencies noted.

3.18.5 CITY OF SANTA CRUZ

The City of Santa Cruz maintains seven miles of underground stormwater pipelines, eight miles of surface storm ditches, one pump station, approximately 1,500 catch basins, and 125 outfalls. The city also maintains the US Army Corps of Engineers levee system on the San Lorenzo River, which is approximately three miles long with five pump stations. The city's operations and maintenance program for the flood control facilities on the San Lorenzo River includes removal of sand and silt from the channels of the river and Branciforte Creek; maintenance of pumps, gates and levees; and removal of weeds and growth in drainage ditches and catch basins. As a best management practice the city has routine street sweeping and regularly cleans the storm drain pipeline system, among other activities.

3.18.6 CITY OF CAPITOLA

The City of Capitola maintains its street drainage systems and relies on the county to provide major storm drain services through the Santa Cruz County Flood Control and Water Conservation District Zone 5. In the past, Capitola has experienced minor intersection flooding which was corrected through maintenance. The city constructed the Lawn Way pump station in the past few years to alleviate village flooding. Capitola has implemented several best management practices related to its drainage infrastructure, including outfall inspection and cleaning, annual storm drain cleaning in the fall, dry weather diversions from stormdrains to the sanitary sewer in the Esplanade area, and zero discharge

sidewalk cleaning.

3.18.7 CITY OF SCOTTS VALLEY

The City of Scotts Valley provides drainage and stormwater management within the city's boundary. Stormwater is discharged into Carbonera Creek, its two tributaries, and a tributary of Bean Creek.

3.19 WATER QUALITY

The Region's water quality is impacted by runoff from urban, rural, and agricultural areas. Known as nonpoint source pollution, runoff picks up pollutants from across the landscape and delivers them to creeks and streams and ultimately to the ocean. Primary pollutants of concern include sediment, nutrients, and pathogens. Herbicides, pesticides, and metals are also sometimes detected at low levels in streams draining developed watersheds and regular but scattered occurrences of pesticides have been found in south Region's streams and sloughs. These pollutants have a variety of impacts, including damaged riparian systems, toxicity to aquatic organisms, increased treatment costs for potable water supply, flooding, fisheries decline, and public health impacts from recreating in contaminated waters.

Pollutant sources are as varied as the different land uses occurring in the county. Sediment sources include road networks, land development, illegal grading, timber harvest activities, agriculture and landscapes scarred by wildfires. Bacteria and nitrate originate from septic and sewer systems, storm drains, homeless encampments, livestock, and agricultural operations. Hydromodification, or the alteration of natural runoff timing and volume, has occurred throughout much of the developed areas of the Region. The effects of hydromodification include increased runoff, erosion, sedimentation, and pollutant loads in receiving waters. Toxicity can be caused by a variety of contaminants including improperly disposed automotive fluids or other discarded materials that break down to toxic substances.

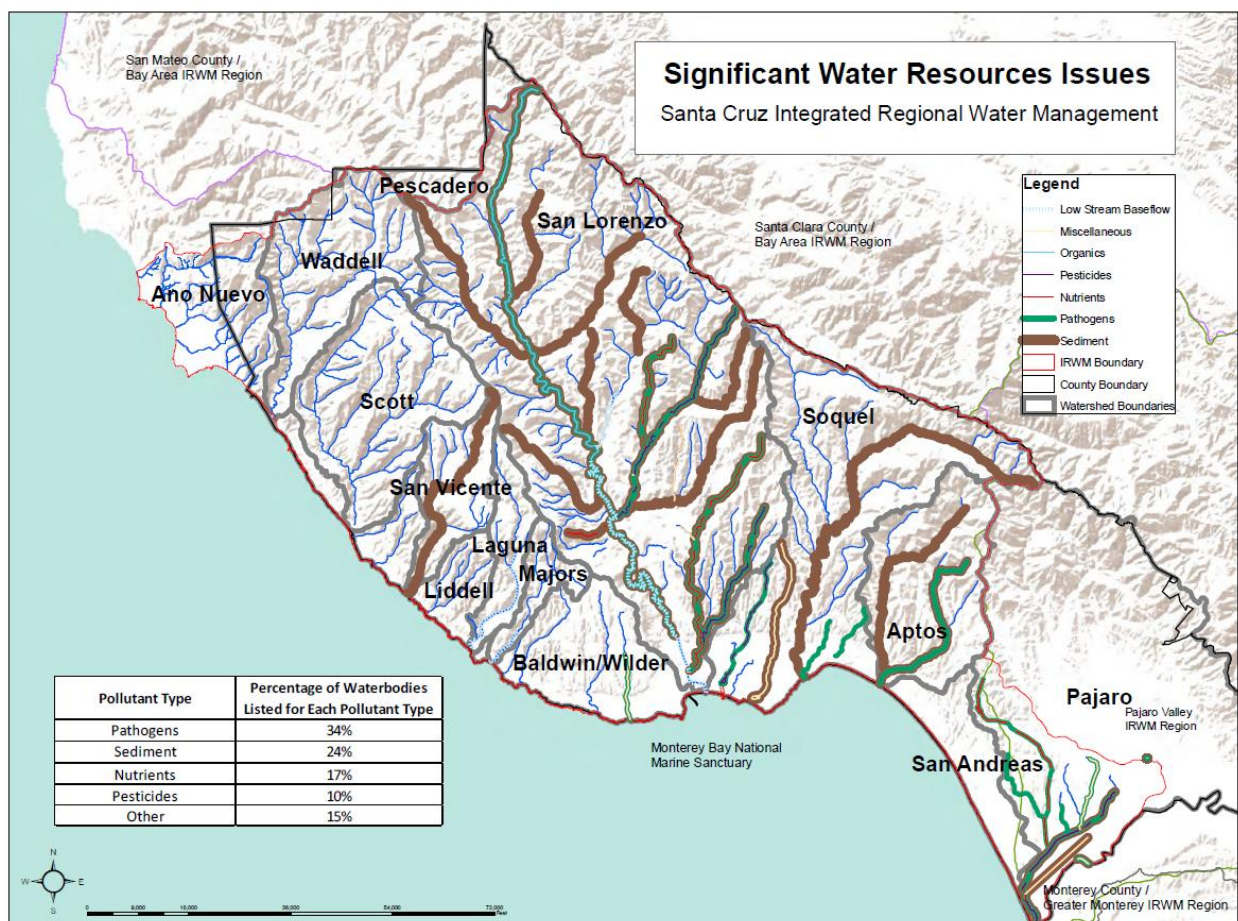
3.19.1 IMPAIRED WATERBODIES

Section 303(d) of the 1972 Federal Clean Water Act requires states to identify waterbodies that do not meet water quality objectives and are not supporting beneficial uses, such as swimming, aquatic habitat, or municipal water supply. Each state must submit an updated list, called the 303(d) list, to the U.S. EPA every two years. In addition to identifying the waterbodies that are not supporting beneficial uses, the list also identifies the pollutant or stressor causing impairment, and establishes a priority for developing a control plan (TMDL) to address the impairment. The list also identifies waterbodies where 1) a TMDL has been approved by U.S. EPA and implementation is available, but water quality standards are not yet met, and 2) waterbodies where the water quality problem is being addressed by an action other than a TMDL and water quality standards are not yet met. The most recent 303(d) list for the State of California was adopted by the U.S. EPA in late 2011. There are over 100 303(d) listings for waterbodies within the Santa Cruz IRWM boundary, as summarized below. Refer to Table 3-12 for the 303(d) listing containing waterbody, pollutant, and potential sources for waterbodies in the Santa Cruz IRWM Region.

Table 3- 26 Santa Cruz Region 303(d) Listings by Pollutant Category⁵⁶

Pollutant Category	Count
Pathogens	36
Sediment	26
Nutrients	18
Pesticides	18
Other	16

Figure 3- 13 Significant Water Resources Issues⁵⁷



The EPA identifies sources that contribute to each 303(d) listing, and for most of the listings there are multiple sources. The two sources contributing to the highest number of listings each are agriculture and urban runoff (Table 3-27).

Table 3- 27 Sources of Impairment of Waterbodies in the Santa Cruz IRWM Region⁵⁸

⁵⁶ 2010 303(d) list dated revised 11/30/2011 provided by the Central Coast Regional Water Quality Control Board.

⁵⁷ 2NDNATURE, LLC. Santa Cruz IRWM Conceptual Framework. Final Draft March 2013.

Source Category	# of Listings
Urban Runoff	39
Agriculture	71
Construction / Land Development	26
Habitat Modification	23
Source Unknown	35
Natural Sources	29
Waste Storage and Disposal (Septic Systems)	21
Miscellaneous (Homeless Camps)	11
Other	63
Total	318

3.19.2 CENTRAL COAST BASIN PLAN OBJECTIVES

The objective of the Central Coastal Basin Plan is to show how the quality of the surface and ground waters in the Central Coast Region should be managed to provide the highest water quality reasonably possible. The Basin Plan lists various water uses (Beneficial Uses), describes the water quality which must be maintained to allow those uses (Water Quality Objectives), and finally, describes the programs, projects, and other actions necessary to achieve the standards established in the plan. The Central Coast Regional Water Quality Control Board (RWQCB) has established the following planning goals for water quality in the Central Coast Region:

1. Protect and enhance all basin waters, surface and underground, fresh and saline, for present and anticipated beneficial uses, including aquatic environmental values.
2. The quality of all surface waters shall allow unrestricted recreational use.
3. Manage municipal and industrial wastewater disposal as part of an integrated system of fresh water supplies to achieve maximum benefit of fresh water resources for present and future beneficial uses and to achieve harmony with the natural environment.
4. Achieve maximum effective use of fresh waters through reclamation and recycling.
5. Continually improve waste treatment systems and processes to assure consistent high quality effluent based on best economically achievable technology.
6. Reduce and prevent accelerated (man-caused) erosion to the level necessary to restore and protect beneficial uses of receiving waters now significantly impaired or threatened with impairment by sediment.

The Basin Plan objectives are reflected in the goals, objectives, and strategies outlined in this Santa Cruz IRWM Plan (see Chapter 4, Goals and Objectives).

3.19.3 WATERSHED MANAGEMENT INITIATIVE GOALS

Each of the nine RWQCBs in the state is responsible for developing a Watershed Management Initiative (WMI) Chapter as part of the State's five-year Strategic Plan for water resource protection. Together the nine Chapters constitute the State's Watershed Management Initiative Integrated Plan. The aim of the WMI is to plan and prioritize activities within and amongst watersheds; integrate various surface and

⁵⁸ 2010 303(d) list dated revised 11/30/2011 provided by the Central Coast Regional Water Quality Control Board.

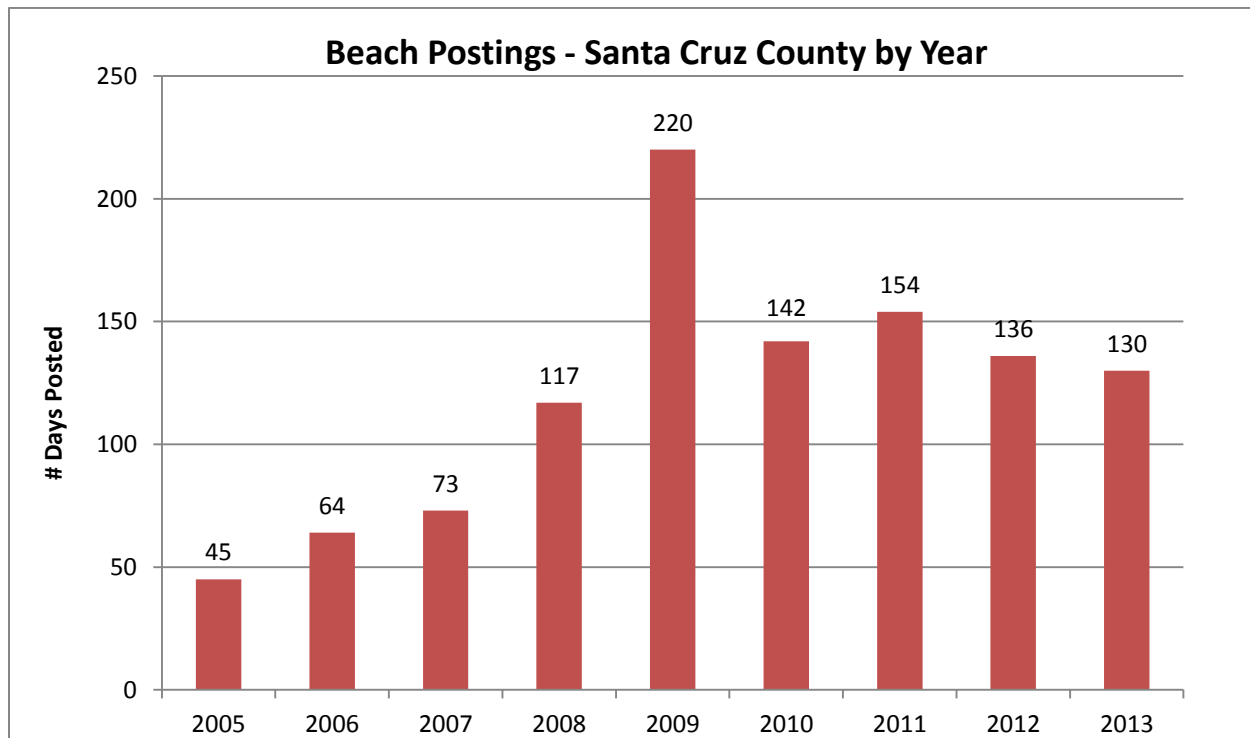
groundwater regulatory programs; promote local, collaborative efforts; and focus limited resources on priorities.

In the Central Coast WMI, the RWQCB outlines water quality priorities for the region, identifies priority watersheds and water quality issues, and describes watershed management strategies. The San Lorenzo Watershed is listed as one of the three highest priority targeted watersheds in the WMI. Targeted activities in the San Lorenzo Watershed include sediment TMDL implementation (sediment reduction from private and public roads, timber harvest activities, and urban runoff), and riparian and wetland protection and restoration. These WMI goals are reflected in the objectives of this IRWM Plan.

3.19.4 BEACH WATER QUALITY

There is a direct connection between water quality in the county's lakes, rivers, and streams and the health of Monterey Bay. Polluted urban and agricultural runoff degrades Monterey Bay water quality during winter storm events, and can impact the nearshore environment and marine habitats. Periodic upwelling and extensive year-round mixing with the open ocean result in well-buffered, highly productive, and well-oxygenated coastal waters, and water quality is generally considered to be good. However, the nearshore waters are more problematic, specifically with regard to beach and lagoon water quality. Urban runoff in developed areas has degraded water quality at moderate levels in coastal lagoons and at ocean beaches, and unusual algal blooms have recently occurred, particularly troublesome in inland lakes. All urban coastal lagoons in the Region are posted as unsafe for swimming year round due to high bacteria levels, and local beaches are periodically posted in response to elevated bacteria. The deaths of at least 21 southern sea otters were linked to microcystin, a toxin also known as blue-green algae, which thrives in warm, stagnant, nutrient-rich water. High concentrations of microcystin were found in the Salinas, Pajaro, and San Lorenzo rivers, Pinto Lake, and in ocean water at the Santa Cruz wharf.⁵⁹ Beach water quality samples continue to show elevated levels of indicator bacteria resulting in beach postings warning visitors of potentially harmful water quality.

⁵⁹ NOAA Monterey Bay National Marine Sanctuary, 2010. Sanctuary Integrated Monitoring Network 2010.

Figure 3- 14 Santa Cruz County Beach Postings, 2005 – 2013 ⁶⁰

3.20 WATER RELATED ISSUES AND CHALLENGES

The goals and objectives for the Santa Cruz IRWM Region were developed through a conceptual framework process that began with an evaluation and assessment of water resource issues and challenges in the Region (see Chapter 4, Goals and Objectives, and Chapter 5, Resource Management Strategies). The following summarizes some of the specific water resources issues and challenges in the Santa Cruz Region that have informed both the development of the Plan's objectives as well as aspects of the IRWM planning process more generally.

Water Supply

Water supply is not sustainable within the Santa Cruz IRWM region in normal years, a situation that is exacerbated when below average water years occur. Surface water supply is highly dependent upon local precipitation, timing, and available storage capacity. A greater volume of water is extracted annually from regional groundwater aquifers than is naturally recharged. Overdraft can cause many serious problems including seawater intrusion, ground subsidence, permanent loss of groundwater storage capacity, reduced stream flow, loss of riparian habitat, and other serious impairments. In Scotts Valley, which overlies the Santa Margarita Groundwater Basin, extensive development over recharge areas has reduced groundwater recharge by as much as 50%. Water supply issues are expected to be greatly exacerbated by climate change impacts in the Region. The achievement of a reliable and sustainable local water supply requires both increased supply and reduced demand. Increased flexibility

⁶⁰ Beach Posting Data compiled by Water Resources Section, Environmental Health Services Division, Health Services Agency, County of Santa Cruz, 2014.

in regional water management, alternative/supplemental supply, and increased groundwater recharge are necessary to improve regional water supply reliability and improve resource conditions.

Water Quality

Water quality impairments caused by elevated bacteria and sediment levels are among the most pressing water quality concerns in the Santa Cruz Region. Elevated bacteria levels in surface waters can limit recreational activities and create human health threats. The supply of sand-sized sediment to streams significantly degrades the aquatic habitat quality, resulting in a myriad of negative ecosystem impacts that particularly affect the spawning and rearing habitat of sensitive salmonid species. There are over 100 waterbodies within the Santa Cruz IRWM boundary listed as impaired on the state's 303(d) list. Water quality impairments are primarily due to agricultural and urban runoff, and include: nitrates and other nutrients from agriculture, livestock management, septic system failures, and urban sources; sediment due to land use practices (e.g., construction, agricultural practices, and poorly constructed/maintained roads); pesticides; metals (e.g., mercury, arsenic, chromium, copper, zinc); bacteria; salts; trash; and unknown impairments in surface waters and the ocean from emerging pollutants (such as pharmaceuticals and personal hygiene products).

Seawater intrusion in local aquifers is occurring in the mid-county and Watsonville Sloughs Watersheds, jeopardizing that source of supply. Much of the Region's groundwater has naturally high concentrations of chromium VI, and newly proposed regulations by the State of California may require huge investments in treatment to meet the new standard. Septic systems, livestock, and agricultural operations in unincorporated areas of the Region have the potential to contribute nitrate to groundwater. Current impacts are generally low. Leakage and spills from gas stations, dry cleaners, and other hazardous materials sites have caused localized groundwater contamination and pose additional threats to water supplies. This is the greatest threat in the Scotts Valley area in the San Lorenzo Watershed.

Impairment to drinking water quality, particularly in small communities in North and South County (including both private and municipal wells) is of special concern. Many small water system managers face significant challenges in complying with water quality regulations. There is a recognized need for increased public education about water quality issues.

Watershed Resources

Riparian encroachment and hydrologic modifications of wetlands, streams, estuaries, and lagoons impact the preservation and quality of habitat by affecting circulation (water quality), habitat structure (geomorphology), and the exchange of energy and nutrients. There is a general need for increased watershed management and flood management in the Region, and a need to better educate rural landowners about land management/development practices that affect water resources. Watershed resource issues of particular concern include:

- Need to protect and restore functioning watersheds and upland riparian habitat
- Food safety issues impacting wildlife and habitat protection
- Habitat protection, including problems caused by erosion and invasive species
- Steelhead protection, specifically related to sustaining flows and fish passage
- Protection of other special status species

Climate Change

The effects of climate change are expected to have significant impacts on environmental and water resources in the Santa Cruz Region. Local watersheds and water systems will be increasingly vulnerable to the effects of drought, extreme temperatures, and rainfall pattern changes. The issues and challenges related to climate change impacts are described in detail in Chapter 16, Climate Change.

Regulatory and Intergovernmental Issues

State or federal regulatory agencies may work at cross-purposes related to local water supply planning efforts. Regulatory and permitting agency decisions are on project-by-project basis not on a more watershed basis. There may be conflicting agency priorities between permitting or implementation of new cutting-edge technology, and inconsistent or conflicting mandates and regulations. Current regulations may be infeasible to implement from a cost and technology perspective, and implementation requirements may not yield desired benefits. Issues that arise may present difficulties associated with project approvals that are necessary for the Region's water managers to move forward with water management efforts.

Inter-agency Coordination

There are numerous entities involved in water management, including federal, state, and local agencies, non-governmental organizations, and other stakeholders in the community. Also, a significant number of individual well owners and small drinking water systems have an impact on the overall water supply picture for the Region. While Santa Cruz has a long history of collaboration, conflicts between jurisdictional and interested parties as well as beneficial uses are unavoidable, and demonstrate a need for integrated planning. There is also an ongoing need for water suppliers and land use jurisdictions to coordinate to ensure protection of water quality, water supplies, and other water-related issues.

Funding

Given the limited amount of funding available through DWR's IRWM Program and ongoing funding limitations for public water management agencies, there is a need to prioritize water management needs and find affordable solutions to address water-related issues.

The issues and challenges described above were considered by the IRWM Steering Committee and stakeholder working group in developing the goals and objectives for the IRWM Plan during the 2014 Plan update process. These issues and challenges are also what continue to drive the IRWM planning process. The Santa Cruz IRWM planning effort is designed to help water resource managers address the Region's water issues in a comprehensive and holistic way. By bringing together all of the Region's water resource decision makers and stakeholders in a collaborative and organized decision making process, it is the intention that this IRWM Plan will result in greater integration of water management activities, and greater efficiency and coordination of agency and organizational efforts.

CHAPTER 4: GOALS AND OBJECTIVES

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4.1 INTRODUCTION

This chapter identifies the goals and objectives for the Santa Cruz Integrated Regional Water Management Plan (Plan). The goals and objectives provide a basis for establishing priorities, identifying strategies, and informing decision making to guide IRWM efforts. The goals and objectives represent what is hoped to be accomplished through the Plan implementation and reflect what the RWMG and stakeholders perceive to be some of the Region's most significant water resources issues that have identifiable solutions. This chapter describes the goals and objectives for the 2014 Plan that were developed through an iterative and consensus-based process led by a working group that included RWMG representatives and stakeholders with the intent to develop a shared vision of regional goals and objectives. The process included review by the IRWM Steering Committee and RWMG members and provided opportunity for stakeholder involvement.

The RWMG built upon the initial 2005 IRWM Plan through a planning process that links high-priority strategy implementation to projects that could achieve practical attainment of objectives. In 2012, as part of the Plan Update, the vision, goals, and objectives were revised through a year-long planning process to ensure objective-based decision making and strategy prioritization for the IRWM Plan. This collaborative process was led by a working group of representatives from the RWMG and stakeholders. The draft objectives were presented to the RWMG in 2012 as well as to stakeholders at a public workshop on August 16, 2012, which provided an opportunity for input.

The Santa Cruz IRWM Plan goals are intended to be a general summary of the shared vision that regional strategies are collectively working to achieve. The objectives reflect regional priorities and support the selection of resource management strategies appropriate for use in the region, guide project development, and inform the assessment and evaluation of project benefits. The objectives are also used in the evaluation and scoring of projects in the IRWM Plan; projects that address a greater number of objectives may receive a higher total score. The RWMG recognized that not all of the Region's issues can be immediately addressed, but rather the intent was to focus on the most pressing concerns, improve the region as a whole, with effective solutions, in the most efficient manner, and with an evaluation process that will inform the extent to which objectives are being met.

The process through which the Santa Cruz IRWM objectives were developed is discussed in the following sections. That discussion is followed by the current Santa Cruz IRWM vision, goals, and objectives. Finally, the consistency of those objectives with state and federal planning efforts is discussed.

4.2 DEVELOPMENT PROCESS FOR THE SANTA CRUZ IRWM VISION GOALS AND OBJECTIVES

The vision, goals, and objectives for the Santa Cruz IRWM Plan form the foundation for the Plan's implementation. The goals and objectives were initially developed for the 2005 Northern Santa Cruz IRWM Plan, and were derived from numerous water resource and watershed planning documents. Since that time, the Steering Committee drafted an overarching vision for the Santa Cruz IRWM Plan and refined the goals and objectives as part of the 2009 Regional Acceptance Process. More recently, the vision, goals, and objectives were revised through a process to ensure objective-based decision making and strategy prioritization for the IRWM Plan. The following sections describe the relationship between

the vision, goals, and objectives, the processes by which they were developed, and how they have been and will continue to be used to guide implementation.

The goals and objectives originally developed for the 2005 Northern Santa Cruz IRWM Plan were based on local water resource issues and opportunities and adhered to the following key attributes:

- Ability to discriminate among strategies: An objective must be able to discriminate among different strategies. If all strategies perform similarly against a particular objective, the objective is not well-defined. Planners should be able to determine, for each individual strategy, the extent to which implementation will achieve the desired objective.
- Understandable and meaningful to decision makers: The objectives must extract the information most important to decision makers and be expressed in ways that will be meaningful to them.
- Reasonable number: The number of objectives must be sufficient to cover the issues that are truly important, and no more than that. Overlap among the objectives (i.e., having two objectives that basically measure the same thing) must be avoided. While there is no right number of objectives, it is important to recognize that more objectives introduce more complexity into the analysis and decision making.
- Reflect community concerns: The objectives must attempt to accurately reflect the issues that are important to citizens and policymakers across all stakeholder groups. This will ensure that the plan recommendations will do a good job at supporting those concerns.
- Ends oriented: The objectives must refer to real-world ends, rather than means to achieving those ends. While there are undoubtedly grey areas, the distinction is nevertheless an important one.
- Precise language: The words used to describe each objective are important. Precision is important to avoid ambiguity and later misunderstandings.

4.2.1 2005 PLAN GOALS AND OBJECTIVES

The RWMG began working on the first Santa Cruz IRWM Plan in 2003 in response to Proposition 50 and the establishment of the Integrated Regional Water Management planning program. The RWMG agreed early on that it was critical to carefully develop a set of goals and objectives that reflect regional priorities and that could be used to prioritize and assess the efficacy of potential projects. Accordingly, the group appointed a three-member Steering Committee that developed a set of objectives, which were then adopted by the larger RWMG. The objectives were used to classify potential projects as either high priority projects or potential future projects.

The precise wording of the objectives and implementation criteria were thoroughly discussed to ensure that each objective reflected regional priorities to the best of their ability. The main objectives were accompanied by a list of sub-objectives drawn from existing planning documents, which were intended to provide support for future expansion of the Santa Cruz IRWM Plan. The 2005 planning objectives were:

Water Supply Reliability - Minimize the impact of droughts, production facility failures, or groundwater overdrafts on regional water supplies. Reduce the likelihood of domestic water shortages and any future need to import water from outside the county.

Raw Water Quality - Maximize the quality of surface and groundwater in the county by addressing sources or conduits of contamination.

Delivered Water Quality - Maximize the quality of delivered drinking water as well as reclaimed water for irrigation.

Habitat Restoration and Maintenance - Aquatic: Restore and maintain habitats to support local aquatic species. Terrestrial: Restore and maintain habitats to support terrestrial species of local flora and fauna. Ocean: Restore and maintain habitats to support Monterey Bay marine life.

Recreation - Maximize the recreational value of county water resources.

Public Health - Minimize adverse water-related public health impacts in the county.

Flood Management - Minimize the adverse impacts of future flood events.

Regional Economy - Add maximum value to the regional economy.

Regional Collaboration - Continue and expand collaboration among public and private agencies to address county water-related challenges.

Readiness to Proceed - Be prepared to proceed with approved projects in a timely manner.

Availability of Funding - Ensure that sufficient local and regional funding is available to move forward with projects.

4.2.2 REGIONAL ACCEPTANCE PROCESS

The IRWM Plan's objectives and sub-objectives were revised as part of the 2009 Regional Acceptance Process and in response to the 2010 IRWM Program Guidelines. At that time, a vision statement was developed as a broad statement of the Plan's purpose and intent. The planning objectives were grouped into four functional areas - water supply, water quality, watershed and resource stewardship, and flood protection and stormwater management, with each having equal priority. Below are the 2009 Regional Vision, Regional Goals, and Objectives organized by management Functional Area (Functional Area).

Santa Cruz IRWM Plan 2009 Regional Vision - Promote comprehensive and integrated water resource use and management to support and enhance: public health and safety; ecosystem health; recreational opportunities; economic vitality; cultural heritage; and quality of life.

Santa Cruz IRWM Plan 2009 Regional Goals:

- Develop and maintain an adequate, reliable, secure, and sustainable water supply that provides regional water self-sufficiency and maintains ecosystem values.
- Protect and improve surface and groundwater quality.
- Practice resource stewardship to protect, enhance, and maintain watersheds, environmental resources, and biodiversity.

- Promote flood and stormwater management to protect public health and safety, property, water quality, and hydrologic function.
- Identify and implement integrated water management strategies adaptable to a changing climate. Promote water and water-related energy conservation and efficiency strategies.
- Promote coordinated and collaborative planning and management of water and water-related resources. Provide a framework for identifying and implementing equitable policies and projects to achieve the region's near-term priorities and long-term sustainability.

Santa Cruz IRWM Plan 2009 Objectives by Management Functional Area:

Water Supply

- Reduce per capita water demand and increase agricultural efficiency
- Provide reliable supply to meet current and expected demand after reasonable conservation and curtailment
- Increase operational flexibility and inter-district transfers and diversify water supply portfolios
- Increase groundwater recharge and protect groundwater recharge areas

Water Quality

- Reduce pollutant loads to surface waters, groundwater basins and the ocean
- Protect and maintain unimpaired and high quality waters
- Reduce the volume and increase the quality of urban and agricultural runoff
- Strengthen regional monitoring and analysis programs, and evaluate management effectiveness

Watershed and Resources Stewardship

- Implement projects that protect, enhance and/or restore ecological functions of rivers, wetlands, and coastal lagoons
- Protect and enhance habitats for sensitive species
- Minimize erosion and sedimentation
- Improve opportunities for open space, trails, and parks consistent with environmental protection, public use, and property rights

Flood and Stormwater Management

- Implement flood management efforts that balance protection from flood damage with protection of environmental values
- Implement land management strategies that reduce runoff volume or delay peak flows
- Minimize damage to infrastructure and property from flooding
- Protect, restore, and enhance hydrological function of wetlands, streams, and their floodplains

4.2.3 SANTA CRUZ IRWM CONCEPTUAL FRAMEWORK

Funds from an IRWM Planning Grant supported the development of a conceptual framework for the Santa Cruz IRWM Plan. The purpose of this planning effort was to build off of prior work on the goals and objectives in a way that directly linked strategy implementation with achievement of objectives and the indicators by which progress towards achievement could be measured. The final outcome of the conceptual framework process was a new set of goals and objectives for the Santa Cruz IRWM Plan

2014, developed and vetted by the RWMG through their participation and input in the process. That process, along with the final goals and objectives, is described below.

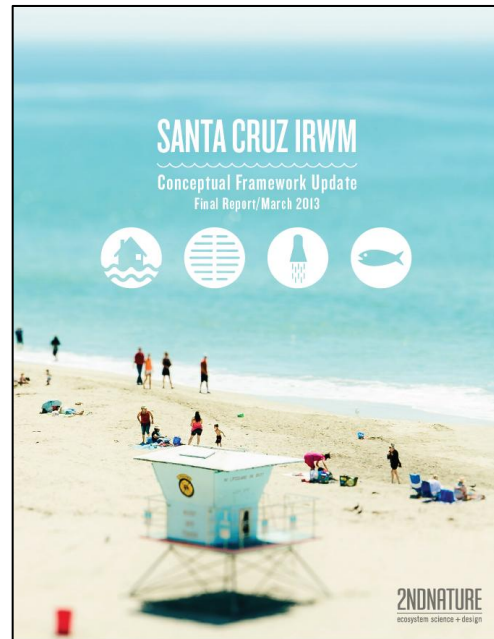
The conceptual framework consists of conceptual models that were developed for each of the four functional areas. The models were created in close collaboration with a diverse and representative group of regional stakeholders (Table 1). Most Working Group members served on at least one functional area team and reviewed and contributed to draft conceptual diagrams that included functional goal statements, diagrams, linkage tables, and draft objectives.

Table 4-1 IRWM Conceptual Framework Work Group

Working Group Member	Affiliation	Functional Area Team
Nicole Beck	2ND NATURE, LLC. (Consultant Lead)	All
Gary Conley	2ND NATURE, LLC.	All
Jeremy Sokulsky	Environmental Incentives (Consultant Lead)	All
Chris Coburn	County of Santa Cruz	All
John Ricker	County of Santa Cruz	All
Tim Carson	Regional Water Management Foundation	All
R. Duncan / T. Dufour	Soquel Creek Water District	Water Supply
Charles McNiesh	Scotts Valley Water District	Water Supply
Mike Ferry	City of Santa Cruz	Water Quality
Chris Berry	City of Santa Cruz	Water Quality
Kristen Kittleson	County of Santa Cruz	Aquatic Ecosystems
Nik Strong-Cvetich	Resource Conservation District of Santa Cruz County	Aquatic Ecosystem
Mike Cloud	County of Santa Cruz	Flood/Stormwater Management
Robert Ketley	City of Watsonville	Flood/Stormwater Management
Mike Sapanour	County of Santa Cruz	Flood/Stormwater Management
Siobhan O'Neil	City of Santa Cruz	Flood/Stormwater Management
Armand Ruby	Coastal Watershed Council	Partial participation
Bridget Hoover	Monterey Bay National Marine Sanctuary	Partial participation

The Working Group meetings included 1) a review of the 2005 and 2009 IRWM Plan and objectives to be updated, 2) an introduction to the format and development process used for the conceptual models, 3) a review and discussion of the draft conceptual models and objectives developed by each development team, and 4) a review and discussion of the draft final version of this document and selection of specific objectives that will be used to track IRWM progress in the short term. The final version of the conceptual framework includes incorporation of Working Group comments and suggestions. The quality of the content greatly benefited from the participation and commitment of the Working Group members.

The reason the RWMG chose to develop the conceptual models is because they were perceived to be effective at focusing management actions where they are most likely to have the greatest beneficial impacts on natural resources of concern. Each model contains a goal, which is supported by quantifiable objectives and condition targets that are used to track progress of the IRWM implementation. Each model represents a working hypothesis of cause and effect between the most important components of the system and management strategies. Included in these hypotheses is the concept that effective implementation of high priority strategies will result in an improvement of natural resource conditions that can be measured by changes in specific indicators over time.



4.2.4 CLIMATE CHANGE

Development of the conceptual models also considered the effects of climate change on the region, including the effects of sea level rise. Climate change model predictions specific to California and the Santa Cruz region have been reviewed and incorporated into the IRWM conceptual framework in a format that is intended to be accessible and useful for regional decision makers.

The strategies identified through the conceptual framework to achieve the goals and objectives of this IRWM Plan, described below, encourage and promote projects that implement climate change mitigation and adaptation measures, including water use efficiency, energy efficiency, water recycling, and reuse of urban runoff. The project prioritization process gives preference to projects that can demonstrate climate change mitigation or adaptation measures, and/or reduced GHG emissions compared with project alternatives.

4.3 SANTA CRUZ IRWM PLAN VISION

The vision statement is intended to be a motivating and purpose-driven policy statement that guides the Santa Cruz IRWM Plan. In contrast to objectives, the vision statement is not intended to be quantifiable, but rather a general statement about the purpose and intent of the IRWM Plan.

Santa Cruz IRWM Vision:

Promote comprehensive and integrated water resource use and management to support and enhance: public health and safety; ecosystem health; recreational opportunities; economic vitality; cultural heritage; and quality of life.

4.4 SANTA CRUZ IRWM PLAN GOALS

The Santa Cruz IRWM Plan goals are intended to be a general summary of the desired state of the functional area that regional strategies are collectively working to achieve. The following are the goals for the Santa Cruz IRWM Plan:

- Provide a safe, reliable, and affordable water supply to meet current and expected regional demand without causing undesirable environmental impacts.
- Maintain and improve regional surface and groundwater quality to protect beneficial uses.
- Improve the condition of riparian and aquatic ecosystems to support the native species, watershed functions, and regional water needs.
- Reduce flood hazards and manage stormwater runoff through economical policies and projects that enhance natural hydrologic function and protect communities.

4.5 SANTA CRUZ IRWM PLAN OBJECTIVES

Objectives are specific statements detailing the desired outcomes of regional strategies for each functional area. These objective statements are supported by a set of strategy implementation objectives that are directly quantifiable by either a performance measure or indicator (described below). The draft goals and objectives were presented at a stakeholder workshop on August 16, 2012, which provided an opportunity for oral and written comments. The draft goals and objectives were posted to the Santa Cruz IRWM website and stakeholders were provided a 30-day window to review and comment upon the draft version prior to their finalization.

The Santa Cruz IRWM Plan objectives include:

Water Supply

- Ensure a reliable and sustainable local water supply through strategies that diversify the supply portfolio, develop production from alternative/supplemental sources, protect and enhance surface and ground water, protect against seawater intrusion, and maximize efficient delivery and use.
- Reduce water demand as technically and economically feasible, particularly in relation to the cost of additional sources.

Water Quality

- Reduce the sources of harmful pollutants (e.g., sediment, bacteria, nitrate, persistent organics and other toxic constituents) and their impacts on aquatic resources.

Watershed Resources

- Increase the habitat quality and quantity of critical aquatic ecosystems (i.e., streams, tidal wetlands and freshwater wetlands).

Flood/Stormwater Management

- Implement integrated flood and stormwater management strategies that reduce hazards and impacts from floods and, where feasible, provide multiple benefits (e.g., improved stormwater quality, ecosystem benefits, low impact development/redevelopment, and groundwater recharge).

Note that the IRWM Plan objectives are not prioritized. The Steering Committee and RWMG decided that, rather than prioritizing objectives, it made more sense to prioritize the *strategies* that that would achieve the objectives identified in the IRWM planning for the Region. By prioritizing some objectives over others, the RWMG felt they would effectively be prioritizing the needs of certain stakeholders over others. In order to maintain inclusivity, and to avoid the possibility of alienating certain groups of stakeholders or discouraging their participation in the IRWM planning process, the RWMG has therefore decided not to prioritize objectives. Through the work on the conceptual framework, strategies were prioritized into categories of high, moderate, and low to help direct project implementation in carrying out the Plan's objectives, as described in Chapter 5, Resource Management Strategies. The prioritized strategies are intended to ensure that projects with the greatest benefit are targeted for implementation.

4.6 STRATEGY OVERVIEW

This section provides a brief overview of the strategies identified in the conceptual framework along with tables that display the relationships between each objective and the high and moderate priority level strategies. The strategies are described more fully in Chapter 5, Resource Management Strategies.

Increase water supply and reduce demand: Water supply is not sustainable within the Santa Cruz IRWM region in normal years, a situation that is exacerbated when below-average water years occur. Surface water supply is highly dependent upon local precipitation, timing and available storage capacity. A greater volume of water is extracted annually from regional groundwater aquifers than is naturally recharged. Increased flexibility in regional water management and increased groundwater recharge are necessary to improve regional water supply reliability and improve resource conditions. The achievement of a reliable and sustainable local water supply requires both increased supply and reduced demand. The regional water supply management strategies include:

- increasing conservation measures through measures such as rebates and conservation pricing, as well as policies to minimize additional demand from new growth,
- developing alternative/supplemental sources of water to meet supply needs including the infrastructure necessary to facilitate inter-district transfers, and
- increasing production from existing sources including increased ability to capture, store, and transfer greater winter storm volumes.

Annual tracking of aquifer water surface elevations and stream flow conditions relative to desired sustainable targets will serve as the measurable indicator of benefit from these strategies.

Bacteria and sediment source control: Water quality impairments caused by elevated bacteria and sediment levels are among the most pressing water quality concerns in the region. Elevated bacteria levels in surface waters can limit recreational activities, create human health threats, and adverse impacts to habitat and species. A significant and controllable regional source of bacteria and nitrate to streams and the near shore is the dense and aging septic system networks in rural areas. Upgrades and maintenance to rural residential septic systems, as well as urban sewer lines and laterals, to reduce leakage, spills, and failures are priority IRWM strategies. A reducing trend of dry season bacteria levels in regional surface water may demonstrate future progress in reducing bacteria sources.

The supply of sand-sized sediment to streams significantly degrades aquatic habitat quality, resulting in negative ecosystem impacts that particularly affect the spawning and rearing habitat of sensitive salmonid species. Implementation of effective erosion control actions to reduce sediment generated from rural road networks, timber harvest activities, and agricultural lands are priority IRWM strategies. Simple methods to measure the relative risk of rural road sediment generation are being developed and could be used to track effective IRWM-supported efforts, including improvements and maintenance, on public and private roads over time.

Riparian protection and enhancement: Strategies aimed to acquire, enhance, and protect the riparian zones throughout the region are expected to contribute to all of the Santa Cruz IRWM Plan functional goals and reduce the region’s vulnerability to climate change. Significant opportunities exist to widen riparian corridors; increase riparian vegetation distribution and complexity; restore morphologic function; and improve overall riparian condition in watersheds throughout the region. Effective riparian enhancement strategies will vary by stream type, location, and adjacent land uses. Riparian zone acquisitions and easements or cash compensation for parcels within the floodplain could allow future land use changes, potential improvements in flood conveyance, and an associated reduction of flood hazards. Many of the regional flood-prone urban areas are located near the coast, where effective riparian enhancement actions would increase the habitat quality and quantity of tidal wetlands, which are critical habitat for rearing salmonids. Functional riparian zones have access to their floodplains, a well-established vegetation canopy, an energy-balanced morphology, and a complex physical structure. All of these attributes support natural fluvial processes that improve water quality and remove pollutants through deposition, filtering, and sorting. A riparian zone in good condition can reduce and sort fine sediment in the channel bed, thereby improving salmonid spawning habitat quality as well as benthic invertebrate abundance and diversity. Given the dependence on local surface water for potable supply, improved riparian conditions will reduce water treatment requirements, increase local recharge and retention of water volumes on the landscape, and contribute to the goal of providing a sustainable water supply.



Laguna Creek Lagoon (photo courtesy: SCWD)

Increase infiltration and recharge: Strategies to reduce the impact of impervious surfaces on the hydrologic function of regional watersheds were identified in each of the four functional areas. Regional opportunities to increase the amount of rainfall that is infiltrated can be realized by disconnecting impervious surfaces; increasing localized parcel-based infiltration through LID on both private and public lands; constructing and maintaining recharge basins; and preventing and/or removing impervious surfaces in known recharge zones. In order to have a measurable impact on the amount of water lost as runoff in developed areas, these strategies would have to be implemented on a vast spatial scale throughout the impervious areas within the region. Effective implementation of these strategies is collectively intended to restore the natural storm hydrograph in local tributaries and increase groundwater recharge. Increasing infiltration opportunities will retain greater annual volumes on the landscape and mitigate several projected climate change impacts, including a longer, warmer dry season and increased drought frequency.

4.7 OBJECTIVE INDICATORS

Quantifiable measures were identified to gauge the extent to which the objectives are achieved. For the most part, these are specific, quantifiable and time-limited statements that interpret each objective that are directly measurable and through which IRWM progress will be measured. These indicators were identified through development of the conceptual framework, and provide for a meaningful and measurable set of criteria through which plan effectiveness can be gauged. Monitoring is discussed more fully in Chapter 8 of this Plan, but the objective indicators are listed below, according to objective.

Water Supply Objective Indicators:

- 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 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.
- Increase the annual production to meet alternative/supplemental water source supply targets established by participating water districts by 2030. Indicator: Annual alternative/supplemental source production compared to regional targets. Comparisons of targets to actual annual production reported as +/- afy and +/- % relative to regional targets.
- Reduce the number of days fish habitat flow targets are not achieved in the San Lorenzo River and North Coast streams. Indicator: Frequency that the actual mean daily streamflow is less than the flow target is to be developed in negotiations between the City of Santa Cruz and the fishery agencies. Objective can be tracked as the number of days per year where mean daily flow is less than its target and maximum % deviation of mean daily discharge (cfs) from the target as specified at each site.
- Reduce the number of days each year where streamflow in Soquel Creek is less than 4 cfs between June 1 and December 1. Indicator: Frequency that the actual mean daily streamflow is less than the 4 cfs reported as number of days per year when mean daily flow is less than target and maximum % deviation of mean daily discharge (cfs) from target by site.

- 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).

Water Quality Objective Indicators:

- 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 trends (MPN/yr) at key locations on 3 to 5 year time steps.
- Reduce frequency of septic system overflows and failures by 30% by 2030. Performance measures: Frequency of septic system failures; number of parcels with septic systems that experience overflows and other issues annually.
- Improve the rural road condition in the San Lorenzo, Soquel, and Aptos watersheds by 40% as measured by increases in rural roads rapid assessment scores by 2030. Performance measure: 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.
- Clean out 100% of urban roads and storm drain drop inlets to best achievable conditions by October 1 of each year. Performance measures: 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.

Watershed Resources Objective Indicators:

- Improve riparian zone condition by 40% as measured by increases in rapid riparian zone condition assessment scores by 2030. Performance measure: Riparian zone condition tracking. Quantified as miles of riparian zone at or above a desired threshold condition.
- 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.
- 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.
- 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.

Flood/Stormwater Management Objective Indicators:

- 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 as the creation of riparian easements, transformation to parks or parking lots, raised structures and basement parking, etc.

- 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. Performance measure: Percent of public/private parcels with infiltration BMPs per regional LID principles.

4.8 CONSISTENCY WITH CALIFORNIA WATER CODE, STATE AND FEDERAL RESOURCE PLANS

While the vision, goals, and objectives are specific to the Santa Cruz Region, they were developed with consideration of other resources and planning efforts in mind to ensure consistency, where applicable. Some of the key planning efforts reflected in the Santa Cruz IRWM Plan objectives include:

Requirements of §10540(c): CWC §10540(c) states that, at a minimum, IRWM Plans shall address the following:

- Protection and improvement of water supply reliability, including identification of feasible agricultural and urban water use efficiency strategies.
- Identification and consideration of the drinking water quality of communities within the area of the plan.
- Protection and improvement of water quality within the area of the plan consistent with relevant basin plan.
- Identification of any significant threats to groundwater resources from overdraft.
- Protection, restoration, and improvement of stewardship of aquatic, riparian, and watershed resources within the region.
- Protection of groundwater resources from contamination.
- Identification and consideration of water-related needs of disadvantaged communities in the area within the boundaries of the plan.

The planning objectives for the Santa Cruz IRWM region encompass all of the objectives outline above, and are therefore consistent with the requirements of CWC §10540(c), the minimum objectives that all IRWM Plan are required to address. Table 4-2 below illustrates how the Santa Cruz objectives and strategies address each of the CWC §10540(c) objectives - either directly (D) or indirectly (I).

Table 4-2 Santa Cruz IRWM Objectives and Strategies Consistency with State Planning Objectives (CWC §10540(c))

Santa Cruz IRWM Strategy	Protection and improvement of water supply reliability, including identification of feasible agricultural and urban water use efficiency strategies	Identification and consideration of the drinking water quality of communities within the area of the Plan	Protection and improvement of water quality within the area of the Plan consistent with relevant basin plan	Identification of any significant threats to groundwater resources from overdrafting	Protection, restoration, and improvement of stewardship of aquatic, riparian, and watershed resources within the region	Protection of groundwater resources from contamination	Identification and consideration of water-related needs of disadvantaged communities
	OBJECTIVE: Ensure a reliable and sustainable local water supply through strategies that diversify the supply portfolio, develop production from alternative/supplemental sources, protect and enhance surface and ground water, protect against seawater intrusion, and maximize efficient delivery and use.						
<i>Develop production from alternative/supplemental sources</i>	D			I	I	I	D
<i>Increase production from existing resources</i>	D			I	I	I	D
<i>Implement system inerties</i>	D			I	I	I	D
Update/replace aging infrastructure	D	D		I		I	D
<i>Construct and maintain groundwater recharge facilities</i>	D			D	I	D	I
Prevent/remove impervious coverage in recharge zones; reduce directly connected impervious area (DCIA)	I		I	D	I	D	I
<i>Shift groundwater pumping from coastal zone</i>	D	D	D	D		D	
Support low impact development (LID)/redevelopment	I	I	I	D	I	D	I

Santa Cruz IRWM Strategy	Protection and improvement of water supply reliability, including identification of feasible agricultural and urban water use efficiency strategies	Identification and consideration of the drinking water quality of communities within the area of the Plan	Protection and improvement of water quality within the area of the Plan consistent with relevant basin plan	Identification of any significant threats to groundwater resources from overdrafting	Protection, restoration, and improvement of stewardship of aquatic, riparian, and watershed resources within the region	Protection of groundwater resources from contamination	Identification and consideration of water-related needs of disadvantaged communities
OBJECTIVE: Reduce water demand as technically and economically feasible, particularly in relation to the cost of additional sources.							
<i>Utilize tiered rates/conservation pricing</i>	D			I	I		D
<i>Conduct education/outreach on conservation</i>	D			I	I		D
<i>Implement policies to minimize additional demand from new growth</i>	D			I	I		D
Implement groundwater mgmt. that includes non-municipal pumpers, to promote sustainable groundwater use	D		I	D		D	
Utilize temporary use restrictions as needed during critical supply shortages	D			I	I		I
Utilize rebate/retrofit programs	D			I	I		I
<i>Conduct irrigation management and water conservation</i>	D		D		I	I	

Santa Cruz IRWM Strategy	Protection and improvement of water supply reliability, including identification of feasible agricultural and urban water use efficiency strategies	Identification and consideration of the drinking water quality of communities within the area of the Plan	Protection and improvement of water quality within the area of the Plan consistent with relevant basin plan	Identification of any significant threats to groundwater resources from overdrafting	Protection, restoration, and improvement of stewardship of aquatic, riparian, and watershed resources within the region	Protection of groundwater resources from contamination	Identification and consideration of water-related needs of disadvantaged communities
OBJECTIVE: Reduce the sources of harmful pollutants (i.e., sediment, bacteria, nitrate, persistent organics, toxic constituents) and impacts on aquatic resources.							
<i>Perform rural road improvements and maintenance</i>		I	D		D		
Implement BMPs related to timber harvest activities		I	D		D		
Implement erosion control measures		I	D		D		
Riparian acquisition or restoration		I	D		D		
<i>Develop and implement Farm Plans that include effective nutrient, sediment and irrigation measures</i>		I	D	D	D	D	I
<i>Implement septic system upgrades, provide incentives and/or maintenance</i>		I	D		D	D	I
<i>Perform sewer system upgrades and maintenance</i>		I	D		D	D	I
<i>Promote/implement private property sewer lateral upgrades and maintenance</i>		I	D		D	D	I
Removal of encampments from riparian zones		I	D		D		
Conduct street sweeping		I	D		I		
Conduct regular infrastructure cleaning and maintenance		I	D		I		
Implement riparian exclusions for livestock			D		D		
Implement livestock waste management BMPs			D	D	I		

Santa Cruz IRWM Strategy	Protection and improvement of water supply reliability, including identification of feasible agricultural and urban water use efficiency strategies	Identification and consideration of the drinking water quality of communities within the area of the Plan	Protection and improvement of water quality within the area of the Plan consistent with relevant basin plan	Identification of any significant threats to groundwater resources from overdrafting	Protection, restoration, and improvement of stewardship of aquatic, riparian, and watershed resources within the region	Protection of groundwater resources from contamination	Identification and consideration of water-related needs of disadvantaged communities
OBJECTIVE: Increase the habitat quality and quantity of critical aquatic ecosystems (i.e., streams, tidal wetlands and fresh water wetlands).							
<i>Reduce stream withdrawals and increase base flow at critical times to achieve streamflow targets</i>				I	D	I	
<i>Identify and eliminate illegal diversions</i>				I	D	I	
<i>Restore natural stream form and function</i>					D		
<i>Restore riparian zone through acquisition/easements</i>					D		
<i>Reduce riparian encroachment</i>					D		
<i>Reduce erosion and sedimentation from public and private roads, unpermitted grading, and other sources.</i>					D		
Preserve and enhance large woody debris (LWD) in streams and riparian zone					D		
Remove non-native species					D		
Conduct riparian revegetation					D		
Reduce riparian encroachment					D		
Remove or retrofit fish passage barriers					D		
<i>Restore lagoon / wetland structure and biotic habitat complexity</i>					D		

Santa Cruz IRWM Strategy	Protection and improvement of water supply reliability, including identification of feasible agricultural and urban water use efficiency strategies	Identification and consideration of the drinking water quality of communities within the area of the Plan	Protection and improvement of water quality within the area of the Plan consistent with relevant basin plan	Identification of any significant threats to groundwater resources from overdrafting	Protection, restoration, and improvement of stewardship of aquatic, riparian, and watershed resources within the region	Protection of groundwater resources from contamination	Identification and consideration of water-related needs of disadvantaged communities
<p><i>continued</i> Objective: Increase the habitat quality and quantity of critical aquatic ecosystems (i.e., streams, tidal wetlands and fresh water wetlands).</p>							
Promote natural sand bar function					D		
Increase/enhance wetland edge habitat					D		
Improve wetland hydrology					D		
Support education/outreach/technical training programs					I		
Support volunteer stewardship programs					I		
Support environmental education programs					I		
Reduce illegal dumping			I		D		

Santa Cruz IRWM Strategy	Protection and improvement of water supply reliability, including identification of feasible agricultural and urban water use efficiency strategies	Identification and consideration of the drinking water quality of communities within the area of the Plan	Protection and improvement of water quality within the area of the Plan consistent with relevant basin plan	Identification of any significant threats to groundwater resources from overdrafting	Protection, restoration, and improvement of stewardship of aquatic, riparian, and watershed resources within the region	Protection of groundwater resources from contamination	Identification and consideration of water-related needs of disadvantaged communities
OBJECTIVE: Implement integrated flood management strategies that reduce hazards and impacts from floods and, where feasible, provide multi-benefits (e.g., improve stormwater quality, ecosystem benefits, Low Impact Development (LID) / redevelopment and groundwater recharge).							
Utilize riparian zones for flood management through acquisition or easement			I		I		
Increase riparian setbacks					I		
Reduce riparian encroachment			I		I		
Maintain/improve levees for flood management and environmental quality					I		
Geomorphic modifications					I		
Increase channel width and floodplain function					I		
Remove channel constrictions					I		
Conduct vegetation management			I		I		
Maintain storm drain conveyance efficiency					I		
Implement infrastructure improvements and maintenance					I		
Reduce directly connected impervious areas				D	I		
Implement low impact development/redevelopment				D	I		
Conduct education and outreach on flood and stormwater issues				I	I		

1. **High priority strategies in bold**; Moderate priority

2. D = directly addresses; I = Indirectly addresses

Central Coast Regional Water Quality Control Board Basin Plan Objectives: The Central Coast Basin Plan is the water quality control plan formulated and adopted by the Regional Water Quality Control Board (RWQCB) for the Central Coast region. The objective of the Basin Plan is to show how the quality of the surface and ground waters in the Central Coast Region should be managed to provide the highest water quality reasonably possible. The Basin Plan lists various water uses (Beneficial Uses), describes the water quality that must be maintained to allow those uses (Water Quality Objectives), and outlines an implementation plan for achieving those standards, including through the development and implementation of Total Maximum Daily Loads (TMDLs), among other regulatory programs. In addition, the Central Coast RWQCB has established the following planning goals for water quality in the Central Coast Region:¹

- Protect and enhance all basin waters, surface and underground, fresh and saline, for present and anticipated beneficial uses, including aquatic environmental values.
- The quality of all surface waters shall allow unrestricted recreational use.
- Manage municipal and industrial wastewater disposal as part of an integrated system of fresh water supplies to achieve maximum benefit of fresh water resources for present and future beneficial uses and to achieve harmony with the natural environment.
- Achieve maximum effective use of fresh waters through reclamation and recycling.
- Continually improve waste treatment systems and processes to assure consistent high quality effluent based on best economically achievable technology.
- Reduce and prevent accelerated (man-caused) erosion to the level necessary to restore and protect beneficial uses of receiving waters now significantly impaired or threatened with impairment by sediment.

While the vision, goals, and objectives for the Santa Cruz IRWM Plan are locally derived and appropriate for the issues and concerns for the Region, they support and are complementary to the objectives described in the Basin Plan.

Coho and Steelhead Recovery Planning: In September 2012 the National Marine Fisheries Service (NMFS) division of the National Oceanic and Atmospheric Administration (NOAA) released a Recovery Plan for the Evolutionarily Significant Unit of the Central California Coast Coho Salmon.²

NMFS assessed instream and watershed conditions and threats using a method developed by The Nature Conservancy in collaboration with the World Wildlife Fund, Conservation International, Wildlife Conservation Society and others, called Conservation Action Planning (CAP). The method is a “structured approach to assessing threats, sources of threats, and their relative importance to the species’ status” and a method recommended in the Interim Guidance. The NMFS application of the CAP protocol included: 1) defining current conditions for habitat attributes across freshwater life stages believed essential for the long term survival of Central California Coast (CCC) coho salmon, and 2) identifying

¹ Regional Water Quality Control Board, Central Coast Region, State Water Resources Control Board, California Environmental Protection Agency. 2011. *Water Quality Control Plan for the Central Coast Basin*. Pg. IV-2.

² National Marine Fisheries Service. 2012. Final Recovery Plan for Central California Coast coho salmon Evolutionarily Significant Unit. National Marine Fisheries Service, Southwest Region, Santa Rosa, California.

activities reasonably expected to continue, or occur, into the future that will have a direct, indirect, or negative effect on life stages, populations and the ESU (e.g., threats). Results from this assessment provided an indication of watershed health and likely threats to coho salmon survival and recovery. These results were the basis used to formulate recovery actions designed to improve current conditions (restoration strategies) and abate future threats (threats strategies).

The evaluation of current habitat conditions and ongoing and future threats led to the conclusion that summer and winter rearing survival were very low due to impaired instream habitats. These impairments were due to a lack of complexity formed by instream wood, high sediment loads, lack of refugia habitats during winter, low summer flows, and high instream temperatures. The major sources of these impairments are roads, water diversions, and impoundments, residential and commercial development, and severe weather patterns. The Santa Cruz IRWM Steering Committee conducted an analysis to determine areas of consistency and opportunities between these plans and the Santa Cruz IRWM Plan. The results of that analysis were taken into consideration in formulating the Region's goals and objectives.

20x2020 Goals: In February 2008, the State of California established a 20 percent reduction in per capita urban water use by the year 2020 (20x2020). Actions toward the 20x2020 goal were furthered by the passage of SBx7-7, which added agricultural water use efficiency to the urban requirement. Even before 20x2020 the Santa Cruz Region has been successful in practicing water conservation, with some of the lowest per capita use in the state. The Santa Cruz IRWM Plan water supply objective to "maximize efficient delivery and use" along with the strategy to "increase water conservation measures" directly support the state's 20x2020 goals.

Local Plans: The Santa Cruz IRWM Plan grew from local resource and watershed planning efforts. While the IRWM Plan reflects broader regional goals and objectives, it naturally reflects, and is consistent with, the objectives of these local plans. Consistency between the IRWM Plan and local plans is discussed in more detail in Chapter 12, Relation to Local Water and Land Use Planning.

CHAPTER 5: RESOURCE MANAGEMENT STRATEGIES

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The Proposition 84/1E Integrated Regional Water Management (IRWM) Grant Program Guidelines require regional water management groups (RWMGs) to evaluate and include in IRWM Plans, as applicable, various resource management strategies, including those listed in the *California Water Plan Update 2009*. The intent of this standard is to encourage an integrated and diversified approach to resource management that is more resilient and mitigates for uncertain future circumstances, such as climate change. The following sections describe the process by which strategies were prioritized for the Santa Cruz IRWM region, how the California Water Plan resource management strategies were evaluated, and the degree to which they are being implemented within the Santa Cruz IRWM region.

5.1 SELECTION OF SANTA CRUZ REGION RESOURCE MANAGEMENT STRATEGIES

The original IRWM Plan for the Santa Cruz Region was prepared in response to the Proposition 50, Chapter 8 IRWM Guidelines¹ and adopted by the Partner Agencies in 2005. As part of that Plan's development, the Santa Cruz IRWM Steering Committee identified and prioritized a list of 55 projects derived from numerous water and water resource related plans and studies conducted throughout the region. The projects were prioritized by evaluating each against a set of planning objectives created for the region. The plan also related those planning objectives to the original 20 water management strategies described in the IRWM Guidelines. A limitation of this planning effort was that the project prioritization was weighted towards the project's grant competitiveness, and did not necessarily evaluate the degree to which each project would help achieve plan objectives. This limitation was addressed by the Santa Cruz IRWM Steering Committee through the 2014 plan update process. To identify strategies based on their ability to achieve objectives, the Steering Committee used funding from a Proposition 84 Planning Grant administered by the Department of Water Resources to develop a conceptual framework for the Santa Cruz IRWM Plan. Conceptual frameworks are planning constructs that have been employed in other regions of the state to assist resource managers in filtering strategies to those that will have the greatest ability to achieve objectives. To accomplish this, a work group consisting of representatives of the Regional Water Management Group (RWMG) and stakeholders was formed in early 2012, and this group developed the framework over the course of a year and several meetings. The conceptual framework is comprised of models, developed by subcommittees of the work group, for each of the four functional areas of the IRWM plan - water supply, water quality, flood/stormwater management, and watershed resources. Each model is a hypothesis of the cause and effect between strategies and management objectives. Explicitly stated within each conceptual model is the hypothesis that effective implementation of particular strategies will ultimately result in achievement of IRWM objectives, as observed through monitoring of specific indicators. The strategies have been prioritized into "high," "moderate," and "low" according to their perceived ability to help achieve the IRWM Plan objectives. Each conceptual model includes goals, objectives, diagrams, and tables that guide effective strategy implementation. The following summarizes the priority strategies for the Santa Cruz IRWM region.

Water Supply: Water supply is not sustainable within the Santa Cruz IRWM region in normal years, a situation that is exacerbated when below average water years occur. Surface water supply is highly

¹ State Water Resources Control Board. November 2004. Integrated Regional Water Management Grant Program Guidelines.

dependent upon local precipitation, timing, and available storage capacity. A greater volume of water is extracted annually from regional groundwater aquifers than is naturally recharged. Increased flexibility in regional water management and increased groundwater recharge are necessary to improve regional water supply reliability and improve resource conditions. The achievement of a reliable and sustainable local water supply will require increased supply or reduced demand or a combination of both. The regional water supply management strategies include:

- increasing conservation measures through such measures as rebates, conservation pricing, and, implementing policies to minimize additional demand from new growth;
- investigating the feasibility of the development of alternative/supplemental sources of water to meet supply needs including the infrastructure necessary to facilitate inter-district transfers or the use of recycled water;
- increasing production from existing sources including increased ability to capture, store, and transfer greater winter storm volumes.

Annual tracking of aquifer water surface elevations and stream flow conditions relative to desired sustainable targets will serve as the measurable indicator of benefit from these strategies.

Water Quality: Water quality impairments caused by elevated bacteria and sediment levels are among the most pressing water quality concerns in the region. Elevated bacteria levels in surface waters can limit recreational activities and create human health threats. An important and controllable regional source of bacteria and nitrate to streams and the near shore is the dense and aging sewage system networks in urban and rural areas. Upgrades and maintenance to rural residential septic systems, as well as urban sewer lines and laterals, to reduce leakage, spills, and failures are priority IRWM strategies. A reducing trend of dry season bacteria levels in regional surface water may demonstrate future progress of reducing bacteria sources.

The supply of sand-sized sediment to streams significantly degrades aquatic habitat quality, resulting in negative ecosystem impacts that particularly affect the spawning and rearing habitat of sensitive salmonid species. Implementation of effective erosion control actions to reduce sediment generated from rural road networks, timber harvest activities, development activities, and agricultural lands are priority IRWM strategies. Simple methods to measure the relative risk of rural road sediment generation are being developed and could be used to track effective IRWM-supported efforts, including improvements and maintenance, on public and private roads over time.

Aquatic Ecosystems: Strategies aimed to acquire, enhance, and protect the riparian zones throughout the region are expected to contribute to all of the Santa Cruz IRWM functional goals and reduce the region's vulnerability to climate change impacts. Significant opportunities exist to widen riparian corridors; increase riparian vegetation distribution and complexity; restore morphologic function; and improve overall riparian condition in watersheds throughout the region. Effective riparian enhancement strategies will vary by stream type, location, and adjacent land uses. Riparian zone acquisitions and easements or compensation for parcels within the floodplain could allow future land use changes, potential improvements in flood conveyance and an associated reduction of flood hazards. Many of the regional flood-prone urban areas are located near the coast, where effective riparian enhancement actions would increase the habitat quality and quantity of tidal wetlands, which are critical habitat for rearing salmonids. Functional riparian zones have access to their floodplains, a well-established vegetation canopy, an energy balanced morphology, and a complex physical structure. All of these attributes support natural fluvial processes that improve water quality and remove pollutants through

deposition, filtering, and sorting. A riparian zone in good condition can flush fine sediment from the channel bed, thereby improving salmonid spawning habitat quality as well benthic invertebrate abundance and diversity. Given the dependence on local water for potable supply, improved riparian conditions will reduce water treatment requirements, increase local recharge and retention of water volumes on the landscape, and contribute to the goal of providing a sustainable water supply.

Flood & Stormwater Management: Strategies to reduce the impact of impervious surfaces on the hydrologic function of regional watersheds were identified in each of the four functional areas. Regional opportunities to increase the fraction of rainfall that is infiltrated can be realized by disconnecting impervious surfaces; increasing localized parcel-based infiltration through low impact development (LID) on both private and public lands; the construction and maintenance of recharge basins; and the prevention and/or removal of impervious surfaces in known recharge zones. In order to have a measurable impact on the amount of water lost as runoff in developed areas, these strategies would have to be implemented on a vast spatial scale throughout the impervious areas within the region. Effective implementation of these strategies is collectively intended to restore the natural storm hydrograph in local tributaries and increase groundwater recharge. Increasing infiltration opportunities will retain greater annual volumes on the landscape and mitigate several projected climate change impacts, including a longer, warmer dry season and increased drought frequency. Note that development of the conceptual models took into consideration the effects of climate change on the region, including the effects of sea level rise and potential impacts on water supply. The strategies identified through the conceptual framework encourage and promote projects that implement climate change mitigation and adaptation measures, including water use efficiency, energy efficiency, water recycling, and reuse of urban runoff.

Table 5-1 summarizes the objectives, drivers, and strategies identified through the conceptual framework planning process. Drivers are the natural or man-made influences on the objectives that define each objective. For example, the amount of potable water that can be produced (production capacity) is a key driver for ensuring a sustainable water supply. Inclusion of the drivers provides an example of the mechanisms through which the strategy will achieve the objective. It should be noted that some strategies are repeated in this table because they are associated with more than one driver and objective.

Table 5 - 1 Priority Strategies by Objective

Objective	Driver	Santa Cruz IRWM Strategy
Ensure a reliable and sustainable local water supply through strategies that diversify the supply portfolio, develop production from alternative/supplemental sources, protect and enhance surface and ground water, protect against seawater intrusion, and maximize efficient delivery and use.	Production capacity	Develop production from alternative/supplemental sources
		Increase production from existing resources
	Water supply reliability	Implement system inerties
	Pipe and facility condition	Update/replace aging infrastructure
	Groundwater aquifer storage	Construct and maintain groundwater recharge facilities
		Prevent/remove impervious coverage in recharge zones; reduce directly connected impervious area (DCIA)
		Shift groundwater pumping from coastal zone
		Support low impact development (LID)/redevelopment

High priority strategies in bold; Moderate priority

Objective	Driver	Santa Cruz IRWM Strategy
Reduce water demand as technically and economically feasible, particularly in relation to the cost of additional sources.	Water price	Utilize tiered rates/conservation pricing
	Water demand; Usage efficiency	Conduct education/outreach on conservation
	Water demand; Usage efficiency	Implement policies to minimize additional demand from new growth
	Usage efficiency	Implement groundwater management that includes non-municipal pumpers, to promote sustainable groundwater use
	Usage efficiency	Utilize temporary use restrictions as needed during critical supply shortages
	Usage efficiency	Utilize rebate/retrofit programs
	Usage efficiency	Conduct Irrigation management and water conservation

High priority strategies in bold; Moderate priority

Objective	Driver	Santa Cruz IRWM Strategy
Reduce the sources of harmful pollutants (i.e., sediment, bacteria, nitrate, persistent organics, toxic constituents) and impacts on aquatic resources.	Roads	Perform rural road improvements and maintenance
	Timberlands	Implement BMPs related to timber harvest activities
		Implement erosion control measures
	Riparian corridor health	Riparian acquisition or restoration
	Row crops Vineyards/Orchards	Develop and implement Farm Plans that include effective nutrient, sediment and irrigation measures
	Septic systems	Implement septic system upgrades, provide incentives and/or maintenance
	Sewer systems	Perform sewer system upgrades and maintenance
		Promote/implement private property sewer lateral upgrades and maintenance
	Encampments	Removal of encampments from riparian zones
	Urban non point sources	Conduct street sweeping
		Conduct regular infrastructure cleaning and maintenance
Livestock	Implement riparian exclusions for livestock	
	Implement livestock waste management BMPs	

High priority strategies in bold; Moderate priority

Objective	Driver	Santa Cruz IRWM Strategy
Increase the habitat quality and quantity of critical aquatic ecosystems (i.e. streams, tidal wetlands and fresh water wetlands).	Hydrologic barriers, Pool Depth and Channel Complexity	Reduce stream withdrawals and increase base flow at critical times to achieve streamflow targets
		Identify and eliminate illegal diversions
		Restore stream form and function
	Riparian corridor width Floodplain connectivity	Riparian zone acquisition/easements
		Reduce riparian encroachment
	Substrate grain size	Reduce erosion and sedimentation from public and private roads, unpermitted grading, and other sources.
	Large woody debris (LWD)	Preserve and enhance large woody debris (LWD) in streams and riparian zone
	Riparian corridor canopy cover; Riparian vegetation composition	Remove non-native species
		Conduct riparian revegetation
		Reduce riparian encroachment
	Constructed fish passage barriers	Remove or retrofit fish passage barriers
	Habitat complexity Edge condition Width to depth ratio	Increase/enhance physical structure and biotic habitat complexity
	Bar dynamics	Promote natural sand bar function
	Habitat complexity	Non-native species eradication
	Hydrology	Improve wetland hydrology to support desired biota
	Community Stewardship	Support education/outreach/technical training programs
		Support volunteer stewardship programs
Support school programs		
Reduce illegal dumping		
Reduce illegal diversions		
Water temperature	Riparian corridor acquisition/protection	
	Riparian vegetation protection and enhancement	
	Restore stream hydro-geomorphic function	

High priority strategies in bold; Moderate priority

Objective	Driver	Santa Cruz IRWM Strategy
Implement integrated flood management strategies that reduce hazards and impacts from floods and, where feasible, provide multi-benefits (e.g., improve stormwater quality, ecosystem benefits, Low Impact Development (LID) / redevelopment and groundwater recharge).	Riparian land use	Utilize riparian zones for flood management through acquisition or easement
		Increase riparian setbacks
		Reduce riparian encroachment
	Stream conveyance	Maintain/improve levees for flood management and environmental quality
		Geomorphic modifications
		Increase channel width and floodplain function
		Remove channel constrictions
		Conduct vegetation management
	Stormwater infrastructure	Maintain storm drain conveyance efficiency
		Implement infrastructure improvements and maintenance
	Hydromodification	Reduce directly connected impervious areas
		Implement low impact development/redevelopment
	Community Stewardship	Conduct education and outreach on flood and stormwater issues

High priority strategies in bold; Moderate priority

5.2 CALIFORNIA WATER PLAN RESOURCE MANAGEMENT STRATEGIES

The Proposition 84 Guidelines list 29 resource management strategies from the *California Water Plan Update 2009*. During the conceptual framework process (described above), the working group considered each of the *California Water Plan* resource management strategies for its potential to help achieve IRWM Plan objectives, with the intention of diversifying, to the maximum extent possible, the Region’s portfolio of strategies. Many of these strategies are currently being implemented in the Santa Cruz IRWM region. The following briefly describes each resource management strategy and its level of implementation in the Santa Cruz IRWM Plan. Table 5-2 lists the selected resource management strategies for the Region.

Table 5-2 Selected Water Plan 2009 Resource Management Strategies

<p><u>Reduce Water Demand</u></p> <ul style="list-style-type: none"> · Agricultural Water Use Efficiency · Urban Water Use Efficiency <p><u>Operational Efficiency and Transfers</u></p> <ul style="list-style-type: none"> · Conveyance – Regional/Local · System Re-operation · Water Transfers <p><u>Increase Water Supply</u></p> <ul style="list-style-type: none"> · Conjunctive Mgmt. and Groundwater Storage · Desalination · Recycled Municipal Water · Surface Storage – Regional/Local <p><u>Improve Water Quality</u></p> <ul style="list-style-type: none"> · Drinking Water Treatment and Distribution · Groundwater Remediation/Aquifer Remediation · Matching Water Quality to Use · Pollution Prevention · Salt and Salinity Management · Urban Runoff Management 	<p><u>Practice Resources Stewardship</u></p> <ul style="list-style-type: none"> · Agricultural Lands Stewardship · Economic Incentives · Ecosystem Restoration · Forest Management · Land Use Planning and Management · Recharge Area Protection · Water-Dependent Recreation · Watershed Management/Planning <p><u>Improve Flood Management</u></p> <ul style="list-style-type: none"> · Flood Risk Management <p><i>Not selected for the Region:</i></p> <ul style="list-style-type: none"> · Conveyance–Delta · Precipitation Enhancement · Surface Storage–CALFED · Crop Idling for Water Transfers · Dewvaporation/Atmospheric Pressure Desal. · Fog Collection · Irrigation Land Retirement · Rainfed Agriculture · Waterbag Transport/Storage Technology
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The descriptions of the resource management strategies are paraphrased from the *California Water Plan Update, 2009, Volume 2*.

5.2.1 REDUCE WATER DEMAND

Agricultural Water Use Efficiency: Agricultural water use efficiency describes the use and application of a scientific process to control agricultural water delivery and achieve a beneficial outcome. Water use

efficiency and conservation measures serve to reduce water use, reduce energy consumption and therefore emissions of pollutants and greenhouse gasses, reduce wastewater and potentially polluted runoff, and reduce the economic and environmental costs associated with water use and water treatment. This strategy is reflected in several Santa Cruz IRWM strategies, including irrigation and nutrient management, reducing dependence on groundwater, and the development of farm plans, among others.

Urban Water Use Efficiency: Urban water use efficiency is considered an important strategy for the region. Residents in the Santa Cruz IRWM region have some of the lowest per-capita water use in California, if not the nation. Conservation is a key feature of the Santa Cruz IRWM Plan, and urban water use efficiency is reflected in several priority strategies, including for example replacing aging infrastructure, implementation of conservation pricing for water, and education, among others.

5.2.2 OPERATIONAL EFFICIENCY AND TRANSFERS

Conveyance–Delta: The Santa Cruz IRWM Region does not rely upon imported water, and as such, this strategy is not applicable to the Region.

Conveyance – Regional/Local: Conveyance provides for the efficient and effective movement of water, and conveyance infrastructure includes natural water courses as well as constructed facilities like canals and pipelines. Although the Santa Cruz region does not import water from outside of the region, conveyance nevertheless is an important strategy reflected in the plan. The need to maintain and/or improve conveyance is reflected in strategies such as investigating the feasibility of development of water produced from alternative sources, which if pursued, would necessitate improved connections between different water districts.

System Re-operation: System re-operation entails changing existing operation and management procedures for reservoirs and conveyance facilities in order to increase benefits from these facilities. Priority strategies such as those associated with investigating the feasibility of development of water produced from alternative sources and maximizing production from existing sources are associated with this strategy. Such strategies may involve upgrading the ability to treat source water or otherwise manage the water delivery system to maximize benefits.

Water Transfers: A water transfer is a temporary or long-term change in the point of diversion, place of use, or purpose of use. Water transfers typically occur in five ways (though not all of these are practiced in the Santa Cruz region): 1) transferring water from storage that would otherwise have been carried over to the following year; 2) pumping groundwater instead of using surface water delivery and transferring the surface water rights; 3) transferring previously banked groundwater either by directly pumping and transferring groundwater or by pumping groundwater for local use and transferring surface water rights; 4) making water available by reducing the existing consumptive use through crop idling or crop shifting or by implementing water use efficiency measures; or 5) making water available by reducing return flows or seepage from conveyance systems that would otherwise be irrecoverable.

Water transfer is reflected in strategies related to improving the water production in the Santa Cruz region in that the strategy might require changes to place of use.

5.2.3 INCREASE WATER SUPPLY

Conjunctive Management and Groundwater Storage: Conjunctive management is the coordinated use of surface water and groundwater to maximize water use in order to meet various management objectives. In the Santa Cruz IRWM region, conjunctive management is related to the water transfer strategy in that implementation would likely include exchange of groundwater for surface water use, which may require the temporary or long-term change to existing water rights.

Desalination: Desalination refers to any of several processes that remove some amount of salt and other minerals from saline water as a means of providing a supplemental water supply. Desalination is similar to conjunctive management in that it is one strategy of many that falls into the category of developing production from alternative sources. Desalination was identified as a potential supplemental supply to further evaluate. In 2007, the City of Santa Cruz and Soquel Creek Water District joined together to address their different needs and share the costs associated with evaluating seawater desalination. A regional seawater desalination project was in the environmental review process in 2013 when the Santa Cruz City Council decided to pursue a more thorough evaluation of water supply strategies through a formal public advisory committee process.

Precipitation Enhancement: Precipitation enhancement, commonly referred to as cloud seeding, utilizes various methods to derive more precipitation from storm events than would naturally occur without manipulation. Cloud seeding injects specific substances, typically silver iodide, into the clouds to enable raindrops to form more easily. Cloud seeding has been practiced for some time throughout California; however this strategy was not considered appropriate for the Santa Cruz IRWM Region.

Recycled Municipal Water: Recycled water is water derived from wastewater through an enhanced treatment process. Currently, recycled water cannot be used for potable use, but is commonly utilized for landscape or crop irrigation. Recycled water is already being utilized in the Santa Cruz region, and like conjunctive management, is a priority strategy for improving supply production. The City of Santa Cruz and the Soquel Creek Water District are proposing to conduct a feasibility study of recycled water.

Surface Storage—CALFED: The Santa Cruz IRWM region does not rely upon imported water, and as such, this strategy is not applicable to the region.

Surface Storage – Regional/Local: Surface storage is an existing, critical component of the Santa Cruz Water Department’s system. However, considering that other methods of ensuring adequate supply exist that do not have the level of impacts associated with on-stream surface storage, it is not identified as a priority strategy going forward for the region. However, there may be opportunities within implementation of a conjunctive use project for off-stream storage, though such a project is not currently being pursued.

5.2.4 IMPROVE WATER QUALITY

Drinking Water Treatment and Distribution: Providing a safe and reliable supply of drinking water is the primary goal of public water systems in the region. Source water protection, sufficient treatment, and efficient delivery systems are all critical to achieving this goal. This strategy is a high priority, ongoing element of the Santa Cruz IRWM Plan reflected in several strategies outlined in the conceptual framework.

Groundwater Remediation/Aquifer Remediation: Groundwater remediation removes contaminants that affect beneficial uses of groundwater. Passive groundwater remediation allows contaminants to biologically or chemically degrade or disperse in situ over time, while active groundwater remediation involves either treating contaminated groundwater in situ or extracting contaminated groundwater from the aquifer and treating it. Fortunately for the Santa Cruz IRWM region, groundwater remediation is not a priority strategy because the region's aquifers are in generally good condition, although remediation of locally contaminated sites is ongoing.

Matching Water Quality to Use: An example of matching water quality to use is a water supplier choosing to use a deeper, cleaner aquifer for municipal water, which requires less treatment before delivery, over a more shallow, more contaminated aquifer or over a surface supply. Benefits would include a reduced need for treatment and potentially fewer disinfection byproducts for the water user. Recycled water can also be treated to a wide range of purities that can be matched to different uses. This strategy is currently being implemented in the Santa Cruz Region with use of recycled water for landscape irrigation, and is reflected in several proposed projects in the IRWM Plan.

Pollution Prevention: Pollution prevention protects water at its source and therefore reduces the need and cost for other water management and treatment options. An important pollution prevention strategy is implementation of proper land use management practices to prevent sediment and pollutants from entering the source water. Pollution prevention supports several Santa Cruz IRWM objectives and goals, including ensuring a safe and reliable water supply and supporting watershed function. Pollution prevention is reflected in numerous Santa Cruz IRWM strategies.

Salt and Salinity Management: Salts are materials that originate from dissolution or weathering of the rocks and soil, including dissolution of lime, gypsum and other slowly dissolved soil minerals. Salinity describes a condition where dissolved minerals of either natural or anthropogenic origin and carrying an electrical charge (ions) are present. Most salts provide some benefit to living organisms when present in low concentrations; however salinity very quickly becomes a problem when salts become concentrated. Salt management is a persistent concern in the Santa Cruz Region because much of our water supply is derived from groundwater aquifers adjacent to the ocean, and this concern is reflected in several priority strategies that either directly or indirectly address salt management. Inland basins in the region are not impacted by salts.

Urban Runoff Management: Urban development drastically alters natural hydrology and impacts water quality. Urban runoff management is a broad series of activities designed to preserve, mimic, or restore the natural hydrologic cycle that is altered by urbanization. The watershed approach consists of a series of best management practices (BMPs) designed to reduce the pollutant loading and reduce the volumes and velocities of urban runoff discharged to surface waters. These BMPs may include facilities to capture, treat, and recharge groundwater with urban runoff, conducting public education campaigns to

inform the public about stormwater pollution and the proper use and disposal of household chemicals, and providing technical assistance and stormwater pollution prevention training. Urban runoff management is common practice in municipalities in the region, and is reflected in several priority strategies in this plan.

5.2.5 PRACTICE RESOURCES STEWARDSHIP

Agricultural Lands Stewardship: Agricultural lands stewardship means farm and ranch landowners – the stewards of the state’s agricultural lands – producing public environmental benefits in conjunction with the food and fiber they have historically provided while keeping land in private ownership.² Agricultural lands stewardship also protects open space and the traditional characteristics of rural communities. Agricultural lands stewardship is reflected in several priority Santa Cruz IRWM strategies including irrigation and nutrient management, rural road maintenance, and others related to maintaining and improving water quality.

Economic Incentives: Economic incentives include financial assistance, water pricing, and water market policies intended to influence water management. Examples of economic incentives practiced in the Santa Cruz IRWM region include conservation pricing and tiered rates and rebates. Economic incentives, such as plumbing retrofits, turf rebates, washing machine rebates, and residential ultra low-flush toilet replacement programs, have been used and continue to be used at different times by water suppliers in the region. Economic incentives have long been implemented in the Santa Cruz region, and will continue to play an important role in reducing water demand, one of the Santa Cruz IRWM objectives.

Ecosystem Restoration: Ecosystem restoration improves the condition of our modified natural landscapes and biological communities to provide for their sustainability and for their use and enjoyment by current and future generations. This strategy focuses on restoration of aquatic, riparian, and floodplain ecosystems because they are the natural systems most directly affected by water and flood management actions, and are likely to be affected by climate change. Significant ecosystem restoration has been practiced in the Santa Cruz region, and many strategies in this IRWM Plan are directly related to this resource management strategy, and several others indirectly related, through such measures as increasing streamflow or improving groundwater recharge. See also the related watershed management strategy regarding the Integrated Watershed Restoration Program (IWRP) for the Santa Cruz Region, which played a key role in significant ecosystem restoration efforts.

Forest Management: Significant portions of the Santa Cruz IRWM region consist of forested land, which are used for sustainable production of resources such as water, timber, native vegetation, fish, wildlife and livestock, as well as source water protection, carbon sequestration, and recreation. Strategies include, among others, meadow restoration (for increased groundwater storage), riparian forest restoration, fuels/fire management, and road management. Climate change is expected to directly affect forests through increased drought stress, and a study conducted by the U.S. Geological Survey (USGS) for the Santa Cruz IRWM region suggested that it may have a dramatic impact on the amount of

² California Water Plan Update 2005, Agricultural Land RMS

suitable habitat for redwoods in the region.³ Forest management is reflected in several priority strategies in this IRWM Plan.

Land Use Planning and Management: Integrating land use and water management consists of planning for the housing and economic development needs of a growing population while providing for the efficient use of water, water quality, energy, and other resources. The way in which we use land - the pattern and type of land use and transportation and the level of intensity - has a direct relationship to water supply and quality, flood management, and other water issues. This strategy calls for more sustainable land use practices, including intelligent site design, source control, and land use decision making that aims to both reduce and mitigate flood loss and the potential impacts of climate change. Land use planning that considers impacts to natural resources and encourages conservation is a hallmark of the Santa Cruz region, and is reflected in several priority Santa Cruz IRWM strategies.

Recharge Area Protection: The goals of recharge area protection are to 1) ensure that areas suitable for recharge continue to be capable of adequate recharge rather than covered by urban infrastructure, such as buildings and roads; and 2) prevent pollutants from entering groundwater in order to avoid expensive treatment that may be needed prior to potable, agricultural, or industrial beneficial uses. Primary groundwater recharge zones have been protected since the 1970s in the Santa Cruz region. This has been done by limiting development in areas in the County outside of the urban services line where soil and geological conditions are appropriate and conducive to infiltration and percolation of rainfall and runoff into groundwater basins. In these areas, development is limited to one unit per 10 acres. Recharge protection is a cross-cutting strategy that supports several IRWM Plan objectives.

Water-Dependent Recreation: California offers a variety of water-dependent recreation opportunities, such as fishing and swimming. Other recreation activities that are not water-dependent but are enhanced by water include wildlife viewing, picnicking, camping, and hiking. Surfing and other ocean-related water-dependent activities are of principal importance to the Santa Cruz region. In addition, several of the region's surface water storage facilities allow varying levels of recreational opportunities. Providing for water-dependent recreation in water projects is part of California law and also part of the Public Trust Doctrine (California State Lands Commission), and is of primary importance to the region. In the Santa Cruz IRWM Region, providing for water-dependent recreation is less about incorporating the concept into water projects, but rather is reflected in the need to ensure that water quality supports recreational beneficial uses.

Watershed Management/Planning: Watershed management is the process of creating and implementing plans, programs, projects, and activities to restore, sustain, and enhance watershed functions. Beginning in the late 1970s, eight watershed restoration plans and a number of other related assessments were developed for seven watersheds in Santa Cruz County. Anticipating the completion of the plans, several RWMG members and other stakeholders turned their focus to ways to effectively implement the recommended projects and programs. Recognizing that watershed restoration would be more effective as a coordinated countywide effort, they developed a program called the Integrated

³ Flint, L.E., and Flint, A.L. 2012. Simulation of climate change in San Francisco Bay Basins, California: Case studies in the Russian River Valley and Santa Cruz Mountains: U.S. Geological Survey Scientific Investigations Report 2012–5132, 55 p.

³Ibid.

Watershed Restoration Program (IWRP). The goal of IWRP is to support local watershed partners in developing projects and to coordinate agencies that provide technical assistance, permits, and funds. Such coordination reduces the staff time required while helping to ensure that critical projects are identified, funded, and permitted. Over 43 projects have been implemented to date through the IWRP program, and it continues to be a primary focus for the Santa Cruz region supporting nearly all of the IRWM objectives.

5.2.6 IMPROVE FLOOD MANAGEMENT

Flood Risk Management: Flood risk management is a strategy specifically intended to enhance flood protection. It includes projects and programs that assist individuals and communities to manage flood flows and to prepare for, respond to, and recover from a flood. Within the Santa Cruz Region, priority strategies supporting flood risk management seek to maximize the benefits of floodplains, minimize or mitigate development in the floodplain, minimize the loss of life and damage to property from flooding, and recognize the benefits to ecosystems from periodic flood events.

5.2.7 OTHER

Crop Idling for Water Transfers: Crop idling refers to the removal of lands from irrigation with the aim of returning the lands to irrigation at a later time. Crop idling for water transfers is done to make water available for transfer, or in certain cases to solve drainage and drainage-related problems. Crop idling has not been specifically identified in the Santa Cruz IRWM region as a strategy for use – primarily because most of the agricultural operations rely upon groundwater for irrigation, so there is limited potential benefit and the strategy would also face practical issues such as limited infrastructure through which to transfer water. Some idling has occurred on the north coast area of the region, due present lack of legal water supplies, and there are some potential benefits of further crop idling either to reduce groundwater overdraft or to make available for municipal use water that is presently used by agriculture.

Dewvaporation or Atmospheric Pressure Desalination: Dewvaporation is a specific process of humidification-dehumidification desalination. Brackish water is evaporated by heated air, which deposits fresh water as dew on the opposite side of a heat transfer wall. The energy needed for evaporation is supplied by the energy released from dew formation. Heat sources can be combustible fuel, solar, or waste heat. The technology of dewvaporation is still being developed, and thus far the basic laboratory test unit is capable of producing up to 150 gallons per day. Despite this, it is not a viable strategy for the Santa Cruz Region at this time.

Fog Collection: There has been some interest in fog collection for domestic water supply in some of the dry areas of the world near the ocean where fog is frequent. Some experimental projects have been built in Chile, including the El Tofo project which yielded about 10,600 liters per day from about 3,500 square meters of collection net (i.e., about 3 liters per day per square meter of net). Because of its relatively small production, fog collection is limited to producing domestic water where little other viable water sources are available. The Santa Cruz Region's coastal location is ideally suited for fog collection; however, as long as other viable water sources exist, fog collection is not considered to be a practical option for the region.

Irrigation Land Retirement: Irrigated land retirement is the removal of farmland from irrigated agriculture. Permanent land retirement is perpetual cessation of irrigation of lands from agricultural production, which is done for water transfer for solving drainage-related problems. This strategy is not considered to be a priority as long as other viable water sources exist.

Rainfed Agriculture: Rainfed agriculture is when all crop consumptive water use is provided directly by rainfall on a real time basis. Rainfed agriculture has both water supply and water quality benefits. Due to unpredictability of rainfall frequency, duration, intensity, and amount, there is significant uncertainty and risk in relying solely on rainfed agriculture. This is especially true in the Santa Cruz region, where high land values and production costs require sufficient returns in order for agricultural operations to be viable. As such, this is not a viable strategy for the Santa Cruz IRWM Region.

Waterbag Transport/Storage Technology: The Steering Committee determined that this is neither a realistic nor a feasible option for the region.



North Coast stream (photo courtesy: SCWD)

Table 5-3 below shows the overlap between the California Water Plan Update 2009 resource management strategies listed above and the priority strategies identified through the conceptual framework process to implement IRWM Plan objectives, thereby illustrating which of the resource management strategies will be implemented to achieve IRWM Plan objectives.

Table 5-3 Relationship between SC IRWM Strategies and California Water Plan Resource Management Strategies

State Water Plan 2009 Resource Management Strategy	Reduce Water Demand		Operational Efficiency and Transfers				Increase Water Supply				Practice Resources Stewardship						Improve Water Quality				Flood Mgmt						
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Crop Idling for Water Transfers	Irrigated Land Retirement	Conveyance - Regional / Local	System Reoperation	Water Transfers	Conjunctive Mgmt. & Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - Region/ Local	Agricultural Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Planning and Mgmt.	Recharge Area Protection	Watershed management	Water-Dependent Recreation	Drinking Water Treatment and Distribution	Groundwater / Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt and Salinity Management	Urban Runoff Management	Flood Risk Management
Santa Cruz IRWM Strategy																											
Water Supply																											
<i>Develop production from alternative/supplemental sources</i>							X	X		X													X		X		
<i>Increase production from existing resources</i>						X	X																				
<i>Implement system inerties</i>																					X						
Update/replace aging infrastructure																				X							
<i>Construct and maintain groundwater recharge facilities</i>																	X										
Prevent/remove impervious coverage in recharge zones; reduce directly connected impervious area (DCIA)																	X										
<i>Shift groundwater pumping from coastal zone</i>																	X										
Support low impact development (LID)/redevelopment																	X										

State Water Plan 2009 Resource Management Strategy	Reduce Water Demand	Operational Efficiency and Transfers				Increase Water Supply				Practice Resources Stewardship						Improve Water Quality					Flood Mgmt						
	Agricultural Water Use Efficiency Urban Water Use Efficiency	Crop Idling for Water Transfers	Irrigated Land Retirement	Conveyance - Regional / Local	System Reoperation	Water Transfers	Conjunctive Mgmt. & Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - Region/ Local	Agricultural Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Planning and Mgmt.	Recharge Area Protection	Watershed management	Water-Dependent Recreation	Drinking Water Treatment and Distribution	Groundwater / Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt and Salinity Management	Urban Runoff Management	Flood Risk Management	
Santa Cruz IRWM Strategy																											
Water Demand																											
<i>Utilize tiered rates/conservation pricing</i>	X												X														
<i>Conduct education/outreach on conservation</i>	X																										
<i>Implement policies to minimize additional demand from new growth</i>	X																										
Implement groundwater mgmt. that includes non-municipal pumpers, to promote sustainable groundwater use	X	X																									
Utilize temporary use restrictions as needed during critical supply shortages		X																									
Utilize rebate/retrofit programs												X															
<i>Conduct irrigation management and water conservation</i>	X																										

State Water Plan 2009 Resource Management Strategy	Reduce Water Demand		Operational Efficiency and Transfers				Increase Water Supply					Practice Resources Stewardship					Improve Water Quality					Flood Mgmt					
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Crop Idling for Water Transfers	Irrigated Land Retirement	Conveyance - Regional / Local	System Reoperation	Water Transfers	Conjunctive Mgmt. & Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - Region/ Local	Agricultural Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Planning and Mgmt.	Recharge Area Protection	Watershed management	Water-Dependent Recreation	Drinking Water Treatment and Distribution	Groundwater / Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt and Salinity Management	Urban Runoff Management	Flood Risk Management
Santa Cruz IRWM Strategy																											
Water Quality																											
<i>Perform rural road improvements and maintenance</i>															X								X				
Implement BMPs related to timber harvest activities															X												
Implement erosion control measures												X															
Riparian acquisition or restoration													X			X											
<i>Develop and implement Farm Plans that include effective nutrient, sediment, and irrigation measures</i>	X												X										X	X			
<i>Implement septic system upgrades, provide incentives and/or maintenance</i>																							X				
<i>Perform sewer system upgrades and maintenance</i>																							X		X		
<i>Promote/implement private property sewer lateral upgrades and maintenance</i>																							X		X		

State Water Plan 2009 Resource Management Strategy	Reduce Water Demand		Operational Efficiency and Transfers			Increase Water Supply				Practice Resources Stewardship					Improve Water Quality				Flood Mgmt											
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Crop Idling for Water Transfers	Irrigated Land Retirement	Conveyance - Regional / Local	System Reoperation	Water Transfers	Conjunctive Mgmt. & Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - Region/ Local	Agricultural Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Planning and Mgmt.	Recharge Area Protection	Watershed management	Water-Dependent Recreation	Drinking Water Treatment and Distribution	Groundwater / Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt and Salinity Management	Urban Runoff Management	Flood Risk Management			
Santa Cruz IRWM Strategy																														
<i>Water Quality, cont.</i>																														
Removal of encampments from riparian zones																											X	X		
Conduct street sweeping																												X	X	
Conduct regular infrastructure cleaning and maintenance																											X	X		
Implement riparian exclusions for livestock																							X							
Implement livestock waste management BMPs																								X						

State Water Plan 2009 Resource Management Strategy	Reduce Water Demand		Operational Efficiency and Transfers				Increase Water Supply				Practice Resources Stewardship					Improve Water Quality					Flood Mgmt						
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Crop Idling for Water Transfers	Irrigated Land Retirement	Conveyance - Regional / Local	System Reoperation	Water Transfers	Conjunctive Mgmt. & Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - Region/ Local	Agricultural Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Planning and Mgmt.	Recharge Area Protection	Watershed management	Water-Dependent Recreation	Drinking Water Treatment and Distribution	Groundwater / Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt and Salinity Management	Urban Runoff Management	Flood Risk Management
Santa Cruz IRWM Strategy																											
Watersheds/Aquatic Ecosystems																											
<i>Reduce stream withdrawals and increase base flow at critical times to achieve streamflow targets</i>		X																									
<i>Identify and eliminate illegal diversions</i>																		X									
<i>Restore stream form and hydro-geomorphic function</i>														X													
<i>Riparian zone acquisition/easements</i>													X			X											
<i>Reduce riparian encroachment</i>													X			X											
<i>Reduce erosion and sedimentation from public and private roads, unpermitted grading, and other sources.</i>														X	X												
Preserve/enhance large woody debris (LWD) in streams and riparian zone														X	X												
Remove non-native species														X		X											
Revegetation efforts														X													
Reduce riparian encroachment														X													
Fish passage barrier removal or retrofit														X													

State Water Plan 2009 Resource Management Strategy	Reduce Water Demand		Operational Efficiency and Transfers				Increase Water Supply					Practice Resources Stewardship					Improve Water Quality					Flood Mgmt					
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Crop Idling for Water Transfers	Irrigated Land Retirement	Conveyance - Regional / Local	System Reoperation	Water Transfers	Conjunctive Mgmt. & Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - Region/ Local	Agricultural Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Planning and Mgmt.	Recharge Area Protection	Watershed management	Water-Dependent Recreation	Drinking Water Treatment and Distribution	Groundwater / Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt and Salinity Management	Urban Runoff Management	Flood Risk Management
Santa Cruz IRWM Strategy																											
<i>Watersheds/Aquatic Ecosystems, cont.</i>																											
Increase/enhance physical structure and biotic habitat complexity														X													
Promote natural sand bar function														X													
Remove non-native species														X													
Improve wetland hydrology to support desired biota														X													
Support education/outreach/technical training programs																		X									
Support volunteer stewardship prog.																		X									
Support school programs																		X									
Reduce illegal dumping																								X			
Reduce illegal diversions																								X			
Riparian corridor acquisition/protection															X												
Riparian vegetation protection and enhancement															X												
Restore hydro-geomorphic function															X												

State Water Plan 2009 Resource Management Strategy	Reduce Water Demand		Operational Efficiency and Transfers				Increase Water Supply					Practice Resources Stewardship						Improve Water Quality					Flood Mgmt				
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Crop Idling for Water Transfers	Irrigated Land Retirement	Conveyance - Regional / Local	System Reoperation	Water Transfers	Conjunctive Mgmt. & Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - Region/ Local	Agricultural Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Planning and Mgmt.	Recharge Area Protection	Watershed management	Water-Dependent Recreation	Drinking Water Treatment and Distribution	Groundwater / Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt and Salinity Management	Urban Runoff Management	Flood Risk Management
Santa Cruz IRWM Strategy																											
Flood and Stormwater Management																											
<i>Utilize riparian zones for flood management through acquisition or easement</i>													X				X										X
Increase riparian setbacks																	X										
Reduce riparian encroachment																	X										
<i>Maintain/improve levees for flood management and environmental quality</i>																											X
<i>Geomorphic modifications</i>																											X
<i>Increase channel width and floodplain function</i>																											X
<i>Remove channel constrictions</i>					X																						X
Conduct vegetation management																											X

State Water Plan 2009 Resource Management Strategy	Reduce Water Demand		Operational Efficiency and Transfers				Increase Water Supply					Practice Resources Stewardship						Improve Water Quality					Flood Mgmt					
	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Crop Idling for Water Transfers	Irrigated Land Retirement	Conveyance - Regional / Local	System Reoperation	Water Transfers	Conjunctive Mgmt. & Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - Region/ Local	Agricultural Lands Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Land Use Planning and Mgmt.	Recharge Area Protection	Watershed management	Water-Dependent Recreation	Drinking Water Treatment and Distribution	Groundwater / Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt and Salinity Management	Urban Runoff Management	Flood Risk Management	
Santa Cruz IRWM Strategy																												
<i>Flood and Stormwater Management, cont.</i>																												
Maintain storm drain conveyance efficiency																											X	X
Implement infrastructure improvements and maintenance																											X	X
Reduce directly connected impervious areas																											X	X
Implement low impact development/redevelopment																											X	X
Conduct education and outreach on flood and stormwater issues																												
Count:	2	5	0	0	1	1	1	1	1	0	1	0	1	6	18	4	7	4	4	0	2	0	2	11	2	9	10	

High priority strategies in bold; Moderate priority

As part of the project review process each of the 76 projects in the 2014 IRWM Plan were reviewed to assess their use of Resource Management Strategies in the 2009 Plan. A summary is presented in Table 5-4.

Table 5-4 Number of Projects Addressing Each Resource Management Strategies

Resource Management Strategy (RMS)	Number of projects in 2014 IRWMP Plan employing RMS
Reduce Water Demand	
Agricultural Water Use Efficiency	10
Urban Water Use Efficiency	22
Operational Efficiency and Transfers	
Conveyance – Regional/Local	16
System Reoperation	3
Water Transfers	10
Increase Water Supply	
Conjunctive Management & Groundwater Banking	17
Desalination	0
Recycled Municipal Water	7
Surface Storage – Regional/Local	8
Improve Water Quality	
Drinking Water Treatment and Distribution	13
Groundwater Remediation/Aquifer Remediation	3
Matching Water Quality to Use	13
Pollution Prevention	36
Salt and Salinity Management	10
Urban Runoff Management	33
Practice Resources Stewardship	
Agricultural Lands Stewardship	9
Economic Incentives	14
Ecosystem Restoration	38
Forest Management	5
Improve Flood Management	0
Land Use Planning and Management	20
Recharge Area Protection	11
Water-Dependent Recreation	12
Watershed Management/Planning	38
Improve Flood Management	
Flood Risk Management	20

CHAPTER 6: PROJECT REVIEW PROCESS AND INTEGRATION

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The Santa Cruz Integrated Regional Water Management Plan (IRWMP) will be implemented through the specific actions, plans, projects and programs proposed by the Regional Water Management Group (RWMG) and stakeholders. The Plan includes a wide range of project types including urban and agricultural water use efficiency, infrastructure, water supply, conjunctive use, aquifer recharge, drinking water treatment, wastewater treatment, recycled water, watershed and habitat restoration, flood and stormwater management, low impact development, groundwater quality, and education and outreach. This chapter describes the process that was used for submitting, reviewing and scoring projects and provides the final list of projects to address the objectives and strategies of the IRWM Plan. The methodology for evaluating projects serves as a tool to help project proponents, stakeholders, and the state to categorize, describe, and assess the status, benefits, feasibility, and costs of the projects in the Santa Cruz IRWM Plan. This chapter also describes the processes in place to coordinate and integrate separate efforts to promote a more unified regional planning approach and promote greater institutional, stakeholder, resource, and project integration.

6.1 BACKGROUND

The 2005 IRWM Plan was adopted with 55 projects that were proposed from stakeholders across the region, which were scored based on consistency based on a set of local and statewide planning objectives and criteria. Through the evaluation and prioritization process 17 high-priority projects were identified. 15 projects of those projects, as well as the grant administration, were included in a successful funding proposal to the State Water Resources Control Board, resulting in a \$12.5 million IRWM Implementation grant award. These 15 high priority projects are more accurately referred to as components because several of the included multiple individual projects. This IWRM grant award, paired with in local funding, and enabled the completion of high priority projects from the initial IRWM Plan. From 2008 – 2013, implementation of the 15 high priority “components” resulted in the completion of 65 projects at more than 80 sites throughout the County.

In June 2010, at the recommendation of the IRWM Steering Committee, the RWMG had an open solicitation for projects to update the IRWM Plan project list. In addition, updated information was sought for the projects contained on the 2005 project list that were not implemented under the IRWM Implementation grant. A solicitation form was developed for this purpose with the intent of standardizing the information collected from each project proponent. The form also provided an opportunity for project proponents to self-score their projects against a suite of local and statewide planning objectives.

The process for developing the 2014 IRWM Plan Update project list and how these prior efforts were incorporated in described below.

6.2 GOALS OF THE 2014 PROJECT SOLICITATION AND REVIEW PROCESS

The goal of the project solicitation and project review process is to provide a transparent methodology that is objective and fair, and one that can be systematically applied to all projects with the end result being an impartial project comparison. The process serves as a tool to help project proponents, IRWM Plan stakeholders, and the state categorize, describe, and assess the status, benefits, feasibility, and costs of the numerous projects that ultimately make up the Santa Cruz IRWM Plan.

The Santa Cruz IRWM Steering Committee developed the following project selection and prioritization process for the 2014 Plan Update with three objectives in mind:

- Update previously submitted projects from the 2009 solicitation to address the 2012 Guidelines requirements. Incorporate the work that Regional Water Management Group (RWMG) entities have already done to prepare projects for the Plan.
- Implement a process that meets the requirements described in the 2012 Proposition 84 and 1E IRWM Guidelines (<http://www.water.ca.gov/irwm/grants/guidelines.cfm>).
- Gather the project specific information using a uniform format (template) to enable an evaluation of the project both for inclusion in the Plan and to support future funding applications.

Consistency with IRWM Plan Standards

The Santa Cruz IRWM Project Review Process was developed based upon the 2012 DWR IRWM Plan Standards, which require RWMGs to:

- Develop and implement a process by which projects are reviewed and prioritized for inclusion in the IRWM Plan
- Describe procedures for submitting a project, reviewing projects and communicating the list of selected projects to stakeholders
- Evaluate the extent to which a project might contribute to achieving local and statewide planning objectives, including IRWM plan objectives and the California Water Plan resource management strategies selected for use in the IRWM plan
- Evaluate the technical feasibility of the project
- Identify specific benefits to disadvantaged community water issues and environmental justice considerations
- Document project costs and financing, economic feasibility, project status, and strategic considerations for IRWM plan implementation
- Evaluate the project's role in adapting to the effects of climate change in the region and/or contribution of the project in reducing greenhouse gas emissions as compared to project alternatives
- Promote and prioritize projects in the selection process, while keeping in consideration the unique goals and objectives of the IRWM Region

This processes established by the Santa Cruz IRWM Steering Committee to address these requirements as part of the 2014 Santa Cruz IRWM Plan update are described below.

6.3 PROCEDURES FOR SUBMITTING A PROJECT

To facilitate the submittal of information in uniform format and to ensure adequate information was requested in order to conduct a comprehensive project review, the IRWM Steering Committee and staff developed the following process and materials.

6.3.1 PROJECT TEMPLATE

A project template was developed to include all the relevant project information (Appendix C). Project projects were encouraged to input project information directly into a web-based form that was linked the Region's website (www.SantaCruzIRWMP.org). Information was posted to website regarding the project submittal submit process. Contact information for IRWM program staff was provided on the website for any stakeholder that wished to submit a project but could not utilize the online form.

6.3.2 PROJECT SOLICITATION

The 2014 call for projects was initiated electronically by updating the website include information about the solicitation and notifying to the entire Santa Cruz IRWM stakeholder listserv by email on January 28, 2014. The email containing instructions and a link to an online project solicitation form. Any stakeholder could submit a project; however, project proponents were encouraged to coordinate with Regional Water Management Group (RWMG) entities on potential submissions to identify opportunities for coordination and avoid duplication of effort.

A workshop was conducted on February 4, 2014 to inform the RWMG and stakeholders of the solicitation process. This included a demonstration and instructions on the online project submittal form, as well as a presentation on the project information requested the submittal deadline and the review and notification process. The Steering Committee and staff were available to answer questions and guide stakeholders in developing projects for inclusion in the IRWM Plan. The initial project submittal deadline was March 14, 2014; this was extended to March 28 in response the 2014 IRWM Drought Funding opportunity to provide stakeholders time to submit additional projects.

6.4 PROJECT EVALUATION CRITERIA AND RANKING

The Santa Cruz IRWM Steering Committee and staff developed criteria to guide the evaluation of projects with a transparent methodology that is objective and fair, and can be systematically applied to all projects. Projects that were submitted through the 2014 solicitation were first evaluated to determine if they supported at least one Santa Cruz IRWM Plan objective and were an eligible project type.¹ Projects that failed to meet either of these criteria were excluded from the IRWM Plan. Projects that passed the initial screening were then prioritized using a scoring scheme developed by the Steering Committee and derived from the 2012 IRWM Program Guidelines and the most recent Proposal Solicitation Package (PSP) provided by the Department of Water Resources (Round 2, IRWM Implementation).

As with the 2010 solicitation, projects were compiled into a matrix that summarizes basic project information (including costs, status, and sponsor information) as well as how the projects contribute to the priority strategies identified in the conceptual framework. To remain in the Plan, projects submitted in 2010 were updated to include information required in the 2012 IRWM Plan Guidelines, such as economic and technical feasibility, climate change adaptation and mitigation, and benefits to disadvantaged communities.

¹ Public Resources Code §75026.(a).

For the 2014 IRWM Plan, the Steering Committee sought to update the existing project list using a similar process to the 2010 solicitation, while incorporating high and medium priority strategies identified through the development of a conceptual framework for the Santa Cruz IRWM Plan, which occurred during the 2014 planning process (see Chapter 4, Goals and Objectives, for a full description of the “conceptual model” process). This approach has allowed the Steering Committee to identify the most influential actions for achieving IRWM objectives and to select appropriate performance measures to characterize how actions incrementally contribute to achieving those objectives. Accordingly, the 2014 project solicitation form was modified to include these high and medium priority strategies. The priority strategies are intended to ensure that projects with the greatest benefit are targeted for implementation.

The prioritization process seeks to identify projects that:

- Address multiple high and/or medium priority Santa Cruz IRWM Plan strategies
- Demonstrate partnership, geographic, and resource management integration
- Effectively employ Resource Management Strategies
- Will be ready to proceed within a reasonable timeframe
- Demonstrate technical feasibility
- Will be able to demonstrate an effective cost/benefit ratio
- Will be able to demonstrate project effectiveness
- Assist the region in adapting to effects of climate change or in mitigating effects
- Directly address a critical water supply or water quality need of a DAC or Tribal interest, and or address an environmental justice issue
- Address strategic considerations for IRWM implementation

The scoring scheme for the project prioritization process is outlined in Table 6-1 below.

Table 6 - 1 Project Ranking Matrix

Category	Criterion	Methodology	Max Points	Weighting
Principles of IRWM Planning and Integration	Supports high and medium-level priority objectives identified in the SC IRWM Conceptual Framework	10 points per high-priority strategy; 5 points per medium level strategy per objective - Max 40 points per objective; scores for each objective will be added to achieve total criterion score	200	43%
	Supports regional partnerships	20 points for 2 or more partners, 30 points for 3, 40 for four; 5 bonus points if an NGO is involved	45	10%
	Strategic considerations for IRWM Plan Implementation	1 point per each IRWM resource management strategy implemented	30	6%
	Land Use	Max points for when project increases coordination between water resources agencies and land use planning agencies	10	2%
Project Status and Feasibility	Technical Feasibility	Max points for documenting technical feasibility based on similar, successful past projects, site conditions known; fewer points no existing or known technology, but proponent has adequately documented project and site conditions are known	60	13%
	Economic Feasibility	Max points for economic assessment that can document and monetize benefits, and demonstrate that benefits exceed costs, and is supported with documentation provided by project proponent	20	4%
	Project Cost	Max points for demonstrating planning level cost estimates complete and matching funds are secured and adequately described (i.e. source, type (in-kind, cash, eligible grant)	10	2%
	Monitoring	Max points for adequately describing a monitoring program that will be sufficient to document project effectiveness	10	2%
	Status	Max points for documenting that all necessary permits secured and CEQA complete	10	2%
Climate Change Adaptation and Mitigation	Climate Change Adaptation	Max points for demonstrating how the project contribute to regional adaptation to vulnerabilities identified in the IRWM or other state or local climate change planning documents	15	3%
	GHG Reduction	Max points for when, compared to alternatives or to existing, does the project reduce GHG emissions or improve energy efficiency	15	3%
Disadvantaged community, tribal, and environmental justice considerations	Benefits a disadvantaged community (DAC)	Max points for project that demonstrates benefits to a DAC identified by the State or through the 2014 Plan update process	20	4%
	Benefits to Native American Tribal Community Water Issues	Max points for demonstrating that a project benefits a critical Native American tribal community water issue	10	2%
	Environmental Justice	Max points for projects that demonstrate mitigation of inequitable distribution of environmental burdens	10	2%
Max Total Points			465	100%

6.4.1 RESULTS

For the 2014 Plan, the Steering Committee and staff compiled and reviewed the information submitted by each project proponents and scored each project according to the Scoring Matrix. A total of 76 projects were submitted from 17 different entities. This included 18 planning projects and 58 implementation projects. The complete project list with scores is provided in Table 6-2 below. This project list and project summary information is also posted to the Santa Cruz IRWM website.

47 of the 76 projects (61%) addressed more than one functional area; 24 projects (32%) address more than 3 functional areas; 9 projects (12%) addressed all four functional areas. The total projects by principal functional area are:

- Water Supply – 30
- Water Quality – 21
- Watershed Stewardship/Aquatic Ecosystems - 17
- Flood and Stormwater Management – 8

Table 6 - 2 2014 IRWM Plan Project List

ID	PROJECT TITLE	PROJECT PROPONENT	CATEGORY	SCORE
59	Santa Cruz County Regional Recycled Water Feasibility Study	City of Santa Cruz	Water Supply	237
44	Water Wise Monterey Bay Friendly Ecological Landscaping Public Education and Incentives Program	Ecology Action	Water Supply	229
64	Residential and commercial water resources and environmental management program	Resource Conservation District	Water Supply	214
58	Scotts Valley Water District Water Use Efficiency (WUE)/Recharge Optimization Plan and Outdoor WUE/Recharge Implementation Pilot Project	Scotts Valley Water District	Water Supply	212
30	Farm and rangeland soil management for water conservation in Santa Cruz County	Resource Conservation District	Water Supply	209
73	Conjunctive Use Water Exchange	County of Santa Cruz	Water Supply	208
49	Implementation of LID, IPM, and Water Conservation at Santa Cruz County School Sites	Ecology Action	Water Supply	207
52	Scotts Valley Water District Regional Groundwater Conjunctive Use Planning and Implementation Project	Scotts Valley Water District	Water Supply	204
57	Scotts Valley Water District Low Impact Development Retrofits for Stormwater Treatment and Groundwater Recharge	Scotts Valley Water District	Water Supply	200
54	Managed Aquifer Recharge Program in Santa Cruz, California	Resource Conservation District	Water Supply	199
75	North Coast Agriculture Water Supply Project	County of Santa Cruz	Water Supply	193
51	Soquel Aptos Groundwater Basin Stakeholder-driven Management Plan Development and Incentive Pilot	Ecology Action	Water Supply	190
66	Groundwater Protection: Achieving water demand reduction and LID BMP implementation through expanded incentive programs	Ecology Action	Water Supply	181

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ID	PROJECT TITLE	PROJECT PROPONENT	CATEGORY	SCORE
42	Scotts Valley Water District Local and Regional Recycled Water Expansion Project	Scotts Valley Water District	Water Supply	180
14	Cox Well / Water Treatment Plant to Treat for Iron and Manganese	Central Water District	Water Supply	171
19	Davenport Recycled Water Plant	Davenport County Sanitation District	Water Supply	171
41	Scotts Valley Water District Regional Automatic Meter Read Program	Scotts Valley Water District	Water Supply	169
50	Soquel Aptos Groundwater Basin Computer Model	Soquel Creek Water District	Water Supply	163
45	Bonita Hexavalent Chromium Treatment Facility	Soquel Creek Water District	Water Supply	162
40	Scotts Valley Water District - Santa Cruz Water Department Regional Water Supply Intertie Project	Scotts Valley Water District	Water Supply	159
46	Country Club Hexavalent Chromium Treatment Facility	Soquel Creek Water District	Water Supply	158
47	Altivo Hexavalent Chromium Treatment Facility	Soquel Creek Water District	Water Supply	158
69	Davenport New Town Toilets and Showerheads Retrofit	Davenport County Sanitation District	Water Supply	156
10	Boulder Creek Recycled Water Project	Santa Cruz County Sanitation District	Water Supply	144
34	Water intake and conveyance system improvements	Davenport County Sanitation District	Water Supply	141
13	Redwood Water Tank Replacement Project	Lompico County Water District	Water Supply	140
43	City of Santa Cruz: Tait Well 1 & 4 Replacement	City of Santa Cruz	Water Supply	122
71	Managed off-stream storage for riparian water rights holders	Resource Conservation District	Water Supply	120
55	City of Watsonville Nitrate Treatment Plant	City of Watsonville	Water Supply	92
56	Chromium 6 well head treatment	City of Watsonville	Water Supply	87
25	Performance-based Incentives for Conservation In Agriculture (PICA) - Watsonville Sloughs	Resource Conservation District	Water Quality	243
65	Reducing nutrient, sediment, & pathogen pollution to surface and ground waters through implementation of Best Management Practices (BMPs) on livestock facilities	Resource Conservation District	Water Quality	237
48	LID Bioretention and Rainwater Catchment Projects Implementation following Prop 84 Planning	Ecology Action	Water Quality	230
3	Rural Roads Erosion Control Assistance Program (RRECAP) for Santa Cruz County	Resource Conservation District	Water Quality	227
9	Upper Rodeo Gulch Trunkline and Soquel Bridge Sewer Replacement	Santa Cruz County Sanitation District	Water Quality	193
5	Arana Gulch Trunkline Replacement Project	Santa Cruz County Sanitation District	Water Quality	184
8	Borregas Gulch Trunkline Replacement Project	Santa Cruz County Sanitation District	Water Quality	183

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ID	PROJECT TITLE	PROJECT PROPONENT	CATEGORY	SCORE
61	Arana Gulch Tidal Reach Enhancement Plan and Feasibility Analysis	Resource Conservation District	Water Quality	174
1	Reducing NPS Pollution in County Road Maintenance Operations	County of Santa Cruz	Water Quality	166
20	Sewer lateral and water line connection replacements	Davenport County Sanitation District	Water Quality	161
76	Private Sewer System Assistance	County of Santa Cruz	Water Quality	159
62	Arana Gulch Sediment Reduction and Habitat Enhancement Program	Resource Conservation District	Water Quality	148
16	Chanticleer Park stormwater and drainage improvements	Santa Cruz County Parks	Water Quality	146
6	Valencia Creek Sewer Relocation	Santa Cruz County Sanitation District	Water Quality	143
15	Street Sweeping and Routine Storm Drain Maintenance Water Quality Protection Project	Santa Cruz County Road Maintenance	Water Quality	143
72	City of Santa Cruz Drought Mitigation to Improve Potable Water Quality, Implement Conservation Program for Agriculture, and Reduction of Ecosystem Conflicts with Habitat Conservation	City of Santa Cruz	Water Quality	138
4	Lode Street Wet Weather Flow Management Facility	Santa Cruz County Sanitation District	Water Quality	137
11	Upper Santa Cruz Harbor North of Brommer Street Sewer Replacement	Santa Cruz County Sanitation District	Water Quality	121
67	Monterey Bay Seawater-Freshwater Interface Location Study	Soquel Creek Water District	Water Quality	120
7	Jewel Box & Venetian Sewer Replacement Project	Santa Cruz County Sanitation District	Water Quality	119
17	Low Impact Demonstration Project - 701 Ocean Street	Santa Cruz County Parks	Water Quality	90
23	Integrated Watershed Restoration Program (IWRP)	Resource Conservation District	Watershed Stewardship/Aquatic Ecosystems	260
63	Watsonville Slough Restoration and Enhancement Project	Watsonville Wetlands Watch	Watershed Stewardship/Aquatic Ecosystems	258
68	San Lorenzo River Alliance	Coastal Watershed Council	Watershed Stewardship/Aquatic Ecosystems	238
32	West Branch Struve Slough Habitat Restoration and Enhancement Project	Watsonville Wetlands Watch	Watershed Stewardship/Aquatic Ecosystems	229
12	Santa Cruz Countywide Partners in Restoration Permit Coordination Program (PIR)	Resource Conservation District	Watershed Stewardship/Aquatic Ecosystems	225
24	Salmonid Recovery in the San Vicente Creek Watershed	Resource Conservation District	Watershed Stewardship/Aquatic Ecosystems	224

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ID	PROJECT TITLE	PROJECT PROPONENT	CATEGORY	SCORE
33	Ecosystem Condition Profile for the San Lorenzo River Watershed using the Level 1-2-3 Framework	Central Coast Wetlands Group at MLML	Watershed Stewardship/Aquatic Ecosystems	195
22	Recovery of the Santa Cruz long-toed salamander and California red-legged frog in the Larkin Valley	Resource Conservation District	Watershed Stewardship/Aquatic Ecosystems	191
53	Zayante Area Outreach Program	Resource Conservation District	Watershed Stewardship/Aquatic Ecosystems	190
26	Scott Creek Lagoon Restoration	Resource Conservation District	Watershed Stewardship/Aquatic Ecosystems	179
74	Lower Soquel Baseflow Protection	County of Santa Cruz	Watershed Stewardship/Aquatic Ecosystems	168
27	Santa Cruz County Watershed Awareness and Stewardship Project: Phase II	Resource Conservation District	Watershed Stewardship/Aquatic Ecosystems	167
18	Moran Lake Water Quality and Butterfly Habitat Restoration Project	Santa Cruz County Parks	Watershed Stewardship/Aquatic Ecosystems	160
60	Pajaro River Steelhead enhancement	City of Watsonville	Watershed Stewardship/Aquatic Ecosystems	160
31	Fire Prevention & Fuel Load Management Program	Resource Conservation District	Watershed Stewardship/Aquatic Ecosystems	154
37	Freedom Sanitation District Trunk Sewer Replacement Project	City of Watsonville	Watershed Stewardship/Aquatic Ecosystems	142
38	Mañana Lane Sanitary Sewer Replacement Project	City of Watsonville	Watershed Stewardship/Aquatic Ecosystems	122
70	Storm Water Allocation Program (SWAP) - Alternative Compliance Options for Stormwater Mitigation	Resource Conservation District	Flood and Stormwater Management	198
2	Repair Sidewalls, Invert, Outfalls and Fish Passage Channel in the Branciforte Creek Flood Control Channel	City of Santa Cruz	Flood and Stormwater Management	172
21	Farm Neighborhood Park and Community Center including storm water quality improvement measures	Santa Cruz County Parks	Flood and Stormwater Management	170
35	Lee Road Stormwater Control Measures Development	City of Watsonville	Flood and Stormwater Management	158
39	Rio Del Mar Flats Stormwater Drainage Project Along Soquel Creek	SC County Flood Control and Water Conservation District Zone 6	Flood and Stormwater Management	112
36	Santa Cruz Stormwater Residuals Disposal Site	City of Watsonville	Flood and Stormwater Management	107
28	Implementation of portions of the Storm Drain Master Plan Recommendations, Santa Cruz County, California, Zones 5 & Zone 6	SC County Flood Control and Water Conservation District Zones 5 and 6	Flood and Stormwater Management	97

ID	PROJECT TITLE	PROJECT PROPONENT	CATEGORY	SCORE
29	38th Avenue Detention Basin Retrofit	SC County Flood Control and Water Conservation District Zones 5	Flood and Stormwater Management	92

6.4.2 PROCEDURE FOR COMMUNICATING THE LIST OF SELECTED PROJECTS

The results of the project ranking were sent to each project proponent, an email notification was sent to the stakeholder distribution list informing that the project list was posted on the Santa Cruz IRWM website for stakeholder review and comment. The ranked Project List was approved by the RWMG as part of the final IRWM Plan adoption process. The final ranked Project List is posted on the Santa Cruz IRWM website at www.SantaCruzIRWMP.org.

6.4.3 UPDATING THE IRWM PROJECT LIST

The IRWM Plan is intended to be a living document based upon the recognition that regional priorities will change over time. In between formal updates to the Plan, the IRWM Steering Committee will periodically review and assess the list of projects in the Plan. Pending the need, and as finances allow, the Steering Committee may recommend a new solicitation for projects and otherwise make adjustments as necessary to be responsive to changes throughout the Region. Solicitations are anticipated to occur on a periodic basis, contingent on the state's IRWM Program grant solicitation schedule. The Plan project list will continue to evolve with each new project solicitation. Updating the IRWM project list will not entail formal re-adoption of the Plan, but just the approval of the RWMG through a simple majority vote. The project lists (and updates) will be announced to stakeholders via email and will also be available for download on the Santa Cruz IRWM website at www.SantaCruzIRWMP.org.

6.4.4 IDENTIFYING PROJECTS FOR FUTURE IRWM GRANT FUNDING REQUESTS

In the event of future solicitations for IRWM funding applications, the Santa Cruz IRWM Steering Committee will lead the effort to develop an application. The Steering Committee will consider strategic aspects of plan implementation in determining what projects to include in an application, including selecting the projects that implement high and medium level strategies in order to best enable the Region to achieve its objectives. The specific projects to be included in the application will be drawn from the project list. The Steering Committee will contact project sponsors to gauge interest in participating in a funding application. For those that are interested, the Steering Committee will develop a set of criteria based on the current Proposal Solicitation Package to further refine the project list. Once applied a final project list for the proposal will be circulated to all project sponsors for review and comment. The Steering Committee and project sponsors together will make the final decision on what projects to put forward in any grant round. An application cannot go forward without the final support of the full RWMG.

In order to be included in an application for IRWM grant funds, all project sponsors must formally adopt, or commit to formally adopting, the IRWM Plan prior to the application being submitted; and all project proponents must have formally adopted the IRWM Plan prior to the grant being executed. All project

sponsors included in the funding application will share equitably in the costs and burdens of developing the funding application.

6.4.5 IRWM PROJECT INTEGRATION

The development of the 2005 Santa Cruz IRWM Plan, the subsequent successful implementation of high priority IRWM projects, and the completion of the IRWM Plan Update 2014 are indicators that the Region is forming, coordinating, and integrating separate efforts in support of a unified regional water management planning effort. Integration is occurring across different levels, through stakeholders, resources, and project development and implementation.

Stakeholder Integration

The governance structure for the Santa Cruz IRWM Region (RWMG + stakeholders) represents a balance and diversity of interests and includes nearly all of the water resource-related agencies responsible for water supply and water quality, flood protection and stormwater management, wastewater and recycled water, and watershed management in the region. The process fosters stakeholder and institutional integration by encouraging the region's diverse range of agencies, interest groups, and residents to actively participate in the IRWM planning process. The formation of the Regional Water Management Foundation to support Santa Cruz IRWM efforts is a unique example of institutional integration in between resource agencies and a community-based organization. Stakeholder outreach methods illustrate the intent to engage a broad, diverse group of participants. Anyone can participate and play a role in IRWM planning, and specifically in the IRWM Plan Update, either through occasional working groups or through public comment, regardless of their ability to pay.

Resource Integration

The Santa Cruz IRWM planning process promotes resource integration in several ways. The active participation of RWMG agencies and stakeholders brings together a wealth of knowledge, expertise, and technical capacity to the planning process. The IRWM Plan itself is based on existing data and information from local agencies, and represents the combined planning efforts of water, land use, and environmental resource agencies throughout the Region. Another way in which the IRWM planning process promotes integration is through the sharing of data (see Chapter 10, Data Management). Throughout the Santa Cruz IRWM Region, a great deal of valuable environmental and water resource data is being collected, but unfortunately, few of these efforts are coordinated and data is seldom shared. The IRWM planning process is helping 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. Finally, resource integration is promoted through the implementation of a broad and diverse array of resource management strategies (see Chapter 5). Promoting an integrated and diversified approach to resource management through the IRWM Plan will enable the Region to become more resilient to, and mitigate for, uncertain future circumstances, such as climate change.

Project Integration

An example of project integration in the Santa Cruz IRWM Region is the Integrated Watershed Restoration Program (IWRP). IWRP is an innovative, effective, coordinated program for local, state, and federal watershed restoration efforts, as described in more detail in Chapter 14 Coordination. The

identification and integration of watershed restoration projects from agencies and stakeholders in the Region is a primary purpose of IWRP. Projects receive technical review by a Technical Advisory Committee consisting of natural resource managers, engineers, ecologists, and biologists representing local, state, and federal agencies; these include the County of Santa Cruz, California Department of Fish and Wildlife, Regional Water Quality Control Board, National Oceanic and Atmospheric Administration National Marine Fisheries Service, Army Corps of Engineers, U.S. Fish and Wildlife, and Natural Resources Conservation Service. In addition, many of the watershed restoration projects are facilitated through the Partners in Restoration Permit Coordination Program (PIR). PIR promotes voluntary implementation of conservation projects to provide a wide range of resource benefits to water quality, habitat quality, and the conservation of agricultural resources. To date, the Santa Cruz IRWM program has funded the implementation of more than 40 watershed stewardship and water quality related projects that were developed through IWRP.

Another example of project integration in the Santa Cruz Region is the development and promotion of stormwater infiltration practices which provide increased groundwater recharge, reduced runoff, and improved water quality. These efforts involve multiple entities including the affected water supply agencies, public works agencies, Resource Conservation District, and property owners. These projects are being implemented at multiple locations in the county. The projects integrate the stormwater management efforts of the county and local municipalities and are informed by the efforts of the Monterey Bay Storm Water Action Group (SWAG). These collaborating partners, including RWMG agencies and stakeholders, identify regional activities and programs to address stormwater quality implementation needs. Multiple projects related to these efforts are included on the IRWM Plan 2014 project list. Previously funded IRWM efforts include elements of the stormwater pollution prevention program and groundwater recharge projects.



Aptos Sewer Transmission Main Relocation – Seacliff State Beach (2010)

CHAPTER 7: BENEFITS AND IMPACTS

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This chapter provides a brief discussion of the potential benefits and impacts of implementing the Santa Cruz Integrated Regional Water Management (IRWM) Plan, including those affecting disadvantaged communities, environmental justice concerns, and Native American Tribal communities. Consistent with the California Department of Water Resources (DWR) requirements contained in the 2012 IRWM Grant Program Guidelines, the discussion is not exhaustive but rather provides a screening level analysis to provide a sense of the benefits and impacts of implementing the IRWM Plan. This overview of benefits and impacts will serve as a benchmark to help the Regional Water Management Group (RWMG) assess whether the anticipated benefits of the IRWM Plan have been realized and/or whether unanticipated impacts have occurred.

Impacts and benefits will be analyzed in more detail prior to the implementation of specific projects. A technical screening will be conducted initially for each project to evaluate whether the project is the most cost-effective option to achieve the desired objective. Additionally, environmental impact assessments will be conducted in accordance with the California Environmental Quality Act (CEQA) and, if applicable, the National Environmental Policy Act (NEPA). Additional regulatory permissions required by the various resource agencies will further help to describe potential impacts and benefits of the various projects contained in this Plan.

Implementation of this IRWM Plan will potentially generate a range of benefits and impacts, at the project, regional, and potentially interregional scale. The impacts and benefits are assessed based on performance measures as described in Chapter 8, Plan Performance and Monitoring. The impacts and benefits of Plan implementation will be reviewed and updated during each Plan performance review, which will occur on a five year interval concurrent with the plan update, or as resources allow.

The following briefly summarizes some of the more significant benefits of Plan implementation:

- *A more resilient water supply:* Development of alternative/supplemental water supplies would lead to enhanced water supply reliability that would have a reduced impact on streamflow and groundwater.
- *Improved water quality:* Water quality projects targeting key pollutants of concern, particularly bacteria, sediment and nitrates, would address key water quality concerns in the Region. Reliable and high quality water is directly linked to economic and environmental health and well-being.
- *Cost-effective projects that realize multiple benefits:* Opportunities for multi-benefit projects, which can achieve a multitude of goals and objectives for several stakeholders rather than a single entity, provide increased value to stakeholders and the communities they serve. Integrated planning and collaboration can lead to projects that achieve cost savings through cost-sharing opportunities, economies of scale, resource sharing, and other mechanisms. Existing resources can be optimized, duplication of efforts avoided, and larger scale efforts developed to provide cost savings to all involved.
- *Reduced flooding and flood-related impacts:* Implementation of the IRWM Plan could lead to reduced levels of nuisance flooding and economic impacts from larger floods when they occur.
- *Increased coordination and efficiency:* Completion and implementation of the Santa Cruz IRWM Plan equips agencies to overcome future challenges by coordinating resources and more effectively meeting the needs of the Region as a whole.

- *Reduced conflicts:* This IRWM Plan provides a guide for agencies and stakeholders to work together as a cohesive group to solve water resource problems in a holistic way and with a consensus-based approach. Ideally this will reduce interagency conflicts that may prevent projects from gaining the necessary support for successful implementation.
- *Improved local understanding of water resource issues:* Through consistent and coordinated public outreach and education programs, local understanding of regional water resource issues, conflicts, and solutions will improve. Maintaining a consistent message will improve public understanding of water resource management issues and encourage public support for funding much-needed water resource projects.

1.1 PROJECT-LEVEL BENEFITS

The projects included in the Santa Cruz IRWM Plan are summarized by project type. For each project, potential benefits and impacts are assumed to be similar to those identified for the specific project type. The projects contained in this Plan are expected to achieve the following types of benefits.

1.1.1 INCREASED GROUNDWATER STORAGE/RECHARGE

Increased storage and recharge will benefit each of the Region's groundwater basins, which are all in a state of overdraft. Typical projects may include those that aim to achieve the following:

- Enhance conjunctive management and groundwater storage
- Stormwater capture and recharge
- Implementation of low-impact development and retrofit of existing impervious areas
- Aquifer storage and recovery
- Construction of new and/or rehabilitation of recharge basins
- Hydrogeologic investigations and groundwater modeling

1.1.2 IMPROVED WATER SUPPLY RELIABILITY

Projects that diversify the Region's water supply portfolio, create new supplies, or improve efficiencies of existing supplies will improve the Santa Cruz Region's water supply reliability. Projects that would achieve this benefit include:

- Water use efficiency and water conservation projects
- New water supply pipelines and/or rehabilitation/repair projects
- Water system tie-ins, interconnections, and diversion structures
- Water transfer projects
- Groundwater extraction and/or treatment projects
- Water storage and treatment projects
- Upgrading wastewater treatment facilities to produce recycled water
- Water quality protection projects

1.1.3 IMPROVED WATER QUALITY

Water quality improvement projects will continue to be given strong emphasis within the Region, with a focus on non-point source pollution and the primary pollutants of concern. Projects that improve water quality include, but are not limited to:

- Stormwater projects (e.g., stormwater capture and recharge or stormwater management to reduce volume of urban runoff discharged to surface waters)
- Erosion and sediment control projects, principally from roads
- Continued inspection program for septic systems, requirements of upgrades where necessary
- Conjunctive management and groundwater storage
- Sewer collection improvements, particularly from private laterals
- Ecosystem restoration and revegetation projects
- Land conservation
- Nutrient and salinity management

1.1.4 FLOOD MANAGEMENT

Flooding is a concern for many areas within the Santa Cruz IRWM planning region. Many cities and communities are included in 100-year floodplains of the San Lorenzo and Pajaro Rivers and Soquel Creek. Flooding can occur from heavy rainfall, saturated soils, or a combination of these conditions. Also, increasing development leads to an increase in impervious surface areas and a decrease in natural vegetative cover, which reduces the detention and attenuation characteristics of the overland areas. To reduce potential property and structure damage and economic impacts, flood control enhancement may be provided by projects that:

- Capture and divert stormwater
- Improve levee systems (e.g., floodwalls or setback levees)
- Install pervious pavement
- Protect, restore, and manage floodplains
- Construct regional flood control infrastructure

1.1.5 INCREASED RECYCLED WATER

Increasing the amount of recycled water available for landscape, golf course, and school irrigation, industrial uses, and other uses, will lead to other benefits such as potable water offsets, reduced groundwater and stream extractions, and increased nutrient levels for landscape, and reduced wastewater discharges to the Monterey Bay National Marine Sanctuary.

1.1.6 HABITAT PROTECTION, RESTORATION, AND ENHANCEMENT

Projects that contribute to habitat protection and restoration have the ability to enhance the Santa Cruz Region's ecosystems and protect threatened, endangered, and sensitive species. The following types of projects would provide this benefit:

- Development of an alternative/supplemental water supply that would reduce dependence on existing sources and provide additional water for environmental uses
- Land conservation
- Species recovery
- Water quality protection projects that would result in surface water quality improvements
- Invasive species removal
- Restoration and enhancement of special aquatic features (e.g., wetlands, fish barrier removal)
- Stormwater management and pollution prevention
- Debris cleanup and habitat restoration
- Road management activities to reduce runoff and sediment discharge to streams

1.1.7 LONG-TERM SUSTAINABILITY OF WATER SUPPLIES

As discussed throughout this Plan, all of the Region's basins are in a state of overdraft. Conservation combined with development of alternative/supplemental water supplies are necessary to ensure the long-term sustainability of local water supplies, particularly in areas subject to seawater intrusion.

1.1.8 PUBLIC EDUCATION AND ENVIRONMENTAL AWARENESS

Many water conservation, water quality protection, and water supply projects include public education and environmental awareness components, creating multi-benefit projects or programs. Public outreach programs include, for example, those that help promote water conservation efforts, educate about forest stewardship which can improve water resources, discourage illegal dumping of trash and litter in watercourses, and encourage appropriate water management practices including appropriate collection and disposal of hazardous liquid wastes and pharmaceuticals.

1.1.9 REDUCED THREAT OF WILDFIRE

Wildfires threaten property, lives, and ecosystems, and can adversely impact flood management and erosion. There is already evidence that wildfires are becoming more frequent, longer, and more widespread, and are expected to increase in frequency and severity due to climate change. Ecosystem restoration and protection and fire preparedness (e.g., defensible space, chipping) activities help reduce the threat and impact of wildfire.

1.1.10 OPEN SPACE PRESERVATION

Open space preservation is a benefit that can be achieved through implementation of land conservation projects. Preserving open space contributes to other benefits such as environmental and recreational benefits, as well as stormwater control, reduced runoff, and flood management benefits.

1.1.11 ENHANCED RECREATION AND PUBLIC ACCESS

Reservoirs, parks, and the wilderness within the Santa Cruz Region are used by outdoor recreation enthusiasts throughout the year. Enhancing recreation and public access in the region will be achieved by projects that:

- Conserve and preserve open space and access to public land
- Remove and control invasive species
- Improve water quality
- Provide appropriate sanitation facilities at recreation sites
- Road management activities to reduce runoff and sediment discharge to streams
- Improve opportunities for public outreach and environmental education

1.1.12 LOCAL PROSPERITY

Local prosperity can be achieved by:

- Ensuring an adequate water supply to support the region's economy
- Avoiding costs of water supply infrastructure with the implementation of water conservation and water use efficiency projects
- Avoiding flood damage costs
- Avoiding impacts to the economy (e.g., businesses and agriculture) associated with water supply interruption
- Increasing tourism and recreational opportunities through improved water quality
- Providing additional jobs and benefiting the regional economy through construction and maintenance of proposed IRWM projects

1.2 PROJECT-LEVEL IMPACTS

Implementation of the projects described in this Plan may also have quantitative and/or qualitative impacts if the Santa Cruz IRWM Plan and/or its component projects are not managed or implemented properly. These impacts may include increased project costs to agencies and ratepayers, delayed construction and/or operation of planned facilities leading to delayed water supply and other benefits, negative impacts to surface water and/or groundwater quality, and more limited operational flexibility, especially in times of drought, leading to increased water rationing and associated pressure on water users and the environment.

Project-specific environmental compliance processes will be completed by project proponents prior to project implementation. These processes will determine the significance of project-related impacts. Each project must comply with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), if applicable, prior to and throughout implementation. Additional permitting requirements from resource agencies (e.g., California Department of Fish and Wildlife, Regional Water Quality Control Board, and Army Corps of Engineers) will provide information regarding potential impacts.

Negative impacts that could be associated with the implementation of projects and programs included in the Santa Cruz IRWM Plan are similar to those of other water infrastructure projects. In general, temporary, site-specific impacts related to construction and potential long-term impacts associated with project operation are anticipated. Short-term, site-specific construction impacts from implementing physical project facilities may include increased traffic and/or congestion, noise, and impacts to public services, utilities, and aesthetics. Other potential, longer-term impacts are described in more detail below.

1.2.1 WATER QUALITY DEGRADATION

Groundwater-related projects, such as projects that increase groundwater pumping or implement conjunctive use, could degrade water quality if not operated appropriately for the groundwater basin and conditions. In addition, projects that involve the implementation of potentially contaminating activities in groundwater recharge areas could result in negative impacts to groundwater quality.

Surface water quality could similarly be impacted by projects that encourage recreation and/or intensive development. Such projects have the potential to increase loading of nutrients, bacteria, and other contaminants to adjacent surface water bodies, negatively impacting water quality for water supply and environmental needs. Recreation-related projects also have the potential to increase erosion and sedimentation. Increased motor vehicle traffic and foot traffic can increase erosion and sedimentation to adjacent water bodies, negatively affecting water quality for water supply and environment/habitat purposes. Water quality issues associated with increased erosion and sedimentation can be detrimental to aquatic communities. Additionally, storm drains and channel modifications that are implemented to manage flood flows can contribute to erosion and sedimentation.

1.2.2 REDUCED GROUNDWATER AVAILABILITY AND RELIABILITY

Several areas of the Santa Margarita and Aromas groundwater basins have groundwater quality issues. Groundwater recharge projects could potentially mobilize existing contaminant plumes that could reduce overall groundwater availability and water supply reliability to users depending on the source. Increased groundwater pumping in the area would contribute to existing overdraft conditions, potentially degrading water quality and further decreasing overall reliability.

1.2.3 LAND USE COMPATIBILITY (RIGHTS-OF-WAY)

A potential impact of any project that includes construction of physical facilities is land use compatibility and potential concerns of nearby residents or businesses. The types of projects that could potentially have land use compatibility or rights-of-way issues include:

- Water conveyance facilities and pump stations
- Storage tanks or reservoirs
- Treatment plants
- Wastewater collection
- Recycled water distribution facilities

1.2.4 DISTURBANCE OF HABITAT AND ENDANGERED SPECIES

The Santa Cruz Region is a largely natural area with significant portions designated as rural or open space. The region provides habitat for numerous species, including special status species (i.e., endangered, threatened, sensitive, or candidate). Projects that involve facility construction have the ability to disturb surrounding habitat and endangered species, depending on the location, type of construction, and facilities. All projects implemented will comply with CEQA and NEPA, as applicable, and as part of that process will identify and implement mitigation measures for potential environmental impacts as necessary.

1.2.5 ENERGY CONSUMPTION

The water sector plays a significant role in California's energy consumption. Implementing certain projects may increase energy use. Water and wastewater treatment projects that require significant amounts of power may result in increased energy consumption in the region. Increased energy consumption can increase greenhouse gas emissions, further exacerbating projected climate change impacts.

1.2.6 ECONOMIC IMPACTS

Implementation of certain projects may have associated long-term economic impacts to agencies and ratepayers. Project financing has historically provided a challenge in the Santa Cruz Region. Even when grants and/or low-interest loans are available to subsidize project capital costs, agency rate revenues are sometimes insufficient to properly operate and maintain the project. Because funds available to implementing agencies are generally limited, it will be important to evaluate financing methods and avenues for potential projects prior to implementation in order to minimize potential economic impacts on ratepayers and agencies in the Region.

1.3 PLAN-LEVEL IMPACTS AND BENEFITS

A number of qualitative benefits could derive from IRWM Plan implementation, including a reduction of regional water related issues; increased information and data sharing; opportunities for collaboration on regional project development; identification of a more diverse and coordinated funding portfolio for project implementation; and programmatic-level economies of scale savings. Ongoing IRWM Plan implementation and updates could help to increase the public's understanding and acceptance of water issues and the strategies designed to address those issues. Finally, the IRWM planning effort could act as a venue for discussion and problem-solving of complex regulatory issues, particularly for water quality concerns.

Additionally, as previously stated, working on a regional basis aids in protecting the economy of the Santa Cruz Region and minimizing direct monetary impacts felt by disadvantaged communities (DACs) in the region through the stabilization of water and wastewater utility rates. IRWM planning and collaboration can lead to multi-benefit projects that achieve cost savings through cost-sharing opportunities, economies of scale, resource sharing, and other mechanisms. Existing resources can be optimized, duplication of efforts avoided, and larger scale efforts developed to provide cost savings to all involved.

At a planning level, impacts of the IRWM process are related to the increased responsibility for funding, administering, updating, and implementing the IRWM Plan. It has been the RWMG's experience that a significant amount of time and resources are needed to develop funding applications, administer grants, and manage and update the IRWM Plan. Much of the work to prepare this update was unfunded, requiring additional resources from the RWMG, particularly the County of Santa Cruz. Dedicated implementation will potentially entail: pursuit of grant and other funding sources; multiple forms of interpersonal contact involving stakeholder time commitments; project development, implementation, and monitoring; and plan performance monitoring and potential update.

1.3.1 INTERREGIONAL BENEFITS AND IMPACTS

Interregional projects such as the restoration and water quality projects in the Watsonville/Pajaro overlap area stand to provide benefits that extend beyond regional boundaries. The projects included in this Plan update benefit not only the local agencies and residents of the Santa Cruz Region, but multiple watersheds and the Monterey Bay National Marine Sanctuary.

- Reduced effluent discharges (and associated pollutant loadings) into the Monterey Bay National Marine Sanctuary due to increased recycled water use and water quality improvement projects
- Improved regional water supply and reliability for the Pajaro IRWM Region achieved through water conservation, recharge, and supplemental supply to the shared Aromas formation.

Project-dependent, construction-related impacts would most likely not impact other IRWM regions, as project and program facilities would be implemented within the Santa Cruz Region with temporary and local impacts, if any.

1.3.2 BENEFITS AND IMPACTS TO DISADVANTAGED COMMUNITIES, ENVIRONMENTAL JUSTICE, AND NATIVE AMERICAN TRIBAL COMMUNITIES

Protection of the people and economy of DACs and Native American tribal communities in the region, and addressing environmental justice concerns, are priorities for the Santa Cruz IRWM Plan. Environmental justice is addressed by ensuring that all stakeholders have access to the planning and decision-making process and that minority and/or low-income populations, such as DACs and Native American tribal communities, do not bear disproportionately high and adverse human health or environmental impacts. Working on a regional basis aids in protecting the economy of the Santa Cruz Region and minimizing direct monetary impacts felt by DACs and Native American tribes in the region through the stabilization of water and wastewater utility rates. Implementation of the region's flood management and stormwater projects will disproportionately benefit DACs and low-income communities given the heightened risk these areas face. The Amah Mutsun tribal band and other tribal groups in the Santa Cruz Region are also encouraged to participate in the IRWM planning process. Although there are no federally or state-recognized tribes actively engaged in the IRWM planning process, through the project review process the Steering Committee has sought to keep tribal representatives informed and engaged where there are potential benefits. Impacts of IRWM project implementation to DACs and Native American tribes will be kept to a minimum, and ongoing coordination and public involvement will aid in preventing possible impacts.

Regional coordination has been and will continue to be achieved through the noticing of public meetings, which will be held as needed to address public and stakeholder concerns, including routine reviews to ensure that DACs are not being adversely affected by project and Plan implementation. The RWMG is currently devoting additional effort to identify DAC's and their water-related needs in the region with supplemental funding for DAC assistance from DWR.

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.

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.



Fish Sampling San Lorenzo River
Photo courtesy: SCWD

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.

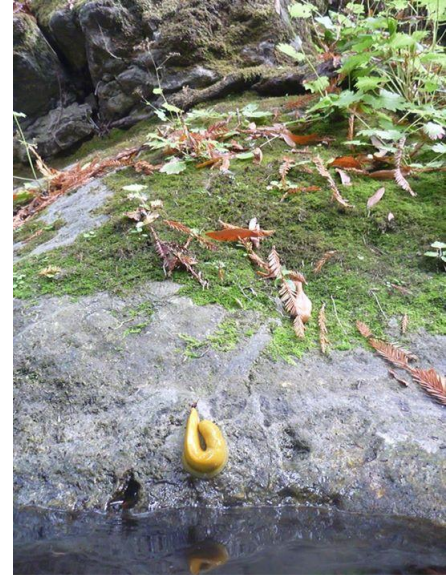
Data: Alternative source production targets for participating water districts.

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.

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.



Stormdrain

Photo courtesy: County of Santa Cruz

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.

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) 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.¹ 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.²

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.³

¹ http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp_sop_field_measures_water_sediment_collection_v1_0.pdf.

² http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/qaprp082209.pdf.

³ 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.

CHAPTER 10: FINANCE

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Funding is the primary obstacle in the Santa Cruz Region for implementing many of the projects and programs in Integrated Regional Water Management (IRWM) Plan. The challenge of securing adequate funding for integrated planning and project implementation is not unique to Santa Cruz; it is a significant obstacle statewide and is one of the primary topics addressed in the California Water Plan Update 2013. It is evident that the need for funding substantially exceeds the grant funding available through state bond measures and the prospect of future bond funding remains uncertain. The Santa Cruz Region's success to date in securing local and state funding to support IRWM planning and implementation efforts supported the completion of numerous high priority projects that have incrementally advanced the Region's progress towards the goals of the IRWM Plan. However, to continue this progress, it will require significant investment in planning and capital costs from project construction as well as ongoing funding for operation and maintenance. While future state and federal funding are anticipated to continue to be a source of supplementary funds, the bulk of the cost of developing, maintaining, and implementing the IRWM Plan will be borne by local entities. The total cost of the projects in the 2014 Plan is more than \$256,000,000, the individual project costs range from \$75,000 to \$90,000,000 with a median of \$1,000,000.

As described in the following Chapter, the financing of the IRWM Plan has been considered at a programmatic level by the Regional Water Management Group (RWMG) to evaluate various potential funding mechanisms and sources to developing, maintaining, and implementing an IRWM Plan. This Chapter provides a program-level description of the sources of funding that will be utilized for the development and ongoing funding of this IRWM Plan, and the potential funding sources for projects and programs that implement the IRWM Plan.

Table 10 - 1 IRWM Grants Awarded to the Santa Cruz IRWM Region

Grant Program	Grant Amount	Local Match
IRWM Implementation Grant (SWRCB, Prop 50)	\$12,500,000	\$13,818,205
Proposition 84 IRWM Planning Grant (DWR, Prop 84)	\$999,750	\$391,028
DAC Outreach Pilot Project Grant (DWR, Prop 84)	\$100,000	\$0

10.1 ONGOING SUPPORT FOR THE IRWM PLANNING AND EFFORTS

Historically, financial support for IRWM Plan development in the Santa Cruz IRWM Region has come from the participating agencies in the Regional Water Management Group (RWMG). The 2005 Northern Santa Cruz IRWM Plan was funded by contributions from the participating agencies. The 2014 Plan update was funded primarily through Proposition 84 IRWM Planning Grant funds with local assistance from the RWMG. Going forward, the RWMG recognizes that most of the cost to maintain IRWM efforts must come from its member agencies. A demonstration of a commitment to IRWM efforts is the financial contributions ranging from \$5,000 - \$10,000 from each of the RWMG agencies (excluding the Davenport County Sanitation District) to the Regional Water Management Foundation for a total combined annual contribution of \$75,000 for fiscal year 2013-2014 and 2014-2015 to fund staff efforts for IRWM coordination. This enables RWMF staff to provide programmatic IRWM coordination, assistance to the IRWM Steering Committee, support with IRWM planning efforts, conduct outreach

locally as well as to state agencies, and support the region's preparation for future funding opportunities. Following the completion of the 2014 Plan Update, as both the local and state IRWM efforts continue to evolve, the Santa Cruz Region will continue to assess the most feasible and equitable methods to fund IRWM efforts through a variety of avenues as outlined below.

10.2 FUNDING SOURCES FOR PROJECTS/PROGRAMS THAT IMPLEMENT THE IRWM PLAN

State grants through voter-approved bonds have funded a number of IRWM projects. Table 10-1 shows prior IRWM grant awards to the Region. Other grant sources and funding mechanisms have been utilized to implement other projects contained in the IRWM Plan. In-kind services play a large role in project implementation, supporting the technical and administrative oversight required by the projects and the grants themselves.

The majority of the project proponents have not yet successfully identified local funding sources to support implementation of their proposed projects. The combined estimated costs of the projects within the plan is more than \$256 million. Most of the projects included within the Santa Cruz IRWM Plan were submitted with the recognition that additional funding from sources such as those listed below will be required for implementation. It should also be recognized that statewide from 1995-2010, 84% of water project funding has come from local sources¹

Each implementing organization has a unique set of revenue and financing methods and sources. This Plan does not provide an exhaustive list of funding sources available. Potential funding sources for implementing projects are listed in Table 10-2, and the funding mechanisms are further described below. Many of the local funding sources require some sort of approval by the ratepayers as specified in Proposition 218.

Table 10 - 2 Potential Sources of Funding

Funding Mechanisms	Project/ Program Implementation	Project O&M	Certainty & Longevity of Funding
User Rates/User Fees	X	X	Dependent upon rate structure adopted by project proponents
Capacity/Impact Fees	X	X	Dependent upon rate structure adopted by project proponents
Special Assessments	X	X	Dependent upon the ability to demonstrate direct and unique benefits to parcels. Once in place this represents high certainty of funding.
General or Capital Improvement Funds	X		Dependent upon budgets adopted by project proponents and participating agencies
Revenue Bonds	X		Dependent upon debt carried by project proponents, revenue stream, and bond market

¹ California Water Plan Update, 2013.

Funding Mechanisms	Project/ Program Implementation	Project O&M	Certainty & Longevity of Funding
Local, State, or Federal Grant Programs	X		Dependent upon future local, state, and federal budgets, and success in application process
Low-interest Loan Programs	X		Dependent upon future local, state, and federal budgets, and success in application process
Private Philanthropic Funding	X		Dependent on willingness of donors, and success of outreach

Raterpayer Fees and Users Fees

Ratepayer and user fees provide a source of revenue for a water agency or districts for the operation and maintenance of the water system infrastructure. The fee charged to users typically includes a fixed cost component for providing service that does not vary with depending upon the amount of supplied water and a variable cost component that is based upon on the amount of water supplied and includes the associated costs (e.g., pumping, electrical, treatment costs). Customers typically pay a monthly or bi-monthly fixed rate and a variable rate based on the metered usage.

Tiered water rates have a variable fee increases with water consumption. Rates may also vary in response emergency water shortages, such as droughts. For example, in response to the 2013 – 2014 drought, user rates at some agencies in the Region have increased in response to water cutbacks and the need to maintain operating revenue. As users conserve more water, the agency generates less revenue based upon decreased water supplied but the operational costs of maintaining the system do not decrease accordingly.

Regional stakeholders understand the need to fully vet projects before passing the costs of projects on to ratepayers in the form of increased water and wastewater rates. Additionally, regional stakeholders have expressed the need for projects designed to address existing water management needs to be economically sustainable given the population and ratepayer base. As such, the certainty of funding for projects which propose rate increases will be largely dependent on the support garnered for the project and ratepayers' understanding of the project need. Increases in user rates require approval by ratepayers through an opportunity to protest rate increases, as provided under Proposition 218.

Capacity/Impact Fees

Capacity fees are charged to users who create new or additional demand on water or wastewater systems. They are typically charged per connection. A water demand offset charge is another example of a water impact charge. Impact fees can also be charged to offset the costs and/or fund mitigation of other potential impacts such as parks, transportation, drainage, or ecosystem services.

California law requires that these charges comply with the Impact Fee Mitigation Act (AB1600, Government Code 66000 et seq.), which states that there needs to be nexus between the connection and costs, and that fees should be proportionate to the cost of providing service.

Special Assessments

When a government agency funds a public project that provides a direct and unique benefit to certain parcels, the agency can assess a charge against those parcels as compensation for the benefit. The

amount of the assessment is limited by the measurable benefit or increase in value provided to the parcel, and must be approved by a two-thirds majority of voters or a weighted majority of property owners, depending on the type of fee.

As the region works to address critical flood management needs, it may benefit from the formation of a Flood Control Zone or a Joint Powers Authority (JPA) comprised of agencies with authority over flood management. The Flood Control Zone or JPA could focus on the creation of drainage areas, flood control zones, and other special assessment areas to support design, construction, and maintenance of flood and stormwater management facilities that would reduce flood hazard for the parcels in that zone.

General or Capital Improvement Funds

General or capital improvement funds are monies that an agency sets aside to fund general operations and/or facility improvements, upgrades, and at times development. These funds are usually part of the overall revenue stream and may or may not be project specific.

Revenue Bonds

In cases in which large facilities are needed to support current services and future growth, revenue bonds may be issued to pay for new capital. In this way, large facilities can be paid for by bonded debt service at the time of construction with repayment of the debt service over a 20- to 30-year timeframe. This is a preferred approach to paying for high-cost facilities because it avoids the perceived over-collection of fees from past customers that go toward facilities that serve present and future customers. The drawback to bonded debt is that it cannot be accomplished with capacity fees alone due to the variability and uncertainty of new development over time. A user rate is needed as a bond covenant in the event that development fees are not adequate to make the required annual payment for the debt service.

Private Philanthropic Funding

Private funding has been used by non-governmental entities and small districts such as the Resource Conservation District to conduct studies and develop new efforts or fund ecosystem restoration projects. The amount of funding available is generally variable and dependent on numerous factors. Private funding was the primary funding source for the Ecosystem Services Valuation described below.

Payments for Ecosystem Services

Payments for ecosystem services (PES), also known as payments for environmental services (or benefits), are incentives paid in exchange for land management or other activities that provide some sort of ecological service. For example, payments could be made to protect forests that filter and clean source water instead of the more traditional approach of building treatment systems for polluted water. In short, payments for ecosystem services promote the conservation of natural resources using market forces.

Twenty-four specific ecosystem services were identified and assessed by the Millennium Ecosystem Assessment,² a 2005 UN-sponsored report designed to assess the state of the world's ecosystems. The report defined the broad categories of ecosystem services as food production (in the form of crops, livestock, capture fisheries, aquaculture, and wild foods), fiber (in the form of timber, cotton, hemp, and

² "Living Beyond Our Means; Statement from the board of the Millennium Ecosystem Assessment." 2012-07-09.

silk), genetic resources (biochemicals, natural medicines, and pharmaceuticals), fresh water, air quality regulation, climate regulation, water regulation, erosion regulation, water purification and waste treatment, disease regulation, pest regulation, pollination, natural hazard regulation, and cultural services (including spiritual, religious, and aesthetic values, recreation, and ecotourism). Notably, however, there is a “big three” among these 24 services which are currently receiving the most money and interest worldwide.³ These are climate change mitigation, watershed services, and biodiversity conservation, and demand for these services in particular is predicted to continue to grow as time goes on.

The Resource Conservation District of Santa Cruz County is leading an ecosystem services valuation project entitled, Healthy Lands and Healthy Economies: Demonstrating the Economic Value of Natural Areas and Working Landscapes. This project used the latest advances in natural resource valuation methods and geographic information systems data, this study identified and assigned dollar values to bundles of ecosystem services by land cover type, and it estimated the total asset value of natural system within the County.

Local, State, and Federal Grant Programs

This section describes potential grant programs that may be used to fund, either partially or fully, the projects included in this IRWM Plan. Grant programs typically require local matching funds. The matching fund requirement demonstrates a local commitment to promoting and completing the study or project. Grant programs that have supported and may be assessed for future IRWM funding include the following:

Proposition 50

- California Department of Water Resources (DWR) Water Use Efficiency Grant Programs

Proposition 84

- Department of Water Resources – IRWM Grant Program
- Department of Water Resources – Local Groundwater Assistance Program
- State Water Resources Control Board - Storm Water Grant Program
- State Water Resources Control Board - Agricultural Water Quality Grant Program
- California Department of Public Health (CDPH) Emergency Grants
- Department of Water Resources – Flood Protection Corridor Program
- Department of Water Resources – Urban Streams Restoration Program

Proposition 1E

- DWR Stormwater Flood Management Grant Program
- California State Parks Office of Grants and Local Service Annual Grant Programs
- Habitat Conservation Fund
- Land and Water Conservation Fund

Other State and Federal

- State Water Resources Control Board - Water Recycling Facilities Planning Grant Program

³ "Paying Farmers for Environmental Services. United Nations Food and Agriculture Office Report." 2012-07-09.

- State Water Resources Control Board - Clean Beaches Initiative Grant Program
- State Water Resources Control Board - Federal 319 Non-Point Source Grant Program
- Regional Water Quality Control Board - Supplemental Environmental Protection (SEP)
- California State Parks Recreational Trails Program
- U.S. Environmental Protection Agency Environmental Justice Grants and Cooperative Agreements
- U.S. Department of Agriculture Rural Development Grant Assistance
- U.S. Economic Development Administration Investment Programs
- U.S. Bureau of Reclamation Title XVI Water Reclamation and Reuse Program

Low-interest Loan Programs

Several funding agencies provide low-interest loans through a revolving fund program for public water system infrastructure needs specific to drinking water. Low interest loans can provide for significant long-term cost savings by reducing interest payments as compared to traditional bonds. Several funding agencies provide low-interest loans through a revolving fund program for public water system infrastructure needs specific to drinking water. Low interest loans can provide for significant long-term cost savings by reducing interest payments as compared to traditional bonds. Through the Clean Water State Revolving Fund (SRF) loan program the SWRCB offers low-interest loans for wastewater and recycled water projects. CDPH administers the Safe Drinking Water SRF loan program for drinking water-related projects. The California Infrastructure and Economic Development Bank (I-Bank) administers the Infrastructure SRF loan program for financing implementation projects such as sewage collection and treatment, water treatment and distribution, and water supply projects.

The Clean Water SRF program generally has approximately \$200 to \$300 million available in loans each year to help cities, towns, districts, Native American tribal governments, and any designated and approved management agency under Section 208 of the Clean Water Act to construct publicly-owned facilities including wastewater treatment, local sewers, water reclamation facilities, nonpoint source projects, and development and implementation of estuary comprehensive conservation and management plans. The interest rate is half of the most recent General Obligation (GO) Bond Rate at the time of the funding commitment. In recent years, the Clean Water SRF loan interest rate has ranged from 1.8% to 3.0%. Amounts available through the CDPH Safe Drinking Water SRF loan program vary, but \$100 to \$200 million is typically available each year. Available loan funding is dependent upon federal appropriations to each program.

10.3 OPERATION AND MAINTENANCE FUNDING FOR IMPLEMENTED PROJECTS

Funding for the operation and maintenance (O&M) of projects included in the Santa Cruz IRWM Plan is expected to derive from many of the same sources that were identified to fund project implementation, with the notable exception of IRWM and other grant sources, and most other state financial assistance programs. Support and funding will likely come primarily from local sources, including in-kind support, user rates, user fees and special assessments. Since regional projects and programs often involve multiple partner agencies, the range of local sources available is broadened. The details of funding and financing larger, multi-partner projects are typically worked out on a project-by-project basis. Large multi-purpose projects typically adhere to standard cost accounting and cost of service principles which are generally described and codified in the agreements for ownership, and the operation and maintenance of facilities is typically developed as part of a project financing package.

O&M costs of proposed implementation projects must be evaluated as the overall viability of a particular project is determined. Prior to advancing a project forward to implementation, an analysis must be completed to establish the ability to operate and maintain the project and project benefits following completion. The annual fiscal impact on user rates, and the willingness of ratepayers to accept any increased cost of service as may be required for project implementation, must be included in this analysis.

To improve the region's ability to provide ongoing support to priority projects, agencies and stakeholders in the region should work together to minimize associated O&M costs and gain savings from economies of scale.

10.3.1 EXAMPLES OF PROJECT FINANCING

Table 10-2 below provides an example subset of the project financing information provided by the project proponents for each of the 76 projects in the 2014 IRWM Plan which summarizes the anticipated and potential sources of funding. Table 10-2 is a subset of the projects included in the IRWM Plan; a full listing of the 2014 IRWM projects, including costs and matching funds, is available at www.SantaCruzIRWMP.org.

Each time the IRWM Project List is updated the project financing information will be updated as well. Project cost and the amount and source of matching funds are known for a majority of the projects submitted to the Plan. It is worth noting the substantial levels of matching funds for each project, and the extent to which project proponents seek to develop a diversified funding approach to support each project. Local sources include in-kind services, direct landowner cost-share and user fees. The table shows the approximate total project cost, and when known, the amount and sources of match, and a narrative discussion of the certainty of match.

Table 10 - 3 Example Subset of Project Financing Information

PROJECT TITLE	Project Type	PROJECT PROPONENT	Functional Area	Estimated Project Cost	Estimated Match Contribution	Source(s) of Match	Certainty of Match
Rio Del Mar Flats Stormwater Drainage Project Along Soquel Creek	Implementation	Santa Cruz County Flood Control and Water Conservation District Zone 6	Flood and Stormwater Management	\$3,500,000	\$1,264,000	Local; Federal; In-Kind	The County has committed to matching \$316,000 as local match for a federal grant for implementation of portions of Phase 1 of the project. There is reasonable likelihood the County will receive the grant for federal funding of \$948,000 for a total cost of \$1,264,000 (for portions of Phase 1 implementation).
Implementation of portions of the Storm Drain Master Plan Recommendations, Santa Cruz Count, Zone 5 & Zone 6	Implementation	Santa Cruz County Flood Control and Water Conservation District Zones 5 and 6	Flood and Stormwater Mgmt.	\$16,250,000	\$2,000,000	Local; In-Kind	Match funds will be appropriated once the flood control districts and the Department of Public Works obtain a grant for a portion or all of the projects identified by the Master Plan.
Rural Roads Erosion Control Assistance Program (RRECAP) for Santa Cruz County	Implementation	Resource Conservation District of Santa Cruz County	Water Quality	\$900,000	\$315,000	Local; Federal; In-Kind	In-Kind: Anticipated. \$265,000. Landowners contribute 50% of the construction cost of implemented projects. This an eligibility requirement for landowners receiving funds. The RRECAP Technical Advisory Committee's (local, state and federal resource professionals) time providing technical oversight. Additional in-kind match comes from donated goods and services such as facilities for hosting workshops, presenters, materials, etc. Federal: Anticipated. \$40,000. This is in-kind match from the Natural Resources Conservation Service and potentially other EPA 319 (h) funds. Local: Anticipated. \$10,000 County and City staff time for GIS services, permitting, etc. Anticipated. \$265,000. Landowners contribute 50% of the construction cost of implemented projects. This an eligibility requirement for landowners receiving funds. Additional in-kind match comes from donated goods and services such as facilities for hosting workshops, presenters, materials, etc. Federal: Anticipated. \$40,000. this is in-kind match from the Natural Resources Conservation Service and potentially other EPA 319 (h) funds. Local: Anticipated. \$10,000 County and City staff time for GIS services, permitting, etc.

PROJECT TITLE	Project Type	PROJECT PROPONENT	Functional Area	Estimated Project Cost	Estimated Match Contribution	Source(s) of Match	Certainty of Match
Performance-based Incentives for Conservation In Agriculture (PICA) - Watsonville Sloughs	Implementation	Resource Conservation District of Santa Cruz County	Water Quality	\$550,000	\$420,740	Federal; In-Kind; Other	Match has already been secured from the CA State Conservation Innovation Grant (\$75,000 in 2011) and CDFA Specialty Crop Block Grant (\$310,740 in 2013) to support the PICA pilot in the lower Pajaro River watershed, including Watsonville Slough watershed. This match has funded the development of the project to date. Participating growers will provide an estimated additional \$35,000 worth of in-kind match (10 growers, 35 hours each at a rate of \$100/hour) for their time participating in the project.
Country Club Hexavalent Chromium Treatment Facility	Implementation	Soquel Creek Water District	Water Quality	\$4,000,000	\$2,000,000	Local	The District has secured \$17.7M in Certificate of Participation (COP) funding to implement capital improvement projects. The subject project can be funded through these COP's.
City of Santa Cruz Drought Mitigation to Improve Potable Water Quality, Implement Conservation Program for Agriculture, and Reduction of Ecosystem Conflicts with Habitat Conservation	Implementation	City of Santa Cruz Water Department	Water Quality	\$696,264	\$200,000	Local; In-Kind	Match funding of \$200,000 is certain for this project. Project related expenditures since 2010 can be documented for staff labor, analytical lab testing, electrical costs of the aerator testing, and consultant fees that directly correspond with the readiness to proceed with project implementation in 2014. There are sufficient funds in the capital improvement budget to provide assurance that project related expenditures will be paid for by the City of Santa Cruz prior to receiving reimbursement from the State of California.
Farm and rangeland soil management for water conservation in Santa Cruz County	Implementation	Resource Conservation District of Santa Cruz County	Water Supply	\$550,000	\$420,740	Federal; In-Kind; Other	Match has already been secured from the CA State Conservation Innovation Grant (\$75,000 in 2011) and CDFA Specialty Crop Block Grant (\$310,740 in 2013) to support the PICA pilot in the lower Pajaro River watershed, including Watsonville Slough watershed. This match has funded the development of the project to date. Participating growers will provide an estimated additional \$35,000 worth of in-kind match (10 growers, 35 hours each at a rate of \$100/hour) for their time participating in the project.

PROJECT TITLE	Project Type	PROJECT PROPONENT	Functional Area	Estimated Project Cost	Estimated Match Contribution	Source(s) of Match	Certainty of Match
Scotts Valley Water District Local and Regional Recycled Water Expansion Project	Implementation	Scotts Valley Water District	Water Supply	\$27,100,000	\$9,000,000	Local; In-Kind; Other	SVWD has secured capital funds dedicated to implement water quality and/or water supply projects. In addition, SVWD expects to provide in-kind match labor and/or partner contributions to meet the local match requirements for the project. In addition, the project elements have been structured so that they can be scaled up or down and can be implemented as funding becomes available.
Santa Cruz County Regional Recycled Water Feasibility Study	Planning	City of Santa Cruz	Water Supply	\$300,000	\$75,000	Local	Funding for the regional recycled water feasibility study will be requested from the City of Santa Cruz and SqCWD as match with \$75,000 from each agency. No decision has been made yet to pursue the Study at this time by the governing bodies of the City and SqCWD, but match funding is anticipated. Because the SVWD would be supplying tertiary treated recycled water and secondary effluent and water would not be delivered into their service area with this feasibility study, no match funding from SVWD is expected at this time. Total project cost and scope of work could be adjusted depending on the availability of grant funding.
Recovery of the Santa Cruz long-toed salamander and California red-legged frog in the Larkin Valley area	Implementation	Resource Conservation District of Santa Cruz County	Watershed Stewardship/ Aquatic Ecosystems	TBD	\$300,000	Local; Federal; In-Kind; Other	CDFW provided \$120,848 in planning funds for the development of the Larkin Valley Plan. In addition the RCD has received additional CDFW funds (\$130K) for the implementation of a new pond as recommended by the plan. The RCD has pending private funds for salamander recovery in Larkin Valley (\$50K)
Salmonid Recovery in the San Vicente Creek Watershed	Implementation	Resource Conservation District of Santa Cruz County	Watershed Stewardship/ Aquatic Ecosystems	TBD	\$360,000	Local; Federal; In-Kind; Other	Funding (\$183,387) from California Dept of Fish and Wildlife's (CDFW) Fisheries Restoration Grant Program (FRGP) to complete the San Vicente Recovery Plan was received in June 2011. Funding (\$25,000) was received from the Moore Family Foundation to improve riparian habitat. Funding from the State Water Resources Control Board (\$50K) and CDFW's FRGP (\$50K) to implement 8 LWD structures was received in 2008 and 2011, respectively. To remove invasive species, \$60K has been requested from the Wildlife Conservation Board (likely to be received in June 2014).
West Branch Struve Slough Habitat Restoration and Enhancement Project	Implementation	Watsonville Wetlands Watch	Watershed Stewardship/ Aquatic Ecosystems	\$780,000	\$200,000	Local; In-Kind	\$200,000 of secured from Watsonville Wetlands Watch, the Pajaro Valley Unified School District, and the City of Watsonville

CHAPTER 11: TECHNICAL ANALYSIS

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The intent of this chapter is to document that the IRWM Plan is based on sound technical information and analyses. The following sections provide a description of the plans, studies, and methodologies used to shape the Regional Water Management Group (RWMG) and Steering Committee's understanding of water management in the Santa Cruz IRWM Region.

The Santa Cruz IRWM Plan was developed through collaborative discussions regarding regional needs, proposed projects, and teaming for regional effectiveness. The basis for many of these discussions were numerous studies, assessments, and planning documents prepared for the various stakeholders in the Region. As the stakeholders shared their needs and objectives, similarities and opportunities for collaboration were identified. During the IRWM Plan preparation and development, particularly through the development of the Plan's conceptual framework (see more below), data and water management strategies were collected from a number of existing local and/or sub-regional planning documents, and were integrated into the regional strategies presented in this document. Examples of local planning documents reviewed during the IRWM Plan development and update include urban water management plans, water supply master plans, capital improvement plans, recycled water master plans, project environmental impact reports/environmental impact statements, and grant applications for other state and federal programs. The specific plans, studies, and key reports used in the preparation of this IRWM Plan are listed at the end of this chapter.

The IRWM Plan is not intended to supersede local planning documents; rather the intent of the IRWM Plan is to provide a regional context from these studies and to support stakeholders in the IRWM process.

11.1 PROPOSITION 84 AND 50 IRWM GRANTS - TECHNICAL STUDIES

Several technical studies specifically carried out with IRWM funding were used in the development of this IRWM Plan. The California Department of Water Resources awarded \$999,750 in Proposition 84 IRWM Grant funds to the Regional Water Management Foundation to support the Santa Cruz Region's work updating the IRWM Plan and to complete key technical studies to guide water resources management. These technical studies provided critical data to evaluate resource management strategies to address the water resource challenges facing the Region. The studies include:

11.1.1 AROMAS AND PURISIMA GROUNDWATER BASIN MANAGEMENT STUDY

This planning and feasibility analysis examined the potential for redistribution of groundwater pumping in mid-county between the Aromas and Purisima Formations near the boundary of the Central Water District and Soquel Creek Water District. Groundwater from both aquifers is currently the sole source of water supply for both Districts. The Aromas is subject to seawater intrusion, elevated levels of hexavalent chromium (Cr-6), and groundwater overdraft. Currently, CWD pumps approximately 96% of its water supply from the Aromas area and 4% from the Purisima area. This study evaluated the potential to shift pumping from the Aromas to inland portions of the Purisima to balance the pumping and potential treatment costs for Cr-6 removal.

As part of the study, CWD's existing wells in the Purisima area on Cox Road were evaluated for their ability to increase pumping. Tests evaluated well condition, well production performance, dry season

well capacity, aquifer response to pumping and properties, and vertical flow and water quality profiles. Based on the age of the wells and documented degradation of well performance, it is recommended that existing wells be taken out of production and replaced with a single modern-designed production well. A new well would likely have a discharge capacity of 300 to 400 gpm and it was estimated that dry season production of approximately 160 acre-feet can be sustained.

In order to evaluate the sustainable yield for redistributing pumping to the Purisima, CWD's groundwater model was updated. The model was originally developed as a steady state model for use in CWD's Drinking Water Source Assessments.¹ The model was updated to simulated transient conditions from 1984-2009 for calibration to available groundwater level data and simulation of long-term groundwater level changes due to shifting pumping. Model inputs including pumping for private wells and some small water systems and return flow recharge were based on a spatial analysis of water use. Rainfall recharge and flow from upgradient watersheds were based on results from a watershed model using the Precipitation-Runoff Modeling System.² The western and eastern boundary conditions were based on groundwater level data from Soquel Creek Water District and Pajaro Valley Water Management Agency.

The updated groundwater model was calibrated to groundwater levels for 1984-2009 so that the model can be defensibly used to evaluate redistribution of pumping from the Aromas area to the Purisima area. Model calibration consisted of modifying the distribution and magnitude of horizontal hydraulic conductivity, vertical hydraulic conductivity, specific storage, and specific yield values. The updated groundwater model was used to simulate three groundwater management scenarios for comparison with a baseline simulation.

Simulation results showed that the strategy to redistribute pumping to a new Cox well is within the sustainable yield of the Purisima Formation that supplies the Cox well field. Shifting pumping from the Aromas area to the Purisima area will also reduce system Chromium VI concentrations while increasing CWD's reliability by diversifying its supply. Finally, CWD's increased inland pumping capacity potentially facilitates regional basin management if water in excess of CWD's demand can be used to help non-CWD pumpers reduce pumping closer to the coast to address seawater intrusion risk. The primary environmental effect of the strategy that may need further evaluation is the effect of predicted lower groundwater levels on the supply of private wells near the Cox well field. Cost estimates for constructing and developing the new well and destroying two of the existing wells were provided.

The study concluded that the strategy of shifting pumping from the Aromas area to Purisima area is beneficial for CWD and regional basin management. Replacing the aging wells at the Cox well field with a new well and treating the groundwater for iron and manganese will improve CWD's system reliability and water quality. Increasing inland pumping capacity has the potential to facilitate regional partnerships that help non-CWD pumpers reduce pumping near the coast to address seawater intrusion risk. The estimated capital cost of the well replacement and treatment system installation is \$2.7 million.

This study was completed in March 2014; the final report is available at the Santa Cruz IRWM website.

¹ Johnson, Nicholas M. Drinking Water Source Assessments (DWSAPs). Prepared for Central Water District, Aptos, California. March 2009.

² HydroMetrics WRI, 2011

11.1.2 SANTA MARGARITA GROUNDWATER MODEL UPDATE

Groundwater levels in portions of the Santa Margarita Groundwater Basin, which underlies the City of Scotts Valley, have declined over 200 feet in the past 30 years. The District relies upon a groundwater model and other monitoring data to inform its groundwater management. SVWD is still in the process of updating, calibrating, and improving the existing groundwater basin model to more accurately evaluate groundwater-surface water interactions. This will inform the District's efforts to restore groundwater levels and increase stream baseflow. This will also support other regional efforts and help to evaluate the expected effectiveness of conjunctive use projects for restoring groundwater levels and restoring stream baseflow. This study will be completed in fall 2014.

11.1.3 CONJUNCTIVE USE AND WATER TRANSFERS - PHASE II

Phase I technical studies (2008-11) evaluated the feasibility of water transfers and aquifer recharge to mitigate the water management problems in the Scotts Valley area. Phase II builds upon Phase I to estimate potential yields for various options of diverting San Lorenzo River winter flows, assess benefits of delivering water to reduce pumping from both overdrafted groundwater basins in Scotts Valley and Soquel, evaluate fish habitat needs to better characterize potential yields, identify infrastructure needs, preliminary designs and cost estimates; and, evaluate water rights options and other legal issues. Implementation of water transfers and exchanges has the potential to reduce groundwater pumping, recover groundwater levels and increase summer stream baseflow. It has the potential in the long term to provide for groundwater banking and some drought relief for the City of Santa Cruz. This study will be completed in fall 2014.

11.1.4 WATSONVILLE SLOUGHS HYDROLOGIC STUDY

The Watsonville Sloughs are a highly valued and unique freshwater wetland resource on the Central Coast. The Slough wetland complex has been modified significantly over the last 100 years, both in size and function. Agriculture and urban uses have encroached on wetland boundaries, portions of the system have been drained to allow farming, and urban development encircles the upper watersheds of three principal sloughs in the six-slough system. There are significant draws of deep groundwater to support these activities and there are subsurface drainage structures that discharge shallow groundwater back to the sloughs.

Many hydrologic control structures have been installed on surface waters throughout the watershed, including pumps, gates, culverts, bridges, and road crossings. Many of these structures modify the rate at which water flows through various portions of the system, dewatering habitat in some areas while contributing flooding in others. In addition to these control structures and extensive upstream/upland development, recent conversion of highly erodible rangelands to strawberry production has led to further modifications of the hydrologic system with elevated erosion rates resulting in deposition of fine sediments into the sloughs and drainage systems.

With these changes, and because of the system's hydrologic complexity, local planners, policymakers, and conservationists have been seeking a means to better understand the hydrologic function and the potential effects of possible future modifications in and around the sloughs. Funded by grants from the California Department of Water Resources and the State Coastal Conservancy, the RCD and its partners recently completed an extensive hydrologic study of the Sloughs, with technical and oversight support

from a steering team composed of local stakeholders and academics with a history of engagement in resource management and data collection in the Watsonville Sloughs watershed.

RCD consultant Balance Hydrologics used existing monitoring equipment and historic measurement records, and installed 11 new measurement gauges in the Sloughs and monitored how the Sloughs responded to rainfall and other movement of water over two water years (2011-2012 and 2012-2013) to develop extensive hydraulic and hydrologic models of the entire slough system. The models provide a means to better understand many questions, including:

- Understanding the overall function of the Sloughs;
- Providing data to support restoration and conservation planning and permitting of restoration projects;
- Understanding how the system might be better managed for water supply and recharge;
- Determining whether land is subsiding in sloughs and if so, by how much; and
- Understanding how water moving through the sloughs may provide opportunities to enhance habitat, water supply and quality, and flood management.

The complete final report was issued in February 2014 and includes the results and conclusions from the study, as well as recommendations for future work to refine the models and better understand the functioning of the Sloughs. The report can be found on the Santa Cruz IRWM and the RCD websites. Both the RCD and the Pajaro Valley Water Management Agency will retain electronic copies of the models for future use by local agencies, partners, and planners for projects including enhancement of water supply, flood management, ecosystem restoration, water quality, and recreational opportunities. This was an interregional study that also benefits the neighboring Pajaro River Watershed IRWM Region.

11.1.5 ADDITIONAL TECHNICAL STUDIES

Additionally, several technical studies were conducted with partial funding from the Region's 2008 Proposition 50 IRWM grant. These include:

Conjunctive Use Phase 1

The Santa Margarita Groundwater Basin is situated in the lower San Lorenzo River watershed. The increasing use of groundwater from the early 1980s through the early 2000s and the loss of infiltration and natural aquifer recharge caused by development resulted in precipitous decline in groundwater levels. Groundwater levels in some parts of the Scotts Valley area have declined as much as 200 feet over the past 25 years. The impacts from the aquifer overdraft include the drying up of wells in the region and a significant decline in groundwater quality. Local stream baseflow and water quality have been impacted by the groundwater decline. Eight technical studies were carried out that analyzed physical, environmental, and regulatory aspects of potential conjunctive use projects. Three preferred alternative project types were identified in the final report:

1. Enhanced stormwater recharge in the Scotts Valley area using low impact design (LID);
2. Inter-district exchange of water for in-lieu recharge of aquifers, and
3. Surface water diversion at Felton for groundwater recharge in the Hanson Quarry area.

Desalination Intake Study

A challenging aspect of the selection of an efficient and environmentally appropriate method to bring seawater into a small coastal desalination facility is gathering sufficient information and data to understand how each proposed intake concept would function at a specific site and at full capacity. The IRWM grant funded technical investigations that met the gaps in data that existed for furthering the conceptual designs of open-ocean and sub-seafloor intakes capable of providing 6.3 mgd of seawater to the proposed 2.5 mgd desalination facility.

Drainage Master Plan

The County prepared a drainage master plan for the Aptos Creek watershed and adjoining urban and coastal areas (Flood Control and Water Conservation District Zones 5 and 6). This includes the urban areas of Soquel Creek, Noble Gulch, Rodeo Gulch, and Arana Gulch. Work included field verification of drainage infrastructure and condition, evaluations of the drainage systems, and analysis of the watershed and the proposed improvements. The master plan assesses stormwater flows and facilitates development of policies and projects to manage flooding, reduce channel erosion, promote groundwater recharge, and improve stormwater quality.

Climate Change Impacts on Water Resources

The US Geological Survey (USGS) prepared an assessment of potential climate change impacts on water resources in the Santa Cruz region, including potential impacts on temperature, water demand, rainfall patterns, runoff and groundwater recharge. Global climate models were downscaled and used to run hydrologic models at the local watershed scale to assess impacts under different scenarios. This work, which is further described in Chapter 15, has greatly helped inform the development of the conceptual framework described below, as well as policies and projects for the region.

11.2 LOCAL PLANS, ASSESSMENTS, AND TECHNICAL STUDIES

This IRWM Plan was informed by a conceptual framework developed over a year-long planning process in close collaboration with a diverse and representative group of regional stakeholders. The framework is comprised of conceptual models for each of the four functional areas of the Plan - water supply, water quality, aquatic ecosystems, and flood and stormwater management - and serves as a tool to prioritize regional management strategies for implementation. Each conceptual model represents a hypothesis of cause and effect between components of the system and management strategies. Within each model, a climate change vulnerability assessment was completed with best available projections of future climatic conditions and used to identify strategies with climate change adaptation benefits. The conceptual framework identifies quantifiable metrics and condition targets (Chapter 9, Plan Performance and Monitoring) to be used to track progress of IRWM Plan implementation and the Plan's progress towards achieving objectives.

A wide variety of plans, assessments, and technical studies were used to support development of the conceptual models and therefore of this IRWM Plan. The IRWM Plan builds upon these existing efforts by integrating them into a water resources document with a regional focus. The manner in which the local plans inform this document is described in various chapters, including Chapter 4, Goals and Objectives, Chapter 13, Relation to Local Water and Land Use Planning, and Chapter 5, Resource Management Strategies. The following sections provide a general description of the types of documents used in the preparation of this IRWM Plan, and Tables 11-1 through 11-6 at the end of this chapter list the specific documents used, as well as the chapters of this IRWM Plan that they have informed.

11.2.1 LAND USE PLANS

Land use plans provide for the scientific, aesthetic, and orderly disposition of land, resources, facilities, and services for urban and rural communities. General plans are a compendium of city or county policies regarding long-term development in the form of maps and accompanying text. In California, general plans have seven mandatory elements and may include any number of optional elements, e.g., a water element. Most local general planning documents generally have identified water resource management strategies that integrate with land use planning efforts and oftentimes reference and tie to regulatory requirements, such as water quality requirements of relevant basin plans (see below).

11.2.2 WATER RESOURCE MANAGEMENT PLANS

Various water resources reports document the reliability and availability of the Region's water supplies to meet current and projected demands, in addition to identifying infrastructure needs to provide effective water resource management. Plans such as groundwater management plans focus mainly on resource management, whereas urban water management plans and similar documents focus more on addressing water supply and demand and forecasting future needs.

Various regulatory and statutory responsibilities require agencies to prepare and implement groundwater management plans. Throughout the state, some agencies are special act districts that have groundwater management authority. However local districts, including Scotts Valley, Soquel Creek, and Central Water Districts have adopted groundwater management plans following the AB 3030 procedure for development of a groundwater management plan. AB 3030, the Groundwater Management Act, authorized local agencies to prepare groundwater management plans for groundwater basins not subject to adjudication or other forms of regulation. AB 3030 lays out a procedure for development of a groundwater management plan. The act also specifies 12 technical components which can be included in a groundwater management plan, including replenishment strategy, mitigation of overdraft, mitigation of contaminated groundwater, and avoidance of saline intrusion. The groundwater management plans prepared by local districts informed various chapters of this IRWM Plan, including Chapter 3, Region Description, and Chapter 9, Plan Performance and Monitoring.



Loch Lomond (photo courtesy: SCWD)

The California Urban Water Management Planning Act applies to public and private municipal water suppliers with more than 3,000 connections or supplying more than 3,000 AFY. The act requires suppliers to assess the reliability of their water sources over a 20-year planning horizon considering normal, dry, and multiple dry years. Suppliers must describe and evaluate sources of water supply, water demand, water quality, water conservation goals and activities, and other relevant information and programs. This information is used by the urban water supplier to develop an urban water

management plan (UWMP), which is submitted to DWR in years ending in five and zero (e.g., 2005, 2010, and 2015). All of the local water supply agencies, with the exception of Central Water District, are subject to the Urban Water Management Planning Act. Each, with the exception of the San Lorenzo Valley Water District, have prepared and submitted their 2010 UWMPs to DWR for approval.

At the local level, general plans (see Chapter 13, Relation to Local Water and Land Use Planning) and municipal services reviews (MSRs) conducted throughout the region present analysis of land use, development plans, and population trends. The information and analysis presented in general plans and MSRs is developed by water suppliers at the subregional level into UWMPs, water master plans, and integrated resources plans (IRPs), groundwater management plans, and stormwater management plans. Water master plans and IRPs present data and analyses including flow projections and facility requirements for wastewater treatment at the service area level. These plans build upon the information and analysis presented in UWMPs to identify issues, goals and objectives, as well as water supply and water quality needs, at the agency level. These plans also present potential strategies for achieving the goals and meeting the identified water supply and water quality needs of the region.

Finally, the information developed in the project-specific plans serve as the foundation for development of IRWM Plan projects and programs. Perhaps because the Region relies on a locally derived water supply, there have been numerous studies and plans developed over the last decade related to water supply planning; these documents are listed in Tables 11-1 through 11-6.

11.2.3 WATER QUALITY PLANS

The Central Coast Regional Water Quality Control Board Basin Plan is the overriding water quality document that encompasses the region. Each of the nine hydrologic units of the state have a basin plan that designates beneficial uses for surface and ground waters, sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's anti-degradation policy, and describes implementation programs to protect all waters in the region. In addition, the basin plan incorporates (by reference) all applicable State Water Board and Regional Water Board plans and policies and other pertinent water quality policies and regulations. As conditions change, such as the identification of new TMDLs or water quality standards, the basin plan is amended. As the basis for water quality regulation, the Central Coast Basin Plan is the driver for many of the water quality strategies outlined in this IRWM Plan.

The Santa Cruz Region is relatively free from large point sources of water pollution. Instead, the main water quality impact comes from non-point source pollution in the form of urban, agricultural, and rural runoff. Various stormwater management plans and related water quality control plans formed the basis for the strategies in the water quality functional area. These plans are described in Tables 11-1 to 11-6 at the end of this chapter. Finally, drainage master plans identify infrastructure necessary for effective stormwater management and implementation of best management practices (BMP). The strategies presented in these documents, together, provided the basis for development of the Santa Cruz IRWM Plan's water quality and stormwater management strategies.

11.2.4 RESOURCE STEWARDSHIP PLANS

Resource stewardship plans are those watershed, river, and conservation plans that analyze the natural, biological, recreational, and historical resources of a particular watershed, subregion, or the Santa Cruz Region as a whole. The Santa Cruz Region has a long history of developing watershed plans and assessments, many of which were initially developed in the 1990s to early 2000s and formed the basis for the Integrated Watershed Restoration Program (IWRP).

Beginning in the late 1970s, eight watershed restoration plans and a number of other related assessments were undertaken for seven watersheds in Santa Cruz County. Over the next few years, the focus shifted to ways to effectively implement these plan recommendations. Unfortunately, there were various barriers to implementing the plans, including inefficient competition for limited funding and costly and time-consuming regulatory processes, among others.

Staff from the Santa Cruz County Resource Conservation District (RCD), Coastal Conservancy, California Department of Fish and Game (CDFG), Coastal Watershed Council, and the City and County of Santa Cruz developed the concept for the Integrated Watershed Restoration Program (IWRP) for Santa Cruz County in 2002 to address these stumbling blocks. IWRP is a voluntary framework, put into place to coordinate resources, funding, and permitting agencies to reduce staff time and help ensure that critical projects are identified, funded, and permitted. IWRP also provides resources to local watershed partners for developing projects.

IWRP has been heralded as a model for collaborative, integrated watershed stewardship by local partners, key funders, as well as state and federal partners. Due to the program's success in identifying, developing, and implementing high priority restoration projects, the staff and management at the National Marine Fisheries Service, US Fish and Wildlife Service, and the California Department of Fish and Game requested that the State Coastal Conservancy expand IWRP and its associated funding to cover the neighboring counties of San Mateo and Monterey. Since IWRP's inception, the RCD and its partners have been able to design, permit, and construct over 80 water quality improvement and habitat restoration projects throughout the County. More than 40 of these projects were implemented with partial funding from the Region's 2008 IWRM Implementation Grant.



Laguna Creek Floodplain Restoration

11.2.5 CLIMATE CHANGE PLANNING

Projected climate changes are expected to have a number of negative impacts on the natural and socioeconomic systems throughout the world. Recently developed regional downscaling approaches have increased the usability of climate change projection information for regional decision makers. Climate change model predictions specific to California and the Santa Cruz region have been reviewed and incorporated into the IRWM conceptual framework in a format that is intended to be accessible and useful for regional decision makers. The potential impacts of these future climatic and hydrologic

changes have been evaluated in the context of each of the IRWM functional areas to identify opportunities for adaptation to reduce the vulnerability of water supply, water quality, aquatic ecosystems, and flood hazards in the region.

The tables below present the technical sources and methodologies used in developing this IRWM Plan, along with a brief explanation of how the local plans were used in the IRWM Plan.

Table 11 - 1 Water Supply

Document Title or Description (Date)	Lead Agencies	Technical Analysis or Method Used	Results/ Derived Information	Use in IRWM Plan
City of Santa Cruz 2010 Urban Water Management Plan (December 2011)	City of Santa Cruz	Population based water demand projections based on historical use and recent trends and climate projections	Water demand projections; water supply availability under future conditions	Used as basis for determining water supply and demand projections incorporated into Region Description
Water Supply Assessment General Plan 2030 (March 2011)	City of Santa Cruz	Population based water demand projections based on historical use and recent trends and climate projections	Projected water demands associated with General Plan projections, total water demand and supply for 20 year planning horizon	Water supply and demand projections, supplemental supply alternatives incorporated into Region Description and Resource Management Strategies chapters
Proposed scwd ² Regional Seawater Desalination Project Draft EIR (May 2013)	City of Santa Cruz / Soquel Creek Water District	Analyses of impacts and benefits, alternatives, and technical feasibility. Region description, water supply and demand trends	Updated supply and demand projections, description of study area, description of water supply operations and constraints, description of impacts and mitigations	Water supply and demand, supplemental supply alternatives, agency/district descriptions incorporated into Region Description and Resource Management Strategies chapters
City of Santa Cruz Habitat Conservation Plan: Conservation Strategy for Steelhead and Coho Salmon. Draft Report (August 2011)	City of Santa Cruz	Water system and stream habitat modeling, statistical analysis	Relationship between water diversions and streamflow, habitat assessments, streamflow targets	Draft stream flow requirements incorporated into Region Description and Monitoring chapters
City of Watsonville 2010 Urban Water Management Plan	City of Watsonville	Population based water demand projections based on historical use and recent trends and climate projections	Water demand projections; water supply availability under future conditions	Water supply and demand forecasts incorporated into Region Description chapter
Revised 2010 Urban Water Management Plan (2011)	Scotts Valley Water District	Population based water demand projections based on historical use and recent trends and climate projections	Water demand projections; water supply availability under future conditions	Water supply and demand projections incorporated into Region Description chapter

Document Title or Description (Date)	Lead Agencies	Technical Analysis or Method Used	Results/ Derived Information	Use in IRWM Plan
Urban Water Management Plan 2010 (2011)	Soquel Creek Water District	Population based water demand projections based on historical use and recent trends and climate projections	Water demand projections; water supply availability under future conditions	Water supply and demand projections incorporated into Region Description chapter
San Lorenzo Valley Water District Water Supply Master Plan (2009)	San Lorenzo Valley Water District	Population based water demand projections based on historical use and recent trends and climate projections	Water demand projections; water supply availability under future conditions	Water supply and demand projections incorporated into Region Description chapter
Annual State of the Basin Report, Water Year 2011 (May 2012)	Soquel Creek Water District	Groundwater elevation monitoring, basin modeling	Status and trends of groundwater basin	Groundwater status and trends incorporated into Region Description and Monitoring chapters
2012 Integrated Resources Plan Update (September 2012)	Soquel Creek Water District	Assessment of basin conditions, demand projections based on use and projected population	Water demand projections; water supply availability under future conditions	Updated water supply and demand projections, water supply alternatives and conservation incorporated into Region Description and Resource Management Strategies chapters
Annual Groundwater Report, 2011 Water Year (June 2012)	Scotts Valley Water District	Groundwater elevation monitoring, basin modeling	Status and trends of groundwater basin	Groundwater status and trends incorporated into Region Description and Monitoring chapters
Integrated Water Plan (June 2003)	City of Santa Cruz	Confluence® model, supply and demand projections	Water demand projections; water supply availability under future conditions	Identified potential resource management strategies and supported development of the Region Description chapter

Table 11 - 2 Land Use and Demographics

Document Title or Description (Date)	Lead Agencies	Technical Analysis or Method Used	Results/ Derived Information	Use in IRWM Plan
Santa Cruz County General Plan and Local Coastal Program (December 1994)	County of Santa Cruz	Population projections	Population estimates; resource protection goals and objectives	Supporting information for the Region Description chapter
City of Santa Cruz General Plan 2030 and Local Coastal Program (June 2012)	City of Santa Cruz	Population projections	Population estimates; resource protection goals and objectives	Supporting information for the Region Description chapter
City of Capitola General Plan and Local Coastal Program (Public Draft Review December 2013)	City of Capitola	Population projections	Population estimates; resource protection goals and objectives	Supporting information for the Region Description chapter
City of Scotts Valley General Plan and Local Coastal Program (1994)	City of Scotts Valley	Population projections	Population estimates; resource protection goals and objectives	Supporting information for the Region Description chapter
Watsonville Vista 2030 General Plan (January 2013)	City of Watsonville	Population projections	Population estimates; resource protection goals and objectives	Supporting information for the Region Description chapter
2035 Metropolitan Transportation Plan / Sustainable Communities Strategy (Draft, February 2014)	Santa Cruz County Regional Transportation Commission	Transportation modeling; vehicle use summaries; land use descriptions	Land use information; planned infrastructure improvements	Supporting information for the Region Description chapter
State of the Region (2012)	AMBAG	Population projections; summary of conditions	Population estimates, land use trends	Supporting information for the Region Description chapter
Community Assessment Project 2013 (2013)	United Way of Santa Cruz County	Statistical analysis, phone surveys	Assessment of social and economic conditions; summary of opinions regarding environment and other concerns	Supporting information for the Region Description chapter

Table 11 - 3 Climate Change

Document Title or Description (Date)	Lead Agencies	Technical Analysis or Method Used	Results/ Derived Information	Use in IRWM Plan
Simulation of Climate Change in San Francisco Bay Basins, California: Case Studies in the Russian River Valley and Santa Cruz Mountains (2012)	Lorraine E. Flint and Alan L. Flint - USGS	Downscaled climate change models; statistical analysis; runoff model	Assessment of future temperature, rainfall, runoff and recharge under climate change	Climate change impacts on rainfall, runoff, and recharge incorporated into Region Description and Climate Change chapters
City of Santa Cruz Climate Change Vulnerability Assessment (2011)	Gary Griggs and Brent Haddad	Literature review; compilation of GHG and other data	Vulnerabilities and potential adaptation strategies for climate change response	Climate change vulnerability assessment incorporated into Region Description and Climate Change chapters
City of Santa Cruz Climate Action Plan (June 2012)	City of Santa Cruz	Literature review; compilation of GHG and other data	Vulnerabilities and potential adaptation strategies for climate change response	GHG emissions inventory incorporated into Climate Change and Resource Management Strategies chapters
City of Watsonville Climate Action Plan (2014)	City of Watsonville	Literature review; compilation of GHG and other data	Vulnerabilities and potential adaptation strategies for climate change response	GHG emissions inventory incorporated into Climate Change and Resource Management Strategies chapters
County of Santa Cruz Climate action Strategy (2013)	County of Santa Cruz	Literature review; compilation of GHG and other data	Vulnerabilities and potential mitigation and adaptation strategies for climate change response	GHG emissions inventory incorporated into Climate Change and Resource Management Strategies chapters

Table 11 - 4 Watershed and Natural Resources

Document Title or Description (Date)	Lead Agencies	Technical Analysis or Method Used	Results/ Derived Information	Use in IRWM Plan
Watsonville Sloughs Watershed Resource Conservation & Enhancement Plan (January 2003)	County of Santa Cruz	Biological surveys, habitat assessments	Resource descriptions, potential management strategies	Watershed study with recommended restoration actions informing Region Description and Resource Management Strategies chapters
Watsonville Sloughs Hydrologic Study (February 2014)	Resource Conservation District of Santa Cruz County	HEC modeling; water surface elevation monitoring; flow monitoring	Updated condition assessment and hydrologic information	Base hydraulic and hydrologic data for potential restoration projects informing Region Description and Resource Management Strategies chapters
San Lorenzo River Salmonid Enhancement Plan (March 2004)	Santa Cruz County	Biological surveys, habitat assessments	Resource descriptions, potential management strategies	Restoration projects for salmonid enhancement informing Resource Management Strategies chapters
A Conservation Blueprint (May 2011)	Land Trust of Santa Cruz County	GIS analysis; surveys; literature review	Resource descriptions; GIS layers; maps	Biotic and other supporting data and information for the Region Description chapter
Aptos Creek Watershed Enhancement Plan (April 2003)	Coastal Watershed Council	Biological surveys, habitat assessments	Resource descriptions, potential management strategies	Biotic and other supporting data and information for the Region Description chapter as well as Resource Management Strategies
Soquel Creek Watershed Assessment and Enhancement Project Plan (November 2003)	Resource Conservation District of Santa Cruz County	Biological surveys, habitat assessments	Resource descriptions, potential management strategies	Biotic and other supporting data and information for the Region Description chapter as well as Resource Management Strategies
San Lorenzo River Watershed Management Plan (1979, updated 2001)	County of Santa Cruz	Biological surveys, habitat assessments, water quality and sediment source assessments	Resource descriptions, potential management strategies	Water quality , hydrologic data, and other supporting data for the Region Description chapter
San Vicente Creek - Plan for Salmonid Recovery (February 2014)	Resource Conservation District of Santa Cruz County	Biological surveys, habitat assessments	Resource descriptions, potential management strategies	Biotic and other supporting data and information for the Region Description chapter as well as Resource Management Strategies

Table 11 - 5 Stormwater and Flood Management Plans

Document Title or Description (Date)	Lead Agencies	Technical Analysis or Method Used	Results/ Derived Information	Use in IRWM Plan
Storm Water Management Program (November 2010)	Santa Cruz County, City of Capitola	Water quality data analysis; literature review	Strategies to address water quality issues / concerns	Management actions to address stormwater pollution informing Region Description and Resource Management Strategies chapters
Storm Water Management Plan (Revised March 2010)	City of Santa Cruz	Water quality data analysis; literature review	Strategies to address water quality issues / concerns	Management actions to address stormwater pollution informing Region Description and Resource Management Strategies chapters
Storm Drain Master Plan Santa Cruz County, CA, Zones 5 and 6 (August 2013)	County of Santa Cruz	Hydraulic modeling	Condition assessment; strategy descriptions	Overview of flooding/drainage system and management options informing Region Description and Resource Management Strategies chapters

Table 11 - 6 Water Quality

Document Title or Description (Date)	Lead Agencies	Technical Analysis or Method Used	Results/ Derived Information	Use in IRWM Plan
Water Quality Control Plan for the Central Coast Basin (June 2011)	Central Coast Regional Water Quality Control Board	Summary of conditions; water quality analysis	Water quality targets	Water quality status and sources of pollution; management recommendations informing Region Description and Resource Management Strategies chapters
Assessment of Sources of Bacterial Contamination at Santa Cruz County Beaches, 2006 (March 2006)	County of Santa Cruz	Water quality sampling, bacterial ribotyping, statistical analysis, epidemiological studies	Water quality conditions, related human health impacts	Water quality status and sources of pollution; management recommendations informing Region Description and Resource Management Strategies chapters
San Lorenzo River Watershed Management Plan Update (December 2001)	County of Santa Cruz	Summary of conditions; water quality analysis	Water quality status and trends, management recommendations	Watershed conditions and project implementation status informing Region Description and Resource Management Strategies chapters
Wastewater Management Plan for the San Lorenzo River Watershed (1995)	County of Santa Cruz	Summary of conditions; water quality analysis	Water quality status and trends, management recommendations	Watershed condition and management recommendations informing Region Description, Resource Management Strategies, and Monitoring chapters
San Lorenzo River Total Maximum Daily Load for Sediment (September 20, 2002)	Central Coast Regional Water Quality Control Board	Summary of conditions; water quality analysis	Water quality status and trends, management recommendations	Load allocation, management actions and monitoring recommendations informing Region Description, Resource Management Strategies, and Monitoring chapters
San Lorenzo River Watershed Nitrate Total Maximum Daily Load for Santa Cruz, CA (September 2000)	Central Coast Regional Water Quality Control Board	Summary of conditions; water quality analysis	Water quality status and trends, management recommendations	Load allocation, management actions and monitoring recommendations informing Region Description, Resource Management Strategies, and Monitoring chapters
Total Maximum Daily Load for Pathogens in San Lorenzo River Watershed Waters (including tributaries) (May 8, 2009)	Central Coast Regional Water Quality Control Board	Summary of conditions; water quality analysis	Water quality status and trends, management recommendations	Load allocation, management actions, and monitoring recommendations informing Region Description, Resource Management Strategies, and Monitoring chapters

Document Title or Description (Date)	Lead Agencies	Technical Analysis or Method Used	Results/ Derived Information	Use in IRWM Plan
Total Maximum Daily Load for Pathogens in Aptos Creek, Valencia Creek and Trout Gulch, Santa Cruz County, CA (May 8, 2009)	Central Coast Regional Water Quality Control Board	Summary of conditions; water quality analysis	Water quality status and trends, management recommendations	Load allocation, management actions, and monitoring recommendations informing Region Description, Resource Management Strategies and Monitoring chapters
Total Maximum Daily Load for Fecal Coliform in Soquel Lagoon, Soquel Creek and Noble Gulch, Santa Cruz County, CA (May 8, 2009)	Central Coast Regional Water Quality Control Board	Summary of conditions; water quality analysis	Water quality status and trends, management recommendations	Load allocation, management actions, and monitoring recommendations informing Region Description, Resource Management Strategies, and Monitoring chapters
Total Maximum Daily Load for Pathogens in Watsonville Slough, Santa Cruz County, CA (December 16, 2005)	Central Coast Regional Water Quality Control Board	Summary of conditions; water quality analysis	Water quality status and trends, management recommendations	Load allocation, management actions, and monitoring recommendations informing Region Description, Resource Management Strategies, and Monitoring chapters

11.3 DATA GAPS

Each technical information source that has been used in the development of this IRWM Plan represents the latest or most currently available information available for that source. Each source is broadly considered to be a reliable and acceptable source of information by water resource managers and related professionals in the field. Thus, the information and data that have been used are considered to be representative and adequate for the development of this IRWM Plan. However, some of the data is being further developed and refined and some data gaps do exist:

- Regional climate, including projections of microclimatic change and fog
- Groundwater model for the Soquel-Aptos basin
- More precise data on sea level rise, and impact on coastal river and stream flooding
- Weather variability, and how will projected changes in climatic water deficit match reality
- Drought measurement of stream baseflow to determine which portions of the watershed are gaining or losing reaches
- Benefits of managed aquifer recharge projects in terms of water supply and basin recharge
- Effectiveness of demand offset programs in terms of providing real water savings
- Assessment of impacts on fish habitat and establishment of workable baseflow regimes for habitat protection and restoration

Note that all of the data and information contained in this IRWM Plan will be reviewed and updated approximately every five years, depending on available funds, as part of the formal IRWM Plan update. Some data will be reviewed on a more frequent basis; for example, MHI data will be reviewed prior to every Proposition 84 Implementation Grant solicitation, using the ACS five-year survey estimates, in order to determine the status of DACs in the region.

CHAPTER 12: RELATION TO LOCAL PLANNING

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One of the goals of the *California Water Plan* is to ensure that water managers and land use planners make informed, collaborative water management decisions to better ensure meeting California's water needs into the future while balancing environmental resources and anticipating climate change impacts. The 2012 IRWM Grant Program Guidelines require that the IRWM Plan describe the current relationship between land use and water resource managers (e.g., how water management input is considered in land use decisions and vice versa), identify current constraints to collaboration, and explore opportunities to facilitate improved collaboration between land use planners and water managers in the future. Local jurisdictions in the Santa Cruz Region have long sought to protect the environment, and specifically water resources, through ordinances and strong general plan policies. The intent of this chapter is to highlight these efforts to meet the standard of the IRWM Grant Program Guidelines and the goals of the *California Water Plan Update 2009*. This chapter is also to document coordination between land use planners and water managers in the Santa Cruz IRWM region.

12.1 LAND USE, GROWTH, AND WATER RESOURCES PLANNING OVERVIEW

Despite its relatively small geographic extent, the Santa Cruz IRWM Region encompasses a number of agencies with water management responsibilities. Two of these water management agencies also have local land use jurisdiction, the Cities of Santa Cruz and Watsonville. Typically, where water resource management and land use management occur in-house, coordination tends to occur naturally through ongoing interdepartmental communications. It should be noted that a large portion (35%) of the City of Santa Cruz Water Department customer base is located in community of Live Oak and other unincorporated areas, limiting the water-land use collaboration in those areas.

Water infrastructure within the remainder of the Santa Cruz IRWM Region is decentralized, and communities within those areas have their water and wastewater services performed by an outside agency or district. In these areas, coordination between water and land use planning can be more difficult where separation exists between a utility and a municipality. For the most part, the districts are independent entities created under California state law, each governed by separate elected boards and managed by individual staff. There is no single overarching authority with jurisdiction over the districts. Overall, linking water and land use planning can be challenging, but as described in the following sections, the Santa Cruz Region has taken a unique approach to planning that has, for decades, linked water resources and land use.

It is important to note that water planning efforts throughout the region generally base their future demand projections on future population projections developed by the land use agencies and the Association of Monterey Bay Area Governments (AMBAG). The water agencies may adjust overall projected water



Swanton Road (photo courtesy Gary Kittleson)

demand based on projected changes in per capita water demand and water use efficiency, but they take the population projections as a given and plan to develop water supplies to accommodate those projections. Land use agencies in turn rely on water agency plans and projections to make the determination that there will be adequate water supply to serve future planned growth. The land use agencies have implemented numerous general plan policies and ordinances to ensure that measures to protect water resources and watershed resources are incorporated into new development. In response to Measure J, a 1978 ballot measure, the County also took steps to reduce growth rates and direct most future growth to urban areas and away from rural lands, watershed lands and groundwater recharge areas.

12.1.1 STATE LEGISLATION

In 2001, the California Legislature passed, and the governor signed into law, two bills linking land use decisions to available water supplies. The intent of these two bills, SB 610 and SB 221, was to strengthen the process by which local agencies determine whether the water supplies of a region are adequate to satisfy the demands of new, large-scale, development projects. The two bills integrate land use and water planning at different stages of project approval. SB 610 requires the preparation of a detailed water supply assessment by the responsible water agency early on when major projects that are subject to the California Environmental Quality Act (CEQA) undergo environmental review. SB 221 prohibits local land use agencies from later approving tentative maps or developer agreements for large subdivisions unless adequate, reliable water supply has been verified. Since new development in the Santa Cruz Region is generally much smaller than that which is covered by SB 610 or 221 (i.e., ~ 500 units), it is unlikely that these laws will change how decisions are made locally. Nevertheless, the policy considerations embodied in these bills are relevant to planning considerations in the Region. The City of Santa Cruz conducted a water supply assessment in conjunction with the 2013 adoption of their 2030 General Plan Update.

Senate Bill X7-7 creates a framework to reduce California's per capita water consumption 20 percent by 2020. The law establishes methods for urban retail water suppliers to determine their urban water use target. Methods specified include: setting a water demand target of 80 percent of their daily per capita water baseline; utilizing performance standards for indoor, landscaping, industrial and institutional uses; meeting 95 percent of the per capita water goal for their specific hydrologic region as identified by the California Department of Water Resources (DWR) and other state agencies in the 20x2020 Water Conservation Plan; or using an alternative method developed by DWR. The bill also requires urban water suppliers to set an interim urban water use target and meet that target by December 31, 2015. SB X7-7 also requires agricultural water suppliers to implement efficient water management practices and prepare, adopt, and periodically revise agricultural water management plans to document their water conservation efforts. DWR is required to work cooperatively with the California Urban Water Conservation Council in achieving the goals of SB X7-7. Implementation of SB X7-7 requirements is resulting in changes in local land use planning practices throughout the state to encourage and require reductions in per capita consumption. For example, some Bay Area municipalities are collaborating with local water districts to incorporate water efficiency requirements into the development approval process.

12.2 WATER PLANNING

The Santa Cruz IRWM Plan combines the relevant information contained in numerous water resources planning documents throughout the Region, as described below. The IRWM Plan does not take the place of local water planning, but rather uses these documents as a basis for developing a regional perspective for water resources issues and concerns. Many of these plans identify the specific projects and programs listed in this IRWM Plan. Local plans were particularly instrumental in preparing the following chapters of this IRWM Plan:

- **Region Description:** This chapter relied on current local and regional water resource plans to define regional water supply and demand, issues and conflicts, and major water-related infrastructure
- **Resources Management Strategies:** This chapter used the water resources information described in the Region Description chapter to characterize strategies needed for the Santa Cruz IRWM Region.

This section provides an overview of the water resource plans in the Santa Cruz Region that were used as a basis for this IRWM Plan. Since the information used in this IRWM Plan was derived from these local planning documents, the IRWM Plan is entirely consistent with these plans. Most of these planning documents are updated on a regular basis. The IRWM Plan will be revised to reflect the most current information from each of these plans during every formal IRWM Plan update, which is anticipated to occur approximately every five years or as funding allows.

12.2.1 URBAN WATER MANAGEMENT PLANS

Urban water management plans (UWMPs), prepared by water service providers with more than 3000 connections, are long-range planning documents for water supply, and serve as source documents for cities and counties as they prepare their general plans. State law requires that UWMPs be prepared and updated every five years. Water suppliers are required to estimate water supply needs for their service areas in normal, dry, and drought years over a 20-year planning horizon. Within these estimates, suppliers are required to ensure that the level of water service is sufficient to meet the needs of their various categories of customers. The four largest water agencies in the Santa Cruz IRWM Region - San Lorenzo Valley Water District (SLVWD), Scotts Valley Water District (SVWD), City of Santa Cruz Water District (SCWD) and the Soquel Creek Water District (SqCWD) - are subject to state requirements to develop UWMPs. All but the SLVWD have developed and adopted their 2010 UWMPs (SLVWD has a draft plan nearing completion).



Photo courtesy SVWD

The estimates provided in these UWMPs have formed the basis for the population, water supply, and water demand estimates used in this IRWM Plan as described in the Region Description chapter. Where more current or updated information was available, particularly for the SqCWD and the SCWD, that information supplemented the information provided in the UWMPs. In addition to the UWMPs, numerous other water resource plans and studies have informed the development of this IRWM Plan, as described below.

12.2.2 CITY OF SANTA CRUZ - INTEGRATED WATER PLAN

In 2003, the City of Santa Cruz adopted an integrated water plan (IWP). The IWP was developed to reduce the City's vulnerability to water shortages and to decrease the level of risk to the community from drought impacts. The IWP calls for increased water conservation, short term curtailment of 15%, and development of a supplemental water supply to avoid severe cutbacks as experienced in the 1976-77 drought, which would be harder to implement today given current lower per capita usage rates and new regulatory requirements to maintain instream flows. After members of the public expressed strong reservation about the recommended desalination project, the City has formed a Water Supply Advisory Committee to review and update projections of demand, supply shortfalls and reevaluate potential alternatives for supplemental or alternative supply.

12.2.3 CITY OF SANTA CRUZ - WATER SUPPLY ASSESSMENT GENERAL PLAN 2030

As described previously, Senate Bills 610 and 221 amended California law to improve the linkage between land use decisions made by cities and counties and water supply availability. Pursuant to SB 610, a water supply assessment (WSA) is required for projects that are subject to the California Environmental Quality Act (CEQA) and that meet certain size thresholds. While not technically required, the City chose to prepare a WSA, building upon the Integrated Water Plan, to support the City's update of its general plan. As part of the WSA, the City evaluated whether water supplies are sufficient to meet the demand of the general plan update over the next 20 years. The WSA describes the City's historical water demand, projected water demand and water supply sources, and provides a comparison of the City's expected water supply and demand through the year 2030. As part of the WSA, the City developed two estimates of water demand that were compared to the various water supply estimates that considered the possibility of drought, regulatory restrictions, and other considerations. The assessment found that the City does not have sufficient water to meet current or future projected water demand during dry years, consistent with the most recent urban water management plan and the Integrated Water Plan. The City is pursuing various sources of supplemental supply to help alleviate this condition.

12.2.4 SOQUEL CREEK WATER DISTRICT INTEGRATED RESOURCES PLAN

In 2006, Soquel Creek Water District adopted an integrated resources plan that was based on extensive review and community participation to evaluate alternatives and establish preferred supply options for the district. That plan was updated in 2012 to reflect lowered estimates of groundwater yield and projected demand. That plan calls for development of a desalination project or other supplemental supply to allow reduced groundwater pumping. With the 2014 hold on the joint desalination project with the City of Santa Cruz, the District is now re-evaluating additional supplemental supply alternatives including increased demand reduction, recycled water, water exchange, or other desal projects.

Groundwater Management Plans and Basin Reporting

Condition and trends for both the Santa Margarita and Soquel-Aptos groundwater basins are extensively monitored and reported, and these reports have informed various chapters of this IRWM Plan. Scotts Valley Water District adopted its groundwater management plan in 1994 and uses the Santa Margarita Groundwater Basin Model (currently being updated) to assess the overall changes in groundwater storage in the Scotts Valley Area. Annual reports describing the groundwater conditions within the management area are prepared annually. Similarly, the groundwater management plan for the Soquel-

Aptos basin was approved by both the SqCWD and Central Water District in 2007. An Annual Review and Report summarizes groundwater conditions in the basin, documents the status of groundwater management activities, and recommends any amendments to the management plan.

12.2.5 FLOOD PROTECTION AND STORMWATER MANAGEMENT PLANS

Flood protection and stormwater drainage in the Region is provided by the County and the four cities as well as one dependent special district. The Santa Cruz County Flood Control and Water Conservation District was formed by a special act of the State Legislature and is the designated flood protection agency for the County. All of the local jurisdictions are subject to Phase II of the Municipal Separate Storm Sewer System (MS4) National Pollution Discharge and Elimination System (NPDES) permit for stormwater discharges administered by the Central Coast Regional Water Quality Control Board. This permit is one of the main primary drivers for addressing water quality in stormwater, which is identified as the largest source of pollution in the region. Under this permit, local jurisdictions are required to implement various management, monitoring, and reporting requirements to support compliance with the NPDES General Permit. The stormwater management plans developed under this permit by the each of cities, the County, and UCSC have informed various sections of this IRWM Plan.

12.2.6 SEWER SYSTEM MANAGEMENT PLANS

In 2006, the State Water Resources Control Board adopted requirements for all public sanitary sewer collection system agencies prohibiting sewer overflows. Under these requirements, each sewer collection system agency is required to develop a plan to provide for the proper and efficient management, operation and maintenance of the collection system. Many of the resource strategies addressing water quality in this IRWM Plan are derived, in part, from these management plans.

12.2.7 WATERSHED AND HABITAT RESTORATION PLANS

Beginning in the late 1990s, eight watershed restoration plans and a number of other related assessments were undertaken for seven watersheds in Santa Cruz County. Staff from the Santa Cruz County Resource Conservation District (RCD), Coastal Conservancy, California Department of Fish and Game (CDFG), Coastal Watershed Council, and the City and County of Santa Cruz developed the concept for the Integrated Watershed Restoration Program (IWRP) for Santa Cruz County in 2002 to address stumbling blocks that had historically prevented implementation of these plans. IWRP is a voluntary framework, put into place to coordinate resource, funding, and permitting agencies to reduce staff time and help ensure that critical projects are identified, funded, and permitted. IWRP also provides resources to local watershed partners for developing projects. IWRP has informed development of this IRWM Plan through the identification of projects and by defining environmental goals and objectives.

12.3 LAND USE PLANNING

There are many factors, both private and public, that affect the amount, location, type and density of development that is permitted and built within the Region. From the policy standpoint, local jurisdictions adopt general plans, local coastal programs, zoning regulations, and development standards that serve to regulate and manage growth. These seek to protect existing neighborhoods and preserve environmental resources as a way to maintain the quality of life and the unique sense of place

for those that live, work, and visit the area. As decisions about infrastructure (such as roads, water facilities, and sewer facilities) affect the amount of growth possible for an area, limiting such services can act as a constraint to development, an approach that has been utilized to varying degrees in the Santa Cruz Region. The following sections describe land use planning in the Santa Cruz Region, particularly as it relates to water resources planning and water management objectives in the region.

12.3.1 GENERAL PLANS

Each city and county in California is required to adopt a comprehensive, long-term general plan for the physical development of its jurisdiction. The general plan is a statement of development policies and is required to include elements (chapters) that address land use, circulation, housing, conservation, open space, noise, and safety. The Land Use element designates the proposed general distribution, location, and extent of land uses and includes a statement of the standards of population density and building intensity recommended for lands covered by the plan.

With respect to planning development to accommodate housing growth, the State Planning and Zoning law prescribes that the Housing element of a general plan may not be constrained by the lack of all needed governmental services, including water service. Assignment of a region's "fair" share of the state's projected housing growth are first developed by the state and then allocated to subareas by the local regional government, in this case the Association of Monterey Bay Governments (AMBAG). To the extent that governmental services, like a public water supply, are not available to fully meet a city's or county's housing allocation, state law requires the city or county to remove the governmental constraints to the development of the housing described in the general plan. This requirement promotes the state general plan policy that the availability of housing is of vital statewide importance, and the early attainment of decent housing and a suitable living environment for every California family is a priority of the highest order. However, state legislation (i.e., SB 610 and SB 221 discussed above) ensures that specific housing and other development projects are not approved and constructed without a demonstrated, adequate water supply.

Water resource topics are usually addressed in general plan conservation, public services and/or open space elements where policies are developed that connect the management of water resources and provision of water supply infrastructure with development patterns. In 2003, the California Governor's Office of Planning and Research published general plan guidelines that encouraged jurisdictions to include an optional Water element in their general plan to allow a more thorough consideration of water supply availability and subsequent development decisions. The water element of the general plan must be developed in coordination with any county-wide water agency and with all districts and city agencies. Such coordination must include the discussion and evaluation of water supply and demand information. While none of the local general plans in Santa Cruz County include the optional water elements, it could be argued that several contain functionally equivalent policies in the required elements.

Similarly, in 2007, legislation was passed to facilitate coordination between land use and flood risk management agencies by updating cities' and counties' responsibilities related to local land use planning requirements. Specifically, the legislation requires cities and counties to amend their general plan land use, conservation, safety, and housing elements to consider and address flood risks. Revised water

resources policies are required to be developed in coordination with applicable flood management, water conservation, and groundwater agencies.

The Cities of Santa Cruz, Capitola, Scotts Valley, and Watsonville as well as the County of Santa Cruz have all adopted general plans. Additionally, these jurisdictions have local coastal plans (Capitola, Santa Cruz, Watsonville, and the County of Santa Cruz), zoning, and other regulations that guide development, and in the case of the County, help to manage growth. Each of these jurisdictions has updated housing elements, each of which sets forth goals and objectives for housing production, rehabilitation, and conservation to address their required regional housing need allocation established by the Association of Monterey Bay Area Governments (AMBAG).¹

This IRWM Plan recognizes and incorporates local water, watershed, and land use goals and objectives as described in various chapters of this plan. Many of these goals and objectives are reflected in the goals and objectives of this IRWM Plan. The IRWM Plan integrates with local general plans in two primary ways:

1. Through communication with local land use planners in the development, implementation, and future updates to the IRWM Plan;
2. Through the participation of local planners in project development, review, and implementation.

The following sections briefly summarize the status of each jurisdiction's general plan.

12.3.2 CITY OF SANTA CRUZ

The City of Santa Cruz's 2005 General Plan was recently updated and the General Plan 2030 was adopted by the City Council in June 2012. The general plan describes goals, policies, and actions to address each of the required elements. The Plan includes a land use map that identifies land use designations throughout the City, with accompanying residential densities and non-residential land use intensity, which remain largely unchanged from the 1990-2005 General Plan and Local Coastal Program. Importantly, the City designates the University of California at Santa Cruz (UCSC) campus and off-campus lands as "UCSC Development," which is guided by the University's Long Range Development Plan (LRDP). Further description of the UCSC LRDP and future development is provided below.

12.3.3 CITY OF CAPITOLA

The City of Capitola's recent General Plan Update was adopted in June 26, 2014. There are no permit restrictions on development or growth limitation policies for Capitola; however, growth is limited by the lack of developable land. As with the City of Santa Cruz and the County, Capitola's housing element was adopted and certified by the state in 2010, and covers the years 2007 - 2014.

¹ The foregoing discussion has been paraphrased from: URS Corporation. 2013. *SCWD² Regional Seawater Desalination Project Draft Environmental Impact Report*. City of Santa Cruz and Soquel Creek Water District. Pg. 3-13 - 3-17.

12.3.4 CITY OF SCOTTS VALLEY

The City of Scotts Valley's General Plan was adopted in 1994. Scotts Valley has initiated the process of updating its General Plan. Between 1970 and 2000, Scotts Valley has grown from a small town of 3,621 persons to a community of 11,385 persons, in large part in response to regional employment opportunities. The City's housing element was adopted and certified by the state in 2010, and covers the years 2009 - 2014.

12.3.5 CITY OF WATSONVILLE

The City of Watsonville's 2005 General Plan was adopted in 2005 and the Watsonville Vista 2030 General Plan Update was adopted in 2013. Conservation and preservation of the agricultural base, as well as natural resources management - including surface and groundwater protection - are key themes in the plan.

12.3.6 COUNTY OF SANTA CRUZ

Land use in the unincorporated portions of the County, which make up the majority of land area in the Region, is regulated and guided by the policies and programs contained in the 1994 Santa Cruz County General Plan and Local Coastal Program. The general plan establishes 15 planning areas for the unincorporated County, and each has a land use map that locates a range of land uses within the planning area. Five of these planning areas are largely within urban areas served by water agencies: Carbonera and Live Oak - City of Santa Cruz; Soquel and Aptos - Soquel Creek Water District; Pajaro - City of Watsonville. In addition to the general plan and local coastal program, the County's current housing element was adopted and certified by the state in 2010.

The County's general plan does not contain the optional water element; however, strong, comprehensive policies related to the sustainable management of land and water resources are contained throughout the plan's required elements. These policies generally reflect the need to protect and sustain the County's water resources, and to ensure compatibility between development and land use.

12.4 OTHER LOCAL LAND USE ORDINANCES, PLANS, AND POLICIES

City and county planning agencies also use specific plans, zoning ordinances, and other development regulations (e.g., urban limit lines), and conditional use permits to implement the general plan policies and regulate development as well as the protection of water and environmental resources within their jurisdictions. Specific plans can be used to implement policies of a general plan. Conditional use permits (CUPs) are planning tools to impose specific requirements on a given proposed land use. In the context of water resources management, CUPs can provide opportunities to impose requirements that advance numerous policies, including low impact development (LID) features to manage stormwater runoff and reduce impervious surfaces and flooding potential.

12.4.1 MEASURE J

Various ordinances contained in the County Code also dictate how growth and development should occur. Of particular note is Measure J, which was passed by County voters in 1973 as a means of managing growth, which resulted in the development of Title 17 of the County Code, entitled Community Development. This established the County's Growth Management Ordinance that sets policies that govern future growth and development in the County, and specifically regulates the character, location, amount, and timing of future development. The ordinance includes:

1. the establishment of urban and rural boundaries
2. the program for developing the annual population growth goal
3. affordable housing requirements and incentives

The establishment of the Rural Services Line and an Urban Services Line in the county has defined areas that are or have the potential to be urban, and areas that are and should remain rural. These designations serve to encourage new development to locate in urban areas, served by utilities, and to protect agricultural land and natural resources. The population growth goal is intended to limit population growth during a given year to an amount determined to represent the County's fair share of statewide population growth. Each year's population growth goal is to include plans to assist and encourage the production of a number of housing units equal to, on average, not less than 15 percent of the newly constructed units during any three consecutive years for purchase or rent by persons with average or below average incomes.

12.4.2 UCSC LONG-RANGE DEVELOPMENT PLAN

Universities within the University of California system are required to prepare long-range development plans (LRDP) that guide physical development and land use to meet the academic and institutional objectives for their campus. The Regents of the University of California adopted an LRDP for the University of California at Santa Cruz (UCSC) in 1988 that guided development through 2005-06. Projected increases in enrollment spurred UCSC to prepared a new LRDP for growth through 2020. UCSC is the City's largest single water customer using about 6 percent of the total city area water demand, and given the relationship between the City of Santa Cruz and UCSC, the LRDP could have a significant impact on water resources.

When UCSC was first established, the City agreed to provide sufficient water to meet University growth, and a 1965 agreement between the City and University states that the City will supply up to 2 million gallons per day to the Campus. Current average daily use is currently well below that level at approximately 565,000 gallons per day. The LRDP calls for increasing enrollment up to 19,500 students by 2020, an approximately 40% increase over current enrollment of 14,000. Potentially more critical to water resources given the seasonal nature of the City's water supply and demand, the LRDP is also proposing expanded summer programs that could increase summer enrollment levels from a current level of about 1,600 students to 8,100 students. With implementation of the LRDP, total UCSC population including students, faculty, and staff would grow from a total of 18,130 to an estimated 27,600. Eighty-five percent of current students and staff reside on campus or elsewhere within Santa Cruz County.

The Environmental Impact Report (EIR) for the LRDP states that the City estimates that there is approximately 300 mg/year of excess capacity within the City's system. The EIR states that the City can meet 100 percent of demand in 7 of 10 years, and approximately 90 percent in 9 of 10 years. At full development under the LRDP, in 2020 the main campus was projected to have an average daily water demand of just over 1 million gallons per day, nearly double the current demand on campus. Increased summer demand would increase total demand during that 10-week period up to approximately 11 million gallons. This increase in summertime demand would account for only approximately 1% of the City average daily summertime demand. The EIR for the LRDP determined that this impact on water resources would be significant and unavoidable and proposed a number of mitigation measures to partially offset this impact. Measures include ongoing implementation of conservation programs, installation of high-efficiency plumbing fixtures, and water efficient landscaping. If campus demand reaches 250 million gallons per year, the campus will be required to initiate a program to retrofit existing facilities with efficient campus standards. Additional measures will be required if demand exceeds 300 million gallons per year, or if the City implements drought emergency management measures. As a result of a lawsuit over the LRDP, UCSC, the City and the County entered into a comprehensive settlement agreement that committed the University to many of the water efficiency mitigation measures contained in the EIR.

12.4.3 SANTA CRUZ COUNTY ECONOMIC VITALITY STRATEGY AND SUSTAINABLE SANTA CRUZ COUNTY PLAN

The Santa Cruz County Economic Vitality Strategy represents the results of an initiative led by the County of Santa Cruz to identify strategies that could work together to strengthen the local economy. the perspective of the Strategy is to recognize countywide assets, opportunities and partnerships, and to highlight goals, strategies and actions that the County government could pursue to complement and strengthen private-sector the economic development efforts. The Strategy recognizes core community values that exist in Santa Cruz County, including an emphasis on environmental conservation and restoration, and a mindfulness of the importance of equity for all County residents. The County is also completing a Sustainable Santa Cruz County Plan which proposes targeted infill development along established transportation corridors to support housing and employment needs in the county. This plan identifies water supply constraints and other natural resource issues.

Healthy Economies Initiative

Healthy Lands and Healthy Economies: Demonstrating the Economic Value of Natural Areas and Working Landscapes is a regional collaboration intended to estimate and articulate the economic value of local ecosystem services and the direct role they play in maintaining sustainable local economies and communities in Santa Clara, Santa Cruz and Sonoma Counties. This effort in the Santa Cruz region is being led by the Resource Conservation District of Santa Cruz County and is supported by a private funding grant.

Santa Cruz County's economy is housed within a landscape of Natural Capital, which provides valuable benefits to people, called Ecosystem Services, such as water supply, clean air, food, fiber, soil fertility, flood protection, recreation opportunities, and more. A few examples of economic goods and services provided by Santa Cruz County's natural capital include:

- **Climate Regulation.** Oak woodlands, grasslands, and evergreen forests native to California contribute to climate regulation by sequestering carbon from the atmosphere. Species like the Blue Oak, Coast Oak, and Black Oak can be found along the eastern foothills of the Santa Cruz Mountain range and play an important role along with other ecosystems in mitigating climate change.
- **Pollination.** Many of Santa Cruz County's most important crops, such as fruit and nursery crops, rely on pollination for production. Species like the wild Digger Bee thrive in grassland, shrub and forest habitats adjacent to agricultural lands and contribute to their yield. In Santa Cruz, apple production for 2012 was valued at \$12.5 million, revealing the economic importance of natural pollination services. A 2011 study by the University of California Berkeley found that wild pollinators contribute to roughly 40% of crop production for the State of California. Diversified farmland, open grassland, and riparian zones are crucial for maintaining the presence of wild pollinators. Wild pollinators in California also help to reduce pest incidences, and the need for pesticide use by farmers.
- **Recreation and health.** Visitors to Santa Cruz County spent almost \$700 million in 2011, supporting roughly 8,000 jobs. This spending also generates \$15.5 million in local taxes, \$29.9 million in state taxes, and \$45.4 million in federal taxes. The natural beauty of Santa Cruz County's forests and coast undoubtedly attracts many of these visitors. In addition, green space within and surrounding towns and cities provides lasting physical and mental health benefits to residents and visitors alike. Researchers have found that when compared to walks in urban areas, leisurely forest walks lead to a 12.4% decrease in the stress hormone cortisol.

Using the latest advances in natural resource valuation methods and geographic information systems data, this study identified and assigned dollar values to bundles of ecosystem services by land cover type, and it estimated the total asset value of natural system within the County.

12.4.4 SANTA CRUZ COUNTY PRIMARY GROUNDWATER RECHARGE ZONES

The County of Santa Cruz designates the areas where an aquifer is exposed at the ground surface and allows water to move downward into the aquifer as primary groundwater recharge (PGR) zones. PGR designation provides for special consideration and protection from development, the intent of which is to allow aquifers to maintain an adequate quantity and quality of groundwater recharge. Parcels outside the urban services line and within mapped PGR can not be subdivided smaller than 10-acres. The rationale for this is to minimize the blockage of the aquifer recharge areas inherent to development and to reduce the amount of impacts to the recharge water quality from septic systems and other site activities. An indirect benefit of the lower development density is that it reduces the amount of potential groundwater extraction from those areas.

12.4.5 SAN LORENZO WASTEWATER MANAGEMENT PLAN

Santa Cruz County has over 23,000 septic systems, 13,500 of which are in the San Lorenzo River watershed. The San Lorenzo Watershed has the highest density of septic systems of any comparable area in the state. The majority of the septic systems in the watershed are over 25 years old and are located on parcels that could not fully meet today's standards for installation of a new septic system due to small lot size, close proximity to a stream, high groundwater, steep slope, or clay soil. Many of these

systems have already been repaired or replaced at least once. However, many of the repairs were done prior to 1980 when there were little or no standards for septic system repairs. There were no minimum size requirements and systems were allowed to go in very deep, with little regard to soil conditions or winter groundwater levels. Poor septic system conditions in the San Lorenzo Valley during the 1970s and early 1980s led to frequent failures, high bacteria levels in the river and elevated nitrate levels which threatened the City of Santa Cruz water supply. In 1986, County Environmental Health proposed a solution whereby septic systems could be allowed to continue to be used, provided that they were upgraded over time to meet a minimum set of standards necessary to improve the water quality in the river. In May, 1995, the State Water Board lifted the septic system prohibitions and adopted the San Lorenzo Wastewater Management Plan, including the repair standards as they substantially are today. Since the County began the program in 1986, septic system failure rates have dropped from 15% to 2%. Some 3,000 systems have been repaired and 85% of these have been able to fully meet the repair standards for standard systems. Where standards for conventional disposal cannot be met, alternative technology is being used. The region now has over 600 alternative technology onsite sewage disposal systems.

12.4.6 SANTA CRUZ COUNTY WATER EFFICIENT LANDSCAPE ORDINANCE

In 2013, the County Board of Supervisors adopted a Water Efficient Landscape Ordinance (WELO) to promote efficient water use and to comply with state law that requires every city and county to adopt efficiency standards for landscaping. The goal of the WELO is to lower the demand for water, particularly during the months of April through October. The WELO, with certain exceptions, requires that all landscapes installed with new buildings must comply with landscape water efficiency standards. A checklist guides property owners subject to the WELO that includes standards for overall landscape design, turf limits, invasive plant control, and irrigation design, among other requirements. WELOs are required throughout the state, and in some cases are implemented directly by the water supply agency. In the Santa Cruz region, the water efficient landscape requirements are also implemented by the City of Santa Cruz Water Department and the Soquel Creek Water District.

12.4.7 SANTA CRUZ COUNTY RUNOFF AND POLLUTION CONTROL ORDINANCE

On March 6, 2012 the County Board of Supervisors adopted a Runoff and Pollution Control Ordinance. The County developed a stormwater management plan (SWMP) as required under the County's MS4 NPDES permit. Under the SWMP, the County was required to develop an ordinance that prohibits non-stormwater discharges into the storm drain system along with appropriate enforcement procedures and actions. The ordinance also addresses construction erosion and sediment control, post-construction runoff from new development and redevelopment projects, and implementation of design standards for specific development projects. The ordinance also requires ongoing maintenance of private stormwater management facilities, and mitigations for impacts on runoff quality and quantity, as well as potential for percolation of pollutants to groundwater.

12.4.8 CLIMATE ACTION PLANS

Providing water to residents and businesses requires a significant amount of energy. The State of California estimates that 20% of state electricity use is for the treatment and distribution of potable water.² Several municipalities within the Santa Cruz Region have developed climate action plans that partially address this issue, including the Cities of Santa Cruz and Watsonville and the County of Santa Cruz. These plans outline the actions the cities and their partners may take to meet state land use requirements pertaining to climate change, achieve the policies identified in the General Plan 2030, and accomplish the greenhouse gas (GHG) reduction goals.³ The GHG emission goal statements in each city plan indicate that nearly 50% of GHGs emitted from municipal sources come from water treatment and delivery and wastewater treatment. Because these municipalities rely on locally obtained surface water and have invested in energy efficient equipment to treat and distribute water, the energy content of each acre-foot of water supply is below most California districts, many of which rely upon imported water.



Solar panels on Graham Hill Water Treatment Facility

Photo courtesy SCWD

The climate action plans identify several actions to significantly reduce municipal energy use, including integrating new energy efficient equipment and reduction measures into the efficiency conservation strategy for the Water Department to reduce energy use 10% below 2005 values; and integrating new energy efficient equipment and reduction measures into the efficiency conservation strategy for the wastewater treatment and collection system to reduce energy use 10% below 2005 values. Specific actions include:

- Public awareness and education: promote awareness about the water system and conservation
- Water demand monitoring: evaluate water supply and demand and determine need for increased demand reduction efforts
- Long-term water conservation programs: develop and implement various conservation programs that result in sustained demand reductions
- Planning and emergency management: plan for future demand, coordinate conservation activities, and analyze impacts of water shortages and demand hardening.

The County's Climate Action Strategy also addresses various measures to adapt to the projected effects of climate change and explicitly supports IRWM as a venue to help mitigate and adapt to climate change.

² Wolff, G., Cohen, R., Nelson, B. Energy Down the Drain. Natural Resources Defense Council. August, 2004.

³ City of Santa Cruz. Climate Action Plan. June, 2012.

12.5 REGIONAL PLANNING

12.5.1 SANTA CRUZ LOCAL AGENCY FORMATION COMMISSION

To provide for better coordination of local land use planning, the California Legislature created Local Agency Formation Commissions (LAFCOs) within each county to discourage urban sprawl and to reserve open space and agricultural lands while meeting regional housing needs and planning for the efficient provision of public services and utilities, including water and wastewater service. LAFCOs have approval authority (with some limits) over the establishment and expansion of municipal and service district boundaries, including expansion related to a city proposing to expand its sphere of influence. LAFCOs also have responsibility to conduct Municipal Service Reviews that evaluate the provision of municipal services within each county. Municipal Service Reviews are required to include determinations regarding (among other things) infrastructure needs or deficiencies, growth and population projections for the affected area, and government structure options (including service providers).

In 2010, Santa Cruz LAFCO amended its policies and guidelines to specifically address water issues.⁴ The additional policies related to water are as follows:

“LAFCO recognizes that the water resources of Santa Cruz County are limited, and the Commission’s objective is to ensure that its decisions relating to water do not lead to adverse impacts on the natural resources of Santa Cruz County. In reviewing sphere of influence adoptions and amendments, LAFCO shall be guided by the potential impacts of the proposal on water resources and will consider the efforts of the water agencies and land use agencies to maintain stream and river flows, promote high water quality of surface waters and groundwater, and reduce groundwater overdraft.

1. To assist in the review of Spheres of Influence and other LAFCO reports, the Local Agency Formation Commission will utilize the following data sources to maintain an ongoing database of the supply, demand, and related water data of the local water agencies subject to LAFCO’s boundary regulation:
 - a. The Public Water System Annual Reports filed by each public water agency with the California Department of Public Health
 - b. The Urban Water Management Plans prepared by water suppliers with 3,000 or more customers as required by the California Water Code Sections 10610 et. seq.
 - c. The annual Water Resources[Status] Report prepared for consideration for the Santa Cruz County Board of Supervisors.
2. Water resources and supplies are critical issues for many sphere of influence and application decisions made by the Local Agency Formation Commission. Public information and participation is an important component in the decisions of the Commission, the land use agencies, and the water agencies. To promote public

⁴ Santa Cruz Local Agency Formation Commission Spheres of Influence Policies and Guidelines. Amended by Resolution 2011--1, February 2, 2011.

education, at least every two years, the Local Agency Formation Commission will sponsor, or co-sponsor with the Regional Water Management Foundation, the County of Santa Cruz, and local water agencies, a public forum that provides the public with an overview of the state of the water supplies in Santa Cruz County.”

12.5.2 ASSOCIATION OF MONTEREY BAY AREA GOVERNMENTS

The Association of Monterey Bay Area Governments (AMBAG) was organized in 1968 for the purpose of regional collaboration and problem solving. AMBAG was formed by a Joint Powers Authority (JPA) governed by a 24-member Board of Directors comprised of elected officials from each city and county within the AMBAG region, which includes Monterey, San Benito, and Santa Cruz counties. AMBAG coordinates planning activities within the region and carries out selected state and federal statutory duties, including setting state-mandated fair-share regional housing allocations for Monterey Bay Area cities and counties. AMBAG’s member jurisdictions include the three Monterey Bay Area counties and the 18 cities and towns in the region.

Notable for the purposes of IRWM planning, approximately every five years, AMBAG produces a regional forecast of population, housing, and employment. Each forecast is produced with the best available data and is extensively reviewed by AMBAG’s member agencies. Once completed, the forecast is used to provide data support to long-term regional planning documents and special districts’ master plans, as well as to support city and county long-range planning.

In addition to the regional forecasts, an AMBAG effort related to water resources is the 2035 Metropolitan Transit Plan and Sustainable Communities Strategy (MTP/SCS). This is a long-range planning document required by both state and federal law that contains a compilation of regional transportation plans (RTPs) for Monterey, San Benito, and Santa Cruz counties and is used to achieve a coordinated and balanced regional transportation system. Transportation system improvement projects identified in the 2035 MTP/SCS include: highway/roadway projects; bus rapid transit and rail projects; active transportation (bicycle and pedestrian projects); transportation demand management, transportation system management and intelligent transportation system (ITS) projects; and aviation projects. For the first time, AMBAG now also has the responsibility to prepare a sustainable communities strategy (SCS) as part of the MTP, pursuant to the requirements of California Senate Bill 375 as adopted in 2008. The SCS sets forth a forecasted development pattern for the region, which, when integrated with the transportation network and other transportation measures and policies, is intended to reduce GHG emissions from passenger vehicles and light duty trucks to achieve the regional GHG reduction targets set by the California Air Resources Board (CARB).

Specific to area water demand and environmental protection, the land use scenario envisioned by the 2035 MTP/SCS would encourage infill, mixed use, and transit oriented development (TOD) within existing urbanized areas. Similar to the effects of Measure J, promoting development of existing vacant or underutilized properties would reduce the impacts on water resources and water quality. However, some improvements in the 2035 MTP/SCS are located within rural areas, and these proposed improvements can be perceived as removing an obstacle to growth by either creating additional traffic capacity (in the case of widening) or improving access to undeveloped areas (in the case of road extensions). However, transportation improvement projects are already anticipated within applicable

general plans and proposed improvements have been coordinated with Santa Cruz County and are consistent with the general plan and Measure J.

12.5.3 REGIONAL TRANSPORTATION COMMISSION

The Santa Cruz County Regional Transportation Commission (RTC) is the regional transportation planning agency for Santa Cruz County. Created by the State of California in 1972 to carry out transportation responsibilities that cross city-county boundaries in Santa Cruz County, the RTC:

- Sets priorities for major improvements to the transportation infrastructure and network of services, including highways, major roads, bus transit, paratransit, rail, and alternative transportation facilities;
- Pursues and allocates funding for all elements of the transportation system;
- Adopts policies to improve mobility, access and air quality;
- Plans for future projects and programs to improve the regional transportation system while improving the region's quality of life;
- Informs businesses and the public about the need to better manage the existing transportation system; and
- Conducts programs to encourage the use of alternative transportation modes.

The Commission consists of all five members of the Santa Cruz County Board of Supervisors, one member of the Watsonville, Santa Cruz, Scotts Valley, and Capitola City Councils and three members appointed by the Santa Cruz Metropolitan Transit District. The Caltrans District 5 Director serves as an ex-officio member of the Commission. The Commission employs a professional planning and administrative staff.

According to the RTC's website, transportation projects must consider the natural and built environment in which they are located. Similarly, the built environment must consider its impacts on the transportation network. The RTC employs several means of promoting compatibility between the natural and built environments and the transportation system, including the following:

- Reviews and comments on transportation aspects of planning and environmental documents prepared by other agencies to ensure consistency with the Regional Transportation Plan Goals and Policies, and forwards applicable plans to the appropriate RTC Committees for consideration.
- Completes environmental reviews for transportation projects and solicits input from the public, transportation agencies, resources agencies, and other partner agencies as required by CEQA and NEPA.
- Implementation of habitat restoration and other projects to mitigate the effects of transportation projects.

One of the RTC's goals is to ensure that the transportation system complements and enhances the natural environment of the Monterey Bay region, and to reduce GHG emissions. Policies related to that goal include:

- emphasizing sustainable transportation modes consistent with regional environmental policies; and
- ensuring that transportation projects contribute to the protection of biological and scenic resources, open space, and agricultural land.

12.5.4 COHO AND STEELHEAD RECOVERY PLANNING

In September 2012 the National Marine Fisheries Service (NMFS) division of the National Oceanic and Atmospheric Administration (NOAA) released a Recovery Plan for the Evolutionarily Significant Unit of the Central California Coast Coho Salmon.⁵ A comparison has been performed between the Recovery Plan and the IRWM Plan for Northern Santa Cruz County in order to determine opportunities for collaboration, and to potentially attract needed restoration funds for projects that will have both water resources and fishery benefits. The Steelhead Recovery plan is in progress and will also have significant bearing on IRWM efforts. It is expected to be released in 2015.

12.6 LAND USE AND WATER RESOURCES COLLABORATION

A primary aim of IRWM planning is to solve regional water management issues through diversified water management portfolios and early water management input into, and coordination with, those responsible for making land use decisions. Many of the IRWM Plan objectives require coordination between land use planners and water managers; as a result, improving collaboration between land use planners and water resource managers will support accomplishment of the IRWM Plan objectives. As noted in the foregoing sections, collaboration between land use planners and water resource managers occurs in the Santa Cruz Region on multiple levels - from project-specific planning to long-term general land use planning. There are numerous triggers for collaboration at the project level, often initiated by the filing of a Notice of Preparation under CEQA. Another route for collaboration is consultation during the development of a Water Supply Assessment, or through specific project review triggered by various development applications. A significant opportunity for long-term planning occurs during the update of general plans and urban water management plans. These documents require an assessment of the reliability of the supplier's water sources over a 20-year planning horizon, and require coordination with appropriate agencies including land use and planning agencies.

12.7 OPPORTUNITIES AND CHALLENGES FOR ONGOING COLLABORATION

Numerous local stakeholders, including water resource managers and land use planners, were involved in the development of this IRWM Plan through the Conceptual Framework, project solicitation, and the IRWM Plan review processes. Involvement continues through ongoing Steering Committee and Regional Water Management Group (RWMG) meetings, as well as workshops and other events related to the IRWM Plan.

⁵ National Marine Fisheries Service. 2012. Final Recovery Plan for Central California Coast Coho Salmon Evolutionarily Significant Unit. National Marine Fisheries Service, Southwest Region, Santa Rosa, California.

In part, the governance structure of the IRWM Region was developed in a manner to facilitate participation through the RWMG Steering Committee. The Steering Committee's makeup was chosen to represent the various interests of the region, including:

- Water resources: One seat on the Steering Committee is reserved for a General Manager from one of the Region's water districts to ensure that interests specific to water districts are represented on the Committee
- Environment: One seat on the Steering Committee is reserved for the Executive Director of the Resource Conservation District of Santa Cruz County
- Government: The final Steering Committee seat is reserved for the County's Water Resources Division Director to represent government interests and the functional areas not specifically covered by the other Steering Committee members.

Among other concerns, the government seat of the Steering Committee was intentionally set to ensure that a broad range of planning and land use interests have an avenue for input to the IRWM planning process. While the IRWM Plan has been informed through input from both water resource and land use planners, it is important to recognize that the dynamic works both ways: through their participation in the IRWM planning process - either as Steering Committee members, the full RWMG, or stakeholders - the IRWM planning process informs and influences local planning efforts. Local planning efforts are also influenced through the implementation of regional projects that cross over jurisdictional and land use/water resource boundaries in carrying out the objectives of the IRWM Plan.

Ongoing involvement in IRWM planning and implementation is limited, however, by stakeholders' capacity (i.e., funding, time, resources) and understanding of the relevance of the IRWM process to existing workloads. Following the economic downturn, most agencies have reduced capacity to participate in efforts for which there is no dedicated funding source. However, participation can be maximized by ensuring that the IRWM Plan and planning effort is as relevant as possible to stakeholders' interests and concerns. Further, it is incumbent upon IRWM planners that development and implementation be conducted in an efficient manner that maximizes benefit from the time and resources invested in the process.

The understanding of relevance can be addressed through communication and the process through which the IRWM program and projects are developed. Water supply reliability is a particular concern for the Santa Cruz Region that has a long history of growth management and is reliant upon a locally-derived water supply. As such, it is fitting to integrate land use managers into the IRWM process. However, these managers' roles will be different from many other stakeholders in that they generally do not have a vested interest in the IRWM Plan, which seeks funding for project implementation. While project proponents will meet on a more regular basis regarding grants, project solicitations, and other project-related topics, land use planners' involvement will occur on a less frequent basis, likely when the IRWM Plan is updated. During these events, staff and the Steering Committee will conduct specific outreach to land use agencies to ensure their involvement, including targeted meetings and issue-specific workshops.

CHAPTER 13: STAKEHOLDER INVOLVEMENT

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The intent of the stakeholder engagement process is to engage, inform, and provide opportunities for the region's diverse range of agencies, interest groups, constituents, and residents to actively participate in the IRWM decision-making process on an ongoing basis. The outreach efforts during the IRWM Plan update have aimed to ensure that diverse interests and perspectives were considered in establishing the region's water management goals, objectives, strategies and priorities. This process and a balanced approach are part of establishing a foundation for broad-based support of the Plan and future efforts. Involving stakeholders is a key element of the Santa Cruz IRWM process to develop a collaborative and integrated approach to water resource management. This chapter summarizes the process for stakeholder engagement in the Santa Cruz region.

13.1 STAKEHOLDER OUTREACH PROCESS

Ongoing public outreach to local agencies, organizations, and the general public about IRWM efforts has occurred since the development of the 2005 IRWM Plan and more actively following the 2008 IRWM Implementation grant award to the Region. A collaborative approach to regional water planning is not new to the Santa Cruz region, as local water districts, cities, and the County share a history of working together that pre-dates the IRWM program by many years. However, the recent IRWM efforts have provided a very effective vehicle to invigorate and create new relationships between agencies and stakeholders in the region as well as a critical source of funding for planning and the implementation of more than 70 projects since 2008.

Stakeholders, together with the Regional Water Management Group (RWMG), represent all of the major water resource management authorities in the region and provide broad, balanced, and fair representation of water supply, water quality, watershed stewardship, sewer and wastewater, flood and stormwater management, environmental, and regulatory aspects of water resources management throughout all geographic areas of the planning region. The engagement and input from this broad suite of interest groups and responsible agencies has informed the development of the goals, objectives, and planning priorities at the core of IRWM Plan, and has guided the identification and prioritization of strategies aimed at achieving sustainable water resource management in the region.

13.2 IDENTIFICATION OF STAKEHOLDERS

The process to identify and involve stakeholders specifically in the IRWM planning process began prior to the development of the 2005 IRWM Plan. During that Plan's development, a stakeholder list was developed to include agencies, organizations, and individuals that were likely to have an interest in or be affected by the IRWM Plan. In 2008, the contact list was updated for the purpose of developing an email

distribution list to communicate with stakeholders and invite their participation. In 2009, a stakeholder involvement plan was developed. The intent of the stakeholder involvement process was to ensure that the wide range of interest groups and citizens were afforded the opportunity to participate in the IRWM Plan development and its implementation. This comprehensive list of stakeholders targeted all of the major water resource management authorities in the region, as well as the IRWM representatives from the neighboring Bay Area and Pajaro IRWM regions and other individuals who may have a general interest in IRWM planning or projects. Collectively, the stakeholders identified include a broad representation of water supply, water quality, wastewater, stormwater, flood control, watershed, municipal, environmental, agricultural, regulatory, and community interests in the IRWM planning region, including non-governmental organizations, disadvantaged community representatives, Native American tribal contacts, and interested residents.

The stakeholder contact list continues to expand and is continually updated with input from the stakeholders, workshop/meeting sign-in sheets, recommendations from stakeholders already involved, and individuals signing up through the website. The stakeholder list serves as the basis for the email listserv distribution list that was used during the IRWM Plan development to share news and information about IRWM efforts, public workshops, project solicitations, and planning documents. The list currently includes approximately 160 individuals representing over 40 agencies, organizations, and interest groups. The following sections describe some of these stakeholder groups.

- Regional Water Management Foundation
- Watsonville Wetlands Watch
- San Lorenzo Valley Water District
- Coastal Watershed Council
- Ecology Action
- Save Our Shores
- Land Trust of Santa Cruz County
- Arana Gulch Watershed Alliance
- City of Scotts Valley
- City of Capitola
- Santa Cruz Port District
- Zone 7 Flood Control/Water Conservation
- San Lorenzo River Alliance
- Community Foundation Santa Cruz County
- Department of Water Resources
- State Water Resources Control Board
- California Department of Fish and Wildlife
- State Coastal Conservancy
- Regional Water Quality Control Board #3
- California Coastal Commission
- California Department of Parks and Rec.
- National Marine Fisheries Service
- US Army Corps of Engineers
- Monterey Bay National Marine Sanctuary
- US Fish and Wildlife Service
- Natural Resources Conservation Service

13.2.1 LOCAL AND REGIONAL WATER AND RESOURCE AGENCIES

In the late 1990s, local government agencies and non-governmental organizations in the Santa Cruz region came together to support and strengthen coordinated programs for water resources and watershed management. Between 2002 and 2004, many agencies and special districts began integrated planning efforts, including coordination of water bond funding. In 2005, the group now referred to as the Regional Water Management Group (RWMG), completed the development of the preliminary IRWM Plan for Northern Santa Cruz County. The nine partner agencies that make up the current RWMG (listed below) represent nearly all of the water resource-related agencies responsible for water supply and water quality, flood protection and stormwater management, wastewater and recycled water, and watershed management in the region. These agencies are the most active participants in IRWM planning and implementation. The local and regional water and resource agencies play the primary role in the

implementation of the IRWM Plan through the implementation and funding of their respective projects and policies. They have decision-making authority on IRWM planning and implementation efforts as established in the IRWM Memorandum of Agreement (MOA). The nine RWMG agencies include:

- Central Water District
- City of Santa Cruz
- City of Watsonville
- County of Santa Cruz
- Santa Cruz County Sanitation District
- Davenport Sanitary District
- Resource Conservation District of Santa Cruz County
- Scotts Valley Water District
- Soquel Creek Water District

All of the RWMG agencies are signatories to the most recent IRWM MOA (2010). Agencies that are targeted for future addition to the RWMG include San Lorenzo Valley Water District, the City of Capitola, and City of Scotts Valley. With the addition of these three entities the RWMG would include all of the municipalities and water districts within the Santa Cruz IRWM boundary.

13.2.2 STATE AND FEDERAL RESOURCE AND REGULATORY AGENCIES

State and federal agencies play primarily a regulatory role in IRWM planning and implementation in fulfilling their resource stewardship mandates, but they also play an advisory role through participation in program and project-related Technical Advisory Committees (TACs), as well as a funding role for IRWM projects and related programs. These agencies have the opportunity for participation or input in Plan development and specific projects through public meetings, stakeholder workshops, and project solicitations. In many instances, state and federal agencies are involved at the project planning or implementation stage as technical advisors or in the permitting process. For example, the Resource Conservation District’s Integrated Watershed Restoration Program (IWRP) TAC includes representatives from numerous state and federal public trust agencies that play an active role in guiding IWRP programmatic and project level design and implementation strategies.

Table 13-1 and 13-2 presents the list of state and federal agencies that are actively involved in the IRWM planning effort, and characterizes their participatory role.

Table 13 - 1 State Agencies Relation to Santa Cruz IRWM

State Agency	Role(s) in Santa Cruz IRWM Planning
Department of Water Resources (DWR)	Regulatory; Funder
State Water Resources Control Board (SWRCB)	Regulatory; Funder
Central Coast Regional Water Quality Control Board (RWQCB)	Regulatory; Funder; IWRP ¹ TAC
Department of Fish and Wildlife (DFW)	Regulatory; Funder; IWRP TAC
Coastal Conservancy	IWRP

¹ Integrated Watershed Restoration Program for Santa Cruz County

Coastal Commission (CCC)	Regulatory; IWRP TAC
Department of Forestry and Fire Protection (CDF, CALFIRE)	Regulatory; Funder; IWRP TAC
Department of Parks and Recreation	Regulatory; Funder; IWRP TAC

Table 13 - 2 Federal Agencies Relation to Santa Cruz IRWM

Federal Agency	Role(s) in Santa Cruz IRWM Planning
Natural Resource Conservation Service (NRCS)	Regulatory; Funder; IWRP TAC
Environmental Protection Agency (USEPA)	Regulatory
Army Corps of Engineers (USACE)	Regulatory; IWRP TAC
National Marine Fisheries Service (NOAA-NMFS)	Regulatory; IWRP TAC
Fish and Wildlife Service (USFWS)	Regulatory; IWRP TAC
Monterey Bay National Marine Sanctuary (NOAA-MBNMS)	Regulatory; IWRP TAC

13.2.3 NON-GOVERNMENTAL ORGANIZATIONS

The important role of non-governmental organizations (NGOs) in Santa Cruz IRWM dates back to the initial efforts in the region. In April 2004, a summit of 30 nonprofit leaders was conducted by the Community Foundation Santa Cruz County (CFSCC) to identify major environmental issues in the county, including water issues, needs, and opportunities. That information supported watershed assessments and informed the 2005 and 2014 IRWM Plan development. An outcome of the summit, stemming from a shared recognition of the importance of a collaborative approach to addressing the region's water resource challenges, was the subsequent formation of the Regional Water Management Foundation (RWMF), a subsidiary of the CFSCC, to serve as the fiscal agent and a supporting entity for IRWM efforts in the region.

A variety of NGOs play an active and important role in IRWM planning and implementation efforts. Their roles and functions vary, and include but are not limited to: watershed stewardship through planning and implementation of habitat protection and restoration projects; water quality monitoring and reporting; IRWM grant administration and coordination; pollution prevention education and advertising campaigns; Green Business Program implementation; and education and outreach programs.

Many of the most prominent and active water resource and environmental NGOs in the region played an active role in IRWM planning or implementation efforts. Organizations that participated in IRWM

planning or received funding for project implementation include, among others: Ecology Action, Coastal Watershed Council, Watsonville Wetlands Watch, Land Trust of Santa Cruz County, Save Our Shores, RWMF, and the Community Foundation Santa Cruz County. NGOs are not voting members of the RWMG but have had representatives on planning study TACs as well as on the working group that guided the development of the 2014 IRWM Plan’s goals, objectives, and priorities. NGOs also have the opportunity to participate or provide input in Plan development and/or projects through public meetings, stakeholder workshops, and project solicitations.

Regional Water Management Foundation

The RWMF has served as grantee for the three IRWM grants awarded to the region. These grants are summarized in Table 13-3. As grantee, the RWMF has provided the grant administration and coordinated the reporting, invoicing, and inter-agency coordination.

Table 13 - 3 Grants received through the IRWM Grant Program

Grant Program; Funding Agency; Duration	Grant Amount	Local Match	Lead Applicants
Proposition 50 IRWM Implementation Grant; State Water Board; 2008 – 2013	\$12,500,000	\$13,818,205	City of Santa Cruz; County of Santa Cruz; County Sanitation District; Davenport Sanitation District; Resource Conservation District; Scotts Valley Water District; Soquel Creek Water District
Proposition 84 IRWM Planning Grant; DWR; 2011 – 2014	\$999,750	\$391,028	Central Water District; County of Santa Cruz; Resource Conservation District; Scotts Valley Water District;
DAC Outreach Pilot Project Grant; DWR; 2011 – 2014	\$100,000	\$0	Davenport Sanitation District; City of Watsonville

13.2.4 GENERAL PUBLIC

Annual assessments of the community indicate water resources, notably water quality and water supply availability, routinely rank highly as one of the community’s environmental concerns. County residents are very interested in water; water supply, affordability, and sustainability of surface water and groundwater receive weekly, if not daily, coverage in the region’s major newspaper, the Santa Cruz Sentinel, and other local media outlets. Providing members of the public opportunities to become informed and engaged is an important element of the required process, as well as the spirit, of the IRWM framework. While the general public is not in a direct decision-making role in the IRWM planning process, individuals are afforded multiple opportunities to review and comment on IRWM planning and projects.

Throughout the Santa Cruz IRWM Plan development and project implementation process, interested citizens have had access to information about IRWM efforts, including but not limited to: the 2005

IRWM Plan; the current IRWM Plan update process and the RWMG; descriptions of IRWM implementation and planning projects; funding opportunities; project solicitation and submission process; meetings and workshops. The primary avenue for information for the general public is the Santa Cruz IRWM website and IRWM email updates. The 2013 IRWM conceptual framework (which served as a basis for the Plan's goals, objectives, and strategies) was the focus of a August 2012 public workshop which included an opportunity for public vetting. The conceptual framework was posted to the IRWM website and made available for public comment. The IRWM Steering Committee and RWMG representatives routinely provide updates to their respective governing boards and councils at public meetings about IRWM projects and planning efforts. Finally, the IRWM Plan adoption by the RWMG occurs, as required by the 2012 IRWM Grant Program Guidelines, through a publicly noticed process that allows for public review and comment.

13.3 STAKEHOLDER ENGAGEMENT METHODS AND ACTIVITIES

Stakeholders throughout the Santa Cruz IRWM Region are invited and encouraged to participate in the IRWM planning process through a variety of methods. Access to participation and involvement is never based on an individual's or group's ability to contribute financially to IRWM Plan development or the planning process.

The RWMG communicates through a website, meetings, workshops, email, and written correspondence and announcements. In addition, the RWMG member agencies regularly conduct outreach with their own boards, councils, commissions, constituents, and members through internal emails, newsletters, websites, and meetings. The following sections describe the various stakeholder engagement methods and activities in the Santa Cruz IRWM Region.



13.3.1 WEBSITE

In 2010, the website SantaCruzIRWMP.org was launched to disseminate news and information about IRWM efforts. The site presents information about the IRWM Plan, including a list of the participating agencies and organizations, and current planning and project efforts in the four functional areas of focus (Water Quality, Water Supply, Flood/Stormwater, Watershed/Resources Stewardship). Descriptions of IRWM Implementation grant funded projects are posted. The site includes access to additional IRWM resources (e.g., maps, documents, links). The site features a Frequently Asked Questions (FAQs) tab and news and information on upcoming events. In 2013, the website was redesigned to improve its functionality and new information and features were added. The site now includes a sign-up feature for the email distribution list to receive news and information about Santa Cruz IRWM planning efforts. The site also includes contact information for the IRWM program staff.

13.3.2 EMAIL

The stakeholder email distribution list in use serves to inform the RWMG, project proponents, and stakeholders about IRWM activities and accomplishments. Email communications to stakeholders include information regarding: IRWM projects and planning documents; planning or implementation milestones; meetings and workshops; funding opportunities; project solicitation and submittal processes; and other noteworthy items. The emails include staff contact information (email address and phone numbers) for the County and/or RWMF IRWM program staff so that stakeholders know who to direct any comments, concerns, or questions about the IRWM planning process. This information can also be provided by US Postal Service for any stakeholders who do not have email access.

13.3.3 PUBLIC MEETINGS AND WORKSHOPS

Special efforts have been made to ensure broad participation at public meetings and workshops for the Santa Cruz IRWM planning process, and to address any barriers to participation. Stakeholder meetings and workshops are held at a variety of locations throughout the region, during the workday as well as in the evenings, in locations that have handicap access and near public transportation. Besides RWMG-sponsored workshops and meetings, outreach to engage stakeholders has been targeted through the following forums:

- Elected and appointed agency boards and councils
- Santa Cruz County Water Advisory Commission
- City of Santa Cruz Water Commission
- Integrated Watershed Restoration Program outreach
- Blue Circle meetings
- SCWD2 Task Force – Outreach Program
- Stormwater Action Group (SWAG)
- Santa Margarita Groundwater Basin Advisory Committee
- Earth Day community events
- Soquel-Aptos Groundwater Management Alliance
- Pajaro Watershed IRWM Region
- Greater Monterey IRWM Region
- Community Foundation Santa Cruz County
- Central Coast Regional Water Quality Control Board
- State Water Resources Control Board
- Department of Water Resources
- Association of California Water Agencies, Region 5
- Santa Cruz Midcounty Groundwater Stakeholder Advisory Committee

In addition to outreach through the established channels listed above, targeted IRWM outreach has included one-on-one meetings with agencies and organizations, including efforts to engage agencies previously not involved in IRWM planning.

Figure 13-1 presents a calendar of the IRWM stakeholder outreach meetings, presentations, and events that have occurred from 2008 - 2014. The sections below describe some of these stakeholder outreach and engagement events.

Table 13 - 4 Santa Cruz Outreach and Activity Calendar 2008 - 2014

2008	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IRWM Steering Committee						✓						
RWMG						✓						
Stakeholders			✓		✓	✓						
State Agency			✓								✓	
SWRCB IRWM Project Visits			✓			✓			✓			
2009	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IRWM Steering Committee									✓	✓		✓
RWMG	✓										✓	
Stakeholders		✓										✓
State Agency			✓			✓			✓			
SWRCB IRWM Project Visits					✓				✓			
2010	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IRWM Steering Committee	✓		✓	✓			✓		✓	✓	✓	
RWMG						✓						
Stakeholders				✓								
State Agency	✓								✓		✓	
SWRCB IRWM Project Visits	✓				✓				✓			
IRWM Project Solicitations						✓						
2011	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IRWM Steering Committee			✓			✓	✓			✓	✓	
RWMG												✓
Stakeholders											✓	✓
State Agency											✓	
SWRCB IRWM Project Visits				✓					✓			
2012	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IRWM Steering Committee		✓	✓						✓			✓
RWMG			✓			✓						
Stakeholders								✓	✓			
State Agency		✓				✓						
SWRCB IRWM Project Visits	✓	✓	✓			✓			✓			
2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IRWM Steering Committee	✓	✓		✓		✓			✓		✓	✓
RWMG							✓		✓			✓
Stakeholders				✓	✓						✓	✓
State Agency				✓								
SWRCB IRWM Project Visits			✓						✓			
2014	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IRWM Steering Committee	✓		✓	✓	✓	✓	✓					
RWMG		✓	✓				✓					
Stakeholders		✓	✓		✓		✓					
State Agency			✓									
IRWM Project Solicitations	✓											

13.3.3.1 PROJECT SOLICITATIONS

In June 2010, the RWMG held a solicitation for IRWM projects from regional stakeholders. A workshop was held to kick off the stakeholder project solicitation. County staff presented a summary of the IRWM program, its purpose, the status of the state's program, and an explanation of the project application form for submitting new projects for inclusion in the IRWM Plan. Staff conducted specific outreach to previously unrepresented agencies and organizations in the IRWM.

In January 2014, the RWMG solicited a new set of projects from regional stakeholders. The project solicitation notification was sent out via email to all Santa Cruz IRWM stakeholders, along with information and a link to the online submission form on the IRWM website. Stakeholders were informed of an alternative version if they were unable to access or utilize the online submittal tool.

13.3.3.2 PLAN UPDATE WORKSHOP - GOALS, OBJECTIVES, PRIORITIES

In August 2012, the RWMG and RWMF conducted an evening workshop to inform the general public about the IRWM efforts in Santa Cruz and to present the draft goals, objectives, and priority strategies for the updated Plan. The workshop was organized around the four areas of IRWM focus, or "functional areas." These include: water supply, water quality, watershed protection, and flood/stormwater management. In preparation for the workshop, staff prepared maps and charts outlining the issues surrounding each functional area and potential strategies to address them. The event was held in the evening at a local elementary school, and opened with a short, general introduction provided by a Steering Committee member regarding the IRWM planning process and the issues confronting the region. Then, participants participated in focused group discussions, rotating through each of the four functional topic areas as RWMG representatives presented the draft goals, objectives, and priority strategies. The workshop was publicized via the IRWM listserv and website and on local radio, and notices were placed in the local newspaper.

13.3.3.3 PLAN UPDATE - TECHNICAL STUDIES

In March 2013, the RWMF hosted an interactive informational session with a focus on technical studies conducted to support IRWM planning efforts. An overview of results of the following studies was presented:

- Conjunctive Use and Water Transfers - Phase II (Lead Agency - Santa Cruz County Environmental Health Services)
- Aromas and Purisima Groundwater Basin Management Study (Lead Agency - Central Water District)
- Santa Margarita Groundwater Model Update (Lead Agency - Scotts Valley Water District)
- Watsonville Sloughs Hydrologic Study (Lead Agency - Resource Conservation District Santa Cruz County)

13.3.4 TARGETED OUTREACH

County and RWMF staff have conducted targeted outreach to local agencies and organizations, including current RWMG members and potential new members, the County Board of Supervisors, and various organizations. The meetings have included presentations to staff and managers on the history and purpose of IRWM at the state level, its role in the State Water Plan, and efforts locally. The goals, objectives, and strategies of Santa Cruz IRWM have been explained and grant-funded IRWM implementation projects discussed along with examples of future projects. Opportunities for engagement in the IRWM process have also been discussed. Targeted meetings have included: County of Santa Cruz (Environmental Health Services; Sanitation; Public Works; Planning; Redevelopment; Parks/Open Space); City of Santa Cruz (Water Department; Public Works; Planning); Resource Conservation District of Santa Cruz County; Soquel Creek Water District; and Scotts Valley Water District. New partner outreach will target San Lorenzo Valley Water District.

IRWM efforts figure prominently in the annual report to the County Board of Supervisors on the Status of Water Resource Management Efforts in Santa Cruz County. This report is presented to the Board on an annual basis and is usually circulated for information to a number of other interested entities, including the Water Advisory Commission, the Local Agency Formation Commission, and the water supply agencies. The report includes the status of IRWM efforts, including special projects, grant programs, and the progress of IRWM Plan updates.

In July 2014, County Environmental Health Services (EHS), the agency tasked with the lead role in the IRWM Plan update, presented the 2014 IRWM Plan at a special meeting of the Santa Cruz County Water Advisory Commission. This meeting was advertised to the public and specific stakeholders and was conducted in a workshop format to provide opportunity for discussion and comment prior to taking the IRWM Plan for adoption by the governing bodies of the various RWMG agencies.

Targeted outreach to disadvantaged communities (DACs) in the region is described below.

13.4 ENGAGEMENT OF DISADVANTAGED AND ENVIRONMENTAL JUSTICE COMMUNITIES

The California Public Resources Code, as well as the Proposition 84 and 1E IRWM Grant Program Guidelines, define economically disadvantaged communities as those with a median household income (MHI) less than 80 percent of the state MHI, or \$49,120; and define "severely disadvantaged community" as a community with a median household income less than 60 percent of the statewide average. While the MHI in Santa Cruz County is higher than the statewide MHI, there are communities within the IRWM boundary that meet the DAC criteria. The City of Watsonville (population 51,586), which is largely contained within the planning region, had a MHI of \$46,603 in 2012. Watsonville comprises almost 19% of the total population of the county (266,766). Two census tracts within the City of Watsonville qualified as "severely disadvantaged," with a MHI less than 60% of the statewide MHI. In addition, two census tracts within the City of Santa Cruz qualified as "disadvantaged," with one of them qualifying as "severely disadvantaged." The community of Davenport (pop. 407) was identified as a DAC through an independent income survey performed in 2008 by the Rural Communities Assistance Corporation.

California Code defines environmental justice (EJ) as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. Historically, disadvantaged communities and communities of color throughout the nation have been disproportionately burdened through land use policies, zoning, and related activities (i.e., pollution, industrial facilities, waste disposal sites) that have adversely impacted their neighborhoods and environment and in turn their health and well-being.

The state's IRWM Grant Program Guidelines requires the project review process to include consideration of EJ concerns. Identifying DAC and EJ stakeholders and communities is a critical initial step in ensuring that the RWMG and project proponents can facilitate and enable these communities and their representatives to participate in IRWM efforts and have a say in decisions that will affect them. In developing the 2014 IRWM Plan, the RWMG reviewed DWR's DAC mapping tool and the American Community Survey data (2006-2010) to identify potential communities.

Ongoing efforts have been made to identify DACs in the region and to engage them in the planning process. DACs in the Santa Cruz Region are represented by water supply, sanitation, and resource agency members of the RWMG. These members receive communications regarding IRWM activities and provide updates to their respective governing boards and councils in public forums about IRWM projects and planning efforts. Participation from staff of the City of Watsonville Public Utilities and the Davenport County Sanitation District in the RWMG have effectively worked to ensure that these communities' needs have been included among the IRWM Plan's strategies and projects.

Both Watsonville and Davenport have benefitted from IRWM funding for specific planning and implementation projects. Until recently, the Davenport water treatment plant did not meet the state treatment standards for turbidity, giardia, or cryptosporidium. The treatment plant has now been upgraded through a project funded partially by the Region's Prop 50 IRWM Implementation Grant. The community still faces water resource challenges and has been severely impacted by the recent closure of the CEMEX cement plant, which for many years had paid a substantial portion of the sewage and water operations and maintenance costs, in addition to providing many jobs in the community. Targeted outreach to Davenport community has occurred to identify needs; two projects are currently included in the 2014 IRWM Plan for Davenport and additional projects are anticipated to be added as an addendum or via future project solicitation as a result of outreach underway through the work described below.

With funding from the Santa Cruz IRWM Implementation Grant, the Resource Conservation District of Santa Cruz County implemented 17 projects to restore and enhance natural habitats and improve water quality in Watsonville Sloughs. This work was conducted from 2008-2013 included eleven agricultural water quality projects implementing Best Management Practices and six habitat restoration projects. This work was made possible by willing landowners and farmers. Key partners included Watsonville Wetlands Watch, Land Trust of Santa Cruz County, City of Watsonville, Community Alliance for Family Farmers, CA Department of Transportation, Regional Transportation Commission, Natural Resources Conservation Service, and the State Water Resources Control Board.

In 2011-2013, with funding from the Santa Cruz IRWM Planning Grant, the Resource Conservation District of Santa Cruz County in partnership with local, state and federal agencies conducted a hydrologic study of the Watsonville Sloughs. This study provides essential information to develop and implement strategies to improve to restore and enhance natural habitats and improve water quality in Watsonville Sloughs.

The 2014 IRWM Plan includes 7 projects from the City of Watsonville and two projects from Watsonville Wetlands Watch. Targeted outreach is also underway to identify needs in Watsonville and additional projects are anticipated to be added as an addendum or via future project solicitation as a result of outreach underway through the work described below.

DAC Outreach Pilot Project

In 2013, Santa Cruz was one of seven IRWM regions in the state awarded an IRWM Planning Grant for Disadvantaged Community Outreach. This work is currently in progress and will be completed in December 2014. Results of the work will be included as a future addendum to the 2014 Plan.

This effort is intended to identify and advance projects to meet water needs in Watsonville and Davenport. Work currently underway includes DAC identification and assessment. An important element of this work includes the identification and assessment of other impoverished or socially vulnerable communities beyond Watsonville and Davenport. Through this task DACs in the IRWM region not previously identified nor engaged in IRWM efforts will be identified and assessed. Census data, mapping tools, and local community knowledge are being employed to identify and assess DACs. This task may result in identifying other economically disadvantaged pockets in the region that may not meet the DAC criteria based upon census data, but may warrant further assessment and outreach for engagement in IRWM planning efforts.

In 2014, the RWMG with assistance from Environmental Justice Coalition for Water (EJCW) and support from the University of California at Davis (UCD) Center for Regional Change (CRC) began mapping socially vulnerable communities. CRC is utilizing the Communities Environmental Health Screening Tool CalEnviroScreen Version 2.0 to identify communities that are disproportionately burdened by multiple sources of pollution. CRC is also using its Regional Opportunity Index (ROI) to identify people and places with the greatest need. This will inform targeted outreach to engage these communities in the IRWM planning process and, as resources allow, technical support to enable project readiness.

The Region is currently conducting outreach to engage key DAC community contacts to empower and engage DACs in the IRWM planning process. This includes conducting community outreach by convening working groups of interested community members to participate in meetings, and interviews or discussions to identify and evaluate water resource needs and priorities. As the needs and priorities of DACs are identified, work will continue to provide the critical support necessary to enable project readiness in IRWM planning and implementation. This includes the review and prioritization of projects and needs; an assessment of planning, feasibility and pre-design activities to enable project readiness; meetings to identify and gather project data and to investigate partnerships with conservation organizations and local governments; and exploring project integration of multi-benefit projects.

13.5 NATIVE AMERICAN TRIBE IDENTIFICATION AND OUTREACH

Archeological evidence indicates that humans have been occupying coastal California for at least 10,000 years. When the first Spanish settlers arrived in the early 1600s, the Santa Cruz area was inhabited by American Indians of the Ohlone Costanoan group. The indigenous people that inhabited much of the Santa Cruz region were known as Awaswas. According to the 2010 US Census, Santa Cruz County had a Native American population of 2,253 persons or 0.9 percent of the County population.

While there are no dedicated tribal lands within the Santa Cruz IRWM region, there are a number of historic, cultural, and Native American sacred sites throughout the region that are of great importance to the descendants of these tribes. The primary organized tribal group in the Santa Cruz Region is the Amah Mutsun tribal band of Ohlone/Costanoan Indians, a group of 500 Bureau of Indian Affairs registered Indians that are direct descendants of the aboriginal tribal groups whose villages and territories fell under the sphere of influence of Missions San Juan Bautista and Santa Cruz during the late 18th, 19th and early 20th centuries. They are the previously recognized tribal group known as the San Juan Band. The Tribe is currently listed with the Department of Interior, Bureau of Indian Affairs as Petitioner #120, as they are seeking status clarification to have their Recognized status restored by the Secretary of the Interior. Many of the Amah Mutsun reside out of the area but would like to acquire lands in or near the region, particularly lands that may be closely tied to water courses. Much of their current efforts are focused on lands in the neighboring Pajaro IRWM region or on lands north of the Santa Cruz region.

The American Indian Resource Center is located in the region at the University of California at Santa Cruz, and serves as a hub for the tribal communities of the Amah Mutsun Tribe, Ohlone Costanoan Esselen Nation (Monterey Bay Area), and Muwekma Ohlone Tribe (San Francisco Bay Area). Members of the Santa Cruz RWMG have met several times with representatives of the Amah Mutsun, and their representatives are included on the stakeholder notification list for the Santa Cruz IRWM region.

13.6 STAKEHOLDER ENGAGEMENT FOLLOWING IRWM PLAN ADOPTION

Stakeholder awareness, interest, and engagement in IRWM efforts are important to the ongoing success of the IRWM program and the successful implementation of the 2014 IRWM Plan. The RWMG, in cooperation with the RWMF, will provide ongoing avenues for stakeholder engagement following the 2014 Plan adoption.

CHAPTER 14: COORDINATION

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This chapter presents an overview of the process to coordinate water management projects and activities with local, regional, and state agencies, diverse stakeholders, and neighboring IRWM regions. The intent of these efforts is to ensure an appropriate level of coordination is occurring within the region in order to avoid conflicts and duplication of efforts, as well as to integrate planning efforts across agencies and jurisdictions in order to take advantage of efficiencies and best manage the region's water resources.

14.1 COORDINATION OF ACTIVITIES WITHIN THE IRWM REGION

IRWM-related activities in the Santa Cruz Region are coordinated with local agencies that have statutory authority over water management and related resources in the Santa Cruz IRWM planning region, along with local districts, non-governmental organizations, and additional diverse stakeholders. The RWMG members, project proponents, and stakeholders include water supply, water quality, flood control, stormwater management, wastewater, municipal, environmental, regulatory, and community groups. Representatives from many of these entities and findings from their respective planning documents have contributed towards shaping the water resources management goals and objectives, priorities, strategies, and projects that make up the IRWM Plan. Meetings and discussions amongst the RWMG, local agencies, and stakeholders provide an opportunity for discussing current projects and new project ideas.

Coordination with this diverse group occurs through a variety of channels. A primary avenue for IRWM coordination and communications is the website (SantaCruzIRWMP.org) which provides information on planning and implementation efforts, meetings and events, and links to resources about related efforts in the region and state, including links to other Central Coast IRWM Plans. The website includes information and lists of completed, active, and proposed IRWM projects from both the 2005 Plan and the 2014 Plan. In addition to the website, the email updates serve to inform stakeholders of significant news about the IRWM Plan or planning process, key milestones and deadlines, public workshops, solicitations for new projects for the IRWM Plan, and funding opportunities.

Coordination amongst the RWMG, agencies, and stakeholders also occurs through numerous parallel and complementary efforts in the county that inform IRWM planning efforts and the projects in the IRWM Plan. The IRWM Steering Committee and RWMG representatives actively participate in the following commissions and groups:

Santa Cruz County Water Advisory Commission

The commission was established in 1975 to serve as a policy advisory body to the County Board of Supervisors on issues relating to the use and protection of the county's water resources. The role of the commission is to advise the board on all policy issues impacting water resources in Santa Cruz County. The commission consists of seven members, five of whom are concerned citizens appointed by supervisors and two that are appointed at large to represent public water purveyors and private or mutual water companies in the county.

Santa Cruz County Commission on the Environment

This commission advises the Board of Supervisors and makes recommendations on ways to improve and protect the environment to ensure the long-term environmental sustainability of the county. This

includes: advising the Board of Supervisors and working with other commissions in reviewing and updating county policies and actions to support environmental goals; serving as an information clearinghouse about legislation that may impact the environment; and advising the board on potential areas of cooperation with agencies and organizations to plan and implement effective environmental policies in Santa Cruz County.

City of Santa Cruz Water Commission

The Water Commission advises the City Council on all matters pertaining to the Santa Cruz water system and its maintenance and management. The commission also makes studies of long range plans for securing sources of domestic water supply for the city and reports to the City Council its conclusions and recommendations for the improvement and extension of water systems, including sources, storage, transmission, distribution, financing, and conservation.

Integrated Watershed Restoration Program

Developed in 2002, Integrated Watershed Restoration Program (IWRP) is in some respects a precursor to the IRWM program and remains an outstanding example of an innovative, effective, coordinated program for local, state, and federal watershed restoration efforts. IWRP is led locally by the Resource Conservation District of Santa Cruz County (RCD). IRWM and IWRP are closely coordinated and are parallel and complementary efforts.

The origins of IWRP date to the late 1990s as watershed restoration plans and assessments were completed for seven watersheds in Santa Cruz County. The RCD, Coastal Conservancy, California Department of Fish and Game, Coastal Watershed Council, and the City and County of Santa Cruz recognized that watershed restoration would be more effective as a coordinated county-wide effort, and in 2002 developed the concept for the Integrated Watershed Restoration Program (IWRP) for Santa Cruz County. The goal of IWRP is to support local watershed partners in developing and prioritizing projects and coordinating agencies that provide technical assistance, permits, and funds. Such coordination reduces the staff time required while helping to ensure that critical projects are identified, funded, and permitted. IWRP identifies projects that integrate multiple benefits for water quality, restoration, and sediment source control.

Phase I of IWRP (2002 - 2007) was funded by the State Coastal Conservancy and focused on the design and permitting of IWRP projects. IWRP Phase II (2008 - 2013) principally focused on project implementation. Phase II was funded in part by the Santa Cruz IRWM Region's 2008 Prop 50 IRWM Implementation Grant; additional financial support was provided by numerous federal, state, local, and private sources, including Proposition 40, Proposition 50, and the American Recovery and Reinvestment Act of 2009 (ARRA). From 2008 to 2012, with funding support from the IRWM Program, the RCD worked with landowners and local, state, and federal partners to:

- Implement 40 water quality and/or habitat restoration projects
- Implement a watershed education program which served 19 teachers and 540 students
- Facilitate the Partners in Restoration Permit Coordination Program (PIR, described below)
- Coordinate and facilitate the IWRP Technical Advisory Committee (TAC)

Integrated Watershed Restoration Program - Technical Advisory Committee

IWRP projects are developed and reviewed by a TAC which enables projects to be vetted through the regulatory agencies early in the project development stage. The TAC consists of natural resource

managers, engineers, ecologists, and biologists representing local, state, and federal agencies including the County of Santa Cruz, California Department of Fish and Game (DFG), Regional Water Quality Control Board (RWQCB), National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA NMFS), Army Corps of Engineers (ACOE), U.S. Fish and Wildlife (USFWS), and Natural Resources Conservation Service (NRCS). Depending on the project type and resource concern, a subset of TAC members with expertise or oversight specific to that project type actively participates in project review. An IWRP Coordinator acts to coordinate interagency activities and technical reviews for the IWRP projects (i.e., environmental compliance, project design, and quality assurance), organizing and facilitating TAC meetings and design charrettes, completing the fish passage inspection checklist for fish passage projects, and assisting with photo documentation of IWRP projects.

Partners in Restoration Permit Coordination Program

The Partners in Restoration Permit Coordination Program (PIR) was initially developed by the RCD and NRCS in partnership with Sustainable Conservation. This innovative program promotes voluntary implementation of conservation projects to provide a wide range of resource benefits to water quality, habitat quality, and the conservation of agricultural resources. Typical projects are small, environmentally beneficial projects, such as stream bank protection, drainage and erosion control, invasive vegetation removal, and fish stream habitat improvement projects, primarily on private land. The program provides “one-stop regulatory shopping” for landowners interested in implementing voluntary conservation projects on their lands, thereby removing the time, cost, and complexity of individual project review. Twelve IRWM-funded projects have been implemented through the PIR.

Monterey Bay Stormwater Action Group

The Monterey Bay Storm Water Action Group (SWAG) was formed in 2008 to share ideas, resources, and information about watershed-scale stormwater issues including National Pollutant Discharge Elimination System (NPDES) programs and regional stormwater quality implementation needs, and to collaborate on regional activities and programs. Initiated by Ecology Action, the RCD, and City of Watsonville, participating entities include numerous RWMG agencies and stakeholders:

- Capitola Public Works
- City of Santa Cruz Public Works
- City of Watsonville Public Works
- Coastal Watershed Council
- Ecology Action
- Monterey Regional Storm Water Management Program
- Santa Cruz County Resource Conservation District
- Santa Cruz County Environmental Health Services
- Santa Cruz County Public Works
- Save Our Shores
- Scotts Valley Public Works
- Soquel Creek Water District

Santa Margarita Groundwater Basin Advisory Group

This group consists of representatives from the Scotts Valley City Council, Scotts Valley Water District, San Lorenzo Valley Water District, County of Santa Cruz Board of Supervisors/Water Advisory Commission, and Lompico Water District. The advisory group meets biannually to discuss Santa Margarita Groundwater Basin management and integrated regional water management.

Soquel-Aptos Groundwater Management Alliance

The Soquel-Aptos Groundwater Management Alliance (SAGMA) is comprised of four water resource agencies responsible for assuring the long-term sustainability and quality of the groundwater supply of the coastal aquifers in mid-Santa Cruz County. These four agencies are: County of Santa Cruz, City of Santa Cruz, Soquel Creek Water District, and Central Water District. SAGMA was formed in 2005 through a formal Cooperative Agreement adopted by the governing board of each participating agency. This agreement broadens the groundwater management efforts initiated through the Soquel Creek and Central Water Districts' AB 3030 Joint Powers Authority (JPA) established in 1995. SAGMA's objectives include monitoring and controlling seawater intrusion, and monitoring and managing groundwater levels, storage, and quality within the area regionally known as the Soquel-Aptos Basin. Numerous projects identified in the Santa Cruz IRWM Plan specifically address SAGMA's objectives and will work in concert with each other as well as existing projects to significantly benefit this important water resource.

Blue Circle

Since 1996, the Blue Circle has provided an opportunity for informal coordination amongst the region's stakeholders. Organized by the RCD and NRCS, it provides a way for local agencies, governments, special interest groups, and concerned citizens to meet and exchange views on natural resource issues affecting residents living in the county's watersheds. The Blue Circle concept was designed to help prevent duplication of effort, to break down institutional barriers, improve communication, and create strong working relationships between all watershed stakeholders, including agencies and government units. The Blue Circle recognizes that social values and perspectives are very much a part of watershed stewardship, which is why, along with the presentations on a variety of watershed topics, there is a social "mixer" at every Blue Circle event, complete with food, beverage, and a silent auction.

The Blue Circle is not political nor does it endorse, support, or lobby any issue in any form. There are no meeting minutes or summaries, annual or long-term plans, or tasks to complete. In addition, most Blue Circle gatherings are held in interesting locations, such as art galleries and museums, to help improve attendance and offer a more stimulating atmosphere for more effective interaction and communication. The motto of the Santa Cruz County Blue Circle is "People Having Fun with Watersheds."

Monterey Bay Regional Climate Action Compact

The Monterey Bay Regional Climate Action Compact is a network of government agencies, educational institutions, private businesses, non-profit, and non-governmental organizations who are committed to working collaboratively to address the causes and effects of global climate change through local initiatives that focus on economic vitality and reduce environmental impacts for the region. Climate Action The Climate Action Compact holds an Annual Regional Climate Summit, where partners convene to define regional climate strategy and share best practices. Compact partners develop and implement initiatives that focus on accomplishing four primary objectives:

1. Regional Greenhouse Gas Emission Reductions
2. Economic Development, Job Creation/Retention
3. Climate Change Awareness and Education
4. Strategic Climate Change Adaptation

Santa Cruz Midcounty Groundwater Stakeholder Advisory Committee

In 2014, the County of Santa Cruz, in conjunction with Soquel Creek Water District and Central Water District, partnered to initiate a community dialogue with private well pumpers and other community stakeholders within the Soquel-Aptos Groundwater Management Basin. The role and purpose of this committee is to broaden the engagement with groundwater basin users to promote open and effective communication; explore issues including efficient water use, groundwater hydrology, protection of groundwater quality, groundwater rights and management institutions, and sustainability; and advise in the development of a set of recommendations for the County, SqCWD, and CWD on groundwater basin protection and management strategies for all basin users in addressing mid-county water issues. The Advisory Committee convened five public meetings in 2014.

14.2 IDENTIFICATION AND COORDINATION WITH NEIGHBORING IRWM REGIONS

The Santa Cruz IRWM Region maintains an open dialogue with the two neighboring IRWM regions on issues of mutual concern, opportunities for collaboration, and coordination on any projects that overlap regional boundaries. The Santa Cruz Region is abutted on the south and east by the Pajaro IRWM Region and shares an area of overlap in Watsonville Sloughs. To the north and east the Region is bordered by the San Francisco Bay Area IRWM Region. In 2009, each of the three regions were formally approved by DWR through the IRWM Region Acceptance Process (RAP); this included approval of the regions' boundaries. The Santa Cruz RWMG has maintained both formal and informal contacts with each of these regions, more actively with the Pajaro IRWM Region. The Santa Cruz County RCD and the Santa Cruz County Water Resources Division Director (both Santa Cruz RWMG agencies) routinely interact with the Pajaro RWMG members on projects of common interest in the areas of overlap. Both the Pajaro and Bay Area IRWM contacts are on the Santa Cruz IRWM stakeholder distribution list and receive email updates on activities.

The water resources related issues facing the Santa Cruz Region are generally quite distinct from those faced by adjacent IRWM regions. This is due, in large part, to the fact that the Santa Cruz Region does not import any of its water supply. In contrast, approximately two-thirds of the Bay Area IRWM Region's water supply is imported from Sierra Nevada and Delta sources through various federal, state and local projects¹. The Bay Area Region is served by large water supply agencies, which contrast to the smaller, dispersed agencies found in the Santa Cruz IRWM region. The Bay Area and the Santa Cruz IRWM regions share some groundwater quality concerns related to contaminants, although such concerns are fairly localized in the Santa Cruz Region. The main differences between Santa Cruz and the Pajaro IRWM regions are that the Pajaro is largely focused on water supply and flooding. The Pajaro is also nearly wholly dependent upon groundwater as a source of supply serviced by a large municipal water agency with oversight by the Pajaro Valley Water Management Agency. The Regions do share water quality concerns related to sediment and contaminants from agricultural operations.

14.2.1 COORDINATION WITH PAJARO RIVER WATERSHED REGION

The Pajaro IRWM effort, which covers all of the Pajaro River Watershed, including the portion within Santa Cruz County, is viewed as parallel and complementary. The Santa Cruz County IRWM and Pajaro IRWM Regions overlap in the Watsonville Sloughs. The coordination of activities were characterized in

¹ San Francisco Bay Area Integrated Regional Water Management Plan, 2013.

the RAP documents and follow-up July 2009 letters of cooperation between the Pajaro and Santa Cruz County IRWM Regions that describes the coordination efforts for the management of the boundary overlap areas; the letters were submitted to DWR by both regions. The Pajaro River Watershed IRWM Plan primarily addresses issues of groundwater management and flooding in the Watsonville Sloughs area, while the Santa Cruz County IRWM Plan addresses water quality protection (including stormwater quality management) and habitat restoration in the slough watershed.

Several Santa Cruz RWMG members also have projects in the Pajaro region, and the Santa Cruz RCD and County staff participate in the Stakeholder Advisory Committee of the Pajaro IRWM planning process. Coordination primarily occurs around overlapping projects and around projects in the Watsonville Sloughs. The two regions have many common stakeholders. Staff from the Pajaro Valley Water Management Agency (PVWMA), one of the 3 members of the Pajaro RWMG, actively participate in management discussions for the Soquel-Aptos Groundwater Basin, which adjoins and contributes groundwater to the Pajaro Basin.

Both Pajaro and Santa Cruz are within the Central Coast hydrologic region. Both regions participate in regular Central Coast IRWM coordination meetings and also in the Roundtable of Regions. The County Water Resources Division reviews and comments on both IRWM Plans. County and RCD staff as well as staff from the City of Watsonville attend both Regions' meetings. There is also some coordination and collaboration on grant funding outside of IRWM efforts.

14.2.2 COORDINATION WITH THE SAN FRANCISCO BAY AREA REGION

The San Francisco Bay Area and Santa Cruz IRWM Regions connect in rather remote geographic areas – in the upper Santa Cruz Mountains, and on the coast near Año Nuevo. The Bay Area IRWM Region is in RWQCB Region 2 (San Francisco Bay), and Santa Cruz is in Region 3 (Central Coast). The planning efforts are viewed as parallel and complementary, although there is limited interaction between water managers in these regions as the water resources are almost completely separate. Coordination has focused on efforts to minimize the area not covered by a planning region in the Central Coast Funding Area in San Mateo County. As a result, the northern boundary of the Santa Cruz IRWM region was adjusted in 2009 to encompass additional portions of small watersheds of Año Nuevo, reducing, yet not eliminating the gap. There is significant coordination and collaboration between the RCD of Santa Cruz County and San Mateo County RCD. Both regions participate in the Roundtable of Regions, and information is also shared through informal networks.

14.2.3 COORDINATION WITHIN THE CENTRAL COAST IRWM FUNDING AREA

The Proposition 84 IRWM Grant Program established the 11 funding areas throughout the state. The Central Coast funding area includes all of the counties of Santa Cruz, Monterey, San Benito, San Luis Obispo, and Santa Barbara and parts of Santa Mateo, Santa Clara, and Ventura. The six IRWM regions in the Central Coast funding area include:

- Santa Cruz IRWM
- Pajaro River Watershed IRWM
- Greater Monterey County IRWM
- Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM
- San Luis Obispo County IRWM
- Santa Barbara Countywide IRWM

Since early 2007, discussions amongst regional representatives from the six IRWM regions has occurred as needed through workgroup conference calls and meetings to share information and to coordinate on issues and items of common interest such as statewide IRWM Program developments, regional coordination, and funding opportunities. The Santa Cruz County Water Resources Director and staff participate on behalf of the Santa Cruz Region.

In early 2007, representatives from the regions agreed to a set of principles that supported regional cooperation and communication within the state's IRWM framework. The IRWM regions in the Central Coast funding area are geographically distinct and while there is some commonality among the water resource issues and challenges, most water issues within the regions are more effectively addressed by the respective regions. In 2010, Santa Cruz County IRWM representatives participated in a Central Coast Funding Area meeting with DWR and the other Central Coast IRWM Regions. Since that time, representatives have continued to participate in semi-regular conference calls to discuss IRWM Program developments and to share information on IRWM planning and project progress.

14.3 COORDINATION WITH AGENCIES

14.3.1 LOCAL AGENCIES

Local agencies and jurisdictions with statutory authority over local land use, water management, and resources are actively engaged in IRWM planning and implementation efforts. The participation of local municipal and county government, special district, and local jurisdictions as RWMG members and as stakeholders is an essential part of enabling the overall coordination of IRWM with local agencies. The local agency representation and participation provides a vital link between the planning process and management actions related to local land use and water management.

As detailed in Chapter 12 (Relation to Local Water and Land Use Planning), numerous plans and studies related to water resources and land use management contributed to the development of this IRWM Plan. The use of these planning documents in the IRWM Plan development helps to ensure its consistency with local planning efforts. Local planning entities, including the County of Santa Cruz, cities of Santa Cruz and Watsonville planning staff, local water district staff, and RCD staff participated in development of the IRWM Plan and will participate in continuing Plan implementation. The RWMG, local agencies and municipalities, and stakeholders will be asked to participate in future updates of the IRWM Plan by attending meetings, providing information and data necessary to revise objectives and priorities, by proposing projects for the IRWM Plan, and by making recommendations regarding project ranking.

The coordination of water management and activities of local agencies is meant to avoid conflicts and take advantage of efficiencies. The IRWM efforts to establish a regional framework are intended to support and encourage individual agencies and jurisdictions in the development of integrated projects, particularly, multiple benefit projects as well as projects to address issues that would benefit most from a regional approach.

14.3.2 STATE AND FEDERAL AGENCIES

Santa Cruz RWMG agencies have a long history of working with state and federal public trust agencies to address water and related resources management issues and are actively involved with implementation of the Region's priority projects. Coordination varies depending upon the jurisdiction and mandates, and occurs at different phases of planning and implementation, including initial scoping and planning, permitting, construction/implementation, monitoring, and reporting.

Table 14-1 presents the list of state and federal agencies that are actively involved in the IRWM planning effort, and characterizes their participatory role.

Table 14 - 1 State and Federal Agency Coordination

Agency	Mandate/Function	Nexus to Santa Cruz IRWM
State		
Department of Water Resources (DWR)	Manage the water resources of California in cooperation with other agencies, to benefit people, and to protect, restore, and enhance the natural and human environments. Conduct statewide water planning to conserve, manage, develop, and sustain watersheds, water resources, and management systems. Operate and maintain the key water supply systems (State Water Project; California Aqueduct); provide dam safety, prevention and emergency response to floods, drought, and catastrophic events. Assist local water districts in water management and conservation activities, promotes recreational opportunities.	<ul style="list-style-type: none"> 2013 Update of the California Water Plan; Resource Management Strategies - IRWM Steering Committee representative on the Public Advisory Committee, the Finance Caucus, Water Quality Caucus and Central Coast Regional Forum.
		<ul style="list-style-type: none"> DAC Outreach Planning Grant (2013-14).
		<ul style="list-style-type: none"> Prop 84 IRWM Planning Grant Plan Update 2014 and technical studies.
		<ul style="list-style-type: none"> IRWM Project Implementation: Abandoned Wells Destruction Program (Component 2); Inland Monitoring Wells (Component 10).
State Water Resources Control Board (SWRCB)	Preserve, enhance and restore the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations.	<ul style="list-style-type: none"> Prop 50 IRWM Implementation Grant (2008-2013).
		<ul style="list-style-type: none"> IRWM Project Assessment and Evaluation Plans (PAEP).
		<ul style="list-style-type: none"> IRWM Coordinated Monitoring Program; Project-specific data reporting to SWAMP and GAMA.
		<ul style="list-style-type: none"> Permitting and financing coordination. SRF and ARRA grant funding for IRWM projects.
		<ul style="list-style-type: none"> IRWM Project Implementation: Components 1 – 16.
		<ul style="list-style-type: none"> Water rights approval for water exchange and conjunctive use.
		<ul style="list-style-type: none"> Proposition 84 Stormwater Grant Program is funding projects in IRWM Plan - Countywide Low Impact Development BMPs.

Agency	Mandate/Function	Nexus to Santa Cruz IRWM
Central Coast Regional Water Quality Control Board (RWQCB)	Protection and management of surface water and groundwater quality.	<ul style="list-style-type: none"> • Basin Plan and Vision of Healthy Watersheds initiative informed IRWM Plan goals, objectives, strategies. • Regulatory oversight of TMDL, stormwater, onsite sewage disposal, recycled water, wastewater discharge permits. • Permitting and financing coordination. • IRWM Project Implementation: Permitting agency for projects with impacts to surface water and groundwater (numerous projects). • Implementation of CCAMP monitoring and evaluation programs.
Department of Fish and Wildlife (DFW)	Manage California's diverse fish, wildlife, and plant resources and habitats for their ecological values and for their use and enjoyment by the public.	<ul style="list-style-type: none"> • Environmental review and permitting of IRWM implementation projects; permitting for projects with potential impacts on streambeds. • Staff attendance at IRWM workshop/meetings. • Fisheries Restoration Grant Program (FRGP) participation in IWRP. • Review and approval for stream diversions for water exchange and conjunctive use. • IRWM Project Implementation: Permitting for IWRP projects (numerous projects under Components 12, 13).
State Coastal Conservancy	Protect and improve the quality of coastal wetlands, streams, watersheds, and near-shore ocean waters working in partnership with local governments, public agencies, nonprofit organizations, and private landowners (non-regulatory).	<ul style="list-style-type: none"> • Funding agency and key partner in the development and ongoing coordination of the Integrated Water Restoration Program (IWRP). 40 IWRP projects implemented through IRWM Program.
California Coastal Commission (CCC)	Plans and regulates the use of land and water in the coastal zone, to protect, conserve, restore, and enhance resources of the California coast and ocean.	<ul style="list-style-type: none"> • Regulatory oversight of Coastal Zone development issues and permitting agency for all IRWM Plan implementation projects located within the Coastal Zone. • IRWM Project Implementation: Aptos Sewer Transmission Main Relocation (2012).
California Department of Forestry and Fire Protection (CDF, CALFIRE)	Emergency response to protect, serve and safeguard people, property and resources, oversight of timber harvesting, management of Soquel Demonstration Forest.	<ul style="list-style-type: none"> • IRWM Project Implementation: IWRP projects; Soquel Creek Large Woody Debris (2012); watersheds fuel loads reduction program.
California Department of Parks and Recreation	Protection, preservation, and management of the State's parks.	<ul style="list-style-type: none"> • IRWM Project Implementation: IWRP projects; Laguna Creek Floodplain Restoration (2012, 2013).

Agency	Mandate/Function	Nexus to Santa Cruz IRWM
Federal		
Natural Resources Conservation Service (NRCS)	Natural resources conservation programs help reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. Provides assistance to private landowners and managers. (Non-regulatory agency).	<ul style="list-style-type: none"> • Key partner in the development, ongoing coordination, and funding agency for the IWRP. 40 IRWP projects implemented through IRWM Program. Key partner in Watsonville wetlands enhancement and restoration efforts. • Provides technical and financial assistance to growers and property owners on livestock management, irrigation efficiency, erosion control, and habitat restoration.
Army Corps of Engineers (USACE)	USACE Civil Works program includes water resource development activities including flood risk management, navigation, recreation, infrastructure, environmental stewardship, and emergency response.	<ul style="list-style-type: none"> • Permitting authority for projects requiring CWA Section 404 permits; flood control projects.
National Marine Fisheries Service (NOAA-NMFS); including NOAA Restoration Center; Southwest Fisheries Science Center (Santa Cruz)	Protection, preservation, and enhancement of sustainable fisheries, recovery of protected species, and health of coastal marine habitats.	<ul style="list-style-type: none"> • IWRP and IRWM implementation projects. • Consultation of fish flow requirements for water exchange and conjunctive use projects.
U.S. Fish and Wildlife Service (USFWS)	Protection, preservation, and enhancement of fisheries, endangered species and habitat.	<ul style="list-style-type: none"> • IWRP, and IRWM implementation projects.
Monterey Bay National Marine Sanctuary (NOAA-MBNMS)	Resource protection, research, education and public use to understand and protect the coastal ecosystem and cultural resources of Monterey Bay National Marine Sanctuary.	<ul style="list-style-type: none"> • Water Quality Protection Program staff participation in IRWM Framework Working Group which informed IRWM Plan goals, objectives, strategies. • IRWM Implementation: IRWM funding provided to the County Stormwater Pollution Prevention Program (Prop 50 Component 5) and support for the Monterey Bay Sanctuary Citizen Watershed Monitoring Network events for First Flush and Urban Watch.
U.S. Geological Survey	Water Resources Unit: collection and dissemination of reliable, impartial, and timely information that is needed to understand the nation's water resources.	<ul style="list-style-type: none"> • Technical resource for Santa Cruz IRWM efforts: Simulation of climate change in San Francisco Bay Basins, California: Case studies in the Russian River Valley and Santa Cruz Mountains (USGS Scientific Investigations Report 2012–5132). • Measurement of streamflow on San Lorezno River and Soquel Creek, publication of real-time data and statistics.

CHAPTER 15: CLIMATE CHANGE

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The term climate change refers to any significant change in measures of climate (precipitation, temperature, winds), though the term is generally associated with an average increase in temperature and referred to as global warming. There is scientific consensus that the temperature of the earth's climate has been increasing more than natural climatic cycles can explain and that this warming is due to human activities.^{1,2} The first 12 years of this century (2001–2012) rank among the 14 warmest in the 133-year period of recorded history³. Recent studies and planning efforts conducted by the State of California include projections for increased temperatures, sea level rise, reduced snowpack, altered precipitation patterns and more frequent and severe storm events. These impacts are already occurring and will further impact agricultural productivity, increase wildfire risk, decrease water supply, and impact public health and ecosystem function.⁴ In 2008, the California Department of Water Resources stated:

“Warmer temperatures, altered patterns of precipitation and runoff, and rising sea levels are increasingly compromising the ability to effectively manage water supplies, floods and other natural resources. Adapting California’s water management system in response to climate change presents one of the most significant challenges of this century.”⁵

Water managers in the Santa Cruz IRWM Region realized the potential impact that climate change could have on local water resources. A Proposition 50 IRWM Grant funded a study by the United States Geological Survey (USGS) to characterize potential climate change impacts on the Region. The study used global climate change models, local geologic, soils, and runoff data along with recent advances in downscaling to model potential impacts to the Region. In addition, the Santa Cruz IRWM Region worked with a group of scientists from the Natural Capital Project to assess the Region’s vulnerabilities to projected sea level rise along with adaptation and mitigation strategies.

The potential impacts of these future climatic and hydrologic changes were evaluated in the context of each of the IRWM functional areas to identify opportunities for adaptation to reduce the vulnerability of water supply, water quality, aquatic ecosystems, and flood hazards in the region. In some instances projected changes may dramatically exacerbate the severity of local water issues, thus providing additional justification for the implementation of effective strategies now. Integration of climate change impacts into the IRWM conceptual framework can allow planners to take those into account in developing projects that will reduce the vulnerability of local systems to droughts, extreme temperatures, and rainfall pattern changes.

¹ IPCC. 2007. IPCC Fourth Assessment Report: Working Group II Report (Technical Summary), Available from: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-ts.pdf>

² Oreskes, N. 2004. Beyond the Ivory Tower: The Scientific Consensus on Climate Change". *Science* 306 (5702): 1686. doi:10.1126/science.1103618. PMID 15576594.

³ NASA, 2013. Hansen, J. and M. Sato, R. Ruedy.. Global Temperature Update Through 2012. http://www.nasa.gov/pdf/719139main_2012_GISTEMP_summary.pdf

⁴State of California. 2012. California Climate Adaptation Planning Guide.

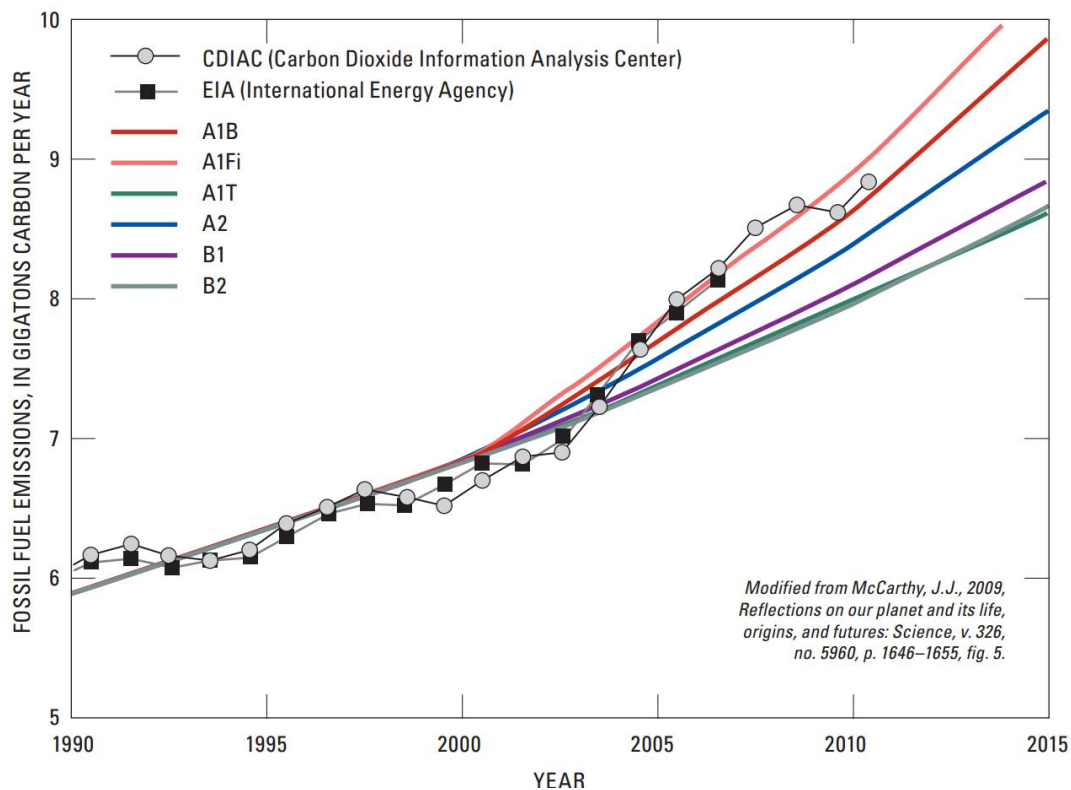
⁵ California Department of Water Resources. 2008. Managing an Uncertain Future: Climate Change Adaptation Strategies for California’s Water.

15.1 CLIMATE PROJECTIONS

All projections of future climate changes are based on models that vary in the structure of climatic dynamics and feedback and use a range of possible fossil fuels scenarios, accounting for the uncertainty with future emissions of greenhouse gases (GHG). The Intergovernmental Panel on Climate Change (IPCC)⁶ Special Report on Emissions Scenarios (SRES) provides a family of common scenarios that cover a range of plausible trends in GHG emissions over the 21st century resulting from economic, technological, and population changes.

Two GHG scenarios have been commonly used in recent planning documents for California. The A2 GHG emissions scenario is defined as a medium-high scenario, where no changes are made in the current policies that affect carbon emissions. The B1 scenario represents a lower, mitigated emissions scenario, where reductions are made to carbon emissions (Figure 15-1). Generally, the B1 scenario might be most appropriately viewed as an optimistic best case scenario for emissions that will require fundamental shifts in global policy, while A2 is more of a status quo scenario reflecting real-world conditions incorporating incremental improvements and may be the more realistic choice for decision makers to use for climate adaptation planning. Recent data suggest that even the A2 scenario, put forth in 2000, is optimistic.

Figure 15 - 1 GHG Emissions Forecasts⁷



⁶ IPCC. 2007. IPCC Fourth Assessment Report: Working Group II Report (Technical Summary), Available from: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-ts.pdf>

⁷ Flint, L.E., and Flint, A.L. 2012. Simulation of climate change in San Francisco Bay Basins, California: Case studies in the Russian River Valley and Santa Cruz Mountains: U.S. Geological Survey Scientific Investigations Report 2012–5132, Pg. 55.

The pathway leading from global GHG emissions to atmospheric composition changes, climate changes, and finally to system-level impacts in the Santa Cruz region is indeed complex and requires a multitude of important simplifying assumptions to model such a chain of cause and effect. The cumulative uncertainty resulting from assumptions employed at each step of the process should be considered when using results for decision making. The content of this synthesis represents the current understanding, which is rapidly evolving. A confidence ranking scale has been defined to simply communicate confidence in a number of different climate change projections throughout this chapter. Table 15-1 below outlines the confidence ranking scale used to communicate general confidence in a number of future climate change projections.

Table 15 - 1 Climate Change Confidence Ranking Scale

Confidence Ranking	Description
High	General scientific agreement of conclusion that is supported by a number of monitoring data, modeling results, research or best available scientific information.
Moderate	Scientifically supported but consensus or agreement is not present due to lack of information, moderate differences between studies, or limitations for drawing general conclusions from limited scientific information.
Low	Lack of information or conflicting results between studies, model outputs, expert opinions, and/or research findings.

15.2 CLIMATE CHANGE IMPACTS TO THE SANTA CRUZ IRWM REGION

During recent years, a number of valuable sources have been developed to facilitate incorporation of global climate change projections into regional planning processes (e.g., <http://cal-adapt.org/>), along with statewide⁸ and regional studies. As noted above, an IRWM grant supported an investigation by the USGS into climate impacts on temperature, rainfall, runoff, and recharge for the Santa Cruz IRWM Region.⁹ As part of that study, the USGS downscaled global climate model data provided by the IPCC from 250 km resolution to 12 km resolution over a 100-yr time frame. Data outputs were analyzed for the Santa Cruz Region, and these climate outputs were paired with hydrologic models calibrated with local stream gage data. The researchers chose to use projections from global climate models and emission scenarios that have proven capable of simulating recent historical climate for California: the Parallel Climate Model (PCM) developed by National Center for Atmospheric Research (NCAR) and the National Oceanic and Atmospheric Administration (NOAA) Geophysical Fluid Dynamics Laboratory

⁸ Cayan, D., M. Tyree, M. Dettinger, H. Hidalgo, T. Das, E. Maurer, P. Bromirski, N. Graham, and R. Flick. 2009. Climate Change Scenarios and Sea Level Rise Estimates for the California 2009 Climate Change Assessment, California Climate Change Center. 64pp.

⁹ Flint, L.E., and Flint, A.L. 2012. Simulation of climate change in San Francisco Bay Basins, California: Case studies in the Russian River Valley and Santa Cruz Mountains: U.S. Geological Survey Scientific Investigations Report 2012–5132, 55 p.

(GFDL) model. The A2 GHG emissions scenario was used, which more accurately reflects the measured data in California.

Figures 15-2 to 15-5 and Tables 15-2 to 15-4 below display and summarize relevant findings from the USGS study, which showed strong evidence for temperature changes in the future, but disagreement between models for future precipitation patterns. Temperature projections showed an increase of 3-4° C for average monthly maximums and an increase in the variability (20-30% larger standard deviation) above the historic reference period (1971-2000), with spring and fall months experiencing warmer temperatures. While there is disagreement amongst climate model projections as to the timing of precipitation patterns, there is agreement that the future will be generally drier, resulting in a higher frequency of droughts, less groundwater recharge, and increased climatic water deficit (CWD). CWD characterizes the relationship between soil moisture storage and evapotranspiration pressure, and integrates the effects of increasing temperature and varying precipitation on basin conditions. Changes in CWD will tend to increase demand for irrigation water and could have dramatic impacts on local ecology, particular to species that are on the edge of their habitat zones, for example the coastal redwoods (Figure 15-5).

Figure 15-2 illustrates projected changes in precipitation, maximum and minimum air temperatures through the year 2100 for the greater bay area.

Figure 15 - 2 Change in Precipitation and Air Temperature through the year 2100

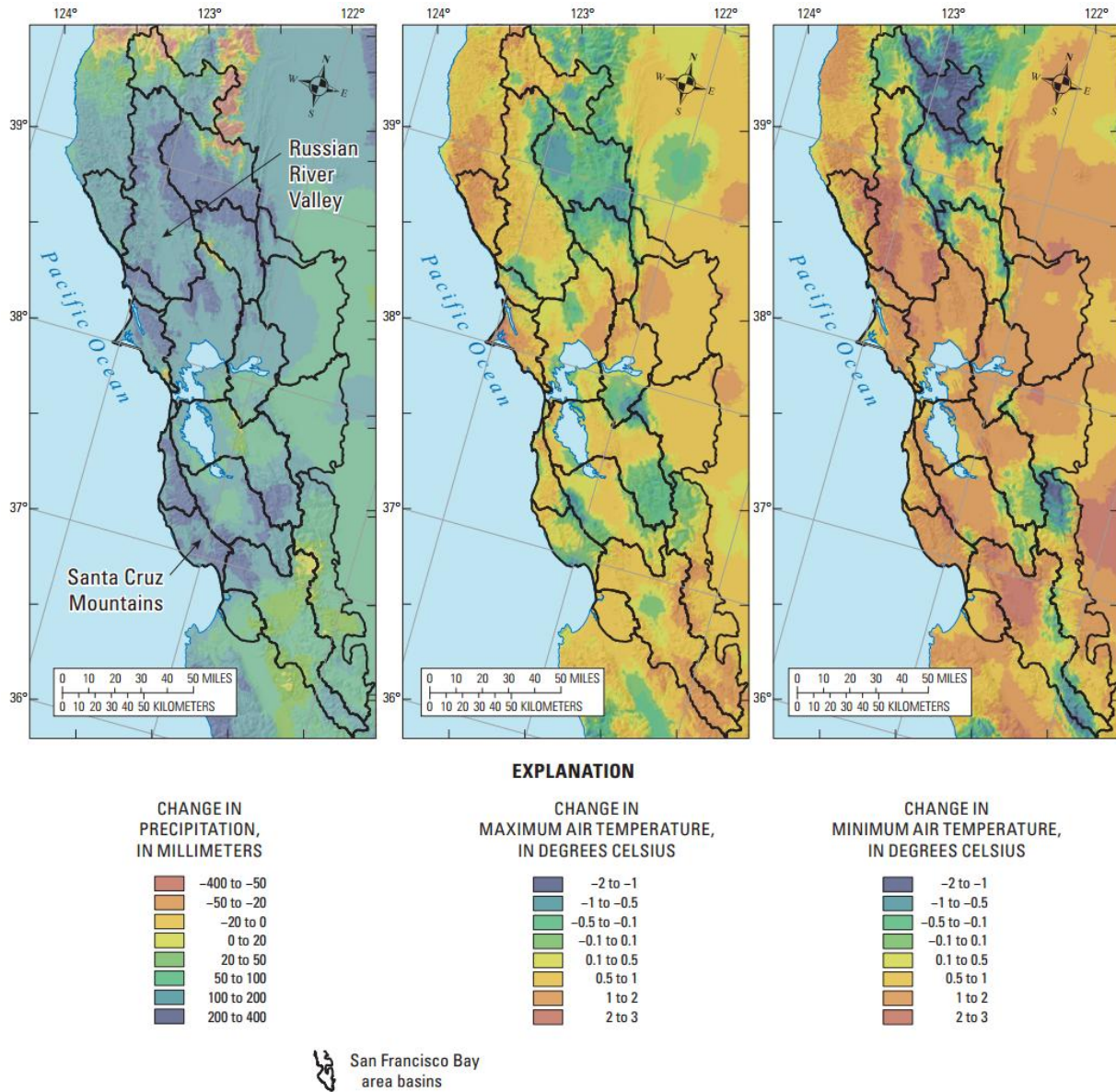


Figure 15 - 3 Change in Recharge

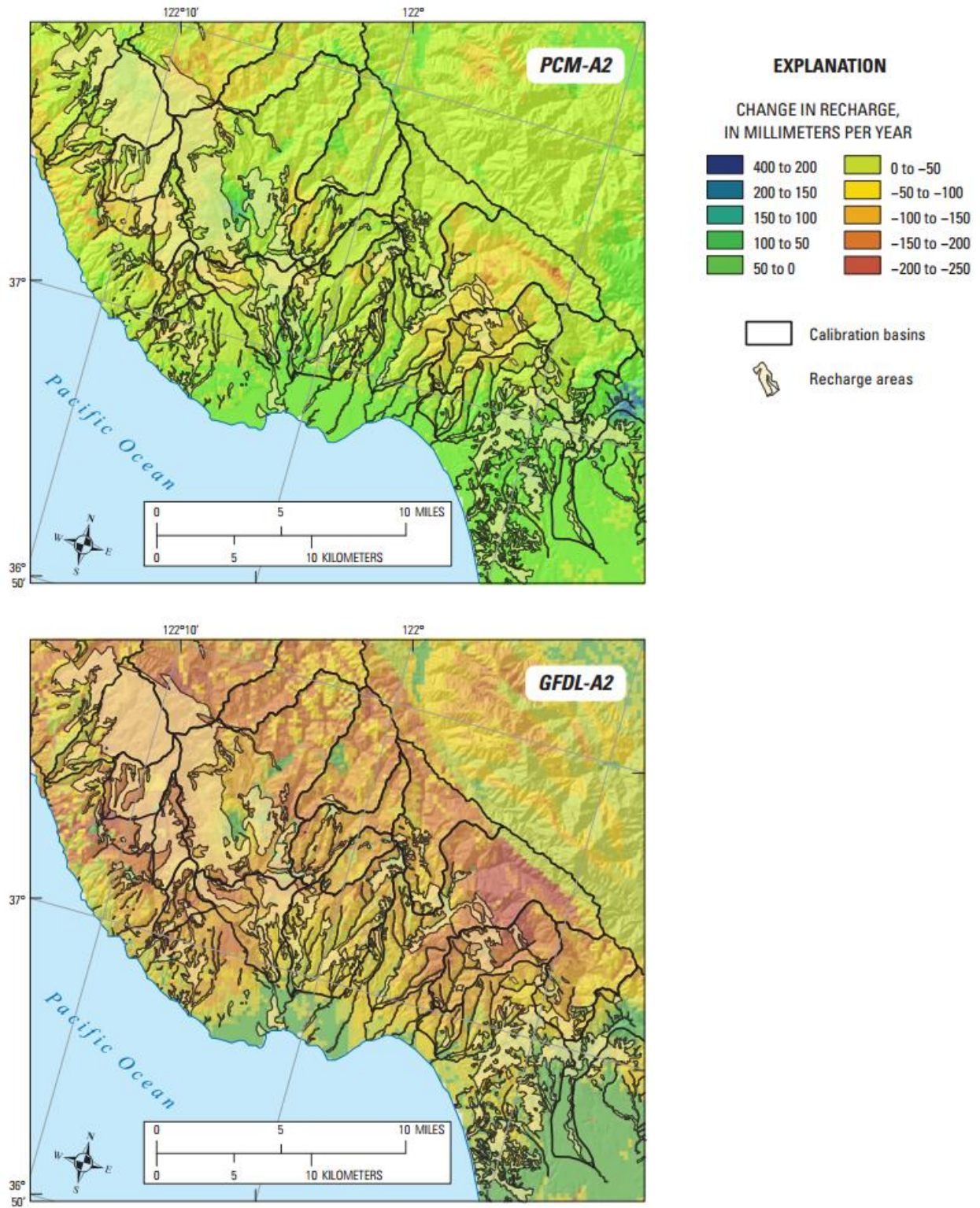
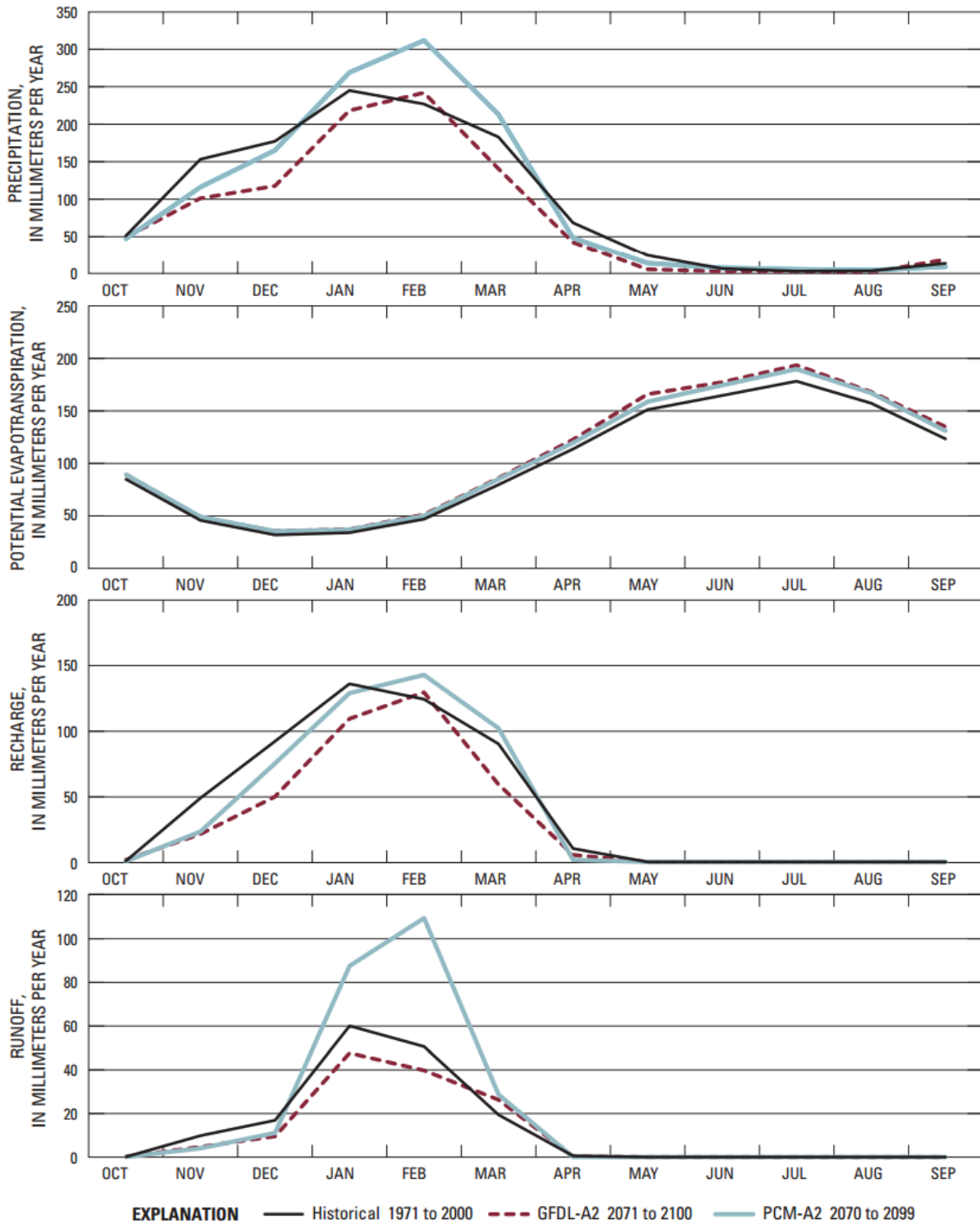


Figure 15-3 illustrates the potential changes in recharge between 1971–2000 and 2071–2100. Warmer colors indicate reduced recharge. The authors conclude there is a reduction in recharge over most of the region, from 10–15 percent for the PCM model to 30 percent for the GFDL-A2 modeled scenario, although slight increases occur in the San Lorenzo River basin recharge zone, as well as along the coastal plain, under both projections.

Figure 15-4 illustrates projected changes to precipitation, evapotranspiration, recharge and runoff through the year 2100 for Santa Cruz County. Of particular note is the increased amount of runoff projected under each model, particularly the PCM-A2.

Figure 15 - 4 Precipitation, Evapotranspiration, Recharge, and Runoff



Changes in precipitation, evapotranspiration, recharge, and runoff as predicted by NCAR’s Parallel Climate Model (PCM) and by NOAA’s Geophysical Fluid Dynamics Laboratory (GFDL) model.

Figure 15 - 5 Climatic Water Deficit

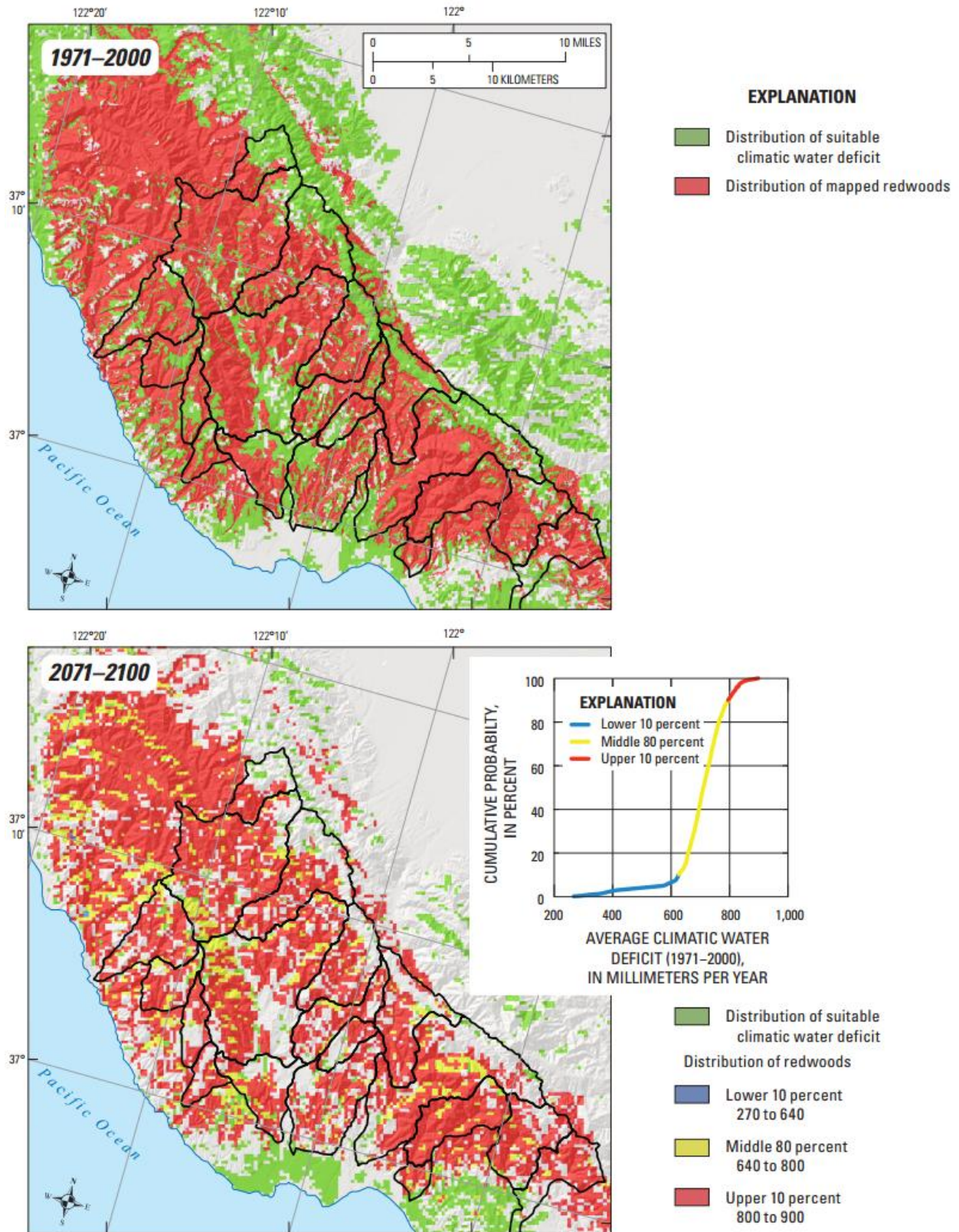


Figure 15-5 above displays the average climatic water deficit (CWD) for Santa Cruz County through 2100 along with the distribution of mapped redwood trees. CWD characterizes the relationship between soil moisture storage and evapotranspiration pressure, and integrates the effects of increasing temperature and varying precipitation on basin conditions. The top figure shows a broad distribution of suitable CWD that corresponds with the extent of redwood forests. The bottom figure illustrates a reduced coverage of suitable CWD along with corresponding potential reduced distribution of redwood forests.

Wildfire

Forested watersheds capture rainfall, clean and replenish a majority of the Region's water supply. Root systems of trees and other plants retain soil and increase its porosity to allow water to filter through various layers of soil before entering groundwater. Through this process, toxins, nutrients, sediment, and other substances can be filtered from the water. Moreover, riparian forests act as living filters that intercept and absorb sediments, and store and transform excess nutrients and pollutants carried in runoff from adjacent lands. Unfortunately, western wildfires are expected to increase in number and severity as climate change continues, according to the recently released National Climate Assessment.¹⁰ Beyond the direct damages caused by forest fires, fire would have a dramatic impact on the Region's water supply. Such an example occurred in 2013 when the Rim Fire impacted the watersheds that supply the San Francisco Public Utilities drinking water. A preliminary study¹¹ of that fire's impacts estimated that direct impacts from the fire only accounted for approximately 10% of the damages, while the majority of impact resulted from the loss of ecosystem services, such as flood retention, soil retention, water regulation, and carbon sequestration, among others.

Sea Level Rise

A 2009 report by the Pacific Institute stated that rising sea levels will be among the most significant impacts of climate change to California, with climate model scenarios suggesting very substantial increase in sea level over the coming century.¹² Climate models indicate that sea level could rise by 3 feet by the year 2100 (Table 15-2), and will result in increased frequency of flooding, gradual inundation, increased rates of erosion, and exacerbated effects of storm surge, larger waves and high tides. These impacts could damage critical infrastructure near the coast such as roads and wastewater treatment plants, as well as places of significant cultural value.

Table 15 - 2 Relative sea level rise projections for the San Francisco Bay¹³

Year	Projection (inches) ^a	Range (inches) ^b
2050	11 ± 3.6	5-24
2100	36 ± 10	17-66

^a Mean ± standard deviation for the A1B climate scenario

^b Ranges are for means for IPCC climate scenarios B1 and A1F1

¹⁰ U.S. Global Change Research Program. May, 2012. National Climate Assessment.

¹¹ Earth Economics. 2013. Preliminary Assessment: The Economic Impact of the 2013 Rim Fire on Natural Lands.

¹² Heberger, M., et al., 2009. The Economic Costs of Sea level Rise on the California Coast. California Energy Commission.

¹³ Heberger, M., et al., 2009. The Economic Costs of Sea level Rise on the California Coast. California Energy Commission. Pg. 8.

The Santa Cruz Region is already vulnerable to erosion and flooding as evidenced through impacts from a strong El Nino cycle in 1983. During that cycle, 12 storms, nine of which arrived at high tides, battered the Santa Cruz region. Large storm waves and storm surge resulted in over \$200 million in losses to property and infrastructure. Similarly, a 1998 El Nino event caused over \$13 million in damage throughout the county.¹⁴

Tables 15-3 and 15-4 Projected Climate-Change Induced Hydrologic Changes for the Santa Cruz Region

Table 15 - 3 Projected Climate Changes for the Santa Cruz Region

Climate variable	Projected changes by 2100	Confidence ranking	Supporting evidence	Seasonal and spatial patterns
Average maximum air temperatures (30 yr. intervals)	↑ Expected to increase 3-4C above the historic reference period of 1971-2000	high	Climate model agreement. Projections are consistent with statewide projections (Cayan et al., 2009).	High spatial variability with the largest changes expected in the Santa Cruz mountains. Warmer temperatures are projected to extend further into fall months compared to the historic reference period of 1971-2000.
Air temperature variability (30 yr. intervals)	↑ Expected 20-30% larger standard deviation than the historic reference period of 1971-2000	high	Climate model agreement. Projections are consistent with statewide projections made in other studies (Cayan et al., 2009).	Increased variability but reduced range of extreme temperatures. Largest changes expected in the Santa Cruz mountains with a high degree of spatial variability across the region.
Sea levels	↑ Expected 1-1.4m rise above 2010 elevations	high	Standardized projections with general model agreement (Knowles, 2010), data available at www.caladapt.org .	Coastal low lying areas and areas adjacent to streams most vulnerable when coupled with high tides during a high runoff event.
Annual precipitation totals (30 yr. intervals)	↔ Direction of change undetermined	low	Climate models disagree on the direction of change, but both show the most pronounced changes during winter months. Climate models disagree on which months are responsible for annual precipitation changes.	Total annual precipitation changes cannot be determined, but projections indicate less precipitation in the fall and spring with the timing of peak annual precipitation shifting from January to February. Summers are projected to be longer and drier.
Precipitation variability (30 yr. intervals)	↔ Expected < 10% larger standard deviation than the historic reference period of 1971-2000	low	Very small changes (<10%) are detected which may be smaller than the uncertainty associated with the model outputs.	Largest increases in precipitation variability projected in the Santa Cruz mountains.

Table 15 - 4 Projected Hydrologic Changes for the Santa Cruz Region

¹⁴Griggs, G., and Haddad, B. 2011. City of Santa Cruz Climate Change Vulnerability Assessment.

Climate variable	Projected changes by 2100	Confidence ranking	Supporting evidence	Seasonal and spatial patterns
Drought frequency	↑ 50% increase in frequency of occurrence (above historic reference period of 1971-2000)	high	Agreement between models.	Historically in the Santa Cruz region about 4 to 5 droughts occurred in 90 years. Future projections include more than one drought every decade, with a multidecadal drought for the GFDL-A2 model projection at the end of the 21st century. Additionally, summers are projected to be longer and drier.
Groundwater recharge	↓ 10-30% decrease (50-200 mm/yr.) (above historic reference period of 1971-2000)	high	Agreement of change direction between models regardless of precipitation and runoff disagreements between models.	Reductions across most areas of the region, with slight increases in the San Lorenzo River basin recharge zone, as well as along the coastal plain. The largest recharge reductions are in the Santa Cruz mountains. Peak recharge shifts from January to February and the largest recharge decreases occur in fall. There is disagreement as to whether recharge increases or decreases in spring.
Potential evapotranspiration	↑ 0-5% increase (0-10 mm/yr.) (above historic reference period of 1971-2000)	moderate	Agreement of change direction between models, but very small changes are detected	Largest changes in summer months with very little or no change in winter months.
Climatic water deficit*	↑ 4-25% increase (above historic reference period of 1971-2000)	moderate	Model agreement on change direction, wide range of change predictions.	Substantial variation of changes across the region. This will create generally drier soil moisture conditions in watersheds which will shift zones of habitat suitability for vegetation.
Annual runoff	↔ Direction of change undetermined	low	Model disagreement of change direction and magnitude during all seasons.	Possible runoff increases during winter months, along with changes in seasonal runoff volumes for fall and spring. Variation across the region with possible larger effects in Zayante Creek than San Lorenzo River. GFDL-A2 model shows all flows except the very highest are lower than historical flows, and the highest flows exceed historical flows by about 20–30 percent. In the PCM-A2 projection, low flows are somewhat lower than historical flows, whereas the top 40 percent of flows are higher than the historical period (1971-2000).

* Climatic water deficit integrates the effects of increasing temperatures and varying precipitation patterns by quantifying the difference between evapotranspiration and soil moisture storage. It is calculated as the amount by which potential evapotranspiration exceeds actual evapotranspiration. An increase in climatic water deficit indicates a more water stressed condition and in Mediterranean climates can be thought of as a surrogate for irrigation water supply availability.

15.3 VULNERABILITY

Assessing the Region's vulnerability is an important first step to informing sustainable water management and IRWM adaptation strategy prioritization. In this context, vulnerability is the susceptibility of a system component to harmful impacts due to climate change, and the degree of vulnerability is used to identify management actions that have the potential to reduce negative consequences. A vulnerability assessment provides a context to focus discussion on IRWM strategies that also can serve as potential mitigation or adaptation actions and may directly improve our preparedness for projected climate changes. For the Santa Cruz IRWM Region, a vulnerability assessment was conducted using methodology from the International Council for Local Environmental Initiatives (ICLEI)¹⁵ climate change guide for local governments. Several terms used in the assessment, including sensitivity, adaptive capacity, and vulnerability, are defined below for clarity in evaluating the results of the assessment.

Sensitivity is the degree to which system components (e.g., water supply, stream habitat quality, or flood hazards) respond to climate conditions (e.g., temperature and precipitation) or system impacts (e.g., stream temperature increases or reduced recharge). If the system or system component is likely to be strongly affected by future climatic conditions then it is considered sensitive. Table 15-5 defines the relative sensitivity scale. Factors considered when determining the relative degree of sensitivity include:

- The degree of exposure of the impact to climate change.
- The existing stressors in the system and whether projected future climatic conditions would exacerbate these stressors.
- The existing balance of resource demand and supply such that climate may increase demand and/or reduce supply.

Table 15 - 5 Scoring Definitions for Sensitivity to Climate Change Impacts

Sensitivity	Definition
High	The system responds measurably to an impact based on historical observations or modeling studies.
Moderate	The system response to an impact has not been measured, but based on our understanding of system function there are likely to be direct or indirect responses.
Low	The system does not respond measurably to impacts and based on understanding of system function there are not likely to be direct or indirect responses.

¹⁵ ICLEI. 2007. Preparing for Climate Change: A guidebook for local, regional and state governments. Center for Science in the Earth Systems, University of Washington and Kings County Washington and ICLEI-Local Governments for Sustainability. September 2007.

Adaptive capacity reflects the inherent natural ability of a system or system components to accommodate climate change without any human intervention. Table 15-6 defines the categories of the relative adaptive capacity scale. In determining how adaptive a system is to climate change the following elements are considered:

- Current level of stressors and flexibility to respond to future stressors. Can or has the system component adapted to historic climatic changes or inclement conditions?
- Are there any barriers (legal, physical, biological) to the system's abilities to accommodate adjustments in response to future climate?
- Are there efforts currently underway that would increase adaptability (e.g., water conservation)?

Table 15 - 6 Scoring Definitions for Adaptive Capacity to Climate Change Impacts

Adaptive Capacity	Definition
High	The system is expected to accommodate climate changes and expected impacts in ways that avoid negative consequences.
Moderate	The system has some capacity to adjust, and the degree of negative consequences will depend on the magnitude of individual and cumulative impacts.
Low	The system has little or no capacity to accommodate expected impacts so that negative impacts cannot be avoided.

Vulnerability is the susceptibility of a system component to harmful impacts resulting from climate change. The vulnerability of systems to specific climate change impacts is determined by combining sensitivity and adaptive capacity scores in the manner outlined in Table 15-7. System components that have high sensitivity to climate changes and a low capacity to adapt are considered to be highly vulnerable to climate changes. As sensitivity decreases the higher weighting of adaptive capability is preserved, such that even a system component that is considered not sensitive to climate change but has a low ability to adapt is considered moderately vulnerable.

Table 15 - 7 Vulnerability Ranking Matrix

		Sensitivity		
		High	Moderate	Low
Adaptive Capacity	High	Moderate	Low	Low
	Moderate	High	Moderate	Low
	Low	High	High	Moderate

Table 15 - 8 Ranking Scale Used to Communicate General Confidence in a Number of Future Climate Change Projections

Confidence Ranking	Description
High	General scientific agreement of conclusion that is supported by a number of monitoring data, modeling results, research, or best available scientific information.
Moderate	Scientifically supported but consensus or agreement is not present due to lack of information, moderate differences between studies, or limitations for drawing general conclusions from limited scientific information.
Low	Lack of information or conflicting results between studies, model outputs, expert opinions, and/or research findings.

15.3.1 WATER SUPPLY

The local climate change projections suggest longer and drier summers, an increased frequency of droughts, increased evapotranspiration rates, and reduced groundwater recharge. These projected changes will exacerbate current water supply issues and reduce the reliability of the local water sources to meet demand.

Using the best information available, Table 15-9 provides an assessment of the vulnerability of key attributes of the water supply system to specific climate changes. The table lists stressors on key attributes within the water supply system. For simplicity, Table 15-9 includes only those climate change projections for which confidence is relatively high. The table also indicates whether opportunities exist to reduce vulnerability to climate change impacts with the implementation of management strategies.

Table 15 - 9 Vulnerability Assessment of Water Supply Key Attributes

Key attribute	Stressors	Relevant projected climatic/hydrologic changes	Expected impact of future climate conditions	Sensitivity	Adaptive capacity	Vulnerability	Can future impact of climate change be lessened by strategy implementation?
Water Supply							
Surface water sources	Population growth, Aquatic ecosystem streamflow requirements	Drought frequency increase	Surface water reliability reduction, increased potential for water use conflicts	h	l	h	YES Strategies that reduce reliance on surface and groundwater sources.
		Seasonal precipitation/runoff pattern changes	Surface water reliability reduction, increased potential for water use conflicts	h	l	h	YES Strategies that reduce reliance on surface and groundwater sources.
		increased evapotranspiration	Greater evaporative losses from surface reservoirs, Drier summer soil moisture conditions	h	l	h	NO
	Aquifer overdraft, Saltwater intrusion	Groundwater recharge reductions, Sea level increase	Reduced groundwater availability	h	m	h	YES Strategies that reduce reliance on surface and groundwater sources. Strategies that reduce groundwater pumping in coastal zones. Strategies that increase groundwater infiltration.
Water Demand							
Water demand	Population growth	Average temperature increase, Temperature variability increase, Drought frequency increase	Extended period of peak demand	h	h	m	YES Strategies to reduce demand can reduce vulnerability of surface water and groundwater sources.

15.3.2 WATER QUALITY

The two water quality variables most susceptible to future regional climate conditions are salts in groundwater and surface water temperatures. The current extent and magnitude of saltwater intrusion as a result of historic and continued groundwater overdraft would be exacerbated in coastal areas by increasing sea level elevations if effective management actions are not implemented. Projected higher air temperatures in the future (particularly during summer) will result in a corresponding increase in surface water temperatures that could have a detrimental impact on coldwater fish species and the overall health of local aquatic ecosystems. Statewide predictions of increased rainfall intensities have the potential to increase pollutant transport, sediment erosion rates and delivery during future episodic storm events. However, the effect may be small relative to other water pollution drivers and pollutant source control strategies.

15.3.3 AQUATIC ECOSYSTEMS

Using the best information available, we provide an assessment of the vulnerability of key attributes of the aquatic ecosystem to specific climate changes in Table 15-10. The table lists stressors on key attributes within aquatic ecosystems that are closely related to the drivers. For simplicity, Table 15-10 includes only those climate change projections for which confidence is relatively high. The table also indicates whether opportunities exist to reduce vulnerability to climate change impacts with the implementation of management strategies.

The local climate change projections suggest an increase in average maximum air temperatures, temperature variability, evapotranspiration, climatic water deficit, frequency of droughts, and sea level. These projected changes would increase the challenges to improve the habitat quality and quantity for aquatic species given current land use and water requirements. Ensuring adequate water availability in streams, tidal wetlands, and freshwater wetlands to support native aquatic species is highly susceptible given the current regional water supply reliance on local sources. In addition, increased air temperatures are expected to impact the habitat quality of streams and tidal wetlands for coldwater fish species, namely steelhead trout and coho salmon. Rising sea levels will likely lead to the landward migration of tidal wetlands from saltwater inundation and erosion, and loss of tidal wetland area is likely in urban areas where inland channels are severely encroached by development. The impacts of climate change to aquatic ecosystems are expected to be most pronounced during the dry, warm summer and early fall months (July-October).

Table 15 - 10 Vulnerability Assessment of Aquatic Ecosystem Management Key Attributes

Key attribute	Stressors	Relevant projected climatic/hydrologic changes	Expected impact of future climate conditions	Sensitivity	Adaptive capacity	Vulnerability	Can future impact of climate change be lessened by strategy implementation?
Aquatic Ecosystems (streams , tidal wetlands , freshwater wetlands)							
Habitat quantity		Increased frequency of droughts, Extended dry season	Greater risk of reduced water availability for aquatic ecosystems	h	m	h	YES Diversify water supply for drought resilience. Optimize surface water extraction timing during excess flow conditions (water exchanges). Increase annual infiltration volumes.
Habitat quality	Surface water extractions, Morphologic and vegetative alterations, Pollution inputs, Sea level rise	Average maximum air temperature increases, Air temperature variability increases	Increased temperature stress on coldwater species	h	l	h	YES Improve and protect riparian canopy (shading). Increase annual infiltration volumes. Improve habitat conditions.
			Increased nitrogen availability will increase risk of low dissolved oxygen conditions (water quality impact)	m	m	m	YES Nutrient source control strategies. Improve and protect riparian corridor condition. Promote natural function of sandbars for tidal lagoons.
		Sea level rise	Inland migration of tidal wetland locations	m	m	m	YES Minimize riparian encroachment of tidal wetlands
*Impact not relevant for freshwater wetlands							

15.3.4 FLOOD / STORMWATER MANAGEMENT

Global climate change projections include expected increases in sea level in the Santa Cruz region. Increased sea level elevation will increase the boundary elevation at the terminus of coastal streams, resulting in an increase of the flooding risk for coastal low lying areas. Statewide models predict an increased frequency of intense winter precipitation events, which will also increase the risk of Santa Cruz flooding.

Table 15 - 11 Vulnerability Assessment of Flood and Stormwater Management Key Attributes

Key attribute	Stressors	Relevant projected climatic/hydrologic changes	Expected impact of future climate conditions	Sensitivity	Adaptive capacity	Vulnerability	Can future impact of climate change be lessened by strategy implementation?
Flood and Stormwater Management							
Flood hazard	Areas with high degree of DCIA, Developed areas	Increased sea level elevations, Possible (low confidence) seasonal runoff changes	Flood hazard increase for flood prone areas	h	l	h	YES Reduce cost of flooding in susceptible areas and improve channel conveyance efficiency during large storms.
Stormwater volumes	Areas with high degree of DCIA	Possible increased frequency of high intensity precipitation events, Possible seasonal runoff changes	Localized risk of episodic flooding	m	h	m	YES Strategies that reduce DCIA and maintain the stormwater conveyance system.
Stormwater quality	Areas with high degree of DCIA		Potential to increase pollutant entrainment during winter storms	l	h	l	YES Pollutant source control strategies.

15.3.5 SEA LEVEL RISE

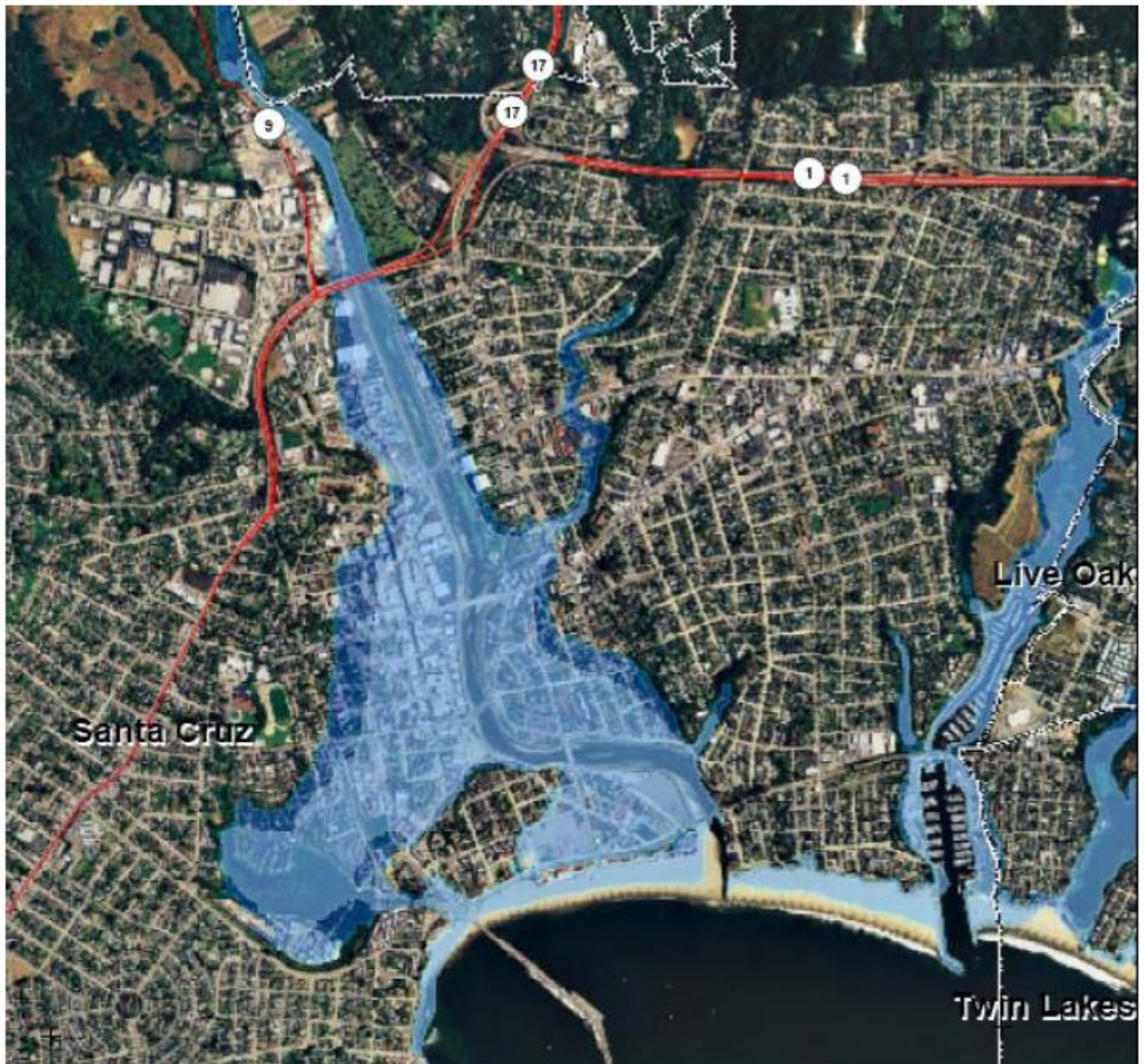
Although rising sea levels will impact the entire California coast, a disproportionate number of people and infrastructure will be vulnerable to sea level rise in the Santa Cruz IRWM Region. The Pacific Institute study mapped areas of the California coast that are vulnerable to flooding with a 55-inch increase in sea level. Based on population at risk, Santa Cruz County was identified as having the second highest flood-related risk and the fourth highest erosion-related risk of the 20 coastal counties, representing nearly a 100% increase in risk from existing conditions (Table 15-12).

Table 15 - 12 Populations Vulnerable to Flood and Erosion from Sea Level Rise¹⁶

County	Flood-related Risk	Erosion-related Risk	Percent Increase
Del Norte	2,600	620	47
Humboldt	7,800	580	110
Los Angeles	3,700	14,000	270
Marin	630	570	20
Mendocino	650	930	22
Monterey	14,000	820	36
Orange	72,000	110,000	55
San Francisco	6,500	1,200	210
San Luis Obispo	1,300	1,100	35
San Mateo	5,900	2,900	98
Santa Barbara	6,700	2,100	24
Santa Cruz	16,000	2,600	94
Sonoma	700	300	21
Ventura	7,300	16,000	120

¹⁶ Heberger, M., et al., 2009. The Economic Costs of Sea level Rise on the California Coast. California Energy Commission. Pg. 42

Figure 15 - 6 Estimated Current and Future 100-year Coastal Flood Risk Areas around Santa Cruz¹⁷



Coastal Flood Risk Area

- Current Base Flood
(approximate 100-year flood extent)
- Sea Level Rise Scenario
Base Flood + 1.4 meters (55 inches)

¹⁷ Heberger, M., et al., 2009. The Economic Costs of Sea level Rise on the California Coast. California Energy Commission. Pg. 39.

The Pacific Institute study also found a disproportionate impact on low-income households in 13 of the 20 coastal counties. These households are less likely than their counterparts to be able to afford emergency preparedness materials, purchase insurance policies, and obtain needed building reinforcements. In Santa Cruz County, the study estimates that approximately 30% of households are low-income, and that of those households, nearly 50% are vulnerable to sea level rise impacts.

The consequences of coastal storm events to people, infrastructure, and the economy will continue to increase as sea level increases. Some climate models predict that extreme storm events will become more common and high sea level events will last longer, increasing the potential for damage. In addition, more intense river flooding due to climate change compounded with sea level rise could lead to more extreme flooding and erosion events for coastal communities.¹⁸ As demonstrated by the previous El Niño events, existing coastal armoring will likely not always be able to protect against projected sea level rise.

15.4 THE VALUE OF NATURAL HABITAT

Building off of the Pacific Institute work, Santa Cruz IRWM planners worked with the Natural Capital Project and the Center for Ocean Solutions, Stanford Wood Institute for the Environment to characterize sea level rise, coastal vulnerability and adaptation planning for the Region.¹⁹ The study summarized existing work conducted in the Region to date, and conducted novel analysis of sea level rise vulnerability with particular emphasis on using natural approaches to adaptation.²⁰ The following sections paraphrase and summarize the work of the Natural Capital Project. The Santa Cruz RWMG is grateful for the work conducted by this group and their assistance in developing this chapter.

The Natural Capital group utilized modeling software, entitled the Integrated Valuation of Environmental Services and Tradeoffs (InVEST)^{21 22} coastal vulnerability model, to assess exposure to coastal flooding and erosion. They then combined those results with social variables to assess vulnerability of the region to coastal hazards. The InVEST coastal vulnerability model is based on seven physical and biological characteristics of the region—geomorphology, natural habitats, relief, wave exposure, wind exposure, surge potential, and sea level change—each ranked for its potential to increase or decrease exposure to erosion and flooding from ocean storms or sea level rise.

The analysis found that exposure to coastal flooding and erosion will increase between approximately 2% to over 50%, depending on the amount of sea level rise and the extent to which habitat is protected or maintained. Without intact coastal habitats, under the highest sea level rise scenario, the extent of

¹⁸ AECOM. 2013. The Impact of Climate Change and Population Growth on the National Flood Insurance Program Through 2100. Report prepared for the Federal Insurance and Mitigation Administration and the Federal Emergency Management Agency.

¹⁹ Langridge, S., Hartge, E., Prahler, E., Arkema, K., Verutes, G., Caldwell, M., Guery, A., Ruckelshaus, M. The Natural Capital Project and the Center for Ocean Solutions. 2013. The Role of Natural Habitat in Coastal Vulnerability and Adaptation Planning in the Santa Cruz IRWM Region. Stanford Woods Institute for the Environment, Stanford University, California.

²⁰ National Research Council. 2012. Sea level Rise for the Coast of California, Oregon, and Washington: Past, Present and Future. National Academies Press.

²¹ Tallis, E. H., et al., 2013. InVEST 2.5.6 User's Guide. The Natural Capital Project, Stanford, CA.

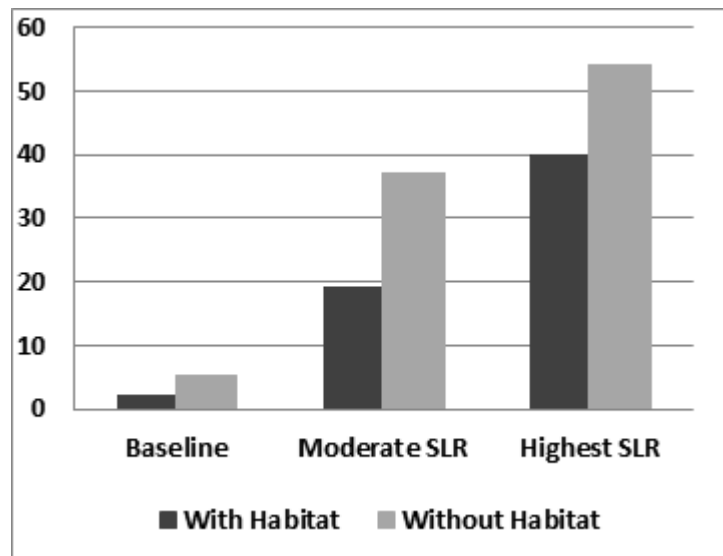
²² Arkema, K., et al., 2013. Coastal habitats shield people and property from sea level rise and storms. *Nature Climate Change* 3:1–6.

the coast with the greatest exposure to coastal flooding and erosion increases by approximately 40% from baseline levels (Figure 15-7).

The study also examined the social dimensions of exposure in the context of local populations and built infrastructure. The study analyzed selected vulnerability metrics that were likely to be sensitive to exposure, including water system infrastructure (i.e., treatment plants, pipes, pumps, and wells), people, disadvantaged households, and farmland. The study found that without projected sea level rise, less than 5% of the total population as well as disadvantaged households were most vulnerable to coastal flooding and erosion. However, those values increased significantly with moderate to the highest sea level rise, between 15 to 25%, respectively, assuming natural habitats are intact. Without protective habitats, those figures increased to over 35%.

The impact of protective habitats was most noticeable when examining vulnerability of farmland. Without protective habitat, the shoreline segments most vulnerable to coastal erosion and flooding within 1 km of farmland increases over baseline levels by more than 50%, under the highest sea level rise scenario. With the highest sea level rise scenario and habitats intact, approximately 35% of water system infrastructure pipes and 90% of water system infrastructure structures are within 1 km of coastal segments most vulnerable to erosion and flooding.

Figure 15 - 7 Percent of the Coast Most Exposed to Coastal Hazards



15.5 REGIONAL MITIGATION STRATEGIES

The AB 32 Scoping Plan (2008) contains the main mitigation strategies California will use to reduce GHG emissions that cause climate change. Section 17 of the Scoping Plan discusses the mitigation measures or strategies for the Water sector. The table below shows the five areas from which specific GHG reduction measures will be identified and implemented.

Table 15 - 13 AB 32 Scoping Plan Water Sector Mitigation Measures

Measure	GHG Reduction By 2020 (MMTCO ₂)
Water Use Efficiency	1.4
Water Recycling	0.3
Water System Energy Efficiency	2.0
Reuse Urban Runoff	0.2
Increase Renewable Energy Production	0.9

The Santa Cruz IRWM planning process encourages and promotes projects that implement climate change mitigation measures, including water use efficiency, water recycling, and reuse of urban runoff. These measures are included among the strategies identified to achieve the goals and objectives of this IRWM Plan (see Chapter 5, Resource Management Strategies). When submitting a project for inclusion in the IRWM Plan, project proponents are asked to list the ways in which their project will include climate change mitigation or adaptation measures, and whether, compared to existing conditions or project alternatives, the project will mitigate its contribution to climate change by reducing energy consumption or GHG emissions. The project ranking process gives preference to those projects that can demonstrate climate change mitigation or adaptation measures, and/or reduced GHG emissions compared with project alternatives.

Below is a description of other efforts in the Santa Cruz Region to reduce GHG emissions and mitigate climate change impacts.

Providing water to residents and businesses requires a significant amount of energy. The State of California estimates that 20% of state electricity use is for the treatment and distribution of potable water. Several agencies and water service providers within the Santa Cruz Region have developed Climate Action Plans that partially address this issue, including the Cities of Santa Cruz and Watsonville, County of Santa Cruz, and the San Lorenzo Valley Water District. These plans outline the actions the agencies and their partners may take to meet state land use requirements pertaining to climate change, achieve the policies identified in the General Plan 2030, and accomplish the GHG reduction goals. The GHG emissions in the municipal plans (Cities of Santa Cruz and Watsonville) indicate that nearly 50% of GHGs emitted from municipal sources come from water treatment and delivery and wastewater treatment. Because these municipalities rely on locally obtained surface water and have invested in energy efficient equipment to treat and distribute water, the energy content of each acre-foot of water supply is below most California districts, many of which rely upon imported water.

The Climate Action Plans identify several actions to significantly reduce municipal energy use, including integrating new energy efficient equipment and reduction measures into the efficiency conservation strategy for both the Water Department and for the wastewater treatment and collection system to reduce energy use 10% below 2005 values. Specific actions include:

- Public awareness and education - promote awareness about the City's water system and conservation
- Water demand monitoring - evaluate water supply and demand and determine need for increased demand reduction efforts
- Long-term water conservation programs - develop and implement various conservation programs that result in sustained demand reductions
- Planning and emergency management - plan for future demand, coordinate conservation activities, and analyze impacts of water shortages and demand hardening.

Between 2006 and 2010, the San Lorenzo Valley Water District prepared annual GHG emissions reports. These reports indicated that the four primary sources of the District's GHG emissions from 2006-2010 were (in order of descending emissions):

1. Purchased electricity (water pumping and building use)
2. Mobile combustion (District vehicle fleet)
3. Commuting (combustion from employee vehicles)
4. Stationary combustion (generators and natural gas)

The SLVWD Board approved a climate change resolution in September 2008 that commits the District to reducing GHG emissions to 1990 levels by the year 2020. The reduction will be accomplished by encouraging water conservation, installing solar panels, and reducing fuel consumption of its vehicle fleet by phasing out the most fuel intensive vehicles.

In addition, the County of Santa Cruz has recently (2013) adopted a Climate Action Strategy (CAS). The first portion of the CAS reports results of a GHG emissions inventory for Santa Cruz County, proposes targets for GHG reduction, and outlines strategies and implementing actions to achieve the targets. The second portion focuses on vulnerability assessment and strategies for adapting to the types of impacts that are likely to occur in Santa Cruz County. The CAS incorporates input from local community and non-governmental agencies that are working to mitigate and respond to climate change.

GHG emissions inventories were prepared for county government operations and for community activities for 2005 and updated for 2009. Total emissions for government operations in 2009 were approximately 34,000 metric tons of CO₂ equivalent (CO₂e), a decrease of 12% from 2005. Total emissions for community activities were approximately 1,030,000 metric tons in 2009, a decrease of more than 50% from 2005. The dramatic decrease in community emissions reflects the closure of the Davenport cement plant, which accounted for approximately 90% of the commercial/industrial emissions in 2005. The inventories indicate that 70% of the community emissions in 2009 were generated by the transportation sector. Agricultural emissions other than electricity emissions were in the range of 17,000 metric tons of CO₂e.

State legislation requires California to reduce GHG emissions to 1990 levels by 2020. Based on the 2005 community emissions inventory, 1990 emissions levels for Santa Cruz County were estimated. Santa Cruz County has already met the target for 2020 due to the closing of the Davenport cement production plant. The State has also set a long-term reduction target for 2050, which is 80% below 1990 levels. The CAS incorporates the two state targets and sets an interim target for 2035. GHG reduction strategies are proposed for the three sectors with the highest emissions: transportation, energy, and solid waste.

A vulnerability assessment was prepared to identify the conditions that may occur in Santa Cruz County as a result of the various components of climate change (increasing temperature, rising sea level, and shifts in the precipitation regime) and the locations, infrastructure and economic sectors that are particularly vulnerable to negative impacts. The assessment identifies the coastal areas that are most susceptible to increased flooding, storm surge, beach and coastal bluff erosion from winter storms. The systems that will be most affected are residential coastal property, wastewater treatment infrastructure, coastal roads and bridges, beaches, coastal and wetland ecosystems, and water supply from coastal wells. The vulnerability assessment also identifies potential effects of precipitation changes and increased temperature on water supply, wildfire, biodiversity, and public health. Particular attention is given to the significant decrease in redwood habitat that may occur, especially if the current trend of decreasing coastal fog continues. A risk analysis was performed to determine which impacts from climate change present the greatest risk to people and to the natural and built environments. In the short to intermediate term (2010–2050) water shortage was identified as the largest risk. In the intermediate to long term (2050–2100) rising water table, coastal bluff erosion, and increased flooding and landslides join water shortage as the greatest risks.

15.6 REGIONAL ADAPTATION STRATEGIES

The Integrated Regional Water Management Planning Act, CWC §10541(e)(10), states that IRWM plans must include an evaluation of the adaptability to climate change of water management systems in the region. The Region’s adaptation evaluation was guided by the *Climate Change Handbook for Regional Water Planning*,²³ which outlines a process for defining vulnerable infrastructure, land uses, and habitats, for defining the sensitivity of those resources to changes in climate conditions, and evaluating the risk of impacts to those resources.

Specifically, adaptation seeks to minimize the risks with anticipated impacts associated with climate change. In 2009, the State of California adopted a Climate Action Strategy²⁴ (CAS) that describes climate change impacts and recommended adaptation strategies across seven sectors, including water. The CAS used downscaled climate impacts as a basis for guiding actions to prepare, prevent and respond to the effects of climate change. DWR developed the following 10 statewide adaptation strategies for the water management sector:

1. Provide sustainable funding for statewide and integrated regional water management
2. Fully develop the potential of integrated regional water management
3. Aggressively increase water use efficiency
4. Practice and promote integrated flood management
5. Enhance and sustain ecosystems
6. Expand water storage and conjunctive management of surface and groundwater resources
7. Fix Delta water supply, quality, and ecosystem conditions
8. Preserve, upgrade and increase monitoring, data analysis and management
9. Plan for, and adapt to, sea level rise
10. Identify and fund focused climate change impacts and adaptation research and analysis

²³ U.S. Environmental Protection Agency, Region 9 and the Department of Water Resources. 2011. Climate Change Handbook for Regional Water Planning.

²⁴ California Natural Resources Agency. 2009. 2009 Climate Adaptation Strategy.

Like much of statewide water planning, several of these strategies do not relate to the Santa Cruz Region, which is not reliant on the Delta for water.

Tables 15-9, 15-10, and 15-11 above identify the various attributes, climate change stressors, adaptive capacities and vulnerabilities per functional area. Those tables also identify adaptation strategies that can potentially reduce the impacts of climate change within each functional area. The project solicitation conducted as part of this plan update sought to identify specific projects to address regional water resource challenges. An element of the solicitation sought to identify projects that had potential to either mitigate or adapt to climate change impacts.

Strategies that can reduce the potential impact of climate change include the following:

- Develop alternative/supplemental water supplies that will reduce groundwater overdraft and extraction of dry season streamflow.
- Increase potential to capture, store and utilize winter precipitation, runoff and streamflow
- Increase stormwater capture and infiltration.
- Increase use of recycled water
- Increase water use efficiency
- Utilize more drought tolerant landscaping and crops to reduce irrigation demand

Recognizing the value of natural habitat, as discussed previously, the Santa Cruz IRWM Conceptual Framework²⁵ identified several specific adaptation strategies were identified to adapt to increased shoreline vulnerabilities. They include:

- Restore coastal wetland habitat. Since there are few coastal wetland habitats in the central area of the Santa Cruz IRWM Region, restoration of coastal wetland habitat may reduce the vulnerability of people and infrastructure. In addition, coastal habitats can provide additional co-benefits such as improving water quality, increasing habitat for important fish species, and providing enhanced recreational opportunities.
- Conserve and restore dune and associated beach habitats. This work may support other regional plans including the NOAA Coho Salmon Recovery Plan. In addition, coastal property owners within the Santa Cruz IRWM Region have made over 35 repetitive loss claims and sea level rise and more severe storms will only increase the number of repetitive loss claims and the amount of damage. Coastal habitats can reduce exposure to these hazards.
- Evaluate the specific costs and benefits of adaptation strategies, such as conservation and restoration of protective natural habitats, construction or removal of hard infrastructure, managed retreat, or siting and design standards. For example, assess how restoration of coastal dunes and marshes or seawall placement impacts coastal protection, as well as provision of fishery habitat, water quality regulation, recreation values, and carbon sequestration.

²⁵ 2nd Nature. 2012. Conceptual Framework for the Santa Cruz Integrated Regional Water Management Plan.

15.7 FUTURE EFFORTS

Research has demonstrated potential impacts of climate change in the Santa Cruz IRWM region, however there still exists some uncertainty regarding the magnitude of impact. Research on the climate change impacts on water resources will be ongoing and will continue to evolve with further analysis and more refined methodologies. During the preparation of this Plan update, key literature resources on climate change have been reviewed. New scientific findings should be reviewed periodically and incorporated into the climate change vulnerability assessment, especially the findings pertinent to the sectors most vulnerable to climate change in the region. The RWMG will continue participating in ongoing Monterey Bay area forums to facilitate networking among water resources planners to exchange ideas on how to incorporate latest tools or science into local planning.

The Climate Change Center of the California Energy Commission prepares periodic reports on climate model simulations for California and some specific Regions. It also maintains the Cal-Adapt site and updates the modeling tools as new climate change modeling results, based on more refined data, become available from the IPCC. In addition, some agencies in the Region have prepared their own climate change analyses for their watersheds and have used these studies to develop scenarios for vulnerability and adaptation assessments. The RWMG will continue to explore ways where existing and updated climate models, and other available climate change tools and projections for the Region, can be used for future vulnerability assessments updated in future versions of the Plan. The intent of future data gathering is to address gaps in the current vulnerability assessment, to improve the understanding of climate change impacts and vulnerabilities, and to enable more quantitative analyses. Future data gathering efforts should include data that facilitate more quantitative analysis of vulnerability within the context of the current and proposed projects and funding available.

APPENDIX A

IRWM MEMORANDUM OF AGREEMENT

MEMORANDUM of AGREEMENT FOR THE SANTA CRUZ INTEGRATED REGIONAL WATER MANAGEMENT PLAN

1. PURPOSE

The purpose of this interagency cooperative memorandum of agreement (MOA) is to reaffirm the mutual agreements of the participating organizations with respect to their joint efforts in developing, implementing, and updating an Integrated Regional Water Management Plan (IRWMP) that will increase coordination, collaboration and communication in addressing the region's water resources issues. The signatories hereby join together for a common and specific purpose to develop and implement the Santa Cruz IRWMP. This MOA updates and continues the efforts initiated under the previous MOA for implementation of the Northern Santa Cruz County IRWMP, dated June 1, 2006.

2. GOALS

The goals of the Santa Cruz IRWMP are to:

- 2.1 Develop and maintain an adequate, reliable, secure, and sustainable water supply that promotes regional water self-sufficiency and maintains ecosystem values.
- 2.2 Protect and improve surface and groundwater quality.
- 2.3 Practice resource stewardship to protect, enhance, and maintain watersheds, environmental resources, biodiversity and ecosystem services.
- 2.4 Promote flood and stormwater management to protect public health and safety, property, water quality, and hydrologic function.
- 2.5 Identify and implement integrated water management strategies adaptable to a changing climate. Promote water and water-related energy conservation and efficiency strategies.
- 2.6 Promote coordinated and collaborative planning and management of water and water-related resources. Provide a framework for identifying and implementing equitable policies and projects to achieve the region's near-term priorities and long-term sustainability.

3. DEFINITIONS

3.1. Integrated Regional Water Management Plan (IRWMP). The California Water Code defines IRWMP as "a comprehensive plan for a defined geographic area, the specific development, content, and adoption of which shall satisfy requirements developed pursuant to this part. At a minimum, an Integrated Regional Water Management Plan describes the major water-related objectives and conflicts within a region, considers a broad variety of resource management strategies, identifies the appropriate mix of water demand and supply management alternatives, water quality protection, and environmental

stewardship actions to provide long-term, reliable, and high-quality water supply and protect the environment, and identifies disadvantaged communities in the region and takes the water-related needs of those communities into consideration." (CWC §10530 *et seq.*)

3.2. Santa Cruz Region also known as the IRWM Region. Regions are self-forming and organizing. Regions are to be geographically contiguous and determined with regard to shared water management issues, stakeholders, and water-related conflicts. In March 2009, the California Department of Water Resources' (DWR) established a Region Acceptance Process to evaluate and approve an IRWM region. Approval of an IRWM region by DWR is required before a region can submit an application for IRWM grant funds. In September 2009, DWR formally approved the Santa Cruz IRWM region. The Santa Cruz region encompasses all of the watersheds of Santa Cruz County, excluding the Pajaro watershed, but including the Watsonville Sloughs watershed. The Pajaro watershed is within the adjacent Pajaro IRWM region.

3.3. Regional Water Management Group (RWMG). State guidelines define the RWMG as a group of three or more agencies, at least two of which have a statutory authority over water supply or water management, as well as those persons who may be necessary for the development and implementation of an IRWM Plan, pursuant to the requirements in CWC §10540 and §10541. The RWMG for the Santa Cruz Region consists of the Partner Agencies.

3.4 Participants. The Santa Cruz IRWM region categorizes participants as follows:

Partner Agency. Public agencies with elected or publicly appointed governing boards that receive taxpayer support either through taxes, user charges, or fees; and have the authority, obligation, and responsibility to carry out water resources management on a long-term basis.

Implementation Affiliate. Agencies and organizations that play an active role in the IRWMP development or that have a direct role in IRWM project implementation.

Stakeholder. Entities that do not necessarily have a direct role in IRWM project implementation but facilitate those efforts or have an interest in the IRWMP.

3.5 Partner Agency Steering Committee also known as Steering Committee. The Santa Cruz IRWM region utilizes a Steering Committee comprised of three regional water managers to oversee planning and implementation efforts, outreach, and pursuing funding opportunities. The Steering Committee is appointed by the larger representative group of Partner Agencies and currently consists of the County of Santa Cruz Water Resources Division Director, the Executive Director of the Resource Conservation District of Santa Cruz County, and the General Manager of Soquel Creek Water District. These individuals shall continue to serve as the Steering Committee unless a majority vote of the Partner Agencies (based on one vote per agency) replaces all or some of the Steering Committee members or a replacement is necessary due to an individual's resignation. The Steering Committee meets on a regular basis to discuss IRWMP administration and coordinate efforts as needed. The Steering Committee shall provide information and consult with the

other Partner Agencies as needed. All Steering Committee decisions with material financial implications shall be ratified by the Partner Agencies.

3.6. Regional Water Management Foundation (RWMF). The RWMF was established in 2007 to provide an organizational structure to support the implementation of the Santa Cruz IRWMP. The RWMF is a subsidiary of the Community Foundation Santa Cruz County (CFSCC). The RWMF is a separate 501(c)(3) tax-exempt nonprofit organization. It has its own Board of Directors and staff, with an office located at the CFSCC. The seven member Board, includes four directors appointed by the Community Foundation and three Public Agency directors; currently, the Public Agency director seats are filled by the Steering Committee members. The primary objectives of the RWMF are to (1) protect communities in Santa Cruz County from water shortages and floods; (2) protect and improve water quality and the natural environment in Santa Cruz County; and, (3) improve water supply reliability in Santa Cruz County. The RWMF is the grantee of a Proposition 50 Round 1 IRWM Implementation grant, awarded to the Santa Cruz IRWM region in 2007. The RWMF provides management and administration for implementation of this grant. The RWMF provides a central hub and technical expertise for consolidation of items for review, reporting, invoicing, and inter-agency coordination, as well as an interface between the implementation partners and the State Water Resources Control Board. The RWMF has also served as the applicant on behalf of partner agencies for several other grant applications and may provide supporting role for IRWMP implementation, not limited to but including serving as grant applicant.

3.7 IRWM Projects. The California Water Code (§10537) establishes that IRWM projects and programs are those that accomplish any of the following objectives;

- a) Reduce water demand through agricultural and urban water use efficiency.
- b) Increase water supplies for any beneficial use through the use of any of the following, or other, means:
 1. Groundwater storage and conjunctive water management
 2. Desalination
 3. Precipitation enhancement
 4. Water recycling
 5. Regional and local surface storage
 6. Water-use efficiency
 7. Stormwater management
- c) Improve operational efficiency and water supply reliability, including conveyance facilities, system reoperation, and water transfers.
- d) Improve water quality, including drinking water treatment and distribution, groundwater and aquifer remediation, matching water quality to water use, wastewater treatment, water pollution prevention, and management of urban and agricultural runoff.

e) Improve resource stewardship, including agricultural lands stewardship, ecosystem restoration, flood plain management, recharge area protection, urban land use management, groundwater management, water-dependent recreation, fishery restoration, including fish passage improvement, and watershed management.

f) Improve flood management through structural and non-structural means, or by any other means.

Additionally, to be included in the Santa Cruz IRWMP, a project must meet the following five criteria:

1. The project is sponsored by a public agency that has water resources management as a key mission (a Partner Agency);
2. The project has a reasonable method identified for evaluating project effectiveness;
3. The project is technically feasible and viable;
4. The project is consistent with applicable existing laws and land-use regulations; and,
5. The project proponent and/or sponsor is able to meet any required funding match commitment.

4. SUMMARY OF SANTA CRUZ IRWM EFFORTS TO DATE

- In 2005, a Preliminary IRWMP was developed and a Proposition 50 IRWM grant proposal submitted to the Department of Water Resources and the State Water Resources Control Board, with the Community Foundation of Santa Cruz County (CFSCC) serving as applicant at the behest of the Partner Agencies.
- On June 1, 2006, the Partner Agencies entered into a Memorandum of Agreement (MOA) to establish an institutional framework to implement the IRWMP under the context of a single, regional grant agreement. The MOA describes the Partner Agencies' and CFSCC's responsibilities to fulfill the terms of the Prop 50 IRWM Implementation grant agreement. The term of the MOA expires December 31, 2010. Signatories to the 2006 MOA include:
 - Soquel Creek Water District
 - Scotts Valley Water District
 - County of Santa Cruz
 - Resource Conservation District of Santa Cruz County
 - Santa Cruz County Sanitation District
 - Davenport County Sanitation District
 - City of Santa Cruz
 - City of Watsonville
 - Watsonville Wetlands Watch
 - Community Foundation of Santa Cruz County

- In 2007, the SWRCB awarded a \$12.5 million grant to the CFSCC to fund the implementation of high priority IRMW projects in the region. In 2007, the CFSCC created a subsidiary organization, the RWMF, to support the IRWMP efforts and the Prop 50 administrative duties.
- In March 2008, the RWMF and the SWRCB executed the Prop 50 grant which established the term of the Grant Agreement effective as of July 1, 2007 with all work to be completed by March 31, 2011 and all funds requested prior to May 1, 2011. The RWMF entered into agreements with sub-grantee partner agencies for their respective components of the grant. It is anticipated that the grant agreement will be amended to extend the completion date by at minimum one year to accommodate current project completion dates.
- In June 2010, as part of the Santa Cruz IRWM Plan Update efforts the Region conducted an open solicitation for partners, affiliates, and stakeholders to submit planning and implementation projects for inclusion in the IRWMP.

5. PROPOSITION 50 IRWM IMPLEMENTATION GRANT

The June 2006 MOA and the March 2008 Prop 50 Partner Agency (sub-grantee) agreements define the responsibilities to fulfill the terms of the Prop 50 IRWM Grant agreement:

- 5.1 Under the terms of this MOA, the RWMF will continue to act as the grantee for the Prop 50 IRWM Implementation Grant and, in this capacity, continue to receive monies from the state, disburse funds to the participating Partner Agencies, and track local match contributions, in accordance with the terms of the SWRCB Grant Agreement and other agreements and procedures developed between the Partner Agencies and RWMF. The RWMF is authorized to enter into amendments of the grant agreement with the SWRCB, for the benefit of the partner agencies. The Partner Agencies will continue to complete approved projects on a reimbursable basis. The RWMF will submit monthly invoices to the state for reimbursement and, upon payment, will grant the funds back to the Partner Agencies.
- 5.2 The RWMF will continue, as grantee, to manage the integration and coordination of the Prop 50 Implementation Grant and provide day to day contract administration. The RWMF will act as the central "hub" for the grant, ensuring that all grant requirements are met, including reporting.
- 5.3 Partner Agencies will continue to use a designated project manager/point of contact for each project receiving funding from the grant. Project managers are responsible for executing the projects according to the schedule, budget and conditions identified in the grant agreement and coordinating with the RWMF IRWM Project Manager as needed.
- 5.4 Partner Agencies will provide project updates and invoices to the RWMF and the IRWMP Project Manager in a timely manner. At a minimum, it is anticipated that there

will be monthly progress reports and monthly invoices to the State for reimbursement for the life of the grant, which is currently anticipated to be from March 1, 2008 through May 1, 2012. Deliverables and measurements of success will be tracked via Project Assessment and Evaluation Plans for each individual project. Partner Agencies agree to keep records according to the terms of the grant agreement, and each agency's Project Manager will be responsible for timely submittal of all reporting requirements.

- 5.5 The signatories to this MOA recognize that the projects funded by the IRWMP grant are integrated and inter-related; therefore, the success of the whole rests on the successful implementation of each individual project.

6. FUTURE IRWM COLLABORATION AND NEW PARTNERSHIPS

As the IRWMP is expanded, and future collaborations develop, new agencies may join this partnership. The Steering Committee will serve a lead role in identifying and cultivating new partnerships. The Partner Agencies are committed to:

- 6.1 Establish and foster relationships with regional, state, and local governments, individuals, and other interested organizations to develop and implement management practices to preserve and protect Santa Cruz County water resources.
- a. Undertake cooperative research and resource management initiatives that are regional in scope and disseminate information resulting from these activities.
 - b. Produce and share relevant informational materials among the Partner Agencies.
 - c. Recommend to the respective governing boards actions necessary to successfully develop and implement the IRWMP.
- 6.2 All parties to this agreement wish to join in a common effort to develop and implement an IRWMP which shall include, but not be limited to establishing water quality, water supply, watershed stewardship, and stormwater and flood management objectives for the Santa Cruz IRWM Region.
- 6.3 As with IRWM efforts to date, the Partner Agencies will contribute the personnel and financial resources necessary to develop and implement the IRWMP proportional to their potential benefit.
- 6.4 As new partners elect to participate, they shall approve and execute this Memorandum of Agreement which establishes the understanding among participating agencies with regard to the purposes, development, and implementation of the Santa Cruz IRWMP.
- 6.5 In the event of future IRWM-related grant awards, sub-grantee agreements are anticipated to be developed that establish the specific roles and responsibilities of the grantee and sub-grantee based upon the terms and conditions of the grant award.

7. IRWMP AMENDMENTS, IRWMP FORMAL UPDATES, AND IRWMP PROJECT LIST UPDATES

The Santa Cruz IRWMP is intended to be a dynamic document that changes over time in response to changing conditions and priorities in order to remain current in identifying strategies to address the region's water resource needs. The updates also serve to keep the document up to date with the State's IRWM Plan Standards. These updates include interim updates for minor changes, formal updates for significant modifications, and updates to the IRWMP Project List.

- 7.1 Interim Amendments.** Interim or minor amendments to the IRWMP may include informal changes that reflect minor process or organizational changes that occur relatively frequently and do not necessitate a decision by the governing bodies of the Partner Agencies. The IRWM Steering Committee will provide guidance and coordination of amendments. A Partner Agency may present an amendment for consideration to the Steering Committee. The Partner Agencies will be informed of and provided opportunity for input on proposed interim amendments. The Steering Committee will ratify amendments by consensus. Interim amendments will be incorporated into the IRWMP during the next formal update.
- 7.2 Formal updates.** Formal updates will reflect any significant changes to IRWMP including processes, organizational structure and governance, water management conditions, or goals and objectives. An IRWMP update is a time and resource intensive undertaking. DWR encourages IRWM regions to formally review, revise, and adopt the IRWMP no less frequently than every five years. The Santa Cruz IRWM region will strive to adhere to this recommended update frequency. The IRWM Steering Committee will provide a leadership role in guiding and coordinating the formal IRWMP updates to ensure an inclusive and transparent decision-making process. Formal updates will include outreach efforts to partners, affiliates, and stakeholders, including disadvantaged communities, to ensure that interested entities have the opportunity to comment and participate in the IRWMP development and implementation. Following completion of the IRWMP update, it is expected that it will be approved and adopted by all participating partner agencies in accordance with section 8.4 of this MOA.
- 7.3 Project list updates.** The IRWMP includes a list of projects submitted by proponents, such as partner agencies or stakeholder organizations, which were evaluated and included based upon each project's anticipated contribution towards meeting the goals and objectives of the IRWMP. To ensure that the IRWMP is not a static document, but rather continues to be useful and reflects current priorities, the list of projects will be periodically updated as projects are completed and as new priorities arise. The Steering Committee is tasked with coordinating updates. The Steering Committee will conduct a review of the Project List no less frequently than every five years, and as needed, initiate and coordinate a publicly announced solicitation for projects. Projects may also be submitted for addition to the list during interim periods. Projects submitted will be vetted for eligibility by the Steering Committee; eligible projects will be added to the list of IRWMP Projects and incorporated into future IRWMP updates.

8. MUTUAL UNDERSTANDINGS

- 8.1 **Purpose of the MOA.** This MOA pertains to the joint efforts of the participating agencies in developing, implementing, and updating an IRWMP that will increase coordination, collaboration and communication in addressing the region's water resources issues. This MOA updates and continues the efforts initiated under the previous MOA for implementation of the Northern Santa Cruz County IRWMP, dated June 1, 2006.
- 8.2 **Subject matter scope of the IRWMP.** The IRWMP will include, but may not necessarily be limited to, water supply, water quality, wastewater, recycled water, water conservation, stormwater and flood management, watershed planning and habitat protection and restoration.
- 8.3 **Decision-making.** Consensus will be sought in decision making. The Steering Committee will provide a lead role in the decision making process and coordinating input from the participating agencies. As needed, the Steering Committee will ratify decisions by majority vote. Amendments resulting in material financial implications shall also be ratified by a majority of the Partner Agencies. Votes shall be recorded as one vote per partner agency.
- 8.4 **Approval of the IRWMP.** IRWMP approval and adoption will occur by the Partner Agencies by resolution adopted by each corresponding governing body.
- 8.5 **Non-binding nature.** This MOA and participation in this IRWMP effort are nonbinding, and in no way suggest that an agency may not continue its own planning and undertake efforts to secure project funding from any source. An agency may terminate their participation in the IRWMP effort by providing 60 calendar days written notice to all signatory parties.
- 8.6 **Personnel and financial resources.** It is expected that agencies and organizations will contribute the personnel and financial resources necessary to develop and implement the IRWMP.
- 8.7 **Reports and communications.** The Steering Committee will regularly report on IRWMP progress to the participating agencies and stakeholders. The Steering Committee serves the lead role in communicating to Partner Agencies. The SantaCruzIRWMP.org website will be used for disseminating news, reports and updates to the participating agencies and the public.
- 8.8 **Future awards.** In the event of future grant awards, it is expected that agreement(s) will be entered into by the applicable participating agencies that establish the terms and conditions applicable to the specific grant award.

8.9 **Term.** This MOA shall commence as of January 1, 2011 and shall continue until terminated by action of the Parties. This agreement shall be evaluated and reviewed no later than five years after its implementation, at which time, recommendations for improvements and modifications shall be considered by all parties. Any amendment or modification to this agreement shall be in writing, agreed upon by all signatories, executed by the duly authorized representatives of the parties hereto, and incorporated into this agreement by reference.


9. SIGNATORIES TO THE MEMORANDUM OF AGREEMENT

We, the undersigned representatives of our respective agencies, acknowledge the above as our understanding of how the Santa Cruz Integrated Regional Water Management Plan will be developed and implemented.


Each party has full power and authority to enter into and perform this MOA and the person signing this MOA on behalf of each party is authorized and empowered to enter into this MOA. Each party further acknowledges that it has read this MOA, understands it and agrees to it.


Soquel Creek Water District


Scotts Valley Water District


City of Santa Cruz


Resource Conservation District of Santa Cruz County


County of Santa Cruz

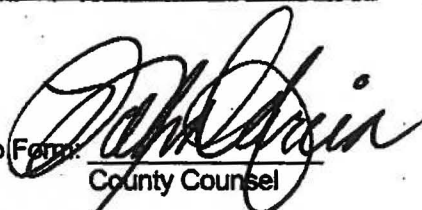

Santa Cruz County Sanitation District


Davenport County Sanitation District


City of Watsonville


Central Water District


Regional Water Management Foundation

Approved as to Form: 
County Counsel

APPENDIX B

IRWM ADOPTION RESOLUTIONS

ANTICIPATED DATES OF IRWM PLAN ADOPTION

Regional Water Management Group entity	Date of Adoption
County of Santa Cruz	8/19/2014
City of Santa Cruz	7/22/2014
Santa Cruz County Sanitation District	8/21/2014
Davenport Sanitation District	8/19/2014
City of Watsonville	8/26/2014
Resource Conservation District of Santa Cruz County	8/13/2014
Soquel Creek Water District	8/12/2014
Central Water District	8/19/2014
Scotts Valley Water District	8/14/2014
Regional Water Management Group	8/27/2014

Resolution No. _____

Board of Directors of the <<INSERT AGENCY>>

**Resolution Adopting the 2014 Update of the Santa Cruz
Integrated Regional Water Management Plan**

WHEREAS, California's electorate approved Proposition 84 on November 7, 2006, which contains a total of \$5.39 billion for water and natural resource projects and programs, including \$1 billion for the Integrated Regional Water Management (IRWM) Program, with \$52 million of that amount allocated to the Central Coast Funding Area; and

WHEREAS: the benefits of integrated regional planning for water resource management activities are intended to include multiple benefits, increased efficiency and effectiveness, enhanced collaboration across agencies and stakeholders, and improved responsiveness to regional needs and priorities; and

WHEREAS, the <<INSERT AGENCY>> is a Partner Agency in the Santa Cruz IRWM Regional Water Management Group and signatory to the 2010 Santa Cruz IRWM Memorandum of Agreement; and

WHEREAS, the Santa Cruz Region is an approved region as determined by California Department of Water Resources (DWR) in 2009 under DWR's Region Acceptance Process; and

WHEREAS, the original Santa Cruz IRWM Plan, developed and adopted under then-existing rules and guidelines, must be updated to comply with new rules and guidelines established by DWR in 2012 and to be eligible for future grant funding; and

WHEREAS, the updated IRWM Plan, developed under the direction of the Steering Committee and vetted through public workshops and meetings, is herewith presented for adoption by the <<INSERT AGENCY>> Board of Directors; and

WHEREAS, adoption of the updated Santa Cruz IRWM Plan does not entail a direct commitment of resources, and implementation of each project listed in the Santa Cruz IRWM Plan will be the responsibility of individual project proponents; and

WHEREAS, the adoption of the updated Santa Cruz IRWM Plan is exempt from the California Environmental Quality Act pursuant to CEQA Guidelines §15262 and §15306 because the Plan involves planning studies for possible actions that participating agencies have not yet approved and consists of basic data collection that would not result in the disturbance of any environmental resource; and

WHEREAS, the Santa Cruz IRWM Plan is meant to be complimentary to participating agencies' individual plans and programs and does not supersede such plans and programs, and adoption of the Santa Cruz IRWM Plan does it proscribe the participating agencies' planning efforts separate from the Santa Cruz IRWM Plan;

NOW THEREFORE, BE IT RESOLVED that the Board of Directors for <<INSERT AGENCY>> the does hereby adopt the updated Santa Cruz IRWM Plan.

The foregoing resolution was duly passed and adopted by the Board of Directors at a Board meeting held on this XXth day of MONTH, 2014 by the following vote:

Ayes:

Noes:

Absent:

Abstain:

Signed and approved by me after its passage this XXth day of MONTH, 2014.

NAME, TITLE
Board of Directors

ATTEST:

Name, Title

APPENDIX C

PROJECT TEMPLATE

SANTA CRUZ INTEGRATED REGIONAL WATER MANAGEMENT PLAN

PROJECT APPLICATION FORM

Section 1: Project Contacts and Abstract

PROJECT TITLE

THIS APPLICATION IS FOR A:

New Project

Update to a project submitted in 2009

Project Category

Planning

Implementation

PROJECT PROPONENT

Proponent Type:

Name

Title

Telephone

Email

Mailing Address

PROJECT PARTNERS

Functional Area

If multiple apply, select primary

Water Supply

Water Quality

Flood and Stormwater Management

Watershed Stewardship/Aquatic

Ecosystems

Located within IRWM Region

Location Details

Yes

No

SECTION 2 - PROJECT DETAILS

Eligible projects must yield multiple benefits and include one or more of the following elements (Public Resources Code §75026.(a))

ELIGIBLE PROJECT TYPES

- Water supply reliability, water conservation, and water use efficiency
- Stormwater capture, storage, clean-up, treatment, and management
- Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands
- Non-point source pollution reduction, management, and monitoring
- Groundwater recharge and management projects
- Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users
- Water banking, exchange, reclamation, and improvement of water quality
- Planning and implementation of multipurpose flood management programs
- Watershed protection and management
- Drinking water treatment and distribution
- Ecosystem and fisheries restoration and protection

Resource Management Strategies identified in the California Water Plan (waterplan.water.ca.gov). Please check all applicable.

Resource Management Strategies

Agricultural Water Use Efficiency
Urban Water Use Efficiency
Conveyance - Regional / local
System Reoperation
Water Transfers
Conjunctive Management & Groundwater Banking
Desalination
Precipitation Enhancement
Recycled Municipal Water
Surface Storage - Regional/Local
Drinking Water Treatment and Distribution
Groundwater Remediation / Aquifer Remediation
Matching Water Quality to Use
Pollution Prevention
Salt and Salinity Management
Urban Runoff Management
Agricultural Lands Stewardship
Economic Incentives (Loans, Grants, and Water Pricing)
Ecosystem Restoration
Forest Management
Land Use Planning and Management
Recharge Area Protection
Water-Dependent Recreation
Watershed Management
Flood Risk Management
Crop idling for water transfers
Irrigated land retirement
Dewvaporation or atmospheric pressure desalination
Rainfed agriculture
Fog collection

STATEWIDE PROGRAM PREFERENCES AND PRIORITIES

Include regional projects or programs

Effectively integrate water management programs and projects within a hydrologic region identified in the California Water Plan, the Regional Water Quality Control Board region or subdivision, or other region or sub-region specifically identified by DWR

Effectively resolve significant water-related conflicts within or between regions

Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program

Address critical water supply or water quality needs of DACs within the region

Effectively integrate water management with land use planning

Drought Preparedness

Water Use and Reuse Efficiency

Climate Change Response Actions

Practice Integrated Flood Management

Expand Environmental Stewardship

Protect Surface Water and Groundwater Quality

Improve Tribal Water and Natural Resources

Ensure Equitable Distribution of Benefits

SANTA CRUZ IRWM OBJECTIVES & PRIORITY STRATEGIES

Check all applicable high (H) and moderate (M) priority strategies

Objective 1: Ensure a reliable and sustainable local water supply through strategies that diversify the supply portfolio, develop production from alternative sources, protect and enhance surface and ground water, and maximize efficient delivery and use.

H - Develop or increase production from alternative sources

H - Increase production from existing resources

H - Implement system inerties

H - Construct and maintain groundwater recharge facilities

M - Update and/or replace aging water resource infrastructure

M - Remove impervious coverage in recharge zones

M - Implement Low Impact Development (LID) and/or LID redevelopment

Objective 2: Reduce per-capita water demand

- H - Implement tiered rates and/or conservation pricing
- H - Conduct education and/or outreach to increase use and effectiveness of conservation strategies
- H - Implement water neutral growth policies
- M - Implement temporary use restrictions
- M - Implement rebate and/or retrofit programs

Objective 3: Reduce the sources of pollutants and their impacts on aquatic resources

- H - Implement rural road improvements and maintenance
- H - Implement BMPs related to timber harvest activities
- H - Implement erosion control / sediment capture BMPs for row crops / vineyard / orchards
- H - Implement urban and agricultural fertilizer and irrigation management measures
- H - Conduct septic system upgrades and/or maintenance
- H - Conduct sewer system upgrades and/or maintenance
- H - Conduct private property sewer lateral upgrades and maintenance
- H - Relocate groundwater pumping from coastal zone to reduce potential for seawater intrusion
- H - Reduce groundwater extractions to address seawater intrusion
- H - Implement urban and agricultural irrigation management and water conservation programs
- M - Restore riparian zone to increase shading and ability to improve water quality
- M - Remove homeless encampments that impact riparian zones/aquatic resources
- M - Conduct effective street sweeping
- M - Clean and maintain sewer and storm drain infrastructure
- M - Create livestock exclusion areas in riparian zone
- M - Implement livestock waste management BMPs

Objective 4: Increase the habitat quality and quantity of critical aquatic ecosystems, including streams and wetlands.

- H - Reduce withdrawals and increase base flow to achieve streamflow targets
- H - Identify and eliminate illegal stream diversions
- H - Restore natural stream form and function
- H - Restore riparian zone through acquisitions or easements
- H - Reduce riparian encroachment
- H - Erosion and sediment control
- H - Restore lagoon /wetland structure and biotic habitat complexity
- M - Preserve or enhance LWD in streams and riparian zone
- M - Conduct non-native species removal
- M - Conduct native and/or beneficial revegetation
- M - Implement fish passage barrier removal or retrofit projects
- M - Promote natural sand bar function
- M - Conduct education / outreach / technical training programs
- M - Conduct volunteer stewardship program
- M - Support environmental education programs for schoolchildren
- M - Reduce illegal dumping

Objective 5: Implement integrated flood management strategies that reduce hazards and impacts from floods and, where feasible, provide multiple benefits.

- H - Utilize riparian zones for flood management through acquisition or easement
- H - Maintain and improve levee conditions for flood management and environmental quality
- H - Implement geomorphic modifications
- H - Increase channel width and floodplain function
- H - Reduce or eliminate constrictions
- H - Maintain storm drain conveyance efficiency
- H - Conduct infrastructure improvements and maintenance
- H - Reduce directly connected impervious area
- H - Implement low-impact development
- M - Conduct environmentally-sensitive vegetation management
- M - Conduct educational programs for stormwater management techniques and opportunities

Project Cost

Amount of Match Contribution

Source of Match

Local

Federal

In-Kind

Other

Undetermined

Certainty of Match

SECTION 3: NARRATIVE QUESTIONS

PROJECT NEED

PROJECT ALTERNATIVES

PERMITS, CEQA / NEPA

PROJECT DURATION

PROJECT STATUS

LAND USE

TECHNICAL FEASIBILITY

PROJECT BENEFITS

DISADVANTAGED COMMUNITY / TRIBAL / ENVIRONMENTAL JUSTICE

ECONOMIC FEASIBILITY

Please review Exhibit D of DWR's most recent Proposal Solicitation Package (PSP) (www.water.ca.gov/irwm/grants/docs/ImplementationGrants/Imp_PSP_Round2_2012_FINAL.pdf).

After reviewing Exhibit D, please indicate in the table below the extent to which projects have cost/benefit information and what additional support may be needed. Which benefit categories are addressed by the proposed project? (Please refer to Table 10 of PSP)

Economic Benefit Category

- Water Supply
- Water Quality
- Ecosystem Improvement
- Recreation and Public Access
- Power Cost Savings and Power Reduction
- Other

Please identify which of the following benefit types will result from project implementation, and for each, the manner in which those benefits can be described – qualitatively, quantitatively, or monetized.

Economic Benefit Type

	Qualitative	Quantitative	Monetized
Water Supply			
Water Quality			
Ecosystem Improvement			
Recreation and Public Access			
Power Cost Savings and Power Reduction			
Other			

Have alternative projects been considered to achieve the same types and amounts of benefits as the proposed project (yes/no)?

PROJECT ALTERNATIVES

Yes No

Has a cost/benefit analysis that would meet the requirements described in Exhibit D been completed (yes/no)?

COST / BENEFITS ANALYSIS STATUS

Yes No

If "No", can a Cost / Benefit Analysis be performed?

COST / BENEFITS ANALYSIS

Yes

Yes - but will need assistance

No

MONITORING AND PROJECT PERFORMANCE

Please describe the monitoring systems that will be used to collect data and other measures that will be used to evaluate project performance. Please describe measurement parameters (for example, additional acre feet of water supply, improved water supply reliability and flexibility, water quality measurements, measurement based estimates of pollution load reductions, acres of habitat successfully restored, feet of stream channel stabilized, groundwater level measurements, stream flow measurements, improved flood control, or other quantitative measures or indicators). Also discuss plans for adaptive management (i.e., mechanisms to adapt project operations based on performance data). (5,000 character limit)

MONITORING AND PROJECT PERFORMANCE

Climate Change Adaptation

- Increases water supply reliability
- Promotes conjunctive use, water exchange, or utilization of multiple water sources
- Increase water use / re-use efficiency
- Develops an alternative source of water supply
- Protects water quality
- Reduces water demand
- Facilitates increased recycled water production or use
- Promotes urban runoff retention or re-use
- Addresses sea level rise
- Improves flood management
- Promotes habitat protection
- Establishes migration corridors
- Promotes river to floodplain hydrologic connectivity
- Directly benefits anadromous fish populations
- Protects forests
- Protects wetlands
- Other

Climate Change Mitigation

- Increases water use efficiency
- Promotes energy-efficient demand reduction
- Improves energy efficiency of water treatment or delivery
- Advances or expands water recycling
- Promotes urban runoff reuse
- Promotes increased use of alternative energy sources over existing conditions
- Achieves carbon sequestration
- Other

As compared to existing conditions or project alternatives, will the project mitigate its contribution to climate change by reducing energy consumption or greenhouse gas emissions?